UNIVERSITY OF KWAZULU-NATAL

INYUVESI YAKWAZULU-NATALI

INSTITUTIONAL REPOSITORIES AS PLATFORMS FOR OPEN ACCESS IN SOUTH AFRICAN UNIVERSITIES: THE CASE OF UNIVERSITY OF KWAZULU-NATAL

By

Grace Mutsvunguma

BA Hons LIS (UNISA), MLIS (UKZN)

Thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy in the Information Studies Programme, School of Social Sciences, College of Humanities, University of KwaZulu-Natal, Pietermaritzburg, South Africa

2019

DECLARATION

I, **Grace Mutsvunguma**, declare that:

i) The research reported in this thesis, except where otherwise indicated, is my original work.

ii) This thesis has not been submitted for any degree or examination at any other university.

iii) This thesis does not contain other person's data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.

iv) This thesis does not contain other person's writing, unless specifically acknowledged as being sourced from other researchers. Where other sources have been quoted then:

    a. Their words have been re-written but the general information attributed to them has been referenced;

    b. Where their exact words have been used, their writing has been placed inside quotation marks, and referenced.

v) This thesis does not contain text, graphics or tables copied and pasted from the internet, unless specifically acknowledged, and the source being detailed in the thesis and in the reference sections.

(vi) This thesis does not contain text, graphics or tables copied and pasted from the internet, unless specifically acknowledged, and the sources being detailed in the dissertation and in the references sections.

Candidate: Grace Mutsvunguma

Signed: __ _____

Supervisor: Professor Ruth Geraldine Melonie Hoskins

Signed:

ACKNOWLEDGMENTS

DEDICATION

This thesis is dedicated to my late father, Walter Nhau Samuriwo. The words of encouragement you said ages ago, echo in my mind till this day. 'Work hard' was your motto, "Hard work never killed anyone", you would always say. Baba, this is yet another product of your child's hard work. Thank you for setting the ground rules, l will always remember them in every aspect of my life.

"All progress takes place outside the comfort zone"

Michael John Bobak

ABSTRACT

For a long time, academic libraries struggled to provide access to scholarly literature, including that which was produced by their own academic community due to paywalls. However, with the growth of internet technology that enables faster and free dissemination of information, universities are embracing institutional repositories (IR) because they are an economic means of sharing scholarship worldwide. This study examined the development, and extent of use of the repository by academics at the University of KwaZulu-Natal's (UKZN), so that strategies to improve usage could be recommended. This investigation grew after the realisation that access to scholarly literature has particularly been a major obstacle in Africa and the developing countries mainly because of tight library budgets. As repositories promote open access (OA) to scholarly literature within the global research community, it is viewed as Africa's solution to improved access to scholarly communication. Informed by the Unified Theory of Acceptance and Use of Technology (UTAUT) model, this study employed the mixed method paradigm, where quantitative data was collected from academics and qualitative data from interviews. Documents were reviewed to corroborate field data.

The findings revealed that the repository has consistently been growing in terms of size and diversity. The signing of the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities in 2012, the appointment of the IR Librarian in 2014 to manage IR duties, the draft OA policy, ongoing OA marketing and promotion activities and the availability of Information and Communication Technology (ICT) infrastructure were found as positive developments on the growth of the repository. Extent of use of the repository by academics was measured using UTAUT variables: performance expectancy, effort expectancy, social influence and facilitating conditions. Findings revealed that most academics believed that using the IR would benefit them but many of them had little to no knowledge about the university's IR and their role in developing it. There was a general lack of skills amongst academics on self-archiving. A majority of academics believed that it would be easy for them to use the repository, especially if high profile researchers in the field, fellow academics, the university and research funders were positively influencing them to use the repository. Findings on ICT infrastructure necessary to support self-archiving, showed that UKZN had adequate infrastructure in place but academics believed that facilitating conditions in the form rewards would encourage them to participate. Academics attitude on the IR was positive, but use was hindered by a lack of knowledge, fear of plagiarism, uncertainty of preservation and integrity of their work and the availability of other suitable platforms where they could share their work.

Strategies recommended to improve IR use at UKZN included implementing an OA mandatory policy, strengthening OA education and IR training programmes to improve academics awareness, devising a reward system to recognise academics that were self-archiving, taking advantage of social factors to influence academics into using the IR and concerted efforts from the government, research funders and universities on OA. The study concludes that there is potential to improve IR use at UKZN and to enhance the access and visibility of its scholarship to the global research community.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

AADP	Accelerated Academic Development Programme
ACHPR	African Charter on Human and Peoples' Rights
BOAI	Budapest Open Access Initiative
CARL	Canadian Association of Research Libraries
CPD	Carnegie Continuing Professional Development
CPUT	Cape Peninsula University of Technology
CUT	Central University of Technology
DHET	Department of Higher Education and Technology
DISA	Director of Digital Imaging South Africa
DTPB	Decomposed Theory of Planned Behaviour
DUT	Durban University of Technology
DVC	Deputy Vice-Chancellor
EU	European Union
HEFCE	Higher Education Funding Council for England
ICS	Information and Communication Services
ICT	Information and Communications Technology
IDT	Innovation Diffusion Theory
IP	Intellectual Property
IR	Institutional Repository
IT	Information Technology
KPA	Key Performance Areas
LIS	Library and Information Studies
MAPS	Model of Acceptance with Peer Support
MIT	Massachusetts Institute of Technology
MUCCoBS	Moshi University College of Cooperative and Business Studies
MWUCE	Mwenge University College of Education
nGAP	New Generation of Academics Programme
NIH	National Institutes of Health
NRF	National Research Foundation
NSF	National Science Foundation
OA	Open Access

OAI	Open Archives Initiative
OAIR	Open Access Institutional Repository
OJS	Open Journal Systems
OpenDOAR	Directory of Open Access Repositories
OSI	Open Society Institute
PAIA	Promotion of Access to Information Act
PMH	Protocol for Metadata Harvesting
ROAR	Registry of Open Access Repositories
ROARMAP	Registry of Open Access Repository Mandates and Policies
RoMEO	Rights MEtadata for Open archiving
SA	South Africa
SADC	Southern African Development Community
SCT	Social Cognitive Theory
SHERPA	Securing a Hybrid Environment for Research Preservation and Access
SPSS	Statistical Package for Social Science
TAM	Technology Acceptance Model
TAM2	Technology Acceptance Model 2
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UCT	University of Cape Town
UFS	University of Free State
UJ	University of Johannesburg
UK	United Kingdom
UKZN	University of KwaZulu-Natal
UN	United Nations
UNISA	University of South Africa
UP	University of Pretoria
USA	United States of America
UTAUT	Unified Theory of Acceptance and Use of Technology
UWC	University of Western Cape
WIPO	World Intellectual Property Organisation
WWIS	World Wide Information Services

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

Access to scholarly literature has particularly been a major obstacle in Africa and the developing countries mainly because of tight library budgets. Shearer (2004:1) consented that the high costs of academic literature is one of the significant access barriers to scholars in developing countries, apart from lack of computers and internet connectivity. Today, Open Access (OA) has emerged and is trending as a new way of publishing scholarly communication since traditional journals, whose subscription, being based on the business model, discourages the circulation of scientific knowledge (Bernius et al. 2009:1). As OA holds the potential of disclosing knowledge that has been kept hidden to institutions worldwide, universities are embracing OA to become an integral part of the infrastructure for supporting and advancing scholarly research (Willinsky 2006:33). Universities are investing in the development of Open Access Institutional Repository (OAIR) networks to speed up the availability of information (Shearer, Haigh and Whitehead 2015:1).

Institutional Repositories (IRs) complement the existing scholarly publishing model by making scholarly literature publicly available on the internet for free. They have presented a welcome opportunity to access the once inaccessible research literature, and at the same time, collecting, showcasing and preserving a university's intellectual and scholarly output. Various authors (Lor and Britz 2007; Raju, Raju and Claassen 2015; Okemwa 2016) have upheld the fact that successful implementation of IRs has the capacity to revolutionalise African scholarship. However, IRs have not received adequate attention and appreciation in universities, including the University of KwaZulu-Natal (UKZN). The purpose of this study therefore, was to examine the development of the UKZN's IR and investigate the extent of use by academics as the prime users. The term 'use' is a concept applied in this study to refer mostly to 'depositing' scholarly work in the IR rather than to indicate the actual utilisation of such content for teaching and research purposes.

UKZN has a strong research base with over 80% of academics actively involved in research (UKZN Research Report 2016:5). Academics play a pivotal role in the development of the IR as they are responsible for either depositing or making their research output available for self-archiving. Besides, as supervisors of Masters and Doctoral students, they ensure that, upon completion, their postgraduate students submit electronic versions of their theses for uploading on the IR. Should all research scholarship be harnessed into the IR, access to scholarly content would be greatly improved, with minimal financial resources incurred. Hence, this study aimed at examining IR development and extent of use of the repository at UKZN, so that strategies to improve usage can be recommended and access to scholarly literature improved.

This chapter provides a background on the development of IRs and further describes the contextual setting of the study. The statement of the problem is formulated based on the background information. The chapter provides the aim of the study, research objectives, research questions, scope and delimitations, as well as the significance of the study. An overview of the theoretical framework, research design and methods adopted by the study is provided. Key terms used in this study are defined, and finally, the structure of the thesis is presented.

1.2 Context of the study

Universities have played a pivotal role in the production of scholarly communication from their scholars, researchers and academic staff. In terms of content, universities produce theses and dissertations, teaching materials, peer-reviewed articles, pre-prints, conference papers, monographs, datasets and a lot of grey literature (Crow 2002:4). IRs have tremendously improved access to these content types and institutions are embracing this option to improve the visibility of their research. In developed countries, as early as 2005, IRs were already becoming established infrastructure components for universities (van Westrienen and Lynch 2005:12). Lynch and Lippincott (2005:10) reported that IRs in Europe and North America "were being positioned decisively as general-purpose infrastructure within the context of changing scholarly practice, in e-research and cyber infrastructure and in visions of the university in the digital age". In 2009, between 34% and 47% of universities in Europe had developed IRs that were compliant with the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) (van der Graaf 2009:29). Currently, as shown in Figure 1.1, Europe alone has 45% of the total IRs recorded in the Directory of Open Access Repositories

(OpenDOAR 2017). Over 80% of the total repositories recorded in the database are from Europe, Asia and North America. The majority of these repositories are hosted by universities and research institutions.
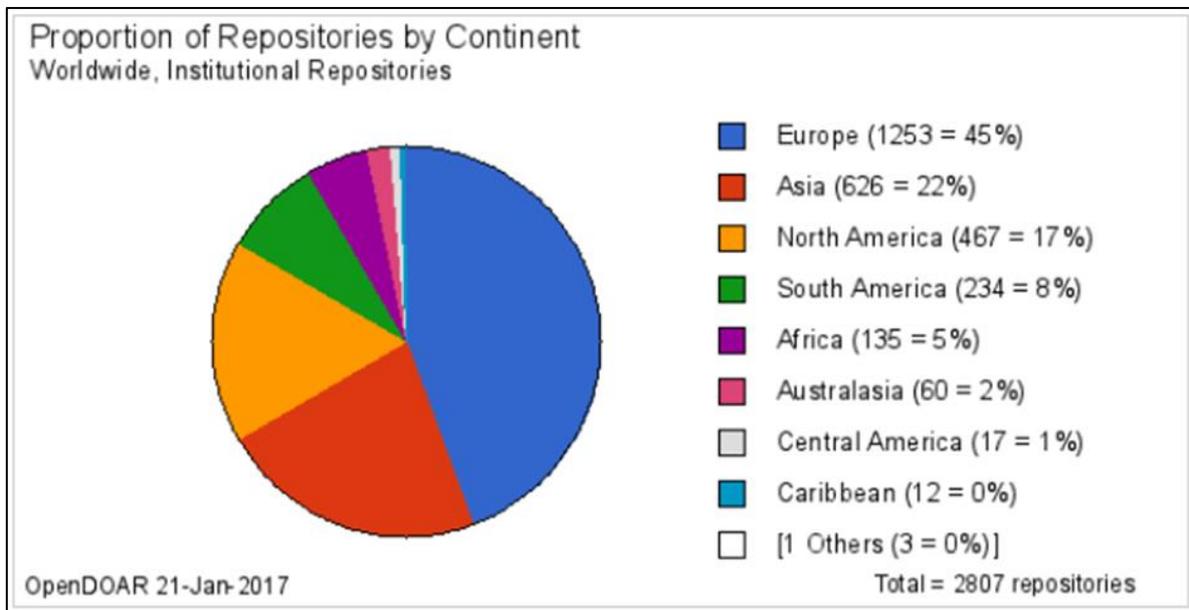
Figure 1.1: Institutional repositories by continent
Source: OpenDOAR (2017)

The development of repositories in Africa and the rest of the developing countries came at a later stage. During the First International Conference on African Digital Libraries and Archives held in Ethiopia in 2009, Felix Ubogu presented a paper on IR and OA initiatives in Africa, where he reported that institutions in Africa started collaborating to develop IRs around the year 2009 (Ubogu 2009). Regrettably, universities in Africa joined the OA movement with "little to no experience in the evolutionary process" (Kimengsi et al. 2016:6). The use of technologies was participatory in nature, making use of what was already designed by the developed world. Consequently, only 2% of IRs were developed in African universities by 2012 and about 4.3% in 2015 (Onyancha 2016:2). As of 2017, OpenDOAR statistics showed that about 5% (135) of repositories were recorded from 21 African countries (OpenDOAR 2017). The accuracy of these statistics is somewhat questionable as some of the IRs in developing countries are not recorded on OpenDOAR (Onyancha 2016:3). Thus, it would not be sufficient to reach conclusions based on the data extracted from OpenDOAR only.

Despite its late ingress, Africa and the developing countries face challenges in setting up viable repositories. Unavailability of sustainable Information and Communications Technology (ICT) infrastructure, lack of awareness and understanding of OA and IRs, inadequate skills of librarians in the development of the IR, lack of policies, lack of coordination between libraries, limited knowledge about copyright issues and lack of funding, are some of the obstacles hindering the success of IRs (Chiware 2007; Ezema 2013; Swan, Willmers and King 2014). Thus, there has been a slow response to the adoption of IRs in Africa and other developing countries when compared with Europe and the developed countries (Ezema and Onyancha 2016:2).

As shown in Figure 1.2, South Africa is the leading country in the region in terms of OA adoption with IRs that constitute 21.5%. Other countries that have made significant progress include Kenya with 17.8%, and Nigeria with 14.1% (OpenDOAR 2017). Besides, studies have revealed the successful adoption of OA practices by South African universities compared with other universities in Africa (Dulle 2010; Ezema 2013; van Wyk and Mostert 2014; Raju, Raju and Claassen 2015, Tapfuma 2016).
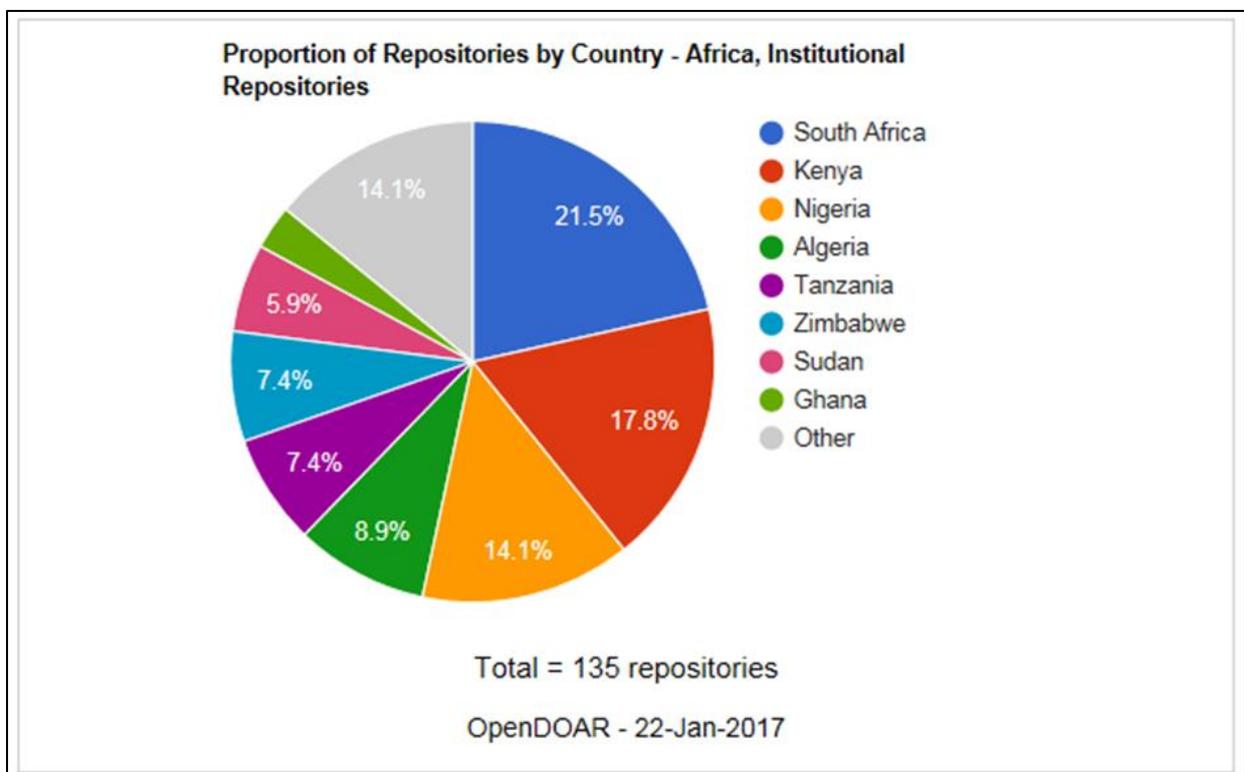
Figure 1.2: Institutional repositories by country in Africa

Source: OpenDOAR – Repositories by country, Africa (2017)

1.3 Contextual setting

After the consolidation of the Universities of Durban-Westville and Natal into UKZN, it became a prerequisite for UKZN libraries to develop strategies to support postgraduate, and specifically, the 'research intensive' university needs emanating from the merger (UKZN Library Newsletter 2007:1). In order to support the research function, it was deemed necessary to pursue digital online access to library resources. The idea of developing an IR was triggered by Dr Dale Peters, the Director of Digital Imaging South Africa (DISA) project, who presented a lecture entitled 'Digital preservation: Development of digital libraries in South Africa' to UKZN librarians (UKZN Library Newsletter 2007:2). The importance of digitisation for preservation and access was discussed, highlighting the need for libraries to consider providing online access to resources like "the entire journal article or thesis" (UKZN Library Newsletter 2007:2). It was after this lecture that librarians were challenged to conduct a pilot project on digitisation.

At the beginning of 2008, UKZN Library shared its vision of developing an IR that would initially make available online theses and dissertations in line with the trends and initiatives of improving online access to resources (UKZN Library Newsletter 2008:4). With this vision, UKZN Library sent two librarians to attend a programme, 'Developing Information Technology Capacity in Higher Education in South Africa,' held at Nelson Mandela Metropolitan University. Librarians from academic libraries of higher education in South Africa met to discuss and share ideas on information technology (IT) related issues. During this meeting, matters regarding content to be loaded on IRs, document format, copyright, policies, marketing of the IR, lack of acceptance by academics and their concerns, and open source versus licensed software were discussed (UKZN Library Newsletter 2008:4). In another initiative, in May 2009, three subject librarians attended a conference on African Digital Scholarship and Curation, and a workshop on setting up an IR using the DSpace open source software (UKZN Library Review 2009:1).

After a series of crucial knowledge gathering exercises, UKZN Library, with the full support of the then Deputy Vice-Chancellor (DVC) Research, Professor Nelson Ijumba, designed and implemented an IR project plan (UKZN Library Review 2009:1). On 23 September 2009, the university's IR – ResearchSpace, with the address http://dspace2.ukzn.ac.za:8080/jspui/ was launched during a Learning and Teaching Conference at the university's Edgewood campus; fulfilling the university's mission of "being a hub for the dissemination of African Scholarship"

(UKZN Research Report 2009:6). The IR became operational in October 2009, with only a handful of theses and dissertations.

An extensive two-year project to digitise all past Masters and Doctoral theses held in the campus libraries of UKZN's former Universities of Durban-Westville and Natal, was planned. UKZN was the first university in South Africa to embark on a complete retrospective theses digitisation project of this nature (UKZN Library News: ResearchSpace goes to Senate 2010). The project began in 2010, starting with the scanning of older Masters and Doctoral theses. An estimated figure of R1 million was sourced in 2010 for the digitisation project (UKZN Library Review 2010:2). As a commitment to this assignment, a project manager was appointed in 2011 to plan the digitisation project, identify financial and human resources needs for the project, establish standards for access and preservation, as well as manage the digitisation process (UKZN Library News: New Digital Manager 2011). A high resolution scanner was purchased and DISA was engaged with the scanning at the E. G. Malherbe Library on the Howard College Campus (UKZN Research Report 2010:6).

In November 2010, The Library Director, together with a team of librarians, attended a senate meeting held at Westville campus to promote and market the IR (UKZN Library News: ResearchSpace goes to Senate 2010). The team brought awareness of the existence of the university's IR and further responded to a variety of questions posed by academics on copyright, patents and Intellectual Property (IP) rights. At this time, the IR had about 1,551 full-text theses and dissertations available through the address: http://researchspace.ukzn.ac.za (UKZN Library News: ResearchSpace goes to Senate 2010). By 31 December 2010, about 2,472 theses had been scanned and loaded on the repository (UKZN Library Review 2010:2). As of 2011, full-text theses and dissertations of graduating students were loaded as soon as they were received by the library but a number of students struggled to convert their theses into acceptable digital format (UKZN Library Review 2011:8).

As the size of the repository was growing, glitches were encountered at the beginning of 2011 which called for an upgrade of the ResearchSpace. During the upgrade, a temporary address for accessing the IR, http://researchspace.ukzn.ac.za:8080/xmlui, was provided to users (UKZN Library News: Where has ResearchSpace gone 2011). The usage of the IR was low during this period but it immediately increased in July after the upgrade. A series of presentations were conducted to market the repository to postgraduate students and staff. The

library and the university's ICT division collaborated to raise an awareness of OA and the university's ResearchSpace during the 2011 Open Access Week (UKZN Library Review 2011:15). This increased visibility and usage of the repository, with Google analytics showing international, regional and mostly local visits to the website (UKZN Library Review 2011:8). For this achievement, the library was awarded a positive review by the UKZN Quality Promotion and Assurance Unit (UKZN Research Report 2011:6). The number of theses increased significantly on the ResearchSpace from 2,472 in 2010 to about 4,901 in December 2011 (UKZN Research Report 2011:6).

However, a number of challenges were faced that prolonged the digitisation project. Although the estimated time frame to complete the digitisation project was December 2011, by June 2011, about 10,000 theses were still awaiting scanning due to scanning and staff challenges (UKZN Library Review 2012:7-8). By the end of 2012, an estimated total of 2,250 theses were still to be digitised. The last recorded projected date of completing the retrospective digitisation project was June 2014 (UKZN Library Review 2013:2). At the same time, several efforts were made to encourage academics to load their research articles on the IR, but uptake of the idea was very slow. Thus, the library complained that it was a challenge convincing researchers to upload their research on the IR (UKZN Library Review 2012:3). By the end of 2013, slight improvements in deposits were noted. The IR had 9,045 items; 8,659 theses, 366 research articles, 16 Masters research reports and four book chapters (UKZN Library Review 2013:5).

A remarkable achievement was the signing of the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities on the 22nd of October 2012 by the then Vice-Chancellor, Professor M.W. Makgoba, on behalf of UKZN (UKZN Library Review 2012:1). The declaration promotes OA to scientific knowledge and cultural heritage and invites universities, research institutions, libraries and other institutions that share the same vision to join the initiative by signing the declaration. In signing this declaration, UKZN agreed:

- To encourage UKZN researchers to make their materials available in OA (through self-archiving in OA repositories or publishing in OA journals);
- To develop ways to evaluate OA contributions to maintain the standards of quality assurance and good scientific practice;
- To advocate that OA publications be recognised in promotion and tenure evaluation; and lastly,

- To advocate the intrinsic merit of contributions to an OA infrastructure (UKZN Library Review 2012:1-2).

As a signatory of the Berlin Declaration, UKZN received a certificate on the 8th of November 2012 during the Berlin10 Open Access Conference hosted in Cape Town (UKZN Library News: UKZN receives certificate at Berlin10 Open Access Conference 2012).

ResearchSpace marketing and promotion events organised by the library continued to take place within the institution for the purposes of improving acceptance by academics and researchers. Among other events, The International Open Access Week of 22nd to 28th October 2012 and another on 19th to 20th October 2015 were celebrated. In addition, the ResearchSpace LibGuide detailing what content can be loaded on the IR was introduced in 2013 (UKZN Library Review 2013:5). A downloadable step-by-step submission guide to assist researchers with loading their work on the IR was also made available on the LibGuide. Links to SHERPA/ROMEO and SHERPA/JULIET databases, where researchers can check publisher archiving policies and funder policies and requirements on OA respectively, have also been provided on the IR page. Overall, the library offered numerous support initiatives to the academics to promote the development of the IR.

Recently in June 2018, there were 13,585 items loaded on the UKZN IR (OpenDOAR 2018). As highlighted earlier, the figures change every day as new content loaded to the repository. Apart from the theses and dissertations, which form the bulk of the content, book chapters, journal articles, presentations, working papers and technical reports are some of the content types loaded on the IR as depicted in Figure 1.3. On the other hand, as of 11 September 2017, a total of 159 508,14 were recorded for 2016 productivity units (UKZN Research Report 2016:9). This shows that a huge portion of the research output produced by the university is not being deposited into the IR.
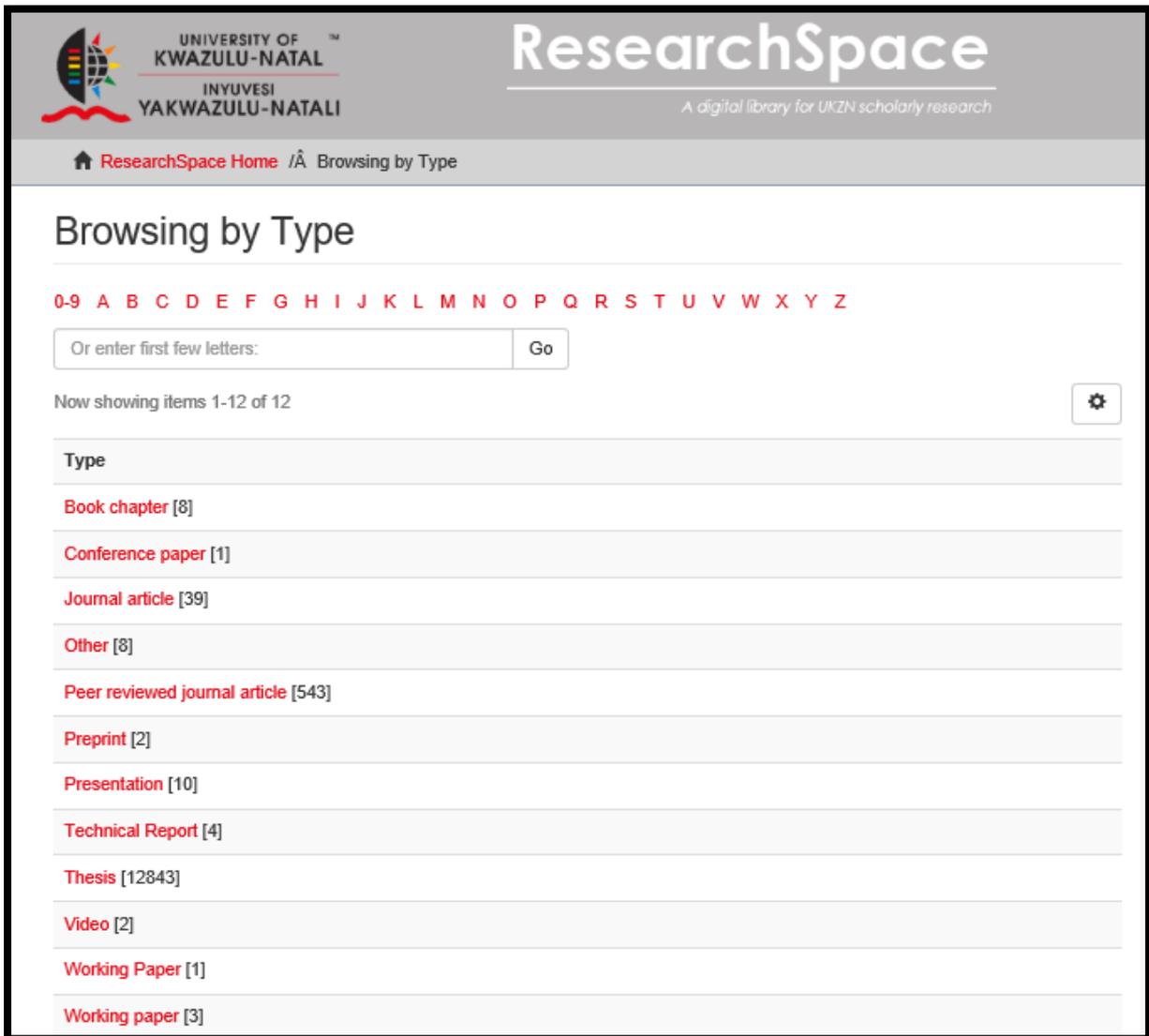
Figure 1.3: UKZN Institutional Repository

UKZN ResearchSpace: Browse by content type (2018)

1.4 Statement of the problem

UKZN is a research-leading institution that has produced a significant research output when compared with other South African higher education institutions. For three years running, UKZN was ranked the top university in South Africa in terms of research productivity output (UKZN Annual Report 2015:67). However, librarians have complained that much of this research output has not found its way through to the IR as reflected in Figure 1.3, challenging the extent of use by academics. UKZN Library Review (2012: 2) clearly stated that the challenge of encouraging UKZN researchers to make their own research available on the UKZN IR remained. Besides, the Ranking Web of Repositories (2017), a website that promotes

OA by quantitatively measuring the global visibility and impact of an institution's scholarly communication online, indicated that UKZN's IR was ranked low compared to similar research-intensive universities like University of Pretoria (UP), Stellenbosch University, University of Cape Town (UCT) and University of the Witwatersrand, which were ranked in the top five; whereas UKZN was ranked number 19. This reflects an imbalance in that the research output is high yet visibility through OA is very low, especially when compared with the other research-intensive universities in South Africa. Research-intensive institutions are expected to take the lead in OA publishing compared with other institutions in the country (Raju, Raju and Claassen 2015:267).

As scholarly visibility is the main aim of an established IR, it is anticipated that UKZN, being one of the top ranking universities in South Africa, will pioneer the IR initiatives and pave the way for the African continent. Instead, it is lagging behind in terms of making its scholarly communication available on its OA repository. This negates the advantages of having an OAIR and affects the visibility and availability of valuable African research. However, the reasons behind UKZN academics low participation in self-archiving their scholarly content on the university's IR are not known. This study was therefore designed to examine the developments of the UKZN IR and investigate the degree to which academics were using it. The outcomes of the study are expected to help in developing strategies that will improve and promote use by academics and ultimately grow the repository at UKZN. Universities in South Africa, and those in Africa, will also benefit from the results of this study as repositories are still emerging and best practices still to be established.

1.5 Aim of the study

The aim of this study was to investigate the development, and to determine the extent of use of the repository by academics at UKZN. The outcome of the study is expected to help universities in South Africa, and particularly UKZN to make informed decisions on how to improve repository use.

1.6 Objectives of the study

Two specific objectives of the study were drawn:

1. To examine the development of the institutional repository at the University of KwaZulu-Natal.

2. To investigate the extent of use of the institutional repository by academics at the University of KwaZulu-Natal.

Given the two objectives, the study adopted the following research questions:

1.7 Research questions

1. What developments have been made towards the growth of the university's IR?
2. What are the roles of the library in developing the IR?
3. To what extent are the academics using the university's IR?
4. What is the academic's attitude towards self-archiving?
5. What challenges are hindering IR use at UKZN?
6. What strategies can be employed to improve acceptance and use of the IR at UKZN?

1.8 Scope and delimitations of the study

Nineteen South African universities have repositories recorded on OpenDOAR (2017) but this study focuses on UKZN. The limitation of this study to UKZN, and not all universities with IRs in South Africa, was necessary to ensure an in-depth analysis of IR development and academics' behaviour associated with self-archiving within this particular environment. OpenDOAR (2017) shows that UKZN has two repositories: DISA and ResearchSpace. ResearchSpace is an IR that provides OA to the university community's research output while the DISA is a disciplinary repository that provides access to scholarly resources on the socio-political history of South Africa. This study focuses on the university's IR, ResearchSpace. Finally, this study focuses specifically on OA repositories. Other OA initiatives, such as OA journals, may be highlighted in the study but will not be discussed in detail.

1.9 Justification and significance of the study

This study investigates IR use by academics at UKZN and assesses the development that has been achieved since its launch. Unlike other research-intensive universities such as UP, UCT and University of Stellenbosch, UKZN has deposited very little content on its IR, implying that academics have not fully embraced OA and the use of the IR. This study therefore, hopes to significantly benefit the UKZN library, which is the custodian of the repository, in understanding the reasons behind academics' low participation in self-archiving. In addition, this study will provide strategies for promoting IR use, which, if implemented, can improve academics interest in depositing their scholarly work on the IR. Furthermore, results of this

study will benefit other universities in South Africa and those within the African region who are struggling to develop viable repositories. Overall, results of this study will help promote OA and IR use within various institutions, particularly in Africa where access to scholarly communication has been a major obstacle.

Detailed research on IR use, addressing behavioural factors that affect an individual's willingness to adopt or reject a new system in South African universities, could not be established. Related studies have focused on the implementation of IRs in some universities in South Africa (Macha and De Jager 2011; Raju et al. 2012; van Wyk and Mostert 2014), with no attempt to assess IR use and adoption by academics. Furthermore, most OA practices have been documented in the form of presentations (Matizirofa and Zaaiman 2011; Peters 2011; van der Westhuizen 2012; Claassen 2015), where information is often compressed and in point form. This study examines in depth IR use by academics at UKZN. By exploring a single entity, detailed data gathered will give more accurate results, and ultimately inform in the making of right decisions.

Finally, OA is currently a hot topic in academic libraries in Africa and a number of researchers in the region have shown interest in evaluating IR use in universities (Dulle 2010; Ezema and Okafor 2015; Tapfuma 2016; Ratanya 2017). Research of a similar nature could not be established at the time of this study, hence the knowledge gap in the use of IRs in South Africa is what this study intends to fill. Considering that South African universities are recognised as the highest producers of research output in the region (Ranking Web of Universities 2017), it becomes important to determine possibilities of sharing through repositories. The concept of sharing was advocated by Raju, Raju and Claassen (2015:5) who expressed that, "South Africa should take the lead in sharing its research output with the rest of the continent, and ensure that its research output is as accessible as possible to the widest African audience". Results of this study, together with a literature review of IR use in South African universities, will help determine the progress made so far in advancing the sharing of scholarly content.

1.10 Theoretical framework of the study

Resistance towards the use of modern technology in accessing information is strong. Technology acceptance models have been developed in an effort to understand how people accept and adapt to technology. The main objectives of many technology acceptance studies

are to investigate how to promote usage and to explain what hinders the acceptance and usage of technologies (Kripanont 2007:45). Systems are evaluated to "predict acceptability, to diagnose reasons resulting in lack of acceptance and to take proper measures to improve acceptance" (Shroff, Deneen and Ng 2011:601 cited Davis 1989).

There are nine prominent technology acceptance theories or models, namely: The Innovation Diffusion Theory (IDT), Social Cognitive Theory (SCT), Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Decomposed Theory of Planned Behaviour (DTPB), Technology Acceptance Model (TAM), Technology Acceptance Model 2 (TAM2), Combined TAM and TPB (C-TAM-TPB), and The Unified Theory of Acceptance and Use of Technology (UTAUT). While a number of studies have focused on these theories to inform their studies, some studies have proved the applicability of other theories, such as the Attribution Theory and the Model of Acceptance with Peer Support (MAPS), in evaluating individual's behavioural intention to adopt a technology. However, UTAUT has proven to be the most powerful model to predict and explain the intention to use an information system. Developed by Venkatesh, Morris, Davis and Davis (2003), UTAUT is a recent model formulated through the integration of all the other eight information technology models. The eight models of the determinants of intention and usage of information technology were compared, and the conceptual and empirical similarities of the models were used to formulate UTAUT (Venkatesh et al. 2003). Thus, UTAUT provides a more comprehensive and unified model of user acceptance of IT usage behaviour (Venkatesh et al. 2003). On account of this, UTAUT is used in this study to inform on the extent of use of the IR by academics at UKZN.

1.11 Research design and methods

This study followed the pragmatist paradigm, which places the research problem as central, and applies all approaches to understanding the problem (Creswell 2014:11). The pragmatic paradigm implies that the overall approach to research is that of mixing data collection methods and data analysis procedures within the research process (Creswell 2014:11). The mixed method approach uses 'what works' tactics to allow the researcher to address questions that do not sit comfortably within a wholly quantitative or qualitative approach. The study adopted a case study research design, which aims at in-depth research, exploring all possible methods to address the study's research questions. For this reason, the researcher is not constrained by the prescriptive nature of positivism and constructivism, but has the flexibility of selecting

methods, techniques and procedures of research that will help address the research problem. Thus, quantitative and qualitative data collection methods and data analysis procedures were employed to allow the researcher to investigate the research problem using the best methods. By mixing methods, the researcher believed that, "the quality of a study can be improved when the biases, limitations, and weaknesses of a method following an approach counterbalance each other" (Fidel 2008:265).

1.11.1 Population of the study

The population of this study included UKZN academics, drawn from the five campuses namely: Westville, Howard, Medical School, Edgewood and Pietermaritzburg. Academics were considered the prime determinants of OA, specifically in terms of dissemination of scholarly content. The study population was limited to professors, senior lecturers and lecturers. Emeritus and honourary appointees, as well as tutors, were not included in the study to allow the researcher to work with academics who were easy of reach. Details on the population sampling methods are discussed in Chapter Four. The study did not include postgraduate or undergraduate users of the IR as they are not the primary users mandated to submit research output on the IR. Management officials, which include the DVC Research and the Library Director participated in this study as individuals responsible for making decisions that impact on the development of the university's IR. Lastly, the IR Librarian was involved as the person responsible for managing and administering the IR.

1.11.2 Data collection instruments

Self-administered questionnaires, documents and semi-structured interviews were used to collect data. The questionnaire was chosen because it is easy to administer to large numbers of people in a relatively short period and is thus less expensive and less time consuming (Gray 2009:211). Questionnaires were designed to gather data from academics. Interviews were conducted with the DVC Research, Library Director and IR Librarian. The interviews were conducted telephonically and were recorded. Although interviews can be long and time consuming, they are an effective way of gathering detailed information, both verbal and non-verbal. Documents, such as policies, annual reports, library newsletters, library annual reviews and other documented literature addressing the research problem, were reviewed. Bibliometric databases were used to provide statistical figures for OA IRs. Secondary sources were used to obtain the worldview of IRs and general developments in OA.

1.11.3 Data analysis

This study employed the use of descriptive statistics to analyse the questionnaires. Data was coded and analysed using Google forms as well as the Statistical Package for Social Science (SPSS). For the quantitative data, the descriptive statistics adopted in this study employed measures such as frequency distributions, measures of central tendency, dispersion or variability and measures of relationship (Brink, van der Walt and van Rensburg 2006:172). Thematic content analysis was used to analyse the qualitative data obtained through open-ended questionnaire questions, the interviews and document reviews. Themes were structured around the research questions. The results of the analysed data were presented in the form of tables, figures, charts and verbal descriptions.

1.12 Definition of key terms

This section contextually defines some of the key terms that were used in this study. These include the following:

Academics

In the context of this study, academics are those lecturers who are involved in research and publishing, as well as supervision of masters and doctoral students.

Grey literature

All material and research products "that have not undergone the formal publishing process [not listed and not priced] and are normally difficult to trace, especially if not available online" (American Library Association 1993:1357). In the context of this study, grey literature includes unpublished material such as theses and dissertations, reports, workshop and conference papers and so forth, produced by academics, researchers and the university students as defined by Crow (2002:4).

Institutional repositories

IRs are digital collections capturing and preserving the intellectual output of a single or multi-university communities, generated by the institution's students, academics, non-academic researchers and staff (Crow 2002:4). The intellectual output may include:

"pre-prints and other work-in-progress, peer-reviewed articles, monographs, enduring teaching materials, data sets and other ancillary research materials, conference papers, electronic theses and dissertations, and grey literature" (Crow 2002:4).

Ideal IRs allow users to have easy access to data for ease of retrieval; enable users to interpret and understand the data; and lastly, allow users to be able to do all this permanently (Jones, Andrew and MacColl 2006:77 cited Wheatley 2004).

Open access

As stated by the Bethesda Statement (Suber et al. 2003), OA allows users to "copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship". OA is basically about giving users the freedom to retrieve scholarly publications online by removing financial barriers associated with the resource.

Research-intensive universities

Research-intensive universities are institutions directly related to their point of reference, which is research. Their goal is to produce high quality research, but they are also educational institutions involved in teaching. They focus on coordinating and integrating research and teaching functions, and their financial expenditure is high on research and development (Elen and Verburgh 2008:78).

Scholarly communication

Scholarly communication is the process through which formal and non-formal writings of an institution are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use (Association of College and Research Libraries: Principles and Strategies for the Reform of Scholarly Communication 2006). The process is concerned with sharing research findings with the wider academic global community.

Detailed definitions of some terms were provided in the body of the work, wherever it was deemed necessary.

1.13 Ethical considerations

The ethical clearance was granted by UKZN before the research was conducted. Participants of the study were asked to sign consent forms. The purpose and objectives of the study were explained to all the respondents so as to get their consent before the commencement of the study. Participants were informed that participation was voluntary. Anonymity of respondents and confidentiality of responses were maintained. The researcher observed UKZN's research ethical guidelines, including that of appropriately citing all references used in the study.

1.14 Structure of the thesis

The study comprises of seven chapters. Each chapter begins with an introduction and concludes with a summary. The structure of the thesis is as follows:

Chapter 1:   Introduction and background of the study

This chapter provides background information on OA and the emergence of IRs before stating the problem of the study. The chapter presents the problem statement, the aim and objectives of the study, research questions, the scope and limitations of the study, significance of the study, theoretical framework underpinning the study, the research design and methods, definition of key concepts, a brief outline of the research design, ethical considerations and the thesis structure.

Chapter 2:   Theoretical framework

This chapter discusses at length the UTAUT model and its relevance to this study. Other theories of technology acceptance are also discussed.

Chapter 3:   Literature review

The purpose of the review is to position the study within similar works as well as explore the available knowledge in the study discipline. This chapter reviews literature on the importance of OA scholarly publishing as well as the development of IRs in universities.

Chapter 4:   Research methodology

This chapter discusses the research methodology and methods used for the study. It identifies the population of the study, the sampling procedure, data collection methods, and the procedure for data analysis and presentation.

Chapter 5:   Presentation and interpretation of the findings

Data gathered from questionnaires, interviews and documents are presented and interpreted in this chapter. Results of the study are presented as narratives, figures, tables, charts and graphs.

Chapter 6:   Discussion of results

This chapter presents a discussion of the findings presented and analysed in Chapter in relation to the research problem and the research questions of the study.

Chapter 7:   Summary, conclusions and recommendations

A summary of the research, conclusions drawn from the results of the study and recommendations are outlined in this chapter. Suggestions for further study are also provided.

1.15 Summary of the chapter

The purpose of this chapter was to introduce the research topic, provide some background information on IRs and define the context of the study. The statement of the problem, aim, objectives and research questions of the study were described. The significance of conducting this study was also discussed. Theories underpinning the study, the research design and methods adopted were also highlighted. The chapter wrapped up with discussions on the definition of key terms, the ethical considerations and the structure of the dissertation.

CHAPTER TWO

THEORETICAL FRAMEWORK

2.1 Introduction

This chapter discusses relevant theoretical frameworks and models capable of evaluating technology acceptance by academics at the UKZN. Psychology and ICT based theories and models are reviewed. The Unified Theory of Acceptance and Use of Technology was discussed at length as the appropriate model chosen to inform this study. The eight theories and models that formulate the Unified Theory of Acceptance and Use of Technology model, namely Theory of Reasoned Action, Theory of Planned Behaviour, Innovation Diffusion Theory, Social Cognitive Theory, Motivational Model, Technology Acceptance Model, Model of Personal Computer Utilisation, Combined TAM and TPB are discussed. The Attribution Theory and Model of Acceptance with Peer Support are also discussed as relevant theories outside of the Unified Theory of Acceptance and Use of Technology model.

2.2 The value of the theoretical framework in research

A theoretical framework can be defined as a set of interrelated constructs (concepts), definitions, and propositions that present a systematic view of phenomenon by specifying relations among variables, explaining what has been done and what has been said on a topic (Sevilla 1992:55). It is "a structure that guides research by relying on a formal theory, constructed by using an established, coherent explanation of certain phenomena and relationships" (Eisenhart 1991:205). As explained by Bloomberg and Volpe (2008:127), in the social sciences, the primary purpose of a theory is to "explain the meaning, nature, and challenges of a phenomenon, often experienced but unexplained in the world in which we live". Within a research study, a theoretical framework gives a researcher structure and boundaries within which to work. It is the lens through which literature is reviewed and discussed (Rockinson-Szapkiw and Spaulding 2014:159). It helps create questions, shape the research design, anticipate outcomes and design interventions (Cargan 2007:41 cited White 1977). It determines what things will be measured and what statistical relationships will be looked for; and it helps understand and give meaning to the relationships among the elements that influence, affect, or predict the events or outcomes specified by the researcher (Ennis 1999:129). A theoretical framework presents itself more like a checklist of factors relevant to

various aspects of implementation within a research process. Mertens (1998:3) noted that the theoretical framework "has implications for every decision made in the research process". Thus, it becomes the base upon which the investigation aims to fill in the gap in knowledge within a particular field (Sevilla 1992:55). Ngulube, Mathipa and Gumbo (2015:56-57) summarise the roles of the theoretical framework as follows:

- to serve as a basis of a research plan;
- to situate the researcher within a scholarly discourse and link the study to the broader body of literature;
- to provide a frame within which a problem under investigation can be understood;
- to shape the research questions and help to focus the study;
- to allow the researcher to narrow the project down to manageable size;
- to offer a plan for data collection;
- to operate as a tool to interpret research findings, and
- to provide a vehicle for generalisations to other contexts.

As the theoretical framework shapes and guides the research, poor theoretical underpinning makes it difficult to understand and explain a phenomenon, denying the opportunity to identify factors that predict the likelihood of certain events or outcomes and consequently denying the development of better strategies to achieve success (Nilsen 2015:1). A discussion and evaluation of relevant theories was conducted in order to identify the appropriate theory most suited to address the research problem of this study.

2.3 Theories and models

In social science research, the domain of definitions is not without its difficulties; distinction between theories and models is not clear (Pearce 2012; Ngulube, Mathipa and Gumbo 2015). As observed by Nilsen (2015:4), terminology is not fully consistent because some of the models are referred to as theoretical frameworks resulting in terms being used interchangeably. Theories and models have been used interchangeably within the conceptual contexts of research, "partly because they are used differently by different writers and partly because they are interrelated" (Polit and Beck 2004:119). To this end, Ngulube, Mathipa and Gumbo (2015:45) asserted that "researchers should appreciate that the use of terms in research is largely dependent on their disciplines". This study will use the terms theory and model interchangeably for the purposes of maintaining consistency with the existing literature.

2.4 User acceptance or rejection of technology

Now that technology has become an integral part of our private and professional everyday life, the influx of information circulating through the information systems has made it impossible to manipulate such information without understanding how high performance can be achieved and what leads to technology acceptance or rejection by users (Davis, Bagozzi and Warshaw 1989; Silva and Dias 2007; Marangunic and Granic 2015). Dillon and Morris (1996:6) observed that society today is concerned with designing information systems that will be used appropriately because dependency on information technology keeps growing. Management and individuals in various organisations are keen to know of activities that ensure the deliverance of quality information systems and good solutions in software which have the potential of bringing competitive advantage to the organisations (Silva and Dias 2007:70). They strive to understand "why people accept information technology so that better methods for designing, evaluating, and predicting how users will respond to new technology can be developed" (Dillon and Morris 1996:5). User acceptance of an information system is pivotal to organisational success, and lack of acceptance is a significant hindrance to achieving organisational goals.

2.5 Theories and models of technology acceptance

Theories and models have been developed to help explain why users accept or reject a technology. The influence of technology on humans is explained by a number of social and psychological factors and characteristics (Marangunic and Granic 2015:84). As a result of the complexities involved in predicting human behaviour, research has generated a variety of theories and models to explain patterns of adoption and use of new technologies (Alomary and Woollard 2015:1). The Unified Theory of Acceptance and Use of Technology model, which informs this study, was formulated by empirically comparing and validating elements of eight models: Theory of Reasoned Action, Theory of Planned Behaviour, Innovation Diffusion Theory, Social Cognitive Theory, Motivational Model, Technology Acceptance Model, Model of Personal Computer Utilisation, and Combined Technology Acceptance Model and Theory of Planned Behaviour. Although UTAUT mentions only these eight models, it is important to mention that extensions of Technology Acceptance Model and Theory of Planned Behaviour, Technology Acceptance Model 2 and Decomposed Theory of Planned Behaviour respectively, were also incorporated and validated by the Unified Theory of Acceptance and Use of Technology model (Venkatesh et al. 2003).

The eight major theories incorporated into UTAUT are briefly discussed below, and the core constructs of each individual model are presented in a table format. As the eight models were combined to form UTAUT, only UTAUT was discussed and justified as a relevant model for the study. The Attribution Theory by Kelley (1967) and the Model of Acceptance with Peer Support (MAPS) by Sykes, Venkatesh and Gosain (2009) were also discussed as relevant theories that are outside of the UTAUT model. These models were included to broaden the theoretical perspectives that are prominent in the information systems research. Literally, the study discusses three theories capable of explaining the extent of use of the IR by academics at the UKZN.

2.5.1 Theory of Reasoned Action (Fishbein and Ajzen 1975)

Developed by Fishbein and Ajzen (1975), TRA is one of the first and most fundamental theories to gain widespread acceptance in technology acceptance research (Samaradiwakara and Gunawardena 2014). Besides, TRA is a versatile behavioural theory which forms the backbone of studies associated with attitude-behaviour relationships (Kripanont 2007; Samaradiwakara and Gunawardena 2014). The model was designed to explain and interpret "the determinants of consciously intended behaviour" (Ani 2013:95 cited Ghobahloo, Zulkiflu and Aziz 2010). TRA postulates that a person's performance of a specified behaviour is determined by his or her behavioural intention, and behavioural intention is jointly determined by a person's attitude, and subjective norm concerning the behaviour (Davis, Bagozzi and Warshaw 1989:984). Sharma and Mishra (2015:19) mathematically interpreted behavioural intention as "the summation of attitude and subjective norms". Furthermore, the theory suggests that a person can build new beliefs by performing some behaviour; and the beliefs provide the basis for the construction of the attitude toward the objects. Attitude, in turn, determines the individual's intention to perform the behaviour in future and this intention leads to performance or non-performance of the behaviour (Ooko 2016:37 cited Fishbein and Ajzen 1975).

TRA has been applied in various academic disciplines (Kripanont 2007; Samaradiwakara and Gunawardena 2014; Al-Mamary et al. 2016) and has demonstrated validity in the information systems literature (Karahanna, Straub and Chervany 1999; Samaradiwakara and Gunawardena 2014; Ooko 2016). However, Samaradiwakara and Gunawardena (2014:28) disagreed with the model's belief that when someone forms an intention to act, they will be free to act without

limitation; yet under normal circumstance, challenges "such as limited ability, time, environmental or organisational limits, and unconscious habits will limit the freedom to act". Al-Mamary et al. (2016:145) added that "this assumption fails to acknowledge that individuals' behaviours may be directed, for example, by systemic constraints". Apart from this, TRA presents a risk of possible confusion between attitude towards a behaviour and normative beliefs since many use these concepts interchangeably (Ooko 2016:38 cited Eagly and Chaiken 1993). Moreover, Ooko (2016:38) noted that several studies have shown the deficiency of TRA in excluding moderating factors, such as demographics, which play a significant role in technology acceptance. Finally, TRA was identified as too general a model that does not specify the beliefs that are operative for a particular behaviour (Al-Mamary et al. 2016:145 cited Davis, Bagozzi and Warshaw 1989).

2.5.2 Social Cognitive Theory (Bandura 1986)

According to Goodwin (1996:17 cited Bandura 1991), the SCT was built upon three lines of research, namely: attribution theory, expectancy-value theory and goal theory. Sharma and Mishra (2015:20-21) explained that according to SCT:

> "… behaviour of the user is influenced by expectations of outcome related to personal as well as performance-related gains. Self-efficacy, in turn, influences the expectation of outcome of both types. While esteem of the person and his sense of achievement relate to personal outcome expectations, outcome expectations related to performance on the job lead to performance related expectations".

The theory proposes that cognitive and other personal factors, behaviour and environmental events all operate as interacting determinants that influence each other bidirectionally (Bandura 1991:267). Within this triadic causal structure, cognitive, behavioural and environmental, each function is an important constituent in the dynamic environment. As stated by Bandura (1991:267), the cognitive determinant is indexed by self-beliefs of efficacy, personal goal setting, and quality of analytic thinking. Finally, the choices that are actually executed constitute the behavioural determinant.

The use of SCT within information systems studies provided a profound understanding of computer/software training and use, e-learning, electronic commerce-related issues and also use of the internet (Carillo 2010:21). The use of the theory started in the nineties after

researchers realised the relevance of 'self-efficacy' in the use and adoption of information technology (Carillo 2010:21). SCT construct, 'outcome expectation' has been widely explored by information systems researchers as perceived usefulness (Carillo 2010:24), and was incorporated by UTAUT as an aspect of performance expectancy. However, Carillo (2010:29) argues that although SCT sheds some light on the individual behaviour issue, its full potential has not been realised due to lack of consideration of the complete SCT model (inclusion of all constructs in one study) in information systems research.

2.5.3 Technology Acceptance Model (Davis, Bagozzi and Warshaw 1989)

Davis, Bagozzi and Warshaw (1989) proposed the TAM to examine the impact of technology on user behaviour. Adapted from TRA, the TAM was specifically developed to provide an explanation of the determinants of computer acceptance that is, in general, capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified (Davis, Bagozzi and Warshaw 1989:985). The crucial point of the TAM is that adoption behaviour is determined by individual acceptance, which is determined by perceived ease of use and perceived usefulness (Mutsvunguma 2013:17 cited Vaidyanathan, Sabbaghi and Bargellini 2005). Davis, Bagozzi and Warshaw (1989:985) suggested that people formulate a positive attitude toward a technology when they perceive the technology to be useful and easy to use.

The TAM was particularly designed to predict information technology acceptance and usage on the job, making it one of the most relevant and widely used models in information systems research (Venkatesh et al. 2003:428). It became one of the most popular research models to predict the use and acceptance of information systems and technology by individual users (Al-Mamary et al. 2016:146 cited Surendran 2012); and the most influential model widely used in the studies of the determinant of information systems and technology acceptance (Agarwal and Prasad 1999; Al-Mamary et al. 2016). Besides, Samaradiwakara and Gunawardena (2014:28 cited Davis, Bagozzi and Warshaw 1989) added that the TAM specifies general determinants of individual technology acceptance, which makes it applicable in explaining and predicting individual behaviours across a broad range of end user computing technologies and user groups. As stated by Jen, Lu and Liu (2009:92), the TAM has been used as the theoretical foundation of many empirical studies with a great number of empirical supports. Nevertheless, although the TAM was proven as a viable theoretical framework in studying ICT adoption and

use, a number of studies have criticised it for its several limitations, which include its generality and parsimony, disregarding non-organisational settings, and overlooking the moderating effects of ICT adoption and use in different situations (Dishaw and Strong 1999; Venkatesh and Davis 2000; Sun and Zhang 2006; Suryaningrum 2012). In addition, Jen, Lu and Liu (2009:92 cited Taylor and Todd 1995) argued that the TAM failed to include factors of society and control that have been proven to affect actual behaviours. Furthermore, Oye, Iahad and Rahim (2014:254 cited Taylor and Todd 2001) lamented the none inclusion of variables, such as training needs, system design characteristics and support, that hinder individual adoption of a system as limitations of the TAM.

2.5.4 Theory of Planned Behaviour (Ajzen 1991)

To address the limitation of TRA in dealing with behaviours over which individuals lack complete volitional control, Ajzen (1991) extended the TRA and proposed a new theory called the Theory of Planned Behaviour, by adding a third dependant variable, perceived behavioural control. This variable is perceived to be an additional determinant of intention and behavioural use (Venkatesh et al. 2003). Ajzen (1991:184) likened perceived behavioural control to Bandura's (1982) concept of perceived self-efficacy, which is concerned with judgements of how well a person can execute courses of action required to deal with prospective situations. According to Ajzen (1991), perceived behavioural control relates to the extent to which a person believes that he/she has control over personal or external factors that may facilitate or constrain the behavioural performance (Al-Mary et al. 2016:153). Perceived behavioural control is theorised as the most important determinant of behavioural change since it leads to building up of coping behaviour (Sharma and Mishra 2015:20). Thus, TPB has been applied in research as the most explicit theoretical basis for many studies in various contextual settings (Samaradiwakara and Gunawardena 2014:28).

TPB has been recommended as a model that would better predict health-related behavioural intention and improve the predictability of intention in various health-related fields, leisure, exercise and diet (Ajzen and Driver 1992; Nguyen et al. 1997; Sheeran and Orbell 1999; Sheeran, Conner and Norman 2001). In terms of its applicability to information systems research, Rawstorne, Jayasuriya and Caputi (2000:36) highlighted that there are very few studies that have employed the TPB, hence it is unclear whether the theory is capable of predicting or explaining situations characterised by low volitional control. Jen, Lu and Liu

(2009:95) added that although TPB addresses controlled ability of required resources, its constructs focus more on an individual's personal traits and neglects suggestions on marketing of technology products.

2.5.5 Model of Personal Computer Utilisation (Thompson, Higgins and Howell 1991)

The premise of this model was to incorporate aspects of human behaviour in information systems research. Informed by Triandis' (1977) Theory of Interpersonal Behaviour, MPCU suggested that:

> "… the utilisation of a PC by a knowledge worker in an optional use environment would be influenced by the individual's feelings (affect) toward using PCs, social norms in the work place concerning PC use, habits associated with computer usage, the individual's expected consequences of using a PC, and facilitating conditions in the environment conducive to PC use" (Thompson, Higgins and Howell 1991:126).

The application of MPCU in research has become a concern, considering the widespread use of computers in organisations, including universities. While this model is best suited to understand and explain computer use in voluntary environments, use of the IR by academics at UKZN is not optional considering that the National Research Foundation (NRF), which funds most research in universities, mandated that research output funded by them should be deposited into IRs (NRF: Statement on Open Access to NRF Funded Research 2015). Besides, academics from competing institutions with which the university collaborates are embracing computer technology, meaning that it is no longer optional for UKZN academics to practice self-archiving.

2.5.6 Motivational Model (Davis, Bagozzi and Warshaw 1992)

Developed by Davis, Bagozzi and Warshaw (1992), the proposition of this model is that extrinsic and intrinsic motivations are two critical factors that have the potential to influence user behaviour. The authors summarised extrinsic and intrinsic motivation as:

> "… the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself such as job performance, pay or promotions… while intrinsic motivations influence behaviour due to the reinforcement value of outcomes… the performance of an activity for no apparent

reinforcement other than the process of performing the activity per se" (Davis, Bagozzi and Warshaw (1992:1112).

Derived as usefulness and enjoyment respectively, extrinsic and intrinsic factors "together represent a simple, yet powerful explanation of what influences computer usage intentions" (Davis, Bagozzi and Warshaw 1992:1125). To organisations who wish to increase user acceptance, the authors advise that an increase in the output quality of a work is essential to positively affect the usefulness of an activity while enjoyment can be achieved by increasing ease of use of a system (Davis, Bagozzi and Warshaw 1992:1126).

Lee, Cheung and Chen (2005) suggested that technology acceptance research should be grounded in employees' extrinsic and intrinsic motivations so that organisations are able to come up with efficient strategies that are capable of promoting the use of technologies in the workplace. As such, a number of researchers have examined the role of extrinsic and intrinsic motivation in explaining users' technology use and adoption (Igbaria, Parasuraman and Baroudi 1996; Atkinson and Kidd 1997; Venkatesh and Davis 2000; Venkatesh, Speier and Morris 2002; Heijden 2004). However, the evolution of theories has witnessed the birth of theories and models that are more aligned to technology acceptance rather than generally focusing on the behaviour of users.

2.5.7 Innovation Diffusion Theory (Rogers 1995)

The Diffusion of Innovation Theory, also known as the Innovation Diffusion Theory, was developed to explain how, why, and at what rate technological innovations spread from the stage of invention up to its acceptance or rejection by members of a social system (Rogers 1995). The theory postulates that technological innovations are communicated from outside the boundaries of the social system and sequentially and progressively spread within a system of users. Over time, as information about technology is shared, individuals develop some knowledge about the innovation, forming attitudes towards the innovation, and making decisions to adopt or reject, implement and finally confirm the benefits of the innovation (Samaradiwakara and Gunawardena 2014; Al-Mamary et al. 2016; Ooko 2016).

A number of studies have used the model of diffusion to inform information systems research (Brancheau and Wetherbe 1990; Agarwal and Prasad 1997; Khasawneh and Ibrahim 2008; Tan and Teo 2000; Ward 2013). Limitations of the theory have been reported by Al-Mamary et al.

(2016:155) who observed that IDT pays no attention to economic, cultural and complex societal setups that determine technology adoption. Besides, the significance of technological systems varies from one group of people to another and from time to time. The model does not offer adequate constructs to deal with collective adoption behaviours and studies that employed the model fail to predict behaviour of both individuals and organisations (Kim and Crowston 2011; Ward 2013).

2.5.8 Combined TAM and TPB (Taylor and Todd 1995)

As the name suggests, TAM and TPB constructs were combined to formulate a new model. The two theories where widely used in information technology research such that researchers were interested in merging them in the attempts to gain a richer understanding of the technology acceptance behaviour. A number of hybrid models of TAM and TPB were proposed and tested in information systems literature (Evans 2014:63 cited Yayla and Qing 2007). While empirical evidence revealed TAM as the most commonly and widely employed model of information systems usage, it failed to incorporate factors of society and control that were proven to affect actual behaviours (Taylor and Todd 1995:561; Jen, Lu and Liu 2009:92). To this end, Taylor and Todd (1995) suggested that the predictive power of behavioural intention to use technology could be improved by integrating TPB constructs; subjective norm and perceived behavioural control into TAM. Thus, C-TAM-TPB hypothesised that usage is influenced by behavioural intention, which, in turn, is influenced by attitude, subjective norm, perceived behavioural control and perceived usefulness (Al-Mamary et al. 2016:153). The model further theorised that the relationships among these constructs is moderated by user experience (Taylor and Todd 1995). In terms of its usage, Attuquayefio and Addo (2014:77) argued that a number of studies have shown that the prediction of technology usage is better with TAM than C-TAM-TPB.

2.5.9 The core constructs of the eight theories
Table 2.1 enumerates the eight models that were incorporated into the UTAUT model. The core constructs of each model together with the definitions are provided for quick and easy comparisons.

Table 2.1: The major theories/models and their core constructs

Theory/Model	Core construct	Definitions of constructs
The Theory of Reasoned Action (TRA) - Fishbein and Ajzen (1975)	Subjective norm	"Influence of people in one's social environment on his behavioural intentions; the beliefs of people, weighted by the importance one attributes to each of their opinions that will influence one's behavioural intention" (Sharma and Mishra 2015:20 cited Fishbein and Ajzen 1975).
	Attitude	"A person's general feeling of favourableness or unfavourableness toward some stimulus object" (Fishbein and Ajzen 1975:216).
	Behavioural intention	"Function of both attitudes toward a behaviour and subjective norms toward that behaviour which has been found to predict actual behaviour" (Sharma and Mishra 2015:20 cited Fishbein and Ajzen 1975).
Social Cognitive Theory (SCT) - Bandura (1986)	Outcome expectation – performance	"The performance-related consequences of the behaviour. Specifically, performance expectations deal with job related outcomes" (Venkatesh et al. 2003:432 cited Compeau and Higgins 1995).
	Outcome Expectation – personal	"The personal consequences of the behaviour. Specifically, personal expectations deal with the individual esteem and sense of accomplishment" (Venkatesh et al. 2003:432 cited Compeau and Higgins 1995).
	Self-efficacy	"Judgement of one's ability to use technology (e.g. computer) to accomplish a particular job or task" (Venkatesh et al. 2003:432 cited Compeau and Higgins 1995).
	Affect	"An individual's liking for a particular behaviour (e.g. computer use)" (Venkatesh et al. 2003:432 cited Compeau and Higgins 1995).
	Anxiety	"Evoking anxious or emotional reactions when it comes to performing a behaviour (e.g. using a computer)" (Venkatesh et al. 2003:432 cited Compeau and Higgins 1995).
Technology Acceptance Model (TAM) - Davis, Bagozzi and	Perceived usefulness	"The user's subjective probability that using a particular technology will raise his or her job performance within an organisational setting" (Davis, Bagozzi and Warshaw 1989:985).

Warshaw (1989)	Perceived ease of use	"The extent to which an individual assumes that utilising an information system would be free of physical or mental effort" (Davis, Bagozzi and Warshaw 1989:985).
	Attitude towards use	Adopted from TRA
	Behavioural intention	Adopted from TRA
Theory of Planned Behaviuor (TPB) - Ajzen (1991)	Attitude	Adopted from TRA
	Subjective norm	Adopted from TRA
	Behavioural intention	Adopted from TRA
	Perceived behavioural control	"People's perception of the ease or difficulty of performing the behaviour of interest" (Ajzen 1991:183).
Model of PC Utilisation (MPCU) - Thompson, Higgins and Howell (1991)	Job-fit	"The extent to which an individual believes that using a technology can enhance the performance of his or her job" (Thompson, Higgins and Howell 1991:129).
	Complexity	"The degree to which an innovation is perceived as relatively difficult to understand and use" (Thompson, Higgins and Howell 1991:128 cited Rogers and Shoemaker 1971).
	Long-term Consequences	"Outcomes that have a pay-off in the future" (Thompson, Higgins and Howell 1991:129).
	Affect towards use	"The feeling of joy, elation, or pleasure, or depression, disgust, displeasure, or hate associated by an individual with a particular act" (Thompson, Higgins and Howell 1991:127 cited Triandis 1980).
	Social factors	"The individual's internalisation of the reference groups' subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations" (Thompson, Higgins and Howell 1991:126 cited Triandis 1980).
	Facilitating conditions	"The provision of support for users of PCs which include training and assisting them when they encounter difficulties" (Thompson, Higgins and Howell 1991:129).
Motivational Model (MM) – Davis et al. (1992)	Extrinsic motivation	Perception that users want to perform an activity "because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay,

		or promotions" (Davis Bagozzi and Warshaw 1992:1112).
	Intrinsic motivation	Relates to perceptions of pleasure and satisfaction from performing an activity "for no apparent reinforcement other than the process of performing the activity per se" (Davis, Bagozzi and Warshaw 1992:1112).
	Behavioural intention	Adopted from TRA
Innovation Diffusion Theory (IDT) - Rogers (1995)	Relative advantage	"The degree to which an innovation is considered as being better than the idea its precursor" (Moore and Benbasat 1991:195 cited Rogers 1983).
	Compatibility	"The degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters" (Moore and Benbasat 1991:195 cited Rogers 1983).
	Complexity	"The degree to which an innovation is perceived as being difficult to use" (Moore and Benbasat 1991:195 cited Rogers 1983).
	Trialability	"The degree to which an innovation may be experimented with before adoption" (Moore and Benbasat 1991:195 cited Rogers 1983).
	Observability	"The degree to which the results of an innovation are observable to others" (Moore and Benbasat 1991:195 cited Rogers 1983).
Model Combining TAM and the Theory of Planned Behaviour (C-TAM and TPB) - Taylor and Todd (1995)	Attitude Toward Behaviour	Adopted from TRA/TPB
	Subjective Norm	Adopted from TRA/TPB
	Perceived Behavioural Control	Adopted from TRA/TPB
	Perceived Usefulness	Adopted from TAM

2.6 The Unified Theory of Acceptance and Use of Technology (Venkatesh et al. 2003)

Venkatesh et al. (2003) formulated UTAUT specifically to integrate the fragmented theory and research on individual acceptance of information technology into a unified theoretical model that would be applied as a solid theoretical framework capable of explaining why users accept or reject technology. As mentioned earlier, UTAUT was developed through a comprehensive review of eight models and theories namely, Theory of Reason Action (TRA) by Fishbein and Ajzen (1975), Social Cognitive Theory (SCT) by Bandura (1986), Technology Acceptance Model (TAM) by Davis, Bagozzi and Warshaw 1989 (1989), Theory of Planned Behaviour (TPB) by Ajzen (1991), Model of PC Utilisation (MPCU) by Thompson, Higgins and Howell (1991), Motivational Model (MM) by Davis, Bagozzi and Warshaw (1992), Combined TAM and TPB (C-TAM-TPB) by Taylor and Todd (1995), and Innovation Diffusion Theory (IDT) by Rogers (1995).

Literature reviewed show that these theories and models were widely and successfully used in previous studies of technology and innovation adoption in disciplines ranging from information technology to marketing, social psychology and management (Williams, Rana and Dwivedi 2015:444). The models and their extensions were compared and the conceptual and empirical similarities across the models were summed up with a selected subset of additional variables to formulate UTAUT (Venkatesh et al. 2003:425). An analysis of 32 variables found in these models were synthesised into four determinants: performance expectancy, effort expectancy, social influence and facilitating conditions. These were theorised to be key variables in predicting system use, moderated by age, gender, experience and voluntariness as shown in Figure 2.1 (Venkatesh et al. 2003:467).
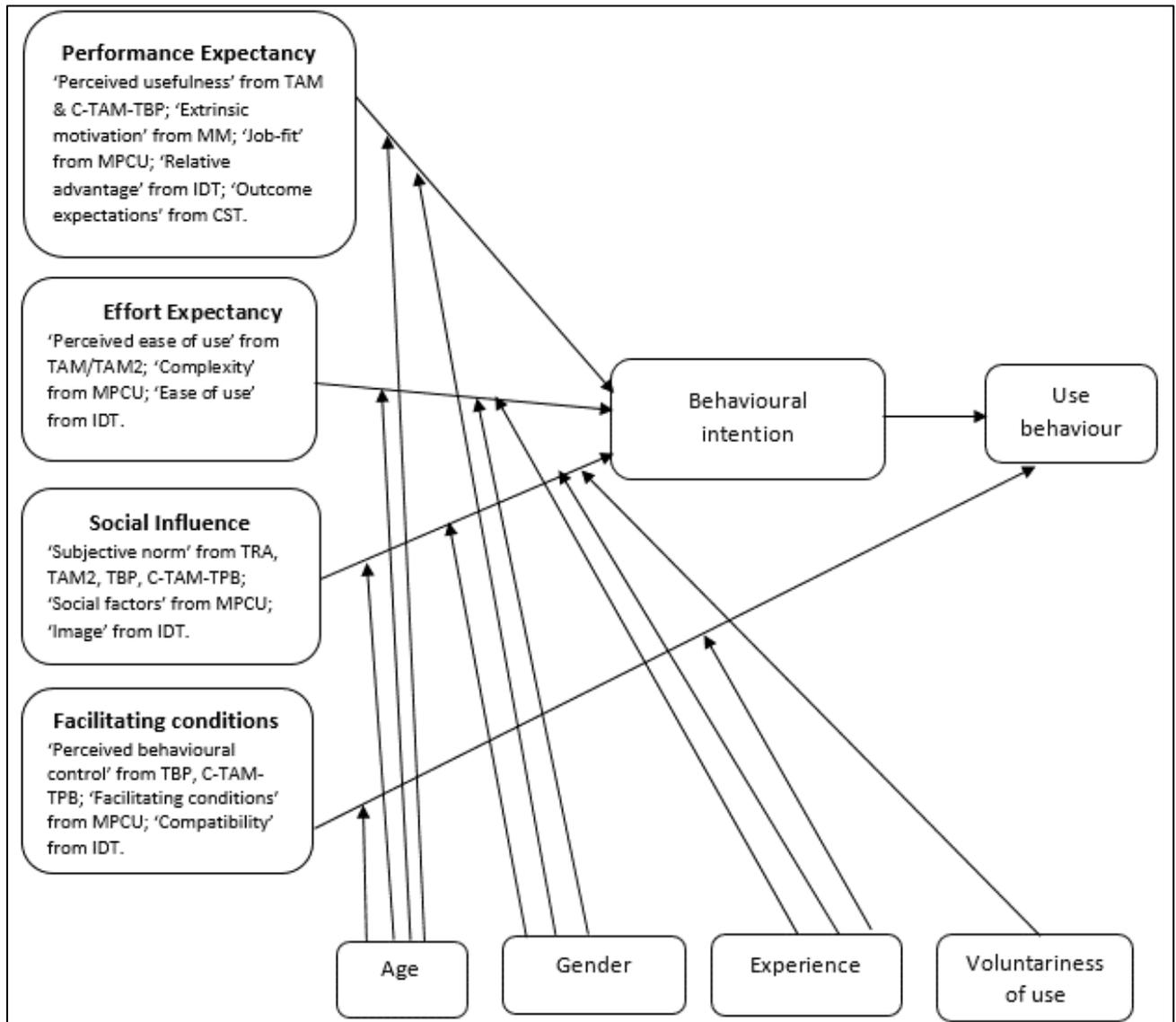
Figure 2.1: The Unified Theory of Acceptance and Use of Technology
Source: Venkatesh et al. (2003)

2.6.1 Performance Expectancy

Venkatesh et al. (2003:447) defined performance expectancy as "the degree to which an individual believes that using the system will help him or her to attain gains in performance". Synonymously known as 'perceived usefulness' in TAM and C-TAM-TPB, 'extrinsic motivation' in MM, 'Job-fit' in MPCU, 'relative advantage' in IDT, and 'outcome expectations' in SCT, performance expectancy was theorised as the strongest predictor of behavioural intention, moderated by age and gender. Male users and younger workers were found to be more comfortable with a new technology (Venkatesh and Davis 2000; Venkatesh et al. 2003) yet outside of the developed countries within which this model was developed and

tested, these assumptions (age and gender) were refuted. In studies conducted in developing countries, age and gender were rendered insignificant moderators of behavioural intention (Baker, Al-Gahtani and Hubona 2007; Afarikumah and Acheampong 2010; Rahman, Jamaludin and Mahmud 2011). These disparities show that although performance expectancy is a good predictor of behavioural intention, moderating factors are to be understood as an influence of culture and should not be neglected.

2.6.2 Effort expectancy

Davis, Bagozzi and Warshaw (1989:320) highlighted that:

> "... even if potential users believe that a given application is useful, they may, at the same time, believe that the system is too hard to use and that the performance benefits of usage are out-weighed by the effort of using the application".

Defined as the degree of ease associated with the use of the system (Venkatesh et al. 2003:450), effort expectancy captured the concept of 'perceived ease of use' from TAM/TAM2, 'complexity' from MPCU, and 'ease of use' from IDT. According to Venkatesh et al. (2003:468), effort expectancy is moderated by age, gender and experience; and behavioural intention to use a system is stronger for women, older workers, and those with limited experience. The authors posit that effort expectancy is significant in the early stages of engaging with a system and gets slower over time.

2.6.3 Social influence

Derived from the 'subjective norm' in TRA, TAM2, TPB and C-TAM-TPB, 'social factors' in MPCU, and 'image' in IDT, social influence is defined as "the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al. 2003:451). It is a process by which individuals make real changes to their thoughts, feelings, attitudes, or behaviours as a result of interaction with others who are perceived to be similar, desirable, or expert (Rashotte 2010:1). According to Malhotra and Galletta (1999:3 cited Kelman 1958), individuals adopt behaviours under different circumstances, either for compliance, identification or internalisation. In compliance, individuals adopt a behaviour to avoid punishment or earn rewards; in identification, one wants to establish or maintain a satisfying self-defining relationship to another person or group and in internalisation, an individual accepts influence because it is congruent with her value system. According to the model, social influence is the only independent variable moderated by age, gender, experience

and voluntariness. Venkatesh et al. (2003:468) further proposed that behavioural intention is stronger for women, older workers, under conditions of mandatory use, and with limited experience.

2.6.4 Facilitating conditions

Facilitating conditions are defined as "the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system" (Venkatesh et al. 2003:453). Coined from 'perceived behavioural control' of TPB, C-TAM-TPB, 'facilitating conditions' of MPCU, and 'compatibility' of IDT, Venkatesh et al. (2003:468) postulated that the influence of facilitating conditions on usage will be moderated by age and experience. They further explained that facilitating conditions become non-significant in predicting behavioural intention when effort expectancy is present. Conditions such as technical support, networks, internet connections, appropriate infrastructures and guidance increase the intention to use a system (Zuiderwijk, Janssen and Dwivedi, 2015; Mubuke et al. 2017). In the context of this study, the aforementioned conditions are critical for OA adoption and use. Likewise, the absence of these conditions create challenges, which hinder system use. Thus, Mubuke et al. (2017:337 cited Iqbal and Qureshi 2012) noted that acceptance of any new technology largely depends on the supporting conditions or environment as these have a significant bearing on an individual's use of the system.

2.6.5 Behavioural intention

Fishbein and Ajzen (1975:288) defined behavioural intention as "a person's subjective probability that he will perform some behaviour". As explained by Kalichman et al. (2007:265), the behavioural intention measure predicts the performance of any voluntary act, unless intent changes prior to performance or unless the intention measure does not correspond to the behavioural criteria in terms of action, target, context, time-frame and/or specificity. This was consistent with the suggestion of Venkatesh et al. (2003:456) that in UTAUT, behavioural intention will have a significant positive influence on technology usage. Furthermore, demographic variables like age, gender, experience and voluntariness act as moderating variables influencing the constructs on which behavioural intention depends.

2.6.6 Usage behaviour

Usage behaviour or actual use quantifies an individual's real course of action in response to some mental processes. Actual use in this study would be measured with the number of items deposited on the IRs. It is an important variable in technology acceptance, as it appears to be a good surrogate measure for the effective deployment of information systems resources in an organisation (Igbaria and Tan 1997:115).

2.6.7 The attitude variable

Although UTAUT does not explicitly include the attitude construct, this study considered it a sensible addition to increase the explanatory power of UTAUT. According to Venkatesh et al. (2003:455), the effect of attitude on behavioural intention is invalid and it only appears when performance expectancy and effort expectancy are omitted from the model, giving the impression that attitude does not provide enough unique information beyond that which is already provided jointly by performance expectancy and effort expectancy (Thomas, Singh and Gaffar 2013:73). Conversely, some relationships that are hypothesised to not exist in the UTAUT model actually do exist and thus conflict with the expectations based on the UTAUT model. For example, studies conducted by Nassuora (2012) and Jairak, Praneetpolgrang and Mekhabunchakij (2009), where both performance expectancy and effort expectancy were included, showed that attitude impacts positively on behavioural intention; contradicting UTAUT's indication that the effect of attitude is invalid. Furthermore, differences in culture can result in differences in behaviours and attitudes associated with certain constructs, resulting in alternative interpretations of the same items (Thomas, Singh and Gaffar 2013:74). Therefore, this study will evaluate the attitude of UKZN academics towards OA in order to fully evaluate IR usage behaviour.

2.7 Mapping the research questions to UTAUT variables

All the four constructs, performance expectancy, effort expectancy, social influence and facilitating conditions, were incorporated into the study. As this study employed the mixed method design (see Chapter 4.2), the UTAUT variables gathered quantitative data on the academics' use of the IR (research question 3) and their attitude (research question 4) towards it. However, this data was triangulated and used to respond to other research questions of the study. For example, data gathered on facilitating conditions can corroborate data on the developments of the IR (research question 1), factors facilitating IR use (research question 5)

as well as strategies to improve IR use (research question 6). In line with this, Table 2.2 lists the research questions and maps them to the UTAUT variables from which relevant data was drawn to determine extent of use of the IR by academics at the UKZN.

Table 2.2: Mapping the research questions to UTAUT variables

Research Question	UTAUT variable
1. **What developments have been made towards the growth of the university's IR?**	Performance Expectancy Facilitating conditions Social influence
2. **What are the roles of the library in developing the IR?**	Performance Expectancy Effort expectancy Facilitating conditions
3. **To what extent are the academics using the university's IR?**	Performance Expectancy Effort expectancy Social influence Facilitating conditions
4. **What is the academic's attitude towards self-archiving?**	Attitude
5. **What challenges are hindering IR use at UKZN?**	Performance Expectancy Effort expectancy Social influence Facilitating conditions
6. **What strategies can be employed to improve acceptance and use of the IR at UKZN?**	Facilitating conditions

2.8 Rationale for adopting the UTAUT model

Venkatesh et al. (2003) posits that the UTAUT has been empirically tested and validated particularly for user acceptance, a trait which renders it more suitable for this study. Furthermore, the developers of the model agree that UTAUT studied complex organisational technologies and employees in organisations undergoing technological changes, a common phenomenon faced by institutions today as technology continues to change. The selection of UTAUT to inform this study is justified by its global and integrative approach of incorporating main theoretical models and forming a rich model capable of explaining behavioural intention and usage of technology (Venkatesh et al. 2003; Dulle and Minishi-Majanja 2011;

Attuquayefio and Addo 2014; Oye, Iahad and Rahim 2014). From the test result of the model conducted by Venkatesh et al. (2003:467), the eight contributing models explained between 17 and 53 per cent of variance in user intentions to use IT while UTAUT was found to outperform the eight individual models with an explanatory power efficiency of 70%. Besides, the inclusion of moderators in UTAUT provides a refined view of how the determinants of intention and behaviour evolve over time. A recent review by Williams, Rana and Dwivedi (2015) confirmed UTAUT to be the most widely used theory, having been cited about 5,000 times; used with reference to technologies, such as: the internet, information systems, mobile technologies, e-learning and open data technologies; focusing upon user groups such as academics, students, professionals and general users; employed by prolific university-based authors; published in high ranking international journals and used on different cultures across the globe. However, despite the evident impact of UTAUT, Williams, Rana and Dwivedi (2015:444-445) noted that "no study to date has either surveyed or reviewed the performance of UTAUT, or explored/assessed the findings, limitations, and potential future directions". In addition, Gbolahan (2014:6 cited Bagozzi 2007; Bouwman and van de Wijngaert 2009) has criticised technology adoption models which include UTAUT as not being suitable to explain technology adoption outside the developed countries where they originated. This, however, does not mean that UTAUT is not valid; predicting human behaviour is complex and this results to studies coming up with mixed and unusual results. Furthermore, the accuracy of the model is not undermined by the absence of literature exploring the findings or limitations of the model.

2.9 UTAUT studies on OA adoption by academics

UTAUT has played a pivotal role in technology acceptance research, its application to this study is not a trial to find conformity but to explore its predictive power in explaining intention and usage behaviour of the IR by academics at UKZN. A number of studies have employed UTAUT to understand adoption and use of OA by academics. Among other studies:

- Hedlund (2008) employed UTAUT to investigate attitudes towards OA and IRs use by academic researchers in business schools in Finland.
- Dulle and Minishi-Majanja (2011) confirmed the suitability of UTAUT in predicting acceptance and use of OA within public universities in Tanzania.
- Oye, Iahad and Rahim (2014), using the UTAUT model, examined the impact on ICT acceptance and usage by academics of higher education institutions in Nigeria.

- Singeh, Abrizah and Karim (2013) used UTAUT to determine the perceptions of Malaysian academic authors regarding their obligations to self-archiving in OA repositories within the research intensive universities.
- Lwoga and Questier (2014) incorporated aspects of UTAUT to assess OA adoption and use in health science universities in Tanzania.
- Akanni and Adetimirin (2017) examined performance expectancy as a determinant factor in the use of OA resources by lecturers at the University of Ibadan in Nigeria.

The application of UTAUT in understanding OA adoption by academics is not new in literature. The use of this model to inform OA adoption at UKZN is justified by the fact that research has revealed the effect of cultural and contextual settings in influencing behavioural intention and usage of a system. Besides, the impact of subjective norms on individual and organisational acceptance of information systems vary. As such, within the South African context, economic, cultural, technological and institutional structures are different, and this poses a unique scenario that will influence system use, and consequently disclose peculiar research results.

2.10 Other relevant theoretical models

Apart from the eight theories that were unified to form the UTAUT, there are other theories and models that have been applied in research to understand information technology behaviour. The Attribution Theory and the Model of Acceptance with Peer Support (MAPS) were discussed as applicable models to this study.

2.10.1 The Attribution Theory (Harold Kelley 1967)

The attribution theory is a social cognitive approach originally introduced by Fritz Heider in 1958 to understand motivation and behaviour among people. Later, various authors made contributions to this theory, including Harold Kelley (1967), who developed Kelley's Covariation Model, which was found to be the most relevant attribution theory to this study. The theory proposes that the attributions people make regarding the causes of their own behaviour have profound psychological and behavioural consequences, and their continued interaction has the potential to influence future behaviour (Moore 1998:37 cited Petri 1996). The theory suggests that people make causal attributions influenced by other people's behaviour. In doing this, people use information from multiple observations, gathered at

different times and situations to form an impression of another person or when making judgements concerning a system. People systematically note the pattern between the presence or absence of possible causal factors and whether or not the behaviour occurs. People look at: consensus - whether peers of a particular individual behave the same in the given situation; distinctiveness - whether a particular individual behaves in the same way when performing different tasks; and consistency - whether an individual behaves the same when conducting a task over a long time and in different circumstances. In the early literature, it was suggested that people use three kinds of covariant data when assessing the causal origin of behavioural events (Kelley 1967). A combination of these information evidence systematically influences the internal (person) and external (environment) orientation of the causal attribution (Kelley and Michela 1980). Eventually, the attributes we connect with people or objects or systems determine our favourable or unfavourable attitudes towards them and what we perceive and believe about what we see defines how we would act.

2.10.1.1 Relevance of Attribution theory to information technology studies

Studies conducted to understand what motivates behaviour are found in a variety of disciplines. The attribution theory has been used in a number of studies in information technology research (Hughes and Gibson 1987; Martinko, Henry and Zmud 1996; Marakas, Johnson and Palmer 2000), and has been found to be significant and relevant in several facets of information systems research (Snead et al. 2015:278). In a study conducted by Magal and Snead (1993), the attribution theory principles were employed to establish the role of causal attributions in explaining the link between user participation and information system success. Marakas, Johnson and Palmer (2000) explored the use of metaphorical personification as an aid to describing and understanding the complexities of computing technologies. The authors noted that while it is important to develop computer literacy skills, organisations "must not lose sight of the social construction of information technology and give equal effort to providing knowledge about the relationships between computers and people" (Marakas, Johnson and Palmer 2000:743). Karsten (2002) employed the theory to examine the causal attributions information systems professionals and end users make for successful and unsuccessful user-system outcomes; as well as end user attempts to use an information system to get the information needed to complete system-dependent and work-related tasks. Standing et al. (2006) investigated the attribution of success and failure in information technology projects using the attribution theory. Thatcher et al. (2008) conducted an empirical investigation on

internal and external aspects on computer self-efficacy, which is an important facet in technology adoption. Snead et al. (2015) applied the attribution theory as a theoretical framework for understanding information systems success. The study stressed the importance of attributional processes users evoke when reacting to the system outcomes they experience (Snead et al. 2015:285).

The attribution theory can be applied as a theoretical framework in understanding factors "determining users' attributions for information system-related outcomes, the influence of these attributions and the nature of the system outcome on the level of users' satisfaction with the system" (Snead et al. 2015:273). A number of authors have alluded to the fact that although there is a human/computer interaction in information technology, there exist ongoing acknowledgements that information system 'success' literature lacks the 'social aspect' of information technology, which defines the composite roles that humans as "social actors engage in while adopting, adapting, and using information systems" (Snead et al. 2015:275). Snead et al. (2015) is supported by Reeves and Nass (1996), Marakas et al. (2000), Benbasat and Zmud (2003), Lamb and Kling (2003), Standing et al. (2006) Wang and Benbasat (2008) and Sykes et al. (2009). Nonetheless, there is a consensus among these authors on the relevance and superiority of UTAUT as a more suitable model for evaluating the success of a system, by incorporating the 'social influence' variable to measure the 'social actors' of the system.

2.10.2 Model of Acceptance with Peer Support (Sykes, Venkatesh and Gosain 2009)

While prior studies acknowledge the effect of social influence on technology acceptance, it is necessary to conceptualise social norms in a more distinguishing manner to capture the nuances of the social environment, and to elaborate on the specific types of social influence processes in a computer acceptance context (ten Kate et al. 2010:21; Srite and Karahanna 2006; Davis, Bagozzi and Warshaw 1989). ten Kate et al. (2010:19 cited Laumann et al. 1978) noted that:

> "Social networks contain a specific set of linkages among a defined set of persons, with the additional property that the characteristics of these linkages as a whole may be used to interpret the social behaviour of the persons involved".

Introduced by Sykes, Venkatesh and Gosain (2009), the Model of Acceptance with Peer Support (MAPS) provides an integration of belief-based technology acceptance, organisational innovation and social network tools (Leonard 2012:46). Sykes, Venkatesh and Gosain

(2009:372) noted that previous models proposed social influences as critical determinants in the early stages of system use, disregarding the "richness of social interactions that can ensue in the post-adoptive phase of a system implementation". Proposing a new model with a 'social network perspective' was an attempt to understand the dynamics of ongoing workplace interactions that are associated with 'coping' and 'influencing' and how these impact on system use. The authors argued that social networks can influence coadaptation through ties to other employees conferring social support, and through the position in the social network conferring influence (Sykes, Venkatesh and Gosain (2009:372). With the current boom in network research, where collaboration amongst academics and researchers has become common, identifying the influencing role of social networks cannot be neglected (Eisenberg, Johnson and Pieterson 2015:148). Academics and researchers are now using online research networks such as ResearchGate, Academia.edu and Mendeley for communicating and sharing scientific texts. Similarly, the development of IRs advances the concept of sharing scholarly content using computer technologies.

2.10.2.1 MAPS core constructs

The core constructs of this model are network density, network centrality, valued network density, valued network centrality, behavioural intention and system use. Behavioural intention, facilitating conditions and system use were adopted from previous models (Fishbein and Ajzen 1975; Ajzen 1991; Venkatesh et al. 2003). Figure 2.2 presents the relationship between these variables.

Network density – An individual's interaction with others in an organisational unit to obtain help - that is, each employee has a score that reflects how much he or she 'gets help' from co-workers (Sykes, Venkatesh and Gosain 2009:374).
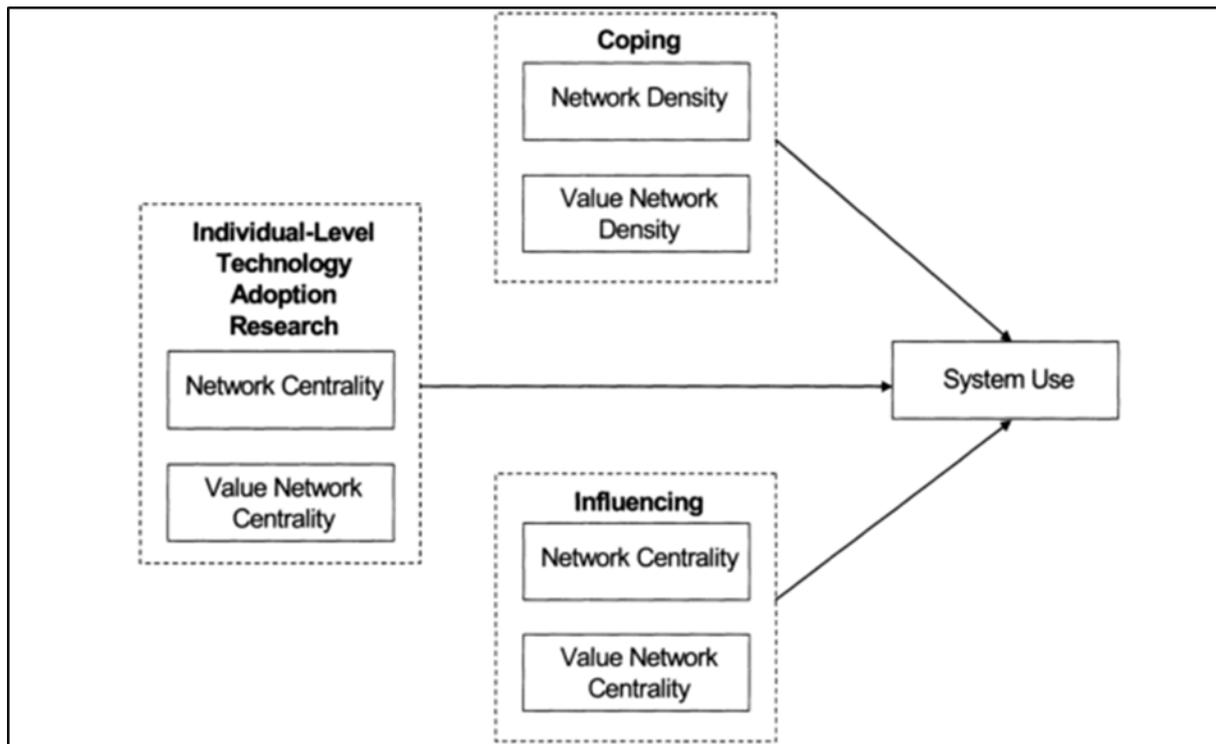
Figure 2.2: The Model of Acceptance with Peer Support
Source: Sykes, Venkatesh and Gosain (2009)

Network centrality - "The extent of an individual's involvement in assistance exchanges with co-workers" (Sykes, Venkatesh and Gosain 2009:375). The model based centrality on the number of ties an individual has with others in an organisational unit to 'provide help'.

Valued network density - Sykes, Venkatesh and Gosain (2009:375) define this variable as:

> "The connectedness of a focal employee to others, weighted by the perceived strength of the tie and the alter's control of system-related information, knowledge and other tangible resources that are needed for effective use of a system"

The authors further theorised that valued network density "contributes a richer conceptualisation that takes into account the strength of the tie and the characteristics of the individual who is connected through the tie to the focal employee" (Sykes, Venkatesh and Gosain 2009:375).

Valued network centrality - "Peers' perceptions of the level of system-related resources controlled by a focal employee" (Sykes, Venkatesh and Gosain 2009:375). It is identified as "a richer conceptualisation of centrality that takes into account the control of resources related to the new system" (Sykes, Venkatesh and Gosain 2009:375).

Behavioural intention - "A person's subjective probability that he will perform some behaviour" (Fishbein and Azjen 1975:288). It reflects the motivational influences that drive an individual to perform a behaviour.

Facilitating conditions - "The degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the system" (Venkatesh et al. 2003:453).

System use - System use is defined as the frequency, duration, and intensity of an employee's interactions with a particular system (Venkatesh et al. 2003).

The model proposes that system use with a focus on user 'coping' and 'influencing' mechanisms will help devise ways to manage user-system coadaptation processes, which foster successful system implementations (Sykes, Venkatesh and Gosain 2009:372). According to the model, coping relates to employees using their network ties to gain access to resources. The authors suggested that network density and valued network density (coping mechanisms) will positively influence system use. With network density, employees 'get help' through knowledge sharing and learning from others while valued network density can be achieved when employees are connected to people with authority, who have control over social resources that facilitate system use (Sykes, Venkatesh and Gosain 2009; Leonard 2012). Regarding network centrality and valued network centrality (influence mechanism), the model theorises that these positively influence system use. The influencing mechanism posit that in organisations, the structure of employee relationships is associated with influence and reputation. Sykes, Venkatesh and Gosain (2009:377) suggest that, because control and power is derived from structural position, it is expected that "an employee's position in the social network would confer influence on decisions related to the design, configuration and deployment of the information system". Centrally positioned employees who control valued organisational resources, and who are exposed to organisational opportunities and benefits, become early, frequent and effective users of the new system and are able to give help to others (Sykes, Venkatesh and Gosain 2009:377).

2.10.2.2 Relevance of MAPS to information technology studies

Sykes, Venkatesh and Gosain (2009:374) explained that MAPS is tailored for emerging networks that play a critical role in shaping an employee's influence and access to resources.

In developing countries, OAIR are emerging online networks of sharing scholarly information amongst universities. The concepts of 'network density' and 'network centrality' that denote 'get-help' and 'give-help' respectively, strongly relate to the collaboration activities required for knowledge sharing that results in the development of IRs.

Introduced in 2009, MAPS is a relatively new model, which has not received much review within information systems research; and examples of the dynamics within the influencing and coping networks regarding new technology acceptance are limited. One relevant study by Lai, Wang and Lei (2012) applied MAPS to examine factors that can help predict university students' use of technology for learning. The study stressed the importance of strengthening peers' support in influencing students' technology adoption. The study recommended the investigation of approaches that can be applied to foster or strengthen peer support. Another study by Karna and Ko (2013) investigated peer support and the mediating effect of using electronic collaboration on academics' research performance and satisfaction. Informed by MAPS, the study revealed that the greater the peer support the greater the positive effect on the use of e-collaboration.

Only a few studies employed MAPS to understand technology acceptance according to ten Kate (2010:20), but it has to be acknowledged that social network analysis is gaining popularity in organisations (Eisenberg 2015:143). MAPS is one of the crucial models developed to understand technology acceptance in organisations, specifically because of its ability to integrate social networks (Leonard 2012).

2.11 Summary of the chapter

The purpose of this chapter was to discuss the different models and theories that focus on technology use. The eight theories and models from which the UTAUT model was derived were discussed, highlighting in brief the limitations of each individual model. The UTAUT model was discussed at length as the model selected to underpin this study. An outline of how the eight models were incorporated individually into UTAUT is presented. Reasons for selecting the model were described and deficiencies of the model were stated. UTAUT studies carried out within the context of OA adoption by academics in various institutions were provided. An overview of other relevant theories was also discussed and how they relate to technology adoption. The following chapter will review literature related to the study.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

The rationale for conducting a literature review is to establish what has already been done on a particular topic and familiarise oneself with what has been found. During this process, the researcher is able to contextualise the existing literature with the current research. The researcher gets "a grip on what is known and learn where the 'holes' are in the current body of knowledge" (Bloomberg and Volpe 2015:106). Ultimately, the researcher makes use of the ideas in existing literature to justify a particular approach to a research problem. Important aspects of a literature review include being critical, assessing strengths and weaknesses of previous research, identifying different views, arguments, agreements, omissions or bias, as well as trends of thoughts on a research topic (Stilwell 2000; Henning, van Rensburg and Smith 2004; Kemoni 2008).

The purpose of this study was to examine the development of the IR and evaluate the extent of use by academics at the UKZN. This chapter begins with a background on the need for humanity to access information. It highlights the OA initiatives, the OA routes, factors that gave rise to OA and the IR and its benefits. Drawing from the research questions of this study, this chapter aims to review developments in IRs, disclose the responsibilities of the university management and the library in developing the IR, evaluate academics' attitudes and perceptions towards self-archiving and highlight factors that facilitate the use of the IR.

3.2 An overview of access to information

Access to information has universally and consistently been recognised as a basic human right. The Ancient Greek Philosopher and Scientist, Aristotle (384-322 B.C.), argued that "*ALL men by nature desire to know… For not only with a view to action, but even when we are not going to do anything...*". Every individual of any age in any society has a right to information, irrespective of whether the information gained is going to be used or not. It is a societal benefit that should be provided to "a patient seeking health information, an educator wishing to enliven a lesson, or a researcher looking to formulate a hypothesis" (Suber 2008:7). Besides, access to

information is an essential component to social, cultural and economic development (John-Okeke 2008:11). Todays' democratic societies which foster public participation in democratic processes should provide their citizens greater access to information, which equips them with the knowledge they need in order to participate in making decisions that affect their lives. An individual's ability to incorporate and apply gained knowledge is critical for economic development and improved living standards. In this line of thought, the United Nations (UN) in 1946 recognised access to information as a "fundamental right and the touchstone to all freedoms…" (Lawson and Bertucci 1996:536). In 1948, the UN proclaimed The Universal Declaration of Human Rights, Article 19, which called for all persons to have a right to seek and receive information (Lawson and Bertucci 1996:1573). In Africa, the African Charter on Human and Peoples' Rights (ACHPR), also known as the Banjul Charter, was adopted in 1981 as an international human rights instrument intended to promote and safeguard human rights (Lawson and Bertucci 1996:1573). Article 9.1 of the charter states that "Every individual shall have the right to receive information" (Lawson and Bertucci 1996:1573). Within South Africa, the Promotion of Access to Information Act (PAIA) (Act No.2 of 2000) was enforced by the South African Human Rights Commission stipulating the public:

> "…constitutional right of access to any information held by the state and any information that is held by another person and that is required for the exercise or protection of any rights; and to provide for matters connected therewith".

Furthermore, in South Africa, the Ubuntu philosophy advocates for a universal bond of sharing that connects all humanity, fosters and reinforces the obligation to share scholarly literature. Against this background, it is clear that access to information was strongly advocated for by societies as a basic right to every individual.

Within the realm of academic research and scholarship, public access to research is also about knowing for its own sake, which provides its own support for freedom of speech (Willinsky 2006; Ware and Mabe 2015). Willinsky (2006:52) explained that access to research does not only enable greater participation in scholarly communication, but it facilitates the informed deliberation on which democracies depend. He explained that:

> "The value of access to research literature lies in how the body of research as a whole can serve as a public resource, helping people to articulate and understand the different positions being taken, as well as the points of disagreement. It can help people see a

greater part of the picture, drawing their attention to what might be otherwise overlooked in, say, what it means to learn to read" (Willinsky 2006:132).

Besides, access to research literature, as explained by Ware and Mabe (2015:84;

"…enhances transparency, openness and accountability, public engagement; closer linkages between research and innovation; economic growth; improved efficiency in the research process and increased returns on the investments made in research".

Alluding to the 'vicious circle of underdevelopment' in Africa, the United Nations emphasised the need to address the "highly imperfect access to the body of world scientific knowledge" (Willinsky 2006 cited Cooper et al. 1971:107–109). Restrictions on access to knowledge lead to significant non-productive activity and lost opportunities for researchers, knowledge workers and the general public. Thus, the shared perception that access to knowledge is a key driver of social, cultural and economic development gave rise to the OA movement.

3.3 OA initiatives

Based on the universal understanding that access to knowledge is key, OA emerged to promote wider access to scholarly content by relying on individual and institutional initiatives to make the information accessible online (John-Okeke 2008; Ghosh and Kumar 2007). Fuelled by the availability of innovative ICT applications, OA has given the research community the freedom to access and distribute scholarly publications globally. With its origins emanating from a 'small but lively meeting' convened in Budapest in Hungary by the Open Society Institute (OSI) on 14 February 2002, the Budapest Open Access Initiative (BOAI) became the first ground-breaking strategy that stimulated significant progress towards the global understanding and adoption of OA (Budapest Open Access Initiative 15: 2017). The agenda of the meeting was to "accelerate progress in the international effort to make research articles in all academic fields freely available on the Internet" (Suber 2008:14). It laid the foundation for uniting humanity in a common intellectual conversation and quest for knowledge through OA. By 'OA' to literature, the BOAI declared:

"…free availability on public internet, permitting any users to read, download, copy, distribute, print, search or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without

financial, legal or technical barriers other than those inseparable from gaining access to the internet itself" (Budapest Open Access Initiative 2002).

The BOAI encouraged individuals and institutions to sign the declaration as an indication of their commitment to OA. As of 27 October 2017, the BOAI had 6,060 individual signatories and 991 organisation signatories (Budapest Open Access Initiative 2017). Institutional signatories in South Africa include University of KwaZulu-Natal (UKZN), University of Cape Town (UCT), University of Johannesburg (UJ), University of South Africa (UNISA), University of Western Cape (UWC), Rhodes University, University of Pretoria (UP), University of Stellenbosch, Cape Peninsula University of Technology (CPUT), University of Free State (UFS), University of Limpopo, Durban University of Technology (DUT) and Central University of Technology (CUT) (Budapest Open Access Initiative: Signatories 2017).

A successive meeting built on the BOAI principles was held on 11 April 2003 at the Howard Hughes Medical Institute in Chevy Chase, Maryland in United States to advance OA initiatives. Peculiar to this meeting was the specific outline on how the research community could operationalise OA (Bailey 2007). Known as the 'Bethesda Statement on Open Access Publishing', the meeting's goal was:

> "…to agree on significant, concrete steps that all relevant parties - the organisations that foster and support scientific research, the scientists that generate the research results, the publishers who facilitate the peer-review and distribution of results of the research, and the scientists, librarians and others who depend on access to this knowledge - can take to promote the rapid and efficient transition to OA publishing" (Suber 2003).

In October 2003, the Conference on Open Access to Knowledge in the Sciences and Humanities issued the 'Berlin Declaration', which became the third influential event in the establishment of the OA movement. Essentially similar to the Bethesda Statement, the Berlin Declaration vision was to be conscious of new possibilities of knowledge dissemination through the OA paradigm via the Internet (Berlin Declaration: Goals 2003). During the Berlin conference, it was agreed by signatories of the Berlin Declaration to organise regular follow-up conferences to promote OA (Berlin Declaration: Berlin conferences - Strategic Aims of the Conference 2017). As of December 2017, 13 conferences had been held. Important to note is the Berlin 10 Open Access Conference held on 7 and 8 November 2012 at Stellenbosch

University. This was a remarkable event in the history of OA in South Africa and the first prestigious OA conference to be convened in the African continent. During this conference, a number of South African universities, including UKZN, received certificates in acknowledgement of their commitment to the principles of OA.

The latest follow-up conference was the 13th Berlin Open Access Conference which was held on 21 and 22 March 2017 in Berlin, Germany. This conference marked the 10th anniversary of the publication of the Berlin Declaration. With the theme, 'Building Capacity for the Transformation', the conference provided a networking and reviewing opportunity in the context of the OA2020 initiative for the large-scale transition to OA (Berlin Declaration: Berlin conferences: Berlin 13th Open Access Conference 2017). The OA2020 global alliance initiative is the latest strategy committed to accelerating the OA transition by:

> "…transforming the current publishing system, replacing the subscription business model with new models that ensure outputs are open and re-usable and that the costs behind their dissemination are transparent and economically sustainable" (Open Access 2020: Mission 2017).

The international Open Access Week is yet another remarkable annual event commemorated to date in the month of October by libraries worldwide. With its roots dating back to 2007, this event was originally celebrated as Open Access Day in the United States but later spread and became an international event (Scholarly Publishing and Academic Resources Coalition (SPARC): International Open Access Week 2017). Open Access Week came about as a partnership between the SPARC and a group of international students organisation advocating for free culture ideals, such as access to information (SPARC: International Open Access Week 2017). This event, as explained by Jennifer McLennan from SPARC:

> "…is an opportunity for OA advocates to engage their communities; to teach them about the potential benefits of OA, to share what they've learned with colleagues, and to help inspire wider participation in helping to make OA a new norm in scholarship and research" (SPARC: International Open Access Week 2017).

The UKZN celebrated its first Open Access Week in 2011 to raise awareness on issues pertaining to OA in South Africa and the international world, as well as bringing to the spotlight the newly developed repository, ResearchSpace (University of KwaZulu-Natal Library Annual Review 2011:12). The latest commemoration of the Open Access Week was on 23 to 25

October 2017 under the theme 'Open in order to make scholarly research visible'. (Open Access International Week: UKZN Library celebrates International Open Access week 2017). This event was attended by the DVC Research, academics, researchers, authors, Masters and Doctoral students, librarians and service providers. The observance of such OA initiatives by the UKZN community is a clear indication of the institution's support in making scholarly communication available on OA.

There are numerous landmark efforts that have contributed to our understanding of OA. The SPARC Open Access Newsletter lists in chronological order, activities that were conducted in support of the OA movement, dated back to as early as 1966 (Suber 2009). This study presented a few noteworthy initiatives that are closely linked to this study. Besides, a number of universities across the globe have contributed immensely to the spread and adoption of OA. This study, however, focuses on OA practices at UKZN which is the case under investigation.

3.4 Factors that gave rise to OA

The OA movement was prompted by a sequence of incidences that happened within the scholarly communication publishing. Johnson et al. (2017:18) summarised these to include:

- 1975-1995 - dramatic increases in the prices of journals 'sold by for-profit' and, to a lesser extent, not-for-profit publishers, outstripping growth in library budgets. This is commonly dubbed 'the serials crisis'.
- 1995-2007 - the emergence of electronic publishing, and the 'big deal', representing bundles of journals that vary from institution to institution. Market consolidation amongst publishers and the development of library consortia are a characteristic of this period.
- 2008 onwards - the impact of the global financial crisis, resulting in significant and prolonged cuts for many libraries and consortia. This exerted downward pressure on publisher revenues in the immediate aftermath of the crisis, but the major publishers saw a return to steady growth in the early years of the current decade.

Besides these factors, there is a strong argument that most research is produced with funding obtained from government coffers; hence, it should be made available on OA as a moral obligation to ensure the effective use of taxpayer funds (Johnson et al. 2017:19). Willinsky (2006:66) added that:

"With so much scholarly activity supported by public money, it is only natural to ask whether there is now a way to distribute the resulting research in ways that make it open and available, as a global public good".

The OA movement arose to mitigate access challenges faced by academic libraries and research institutions. A boycott by librarians and scientists to voluntarily stop subscribing and submitting papers to expensive commercial journals as a way of protesting to the financial pressure, and a proposal of an alternative non-profit, open communication system (Schöpfel 2015:322), was a strong push towards OA publishing. Commenting on this challenge, Willinsky (2006:37) further commented that:

"Had journal prices not skyrocketed over the last few decades, it is possible that the idea of creating OA would not have taken the form it has, or at least the idea would not have the force and urgency that it has now assumed".

The push for OA was a genuine need for improved access, visibility and use of scholarly communication by the global society.

3.5 OA routes

OA should be characterised as a practice of removing price barriers and permission barriers, replacing it with royalty-free literature and minimal use restrictions (Suber 2008:7). Two complementary strategies to OA, namely: self-archiving and OA journals, also known as the 'green road' and 'gold road' respectively, were first recommended by the Budapest Initiative. These strategies disclose what is made open, when it is made open and how it is made open (Ware and Mabe 2015:88). 'What' refers to whether the information being made open is either the author's draft manuscript, accepted manuscript or final published version; 'when' refers to the timing within which the information is made open; either prior to publication, immediately on publication or some period after publication and 'how' is largely seen as one of the business models (Ware and Mabe 2015:88).

3.5.1 Green OA

Green OA takes place when authors make their articles freely available in digital form on the Internet (Budapest Open Access Initiative 2002; Bailey 2007). Three most popular ways of self-archiving are institutional repositories/archives, disciplinary repositories and authors websites (Bailey 2007; Bernius et al. 2009; Bjork et al. 2014). Manuscripts that precede the

final article are made freely available in any of the aforementioned platforms, regardless of where the original article has been published (Bjork et al. 2014:3 cited Harnad et al. 2004). Self-archiving requires consent from copyright owners before published research can be collected or distributed on the IR. Authors should take heed to "publish articles only according to their publishers' copyright policies and the agreement signed at the moment of acceptance" (Giglia 2010:462). Generally, self-archiving only allows access to scientific publications after an embargo period, typically ranging between six and 24 months, during which publishers have exclusive rights to dissemination (Johnson et al. 2017:22).

Self-archiving has been found to be the most favourable model amongst authors in terms of visibility and speed in the circulation of ideas; and the most cost-effective and affordable means for funders, institutions and other stakeholders to enforce movement towards OA (Bernius et al. 2009:107 cited Swan 2007; Giglia 2010; Bjork et al. 2014:3 cited Houghton and Swan 2013). Of all the self-archiving methods, one "with the greatest potential to provide OA is self-archiving in the author's own university's OAI-compliant Eprint Archives" (Harnad et al. 2004:312). Thus, this study focuses on evaluating the development, adoption and use of the IR at the UKZN so that its impact on OA can be disclosed.

3.5.2 Gold OA

The gold route, also known as the OA Journals, describes electronic-based journals that make their published content available freely to all, immediately upon publication (Raju et al. 2015:271). Gold OA is a business model that generates profit through the payment of article processing charges (APCs), which are paid by the authors or their academic institutions or funding agencies (Raju et al. 2015; Madalli 2015). Although gold OA offers free access to the end-user, costs are incurred at the initial stages of the supply chain instead of paying subscriptions at the end of the supply cycle; making the journal's content available online, free of charge (Raju et al. 2015: 271; Ware and Mabe 2015:9).

3.6 The IR and its benefits

Czerniewicz and Goodier (2014:2) pointed out that "the value of OA sometimes gets lost in bureaucratic squabbling and regulatory nitpicking, but generally there is little dispute about its merit". IRs have proved to be platforms that disseminate vast amounts of research faster at a much lesser cost when compared with subscriptions. Before OA, intellectual capital produced

by a university's community was, to a greater extent, inaccessible as it ended up being disseminated by commercial publishers whose prices were beyond reach (Yeates 2003:96). Even the grey literature, which normally would not be published, yet have great potential to advance research, was inaccessible before OA.

The proliferation of computer internet technology which allows low cost self-archiving has seen the growth of IRs, which is an economical avenue to disseminate scholarship to the widest audience possible, at the earliest time, after work has been completed (Jantz and Wilson 2008:186). IRs have become essential infrastructures for scholarship that can promote OA and are perceived as critical components in reforming the current system of scholarly communication. In describing the mission and aim of an IR, several authors draw on a definition made by Clifford Lynch who defined an IR as "a set of services a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members" (Lynch 2003:328). The two main objectives of an established IR are to provide global OA to institutional research output and to store and preserve institutional digital assets (Ware and Mabe 2015:104). The SPARC distinguishes the elements of a university's IR as follows:

- It is institutionally defined - it captures the original research and other intellectual property generated by an institution's constituent population;
- It contributes to the process of scholarly communication in collecting, storing and disseminating scholarly contents, such as: pre-prints and work in progress, peer-reviewed articles, monographs, enduring teaching materials, data sets and other ancillary research materials, conference papers, electronic theses and dissertations and gray literature generated by the institution's students, faculty, non-faculty researchers and staff;
- It is cumulative and perpetual - accommodates thousands of submissions and preserve for long-term access;
- It is interoperable – provides limited access barriers to the users beyond the institution's community (Crow 2002:3-5).

Universities develop diversified IRs and often modify services to fit the culture, needs and demands of the user community. Furthermore, financial resources and skills to set-up and maintain repositories often force universities to customise services, working with what they

can afford. However, despite the conditions under which an IR is deployed, the mere fact of having one allows an institution to benefit in many different ways. Barandiaran, Rozum and Thoms (2014:456-7) identified the following benefits for an established IR:

- opens up the outputs of the university to the world;
- maximises the visibility and impact of these outputs as a result;
- showcases the university to interested constituencies—prospective staff, prospective students, and other stakeholders;
- collects and curates digital outputs;
- manages and measures research and teaching activities;
- provides a workspace for work-in-progress, and for collaborative or large-scale projects;
- enables and encourages interdisciplinary approaches to research;
- facilitates the development and sharing of digital teaching materials and aids; and
- supports student endeavours, providing access to theses and dissertations and a location for the development of e-portfolios.

One of the benefits mentioned by Barandiaran, Rozum and Thoms (2014) that is receiving much attention in research and scholarship is that of global visibility. Visibility and accessibility of information resources are only possible when universities harness their research output and make it available on the web (Ukwoma and Okafor 2017:46 cited Abrizah, Noorhidawati and Kiran 2010). For a university to raise its visibility or the ranking of its IR, academics and students should be willing to contribute or make their intellectual work available for self-archiving. The Ranking Web of Repositories is one of the online bibliometric tools designed to measure visibility of content deposited in the repositories and the quality of a university's scholarship. Universities with high quality output on their IRs are likely to be ranked higher, and often earn respect and appreciation in the learning society, attract prospective staff, prospective students and other stakeholders interested in research networking and collaborations (Barandiaran 2014; Ukwoma and Okafor 2017). Thus, visibility has become a crucial element in measuring the viability of an institution.

The development of IRs, as expressed by Lynch (2003:328) is an indication that the intellectual life and scholarship of universities will increasingly be represented, documented and shared in digital form and that a primary responsibility of our universities is to exercise stewardship over

such resources. University repositories are seen as strategic mechanisms to expand diversity and ensure worldwide availability of digital scholarship using opportunities of the networked digital environment to strengthen teaching, learning and research activities. A university can ensure effective exploitation of scholarship by its community as the IR brings together extensive formal and informal scholarly communication in a single archive as determined by the institution's policy (Chan 2004:282 cited Johnson 2002; Ukwoma and Okafor 2017). The vast amounts of intellectual output which had remained invisible to academics and researchers within the global community, created a serious void in the continuity of research and led to duplication of research projects (John-Okeke 2008:11). With IRs, there is an expansion in the range of knowledge being shared. Academics and the research community are encouraged to ensure that the intellectual life and scholarship of universities are increasingly represented, documented and shared in digital form via IRs, while the university's responsibility is to make them available and to preserve them (Lynch 2003:328).

3.7 Developments in the IR landscape

Scientists and researchers in the late 1980s practised OA by adopting the internet technology to disseminate information faster and for free (Johnson et al. 2017:20). This practice was quickly overtaken by the library community through the development of a species of digital libraries called OA IRs in response to the rapidly-increasing prices of scholarly content. The launch of the Massachusetts Institute of Technology (MIT) DSpace repository in 2002 and the subsequent release of the DSpace software under an open-source licence generated excitement and encouraged institutions from around the world to begin installing, testing and evaluating the software for local use (Chan 2004:283). Though DSpace was not the first software available during that time, it became popular because it was the most general-purpose IR for archiving arbitrary digital materials (Lynch 2003:1). Since then, there has been an outgrowth of repositories to support the research community in searching, sharing, reusing of existing contents and creating additional resources through collaboration with other institutions in a structured way (Leng, Ali and Hoo 2016:36).

Early implementers of IRs experimented by populating their repositories mostly with grey literature such as theses and dissertations, material which does not normally find its way into the various publication channels. Content has since diversified and the current state seems to agree with what Shearer (2004:4 cited Ginsparg 2000) predicted that:

"In the next ten to twenty years, it is likely that the scholarly communications system will have evolved into some form of unified global archive system, without the current partitioning and access restrictions familiar from the paper medium, for the simple reason that it is the best way to communicate knowledge and hence to create new knowledge".

Figure 3.1 shows that at global level, as reflected on OpenDOAR (2018), digital materials, such as: journal articles, theses and dissertations, books and book chapters, datasets, multimedia and audio-visual material, learning objects, unpublished reports and papers, conference and workshop papers, patents, software, and bibliographic references, are being populated in IRs. Suber (2008:5) noted that, the goal of OA is "open access to peer-reviewed journal literature", which was previously inaccessible due to financial barriers. With over 71% of repositories populating journal articles (OpenDOAR 2018), it can be deduced that OA publishing is slowly reaching a point of maturity.
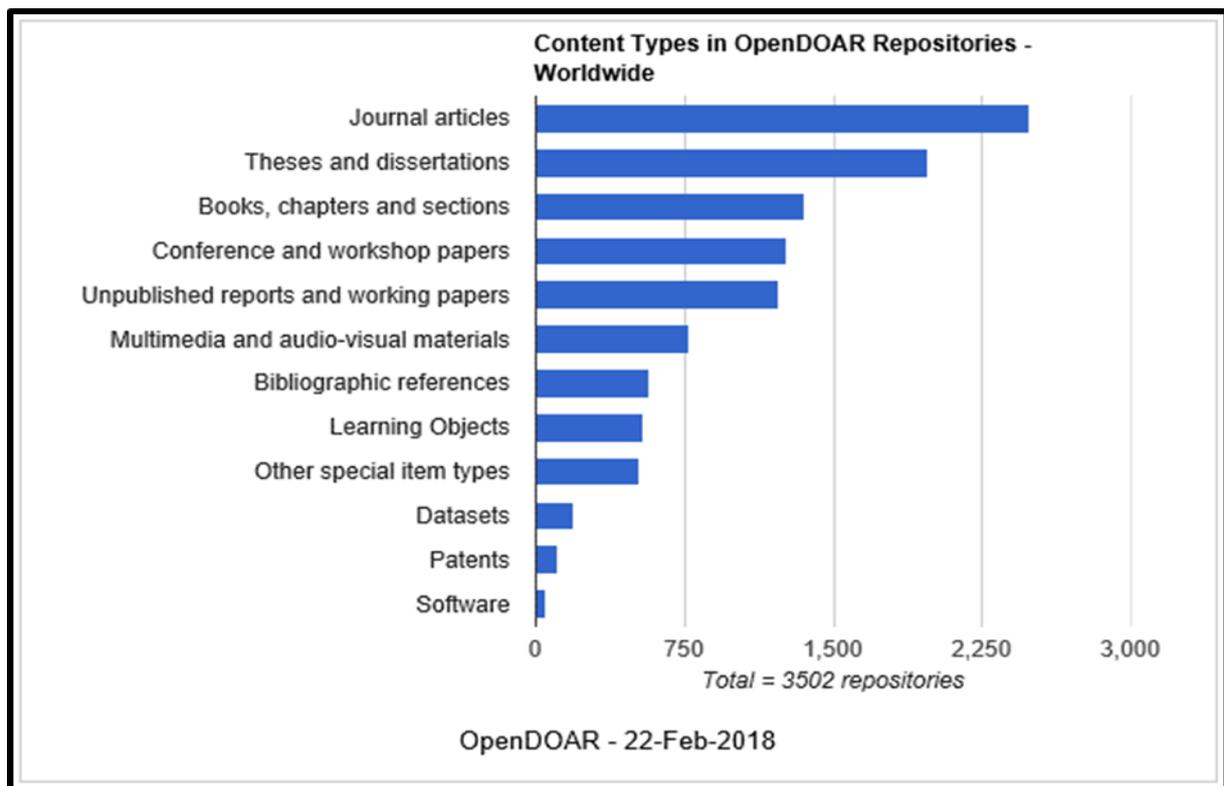
Figure 3.1: Content types deposited in IRs worldwide

Source: OpenDOAR: Content Types in OpenDOAR Repositories - Worldwide (2018)

Besides the growth and diversity of content deposited in IRs, there has been a gradual increase in the development of repositories worldwide. Between 2005 to date, OpenDOAR recorded a total of about 3502 repositories and this number continues to grow on a daily basis. For many, IRs have become a staple of the academic library in their mission to spread scholarship, such that readers in academia have greater access to more content than ever before (Johnson et al. 2017:3). OA publishing has completely changed the landscape of every aspect of scholarly publishing and has tremendously grown at global level as depicted in Figure 3.2.
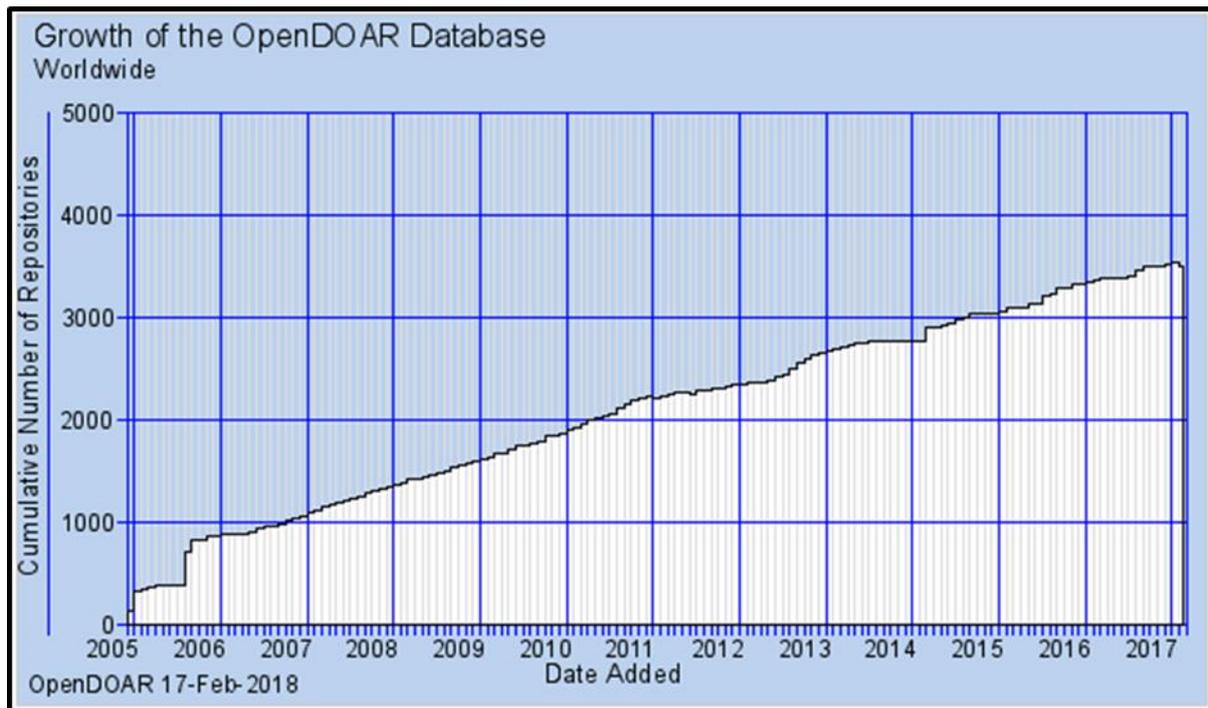
Figure 3.2: Overall growth of repositories

Source: OpenDOAR: Growth of the OpenDOAR Database – Worldwide (2018)

However, many authors have noted the disparities in OA adoption within regions and countries, perpetuated by financial capabilities (Ghosh and Kumar 2007; Ezema 2013; Islam and Akter 2013; Mohammed 2013; Schöpfel 2015; Ware and Mabe 2015; Iton and Iton 2016; Mashroofa and Seneviratne 2016; Anenene and Oyewole 2017). They argued that financial constraints faced by developing economies limit their access to quality scholarly works, which obstructs research and development activities in those countries. While it would be a misnomer to ignore financial support as a requirement for the development and maintenance of IRs, other studies have revealed that the availability of other IR enablers such as policies, significantly impacts on the growth of IRs (Shearer 2005; Kumar, Chandra and Parthasarathi 2016; Zhong and Jiang

2016; Johnson et al. 2017), irrespective of their location. Policy interventions have been identified as important strategies for mandatory self-archiving. Nonetheless, Johnson et al. (2017:4) argue that barriers to OA do not emanate from financial or legislative constraints but from a cultural inertia where a cultural bias against OA stifles its growth. Culture defines what a society values and prioritises. The perceived importance of OA to a society determines its input towards the development of IRs. From a different perspective, Suber (2012:x), one of the pioneering advocates of OA believes that, the biggest obstacle to OA is misunderstanding, which is caused by a lack of familiarity, with unfamiliarity caused by preoccupation. People generally do not create time to understand OA, hence their participation in OA practices is limited because they are uniformed.

However, despite the drawbacks mentioned above, IRs continue to thrive. The impetus for the growth of IRs has been propelled by the emergence of a variety of enabling online tools developed to support and advance OA practices by advocates of the movement. Open-source software, such as DSpace, Eprints, Fedora, Greenstone, WEKO, Digital Commons and OA aggregators, such as OpenDOAR, ROAR, ROARMAP, SHERPA/RoMEO and the ranking web of repositories, are some of the tools that have positively impacted on the growth of IRs worldwide. A few of these tools are discussed below, particularly those that relate to this study.

3.7.1 Open source software

The growth of IRs was inspired by the availability of free and open source software. This rapid growth became more evident at the beginning of the 21st century when open source software enjoyed a strong uptake particularly in Europe (Shearer 2015:3). Free and open source software packages allow users to freely use the software so long they have the technical expertise needed to work on the software. The rights that were normally reserved for copyright holders are now being provided under a free software license that permits users to study, change and improve the quality of the software for higher reliability and flexibility (Tramboo et al. 2012:1). Considering that the software is mostly improved by professional software developers and the general user community, it is not privately owned and therefore cannot be purchased. Institutions can download and install the software on their servers freely from the web. Open source software became a popular and affordable platform for setting up e-print archives where scholarship could be accessed and retrieved online with utmost speed and specificity. The

interdependent relationship between open source software and OA has witnessed a tremendous growth in open scholarship.

A number of digital repository systems have been developed using free open source software with varying characteristics and system features. Globally, DSpace is the most popular OA software, constituting 44% of open source software used to develop repositories (OpenDOAR: Usage of OA Repository Software Worldwide 2018). Eprints, Digital Commons, WEKO, OPUS, dLibra are some of the highly used software systems as reflected in Figure 3.3. Within the African region, 84% of repositories use the DSpace software. In South African universities, 77% of repositories use DSpace, 7% use ETD-db, 7% use Eprints, 7% use VITAL and 3% use ContentPro (OpenDOAR: Usage of OA Repository Software – South Africa 2018). University of KwaZulu-Natal is amongst those which have adopted DSpace for their IRs.
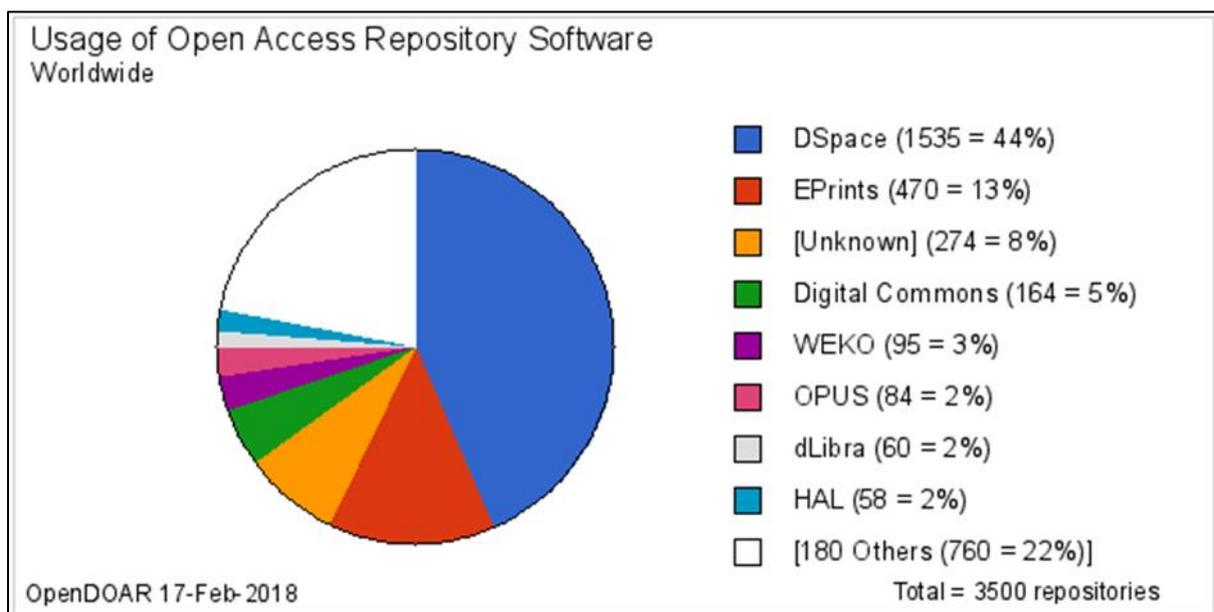
Figure 3.3: Usage of OA Repository Software Worldwide
Source: OpenDOAR: Usage of Open Access Repository Software - South Africa, Institutional Repositories (2018)

Institutions prefer DSpace because it caters for a variety of digital archiving needs ranging from IRs to learning object repositories or electronic records management and more (Suber 2008:134). DSpace has been found to be user friendly (Ukwoma and Okafor 2017:51). It is adaptable to different community needs, its interoperability between systems is built-in and it

adheres to international standards for metadata format (Tramboo et al. 2012:1). Institutions find DSpace easier to implement, maintain and use, especially from the point of view of many libraries that lack specialised IT staff (Tkacikova 2009:66).

Pyrounakis and Nikolaidou (2009:56) however highlighted that, no one specific software is suitable for all since the needs for each institution vary depending on the "number of collections, the types of objects, the nature of the material, the frequency of update, the distribution of content and the time limits for the development of repository". Besides, motivations for setting up IRs and the functions they serve differ from institution to institution. Nonetheless, the sustainability of a software, best practices and tools in preservation and curation, and compliance standards (Francke, Gamalielsson and Lundell 2017:3), are important factors to consider when selecting open source software to ensure future accessibility of the repository.

3.7.2 The Directory of Open Access Repositories (OpenDOAR)

OpenDOAR is an authoritative online global directory of academic OA repositories. Launched in 2006 jointly by the University of Nottingham in the U.K. and Lund University in Sweden, OpenDOAR was developed primarily to support and strengthen the academic and research activities of institutions worldwide. The idea for OpenDOAR generated from the need to have more than just lists of repositories, but instead, being able to search through a structured information of catalogued and described repositories (Axelsson 2012:42). OpenDOAR specifically chose to collect and provide information on repository sites that fully embrace the concept of OA to full text resources (OpenDOAR: Criteria for inclusion and exclusion 2018). OpenDOAR administrators harvest and allocate metadata for these sites to allow categorisation, analysis and exploitation of repositories (Madalli, 2015:35). To ensure quality, detailed investigations of each site or repository are conducted to ascertain accessibility and full-text content provision. Metadata only repositories, duplicates as well as OA journals are some of the rejected resources for this database (OpenDOAR: Criteria for inclusion and exclusion 2018).

As one of the services developed to advance OA practices, OpenDOAR aims to:

- Survey the growing field of academic OA research repositories and categorise them in terms of locale, content and other measures.
- Produce a descriptive list of OA repositories of relevance to academic research.
- Provide a comprehensive and authoritative list for end users wishing to find particular types of, or specific repositories.
- Deliver a comprehensive, structured and maintained list with clear update and self-regulation protocols to enable development of the list.
- Play a prominent international role in the organisation of, and access to, OA repository services.
- Support OA outreach and advocacy endeavours within institutions and globally (OpenDOAR: Service Aims 2018).

OpenDOAR is one of the most widely used websites helping users to examine and clarify the structures of repositories world-wide. Researchers are able to analyse repositories and generate statistics by location, type of repository, the material they hold, subject areas, type of open source software and other measures.
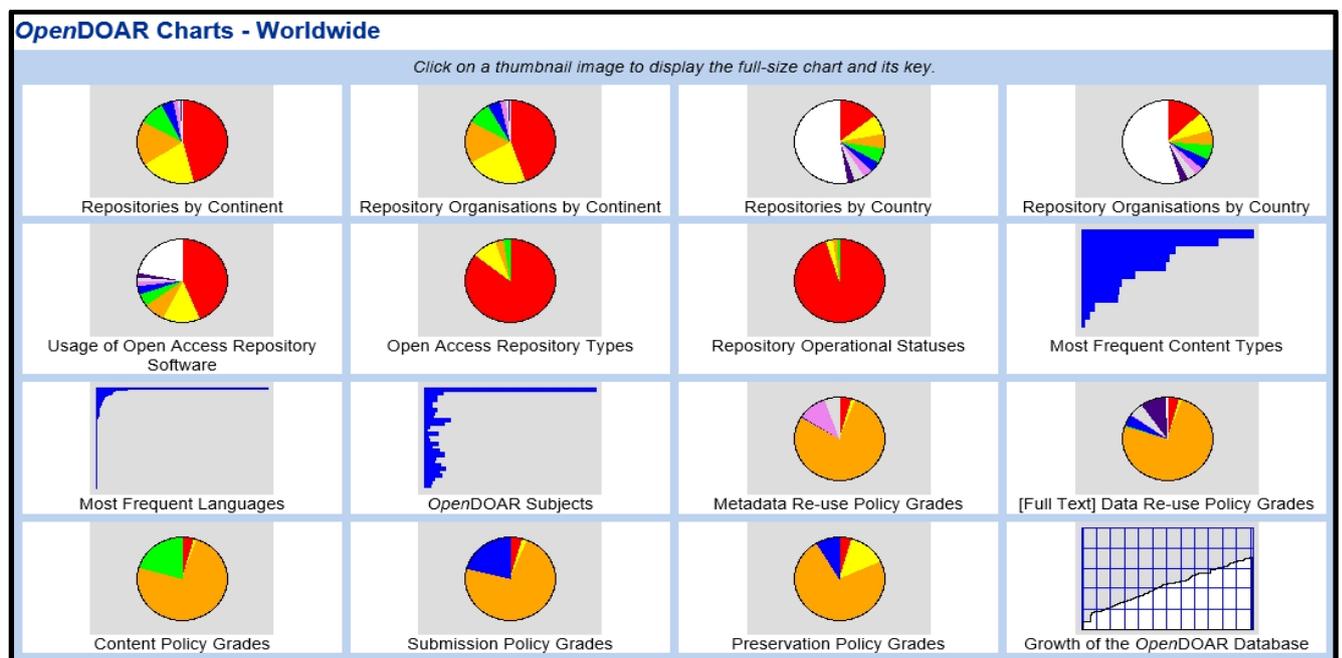
Figure 3.4: OpenDOAR information types

Source: OpenDOAR Charts - Worldwide (2018)

A number of recent studies have employed OpenDOAR statistics to understand developments in IRs. Ukwoma and Okafor (2017) monitored the developments and trends of IRs in universities in Nigeria using OpenDOAR. Tapfuma (2016) conducted a bibliometric analysis using OpenDOAR to understand acceptance and use of IRs in Zimbabwe's public universities. Onyancha (2016) employed OpenDOAR services to derive statistics on open data repositories, as part of the study on Open Research Data in Sub-Saharan Africa and Dulle (2010) used OpenDOAR data to show the disparities in OA adoption in different continents. This study used OpenDOAR to analyse the development, adoption and use of the IR at UKZN in comparison with other academic institutions in South Africa and abroad.

3.7.3 The Registry of Open Access Repositories (ROAR)

ROAR is a searchable international registry of OA repositories indexing the creation, location and growth of repositories and their contents. The aim of ROAR is to promote the development of OA by providing timely information about the growth and status of repositories throughout the world. Unlike OpenDOAR, ROAR is based on automatic harvesting, thus ensuring immediacy in record creation (Pinfield et al. 2014:2408). ROAR tends to have larger numbers of repositories listed in its directory compared to OpenDOAR. While OpenDOAR currently records 3,500 repositories, ROAR records 4,618 repositories. This is because ROAR includes metadata only repositories, some OA journals, as well as repositories with restricted access content. OpenDOAR has been providing a relatively accurate and up-to-date picture of the repository landscape since it became fully established in 2006 (Pinfield et al. 2014:2407), hence it has become more popular compared to ROAR.

3.7.4 The Registry of Open Access Repository Mandates and Policies (ROARMAP)

ROARMAP is a site created as an online location for registering OA policies. This searchable international registry shows the growth of OA mandates and policies adopted by universities, research institutions and research funders that require or request their researchers to provide OA to their peer-reviewed research article output by depositing it in an OA repository (ROARMAP 2018). The importance of OA policies is that it provides a framework that authors are encouraged to comply with in order to make their research outputs available on their IRs. In most instances, OA policies specify:

- Who should make scientific information openly available;

- What should be made available on OA;

- Why scientific information should be made openly accessible;

- When the research outputs should be made freely available online;

- Where the research outputs should be deposited; and

- How authors should comply with the policy criteria (Picarra and Swan 2015:1).

Evidence has shown that institutions that have a mandatory policy have high proportions of published articles self-archived compared to those that have only voluntary policies (Abdullah 2009:32 cited Suber 2006 and Sale 2006). Figure 3.5 shows that several institutions across the globe have implemented OA policies as recorded in the ROARMAP.
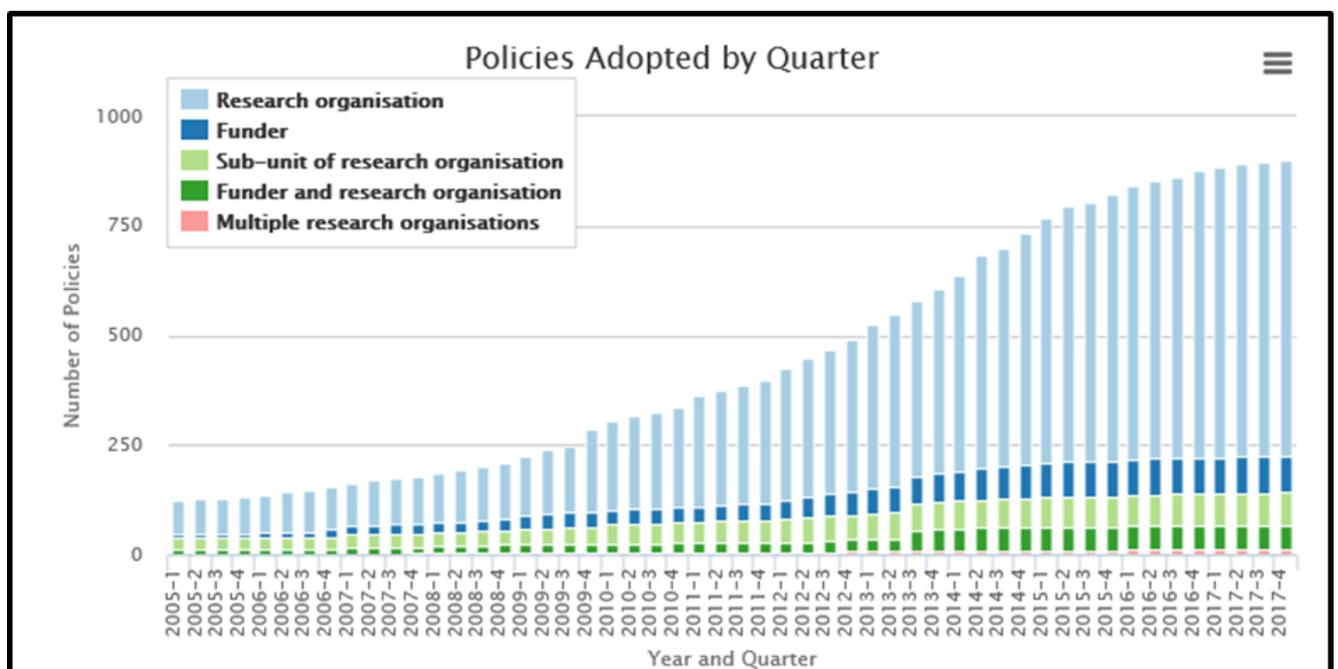
Figure 3.5: The growth of policies registered with ROARMAP

Source: ROARMAP (2018)

As of 2015, ROARMAP recorded the existence of 738 OA policies across the world, with 440 having been implemented by universities in Europe (Picarra and Swan 2015:1). As of Februrary 2018, figures had grown to 898 as shown in Figure 3.5. About 75% of these policies are from universities and research institutions and 8% from sub-units of a research organisation such as a faculty or department (ROARMAP 2018). Figures will continue to grow as OA acceptance continues to improve.

Studies have shown that without a well-implemented mandatory policy, levels of OA remain low, while with a well-designed policy they are enhanced. This is evidenced by the current statistics in OpenDOAR and ROARMAP. Table 3.1 illustrates the number of institutions that have adopted OA policies by region. Europe, being the highest in terms of developed repositories, has implemented the highest number of mandatory policies to enforce self-archiving within its institutions. Conversely, Africa has the least policies registered 3%, hence its contribution to OA repositories is also limited. Within South Africa, 10 policies are recorded on ROARMAP (2018). Eight of these were registered by UP, UNISA, UJ, University of Stellenbosch, UCT, UWC, CPUT and UFS (ROARMAP 2018). There is no record of a policy on OA archiving for UKZN on ROARMAP.

Table 3.1: Policies by continent

Continent	Number of institutions with OA policies	Percentage
Africa	24	3%
America	216	24%
Asia	60	7%
Europe	558	62%
Oceania	40	4%
Total number of policies	**898**	**100%**

Source: ROARMAP: Policies by continent (2018)

3.7.5 Rights MEtadata for Open archiving (RoMEO)

Run by the Centre for Research Communications at the University of Nottingham, Securing a Hybrid Environment for Research Preservation and Access (SHERPA) is a project partnership of some institutions in the United Kingdom (UK), particularly those in Higher Education, to collaborate on OA projects. One of their projects discussed earlier in this chapter is the OpenDOAR service. Rights MEtadata for Open archiving (RoMEO), is yet another service that is concerned with providing, in one database, publisher's policies regarding the self-archiving of peer-reviewed scholarly journal articles and certain conference series in OA repositories as well as on the web. Popularly known as SHERPA/RoMEO, this searchable database provides a summary of the publishers' policies and uses a colour code to help differentiate publisher's archiving policies. Each publisher is assigned a colour code between four categories of archiving rights as shown in Table 3.2.

Table 3.2: Colour codes of SHERPA/RoMEO

Colour code	Meaning of code
Green	Can archive pre-print and post-print
Blue	Can archive post-print (i.e. final draft post refereeing)
Yellow	Can archive pre-print (i.e. pre-refereeing)
White	Archiving not formally supported

Source: SHERPA: Romeo colours (2018)

The RoMEO database can be searched by country, publisher's name or journal title. Each publisher has a default policy on OA but authors are encouraged to check the journal title as some individual journals may have special permissions, especially if they involve other organisations or have paid OA options (SHERPA/RoMEO: RoMEO Statistics 2018). Authors should consult the SHERPA/RoMEO database (http://www.sherpa.ac.uk/romeo/) before publishing their work on the IR. Publishers' copyright rules should be adhered to, that is, conform to what version of an article can be deposited (post-print or pre-print), when it can be deposited (embargo periods) and any conditions that are attached to that deposit (SHERPA: About RoMEO 2018). Authors can also consult the RoMEO database to select a publisher or journal with favourable OA conditions when considering publishing.

3.7.6 Ranking Web of Repositories

The webometrics ranking of OA repositories, also known as the Web Ranking of Repositories or the Ranking Web of Repositories was developed as an indicator for quantitatively measuring global visibility and impact of the publicly accessible repository content on the web (Aguillo et al. 2010:478). It was designed to promote OA to formal and informal scholarly publications that have been published within IRs and that are discoverable and accessible on the web. A repository that is well ranked is considered in webometrics to be well used, highly visible, and capable of reaching much larger audiences globally than lower ranked repositories. Available on the web address http://repositories.webometrics.info/, this site ranks repositories by country, region and at global level. Three groups of indicators showing: activity related (documents deposited by author, institution, subject), usage related (visits, visitors, downloads), and visibility related (citations and web links) are used to measure and monitor web presence (Aguillo et al. 2010:478).

The Ranking Web of Repositories has been used as an authoritative source of reliable statistical information that accurately reflects web presence and performance of repositories. In this era of electronic technology, usage figures are larger, composition richer, more discriminative but also far more inclusive (Aguillo et al. 2010:478). The Ranking Web of Repositories interestingly provides a solid base for analysing web data which could otherwise be difficult to secure. Institutions and scholars are motivated to improve their web presence to reflect their commitment to OA initiatives.

3.8 Developments in IR use in South African universities

Open access to scholarly communication has become a mainstream concept embraced by a majority of universities in South Africa. Currently, Africa contributes 5% of global repositories, and of these, 22.4% of the repositories are hosted by university libraries in South Africa (OpenDOAR charts: Africa 2018). Over the years, there has been a consistent growth of IRs in South African universities, with 14 IRs having been registered on OpenDOAR by 2009, (van Wyk and Mostert 2014:2 cited Smith 2009), 23 in 2014 (van Wyk and Mostert 2014:2) and currently 26 (OpenDOAR: South Africa 2018). University of Limpopo recently launched its IR, ULSpace, which is not yet recorded on OpenDOAR. Universities, such as UCT, Stellenbosch and UP have more than one repository recorded on OpenDOAR as reflected in Table 3.3 below.

Table 3.3: University repositories in South Africa

Repository name	Num. Recs.	Pubs	Confs	Theses	Unpub	Other	Software
CPUT Electronic Theses and Dissertations Repository	1773			+			DSpace
CUT Institutional Repository	1329			+			DSpace
Digital Knowledge at Cape Peninsula University of Technology	2963			+	+		DSpace
DUT IR	2831			+			DSpace
KovsieScholar	7537			+			DSpace
North-West University Institutional Repository	24620			+			DSpace
OpenUCT	25689			+			DSpace
ResearchSpace@UKZN	13660			+		+	DSpace
Rhodes eResearch Repository	4096		+	+			EPrints
SEALS Digital commons	24643			+		+	VITAL

Stellenbosch University SUNScholar Repository	53004		+	+		+	DSpace
SUNDigital Collections	12891	+				+	DSpace
TUT Digital Open Repository	1733			+			ContentPro
UCT Computer Science Research Document Archive	899	+	+	+	+		EPrints
Unisa Institutional Repository	18163			+	+	+	DSpace
University of Fort Hare Institutional Repository	446			+			DSpace
University of Johannesburg Institutional Repository	26165	+	+	+			VITAL
University of Limpopo	1762			+			DSpace
University of Pretoria Electronic Theses and Dissertations	8774			+			ETD-db
University of the Free State ETD	1280			+			ETD-db
University of the Western Cape Research Repository	2873		+		+		DSpace
University of Zululand Repository	1473			+			DSpace
UPSpace at the University of Pretoria	50305		+	+		+	DSpace
UWC Theses and Dissertations	3949			+			DSpace
VUT DigiResearch	185			+			DSpace
Wits Institutional Repository on DSPACE	17146			+	+		DSpace

Source: OpenDOAR: South Africa, universities (2018)

In terms of the size of the repositories, Stellenbosch has the highest number of items amounting to 53,004 records followed by UP with 50,305. On the contrary, UKZN, being one of the leading research institutions in the country, has uploaded very little content on the IR to showcase its research output. With only 13,660 records, it becomes necessary to investigate IR use at UKZN so that challenges can be identified and strategies mapped.

The most common content loaded on the IRs, as shown in Figure 3.6, is thesis and dissertations. Other content types include, research articles (published, post-prints, pre-prints), published and unpublished conference papers, popular research material, unpublished research, inaugural addresses, historical and archival material, photos, images, video clips and sound clips (OpenDOAR: South Africa - Institutional Repositories, Content type 2018). While other competing institutions have uploaded large amounts of diversified content on their IRs, Figure 1.3 showed that UKZN has mostly concentrated on uploading theses and dissertations. This study seeks to establish why this is so.
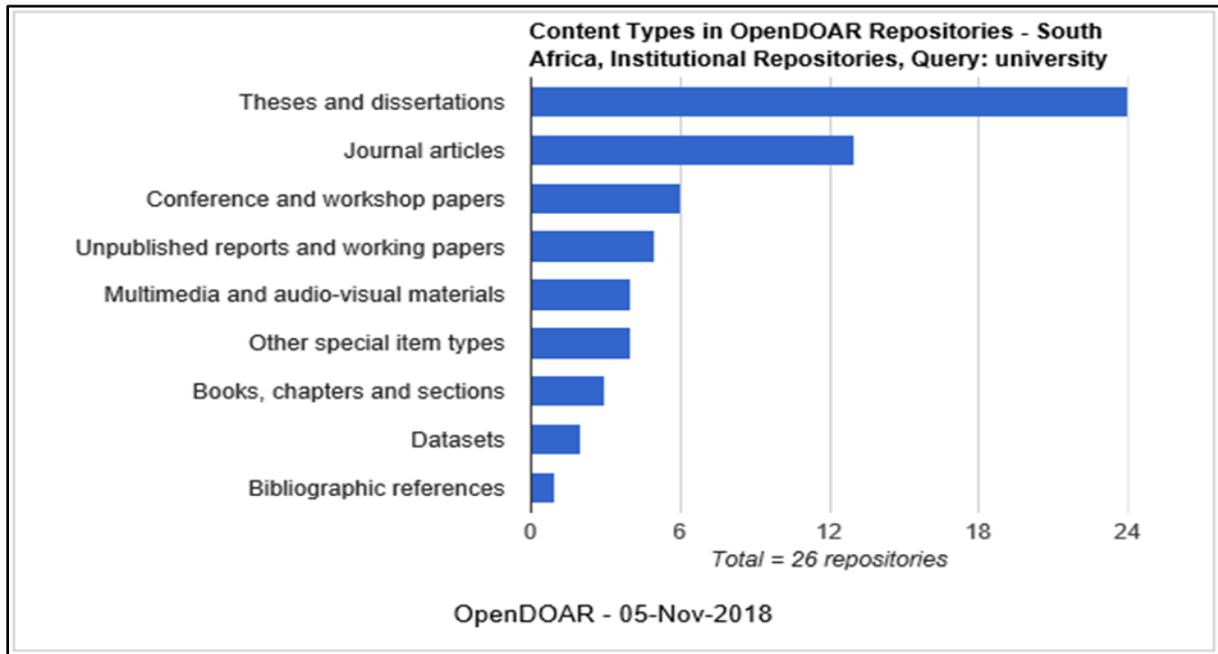
Figure 3.6: Content types in South African university repositories

Source: OpenDOAR: South Africa, Institutional Repositories - Content type (2018)

Eight universities have implemented OA policies to assist in the recruitment of content to their repositories (ROARMAP: South Africa 2018). UP became the first to adopt an OA policy in 2009 followed by UNISA in the same year. University of Stellenbosch and UJ adopted in 2010, UCT in 2011, UWC and UFS in 2014 and CPUT in 2015 (ROARMAP: South Africa 2018). It can be observed that early adopters of OA policies have managed to recruit more diversified content in their repositories. There are some universities with policies that are not recorded on ROARMAP such as Rhodes University and DUT. UKZN does not have a policy recorded on ROARMAP. Besides, from documents reviewed, no policy was found on OA or the IR.

The support and commitment to OA in universities in South Africa has also been witnessed by the signing of the Berlin Declaration. Fifteen universities are signatories of the Berlin Declaration, with Stellenbosch University being the first in 2011. UKZN was also one of the early signatories who signed in 2012, and University of Limpopo being the latest one in 2017 as shown in table 3.4.

Table 3.4: South African universities Berlin Declaration signatories

Date	University	Signatory
26.06.2017	University of Limpopo	N. M. Mokgalong
22.10.2015	Cape Peninsula University of Technology	Azwitevhelwi Prinsloo Nevhutalu
11.02.2014	North-West University	Theuns Eloff
24.10.2013	Rhodes University	Peter Clayton
23.10.2013	University of the Western Cape	Brian O´Connell
21.10.2013	Tshwane University of Technology	Nthabiseng Ogude
20.05.2013	Durban University of Technology	Ahmed Bawa
09.11.2012	University of the Witwatersrand	Loyiso Nongxa
22.10.2012	University of KwaZulu-Natal	Malegapuru W. Makgoba
21.05.2012	University of South Africa	Mandla S. Makhanya
01.11.2011	University of Cape Town	Max Price
24.10.2011	University of the Free State	Jonathan D. Jansen
12.08.2011	University of Pretoria	Stephanie Burton
27.05.2011	University of Johannesburg	Henk Kriek
30.09.2010	Stellenbosch University	Arnold van Zyl

Source: Berlin Declaration: Signatories (2018)

Being the most significant producer of research within the continent, South African universities have also taken the lead in adopting OA practices, particularly the development of IRs. Setting up repositories, adopting OA policies and signing of the Berlin Declaration are positive signs of OA growth. However, when compared with other continents, a lot is still to be done to improve OA adoption, both at institutional and national levels.

3.9 The role of the university in the development of the IR

It is the responsibility of every university to ensure that scholarship produced by its research community is discoverable by, and accessible to, the highest number of people possible worldwide (Armstrong 2014:44). Universities should take a leading role in ensuring dissemination of its knowledge. Lagzian, Abrizah and Wee (2015:198 cited Cullen and Chawner 2012) emphasised that, for any institution, setting up a repository is a major undertaking requiring the commitment of resources to ensure success in both the establishment and maintenance of the repository. As the support for repositories continues to grow,

universities are set to gain more from well-run IRs because they are a hub that provides a permanent record of a full range of research outputs of the institution. Besides, IRs can be seen as advertisement tools for institutions to lure funders, potential new researchers and students (Ibinaiye et al. 2015:3). Thus, institutional commitment and support is vital for successful IR implementation because IRs exist to serve and benefit the institution much more than the individual academic or researcher (Abdullah 2009:32).

Umar and Das (2015:47 cited Suber 2009) proposed tasks that universities as administrators' can undertake to promote self-archiving. Suber recommended that universities should:

- Adopt policies encouraging or requiring academics to fill the institutional archive with their research articles and preprints.
- Adopt a policy in hiring, promotion, and tenure; the university will give due weight to all peer-reviewed publications, regardless of price or medium.
- Adopt a policy: academics who publish articles must either retain copyright, and transfer only the right of first print and electronic publication, or transfer copyright but retain the right of post-print archiving.
- Adopt a policy: all theses and dissertations, upon acceptance, must be made openly accessible, for example, through the IR or one of the multi-institutional OA archives for theses and dissertations.
- Adopt a policy: all conferences hosted at your university will provide OA to their presentations or proceedings, even if the conference also chooses to publish them in a priced journal or book. This is compatible with charging a registration fee for the conference.
- Adopt a policy: all journals hosted or published by your university will either be OA or take steps to be friendlier to OA.
- Consider buying an institutional membership in BioMed Central, or an institutional membership or sponsorship in the Public Library of Science.
- Consider joining the DSpace Federation if your university uses DSpace.
- Sign the Budapest OA Initiative and/or sign the Berlin Declaration on OA to Knowledge. UKZN signed the Berlin Declaration as noted in chapter 1, section 1.3.

Great emphasis is on developing policies because "they provide clear, unambiguous guidelines under which repositories can operate and demonstrate long-term institutional commitment to

ensuring sustainability" (Ibinaiye et al. 2015:7). University policies play a pivotal role on the extent to which academics and the research community are willing to participate in initiatives that promote OA (Abrahams et al. 2008:43). While libraries are seen as important stakeholders in formulating policies (Macha 2012:25 cited Nfila 2007), the university as the administrator enact policies as official principles and directives to be observed by the university community. Adopting policies that promote OA practices is a symbol of the university's commitment to the success of the IR. Studies revealed that a majority of South African universities are struggling with their OA practices because of lack of policies (Czerniewicz and Goodier 2014; Raju, Raju and Claassen 2015). Of the 26 South African university repositories recorded on OpenDOAR (2017), only seven universities, excluding UKZN, have policies recorded on the Registry of Open Access Repository - Mandates and Policies (ROARMAP 2018).

Apart from policies, a study by Lagzian Abrizah and Wee (2015:198 cited Cullen and Chawner 2012) revealed the need for an institution to commit to providing financial and staff resources for successful implementation of IRS. The appointment of personnel with relevant skills and the capacity to partner and work as a team are key drivers in the establishment of IRs (Abrahams et al. 2008; Ibinaiye et al. 2015). Studies by Ezema (2011), and Chalabi and Dahmane (2011) agree that the availability of adequate technological infrastructure is critical; its lack results in failure and has been found to be one of the major obstacles in developing countries. While libraries are responsible for the actual marketing and promotion of OA within an institution, the involvement of, or partnering with the university management in OA activities draws the attention of academics and researchers, who generally shun library events. The signing of the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities by the then UKZN Vice-Chancellor, Professor Malegapuru W. Makgoba was a sign of the university's commitment towards OA. Without management favouring OA initiatives within the university, IRs will remain isolated and experimental (Chalabi and Dahmane 2011:117).

3.10 The role of the library in the development of the IR

The foundational role of academic libraries is to be credible sources of objective scholarly communication that support teaching, learning and research activities of a university. While this core function of providing and supporting access to scholarly content remains, new models of scholarly communication have emerged which place libraries as key role players in the

development of these models of academic publishing and dissemination (Alam 2014:452). Within the university structure, libraries have been singled out as suitable spaces capable of managing OA publishing through IRs (Okhakhu 2015:2 cited Pelizzari 2003). Studies have revealed that academics are reluctant to self-archive their research output without library mediation (Zhang, Boock and Wirth 2015:3). In South Africa, university libraries have taken the responsibility to create, populate and manage repositories (Raju, Raju, Claassen 2015:269), and to bring awareness to OA publishing. Currently, there are 26 repositories managed by academic libraries in universities in South Africa (OpenDOAR: South Africa 2017). As libraries were struggling financially under the business model of publishing, IRs emerged as affordable alternative models of developing library collections, where a university shares "its intellectual wealth with the worldwide community of scholars, allowing all interested readers access to the discoveries and insights produced by its members" (Vos 2015:11 cited Jones, Andrew and McColl 2006). One of the major roles is that academic libraries become strong advocates of OA by maintaining awareness and promoting OA activities within their institution (Mercer 2011:443). Alam (2014:454) concurred that:

"With knowledge of OA, understanding of copyright and licensing, expertise in bibliometrics and applying quality indicators for research quality evaluation, and access to a range of resources and tools, academic librarians are well situated to claim a proactive role in supporting scholarly publishing literacy".

A study conducted by Kassahun and Nsala (2015) on OA awareness revealed that academic librarians in private higher institutions of learning in Botswana were not aware of the concept of OA and this contributed to a low rate of engagement in OA activities. This is a common trait in African institutions (Okhakhu 2015), hence it is important for universities to invest in skilling and training of library staff on OA so that they get to be knowledgeable and become true advocates of OA practices.

Lagzian, Abrizah and Wee (2015:201 cited Mackie 2004) urged librarians to take a proactive role in garnering content for their repositories and work towards a sustainable approach to ensure success. Libraries can assume the mediated deposit model approach or 'do it for them' approach, where they deposit on behalf of the academics and determine the eligibility of content for uploading on the IR (Armstrong 2014:47). Other roles and responsibilities of the academic library in OA publishing as outlined by Bailey (2005) include:

1. Acting as change agents by promoting the IR to academics and graduate students in their subject areas.
2. Preparing web-based and paper documents that explain and promote the IR and advocate scholarly publishing reform.
3. Training users in IR deposit and searching procedures.
4. Helping to identify current self-archiving activity on campus to aid the content recruitment effort.
5. Depositing digital materials for academics in their subject areas if such assistance is desired.
6. Participating in the creation of IR metadata, such as local controlled vocabularies (e.g. subject categories for IR documents).
7. Assisting in designing the IR user interface so that it is clear, easy to use, and effective.
8. Informing academics and graduate students about Creative Commons licensing options and publisher e-print policies.
9. Helping to create sensible IR policies and procedures and to provide feedback about how they work in practice.
10. Assisting local and remote users with IR utilisation, answering questions about IR policies and procedures, and using the IR to answer reference questions (Bailey 2005:266).

Alluding to Bailey's (2005) point on metadata creation, Bjork et al. (2014:5) added that the process of checking of metadata for quality assurance and permissibility of uploaded content are critical responsibilities of the library. Furthermore, adding metadata for OA resources on the university catalogue is necessary for the use and acceptance of OA resources as a normal part of the library's research and educational collection (Rodriguez 2017:271). Armstrong (2014:43) encouraged libraries to connect with academics and help make their published works openly accessible and provide them with publication and usage data. Engeszer and Sarli (2014:406) stressed the need for libraries to equip academics with knowledge on copyright issues.

Promoting the creation, deployment, mobilisation and utilisation of OA resources by users, especially young researchers, academics and students' communities is critical for libraries as they advance OA within universities. Furthermore, libraries can provide their expertise as well as infrastructure to stimulate participation by academics (Ibinaiye et al. 2015:2). Finally, long-

term preservation of the IR content for posterity is yet another important role of the library. Axelsson (2012:12) rightfully commented that:

> "Humankind has for generations left pieces of history behind, either accidentally preserved or on purpose. From the cave paintings of prehistoric man to the latest digital formats. To leave behind a piece of ourselves for future generations to learn from; academically, socially and technically… the research and knowledge of the past and present need to be preserved for subsequent generations of scholars and information seekers".

Thus, preservation of scholarly communication for generations to come is for the betterment of scientific and intellectual advancement.

Accordingly, active participation of the library, through its information and publishing professionals is important because they hold key portfolios in OA infrastructure development (Madalli 2015:52). For effective execution of OA responsibilities, there is need to empower librarians with technical skills, ensure that they develop competencies in handling OA software and have access to continuous OA training programmes. Besides having the technical knowhow, librarians need to articulate a case for why academics should deposit their materials in the repository and explain what they can potentially benefit from doing so. Academics need to be persuaded about the benefits rather than intimidated by the consequences of not contributing to the repository (Lynch and Lippincott 2005:9). Thus, the librarians' attitude and personal actions contribute greatly in shaping OA acceptance by academics; and ultimately the growth of the IR.

3.11 Academics' perceptions and attitude towards IR use

Attitudes and perceptions play a major role in the decision making process, hence their effect on the behavioural intention and actual use of a technology such as OA repositories cannot be underestimated. Surveys have revealed that academics show a positive attitude and seem to agree with the fundamental principles and intentions of OA, yet they tend to misrepresent themselves as exposed by their behaviour of non-compliance to OA practices (Andersson 2016:51). The ratio of willingness to participate does not match the actual work of OA publishing (Xia 2013:119). Although there has been a wide acceptance of IRs' potential to enhance scholarship, there is growing certainty that most IRs remain largely empty, ineffective, or underutilised (Carlson, Ramsey and Kotterman 2010:154 cited Albanese 2009). Globally,

scholarly research output has increased tremendously, but most of it is not finding its way through to the IRs (Rowlands and Nicholas 2005; van Westrienen and Lynch 2005; Davis and Conollay 2007; Abdullah 2009; Bjork et al. 2014). Academics have not participated in self-archiving in large numbers or at the rate that was initially predicted (Zhu 2017:559 cited Willinsky 2010). A majority of the academics have shown little or no motivation in self-archiving, and some have chosen to remain ignorant and are not buying into the importance of IRs. The extent of support and use of OAIR by academics is determined by the volume of content they self-archive. A large percentage of documents in repositories is being deposited by librarians or IR administrative staff (Zhu 2017:559). A number of challenges have been reported in various studies as reasons for academics' non-participation. Lack of OA awareness, copyright concerns, the availability of alternative platforms, individual traits and the perception that OA content is of low quality, were some of the concerns raised.

3.11.1 Lack of OA awareness

Academics' attitude towards OA and their willingness to contribute to repositories are shaped by their level of OA awareness. Awareness is an essential positive condition necessary for the maximum exploitation of OA-related opportunities. Apart from understanding what OA is, academics need to be aware that OA allows greater access to scholarly literature, faster dissemination of new knowledge, greater research impact and increased citation rates (Creaser et al. 2010:147). In many instances, authors have benefited from OA initiatives without knowing this mode of scholarly communication.

Lack of awareness on the existence and potential benefits of OA in scholarly communication has been identified as a major constraint contributing to the slow uptake of OA development (Dulle 2010:63). A report by Wallace (2012 cited in Ware and Mabe 2015:105) on OA adoption in Europe revealed that majority of authors were either ignorant of, or indifferent to, the potential benefits of self-archiving. A recent study evaluating the competitiveness and sustainability of OA publishing in Europe reported that academic awareness of OA remains low, highlighting a significant resistance amongst older researchers (Johnson et al. 2017:49). At a university in India, a study to investigate faculty awareness of IRs and OA publishing revealed a low level of awareness even though academics showed support for OA, given the perceived benefits (Abdelrahman 2017:105 cited Dhanavandan and Tamishchelvan 2013).

Within South African universities, results of a study conducted in 2005 on academics' OA awareness seemed to be notional and limited to knowledge about general concepts rather than detailed knowledge of OA scholarly publishing (De Beer 2005:125). In 2007, a study by Fullard (2007) revealed that South African academics and researchers needed to be fully aware of OA before they could practice self-archiving. However, Creaser et al. (2010:153) cautioned that "levels of OA awareness do not necessarily equate to levels of repository awareness". This is especially true in developed countries where academics and researchers have already been actively involved in OA journal publishing, as well as self-archiving, in subject repositories and on social media platforms. Adequate knowledge about repositories and what kind of material goes into it might be lacking (Creaser et al. 2010:153). Marketing and promotion of OA are key factors in bringing awareness of repositories to academics and researchers. Crissinger (2017:88) advised that "in order to revolutionise the broken scholarly communication ecosystem we currently operate in, we must first inform and engage our own communities". Libraries should conduct advocacy programmes that raise awareness and exhibit the benefits of OA to the academic community (Abdelrahman 2017:104). A full knowledge of OA has the potential to change academics' attitude towards repositories. Institutions that put in efforts "to reach out systematically to their faculty and to understand their faculty needs seem to be more successful in attracting content for their repositories" (Lynch 2005:10).

3.11.2 Copyright concerns

The World Intellectual Property Organisation (WIPO), a UN agency that encourages creativity and promotes the protection of intellectual property, defines copyright as "a legal term used to describe the rights that creators have over their literary and artistic works", ranging from "books, music, paintings, sculpture, and films, to computer programmes, databases, advertisements, maps, and technical drawings" (World Intellectual Property Organisation: Copyright 1967). Within the research and academic scholarly communities, copyright is a tool for protecting intellectual work published in monographs, journals and other scholarly research literature. In many instances, researchers and authors transfer most exclusive rights to publishers to get their work published in highly ranked journals or publish with prestigious publishers', so as to establish a strong research profile. Rights such as "reproduction, reuse, distribution, public performance, translation, public display, and modification of the original work" (Umar and Das 2015:33) are given away. Thus, advocates of OA see copyright "as a

law that prohibits free access to information rather than its true intent of copyright which is to protect the rights of creators or authors over their works" (Madalli 2015:7). Given that most authors transfer these rights to publishers without a full understanding of what they are giving up, restrictions on access to published research is common (Koundouri et al. 2014:14). Institutions lose the right to make public its funded research projects through its academics and researchers'; and now have to negotiate the right from the journal publishers (Christian 2008:39).

Despite the fact that many academics are experts in their disciplines, a majority of them do not fully understand issues such as negotiating copyrights (Armstrong 2014:44). A recent survey on OA carried out by Taylor and Francis, an international academic publisher, asserted the existence of uncertainty regarding copyright amongst authors (Frass, Cross and Gardner 2014). This is affirmed by an analysis of studies on copyright which revealed that copyright and associated use and reuse rights are not well-known and are even misunderstood by academics (Ware and Mabe 2015:77). Several studies have revealed that copyright is a challenge amongst academics:

- Swan and Brown (2005, cited in Abdullah 2009:20) found that, "with only 10% of authors knowing of the SHERPA/RoMEO list of publishers' permissions policy with respect to self-archiving, a substantial proportion of authors were unaware of the possibility of providing OA to their work";
- van Westrienen and Lynch (2005:11) concluded that "it is clear that there is confusion, uncertainty and fear about intellectual property issues" amongst academics in Europe;
- Fullard (2007:43) found that issues of copyright often seem to present difficulties for academics. Fullard explained that academics are so "schooled in viewing copyright as publishers' property that it appears they are not easily able to imagine a different regimen under OA".
- Morris (2006 cited in Ware and Mabe 2015:77) found that "authors underestimate what they could do with pre-publication versions (e.g. self-archiving, use in course packs, provide copies to colleagues) while overestimating what publishers' policies allowed them to do with the published version";
- Creaser et al. (2010) reported that academics were ignorant of their intellectual property rights; and those of the publishers.

- Cullen and Chawner (2011 cited in Björk 2014:9) found that academics believed that the copyright policies of the publishers prevented them from self-archiving.

Authors, however, need to be aware that considerable work has already been done "on copyright in association with the use of repositories to enhance the OA for research outputs, especially published articles" (Abdullah 2009:31). The Sherpa/RoMEO database for example, is an OA support tool developed to provide authors with information regarding publishers self-archiving policies as well as the permissions they grant to authors to disseminate different versions of a published article (Creaser et al. 2010:157). In over 90% of cases, the publisher expressly permits an author to self-archive their own final draft (Swan and Brown 2005:3). As of November 2017, the Sherpa/RoMEO database had 41% of publishers allowing archiving of both pre-print and post-print, 33% allowing only post-print or final draft, and 6% allowing only pre-print; summing up to 80% of publishers formally allowing some form of self-archiving (SHERPA/RoMEO: RoMEO Statistics 2017). Authors are therefore encouraged to check the OA policy of the selected journal title before considering publishing. The UKZN IR page provides links to Sherpa/RoMEO and Sherpa/Juliet – a database with information on funders' policies and their requirements on OA; which academics and researchers can easily and quickly consult.

Besides the Sherpa/RoMEO, the SPARC Author's Addendum is yet another legal tool that modifies the publisher's agreement and allows authors to keep key rights to their articles (SPARC: Author Rights: Using the SPARC Author Addendum 2017). In essence, it allows the author to transfer copyright while holding back crucial rights such as rights of distribution which will allow online publishing on author webpages, social media platforms like ResearchGate and on institutional or subject repositories. Developed by SPARC in partnership with Creative Commons and Science Commons, the Author Addendum is a free resource that authors can use to supplement the actual Publication Agreement. Regarding author's retention rights, the agreement form states that:

> *"*Notwithstanding any terms in the Publication Agreement to the contrary, AUTHOR and PUBLISHER agree that in addition to any rights under copyright retained by Author in the Publication Agreement, Author retains: (i) the rights to reproduce, to distribute, to publicly perform, and to publicly display the Article in any medium for non-commercial purposes; (ii) the right to prepare derivative works from the Article;

and (iii) the right to authorize others to make any non-commercial use of the Article so long as Author receives credit as author and the journal in which the Article has been published is cited as the source of first publication of the Article. For example, Author may make and distribute copies in the course of teaching and research and may post the Article on personal or institutional Web sites and in other open-access digital repositories (Sparcopen: access reuse addendum 2016).

Creating an awareness of such tools reduces copyright fears amongst authors and may improve faculty use of IRs. Within the African continent, copyright was found to be one of the major obstacles hampering the success of IRs (Swan, Willmers and King 2014:5). Instituting advocacy and timeous education plans can help repositories to thrive.

3.11.3 The availability of alternative platforms

The Internet technology has brought diversified opportunities that allow academics and researchers to quickly and easily distribute their research output to a potential wide audience online. Lupton (2014:7) commented that "new digital technologies offer great potential for sharing and disseminating academic scholarship far more widely and rapidly than ever before". This allowed for greater transformation of knowledge in ways that authors could not anticipate or approve. Social media networks are being used for purposes related to research; from identifying research opportunities to disseminating research results (Nandez and Borrego 2013:782). Networking tools such as ResearchGate, Academia.edu, Mendeley and LinkedIn are used by academics and researchers to make connections and strengthen existing ones, keep up to date with topics in their field of research, promote their own scholarly work, share and request for information from other researchers, seek collaborations and communicate current research studies among other uses (Nandez and Borrego 2013; Lupton 2014; Rugut 2015). Furthermore, social media, such as Facebook, Pinterest, Youtube, twitter and blogs are used by a majority of academics to reach their audience (Rugut 2015:12). A study by Nandez and Borrego (2013) evaluating the use of social media by academics showed that a majority of them used social media as a tool for citation indexes, document creation and following other researchers' activities (Nandez and Borrego 2013:789). Twitter, for example, is used by academics for citation practices. One author evaluated the impact of tweeting about her own research and found that doing so had a significant impact on how many views her published articles received and this would happen within a week of the article's publication (Lupton

2014:6 cited Terras 2012), which is a much faster response compared to the traditional academic citation practices.

Besides social media platforms, academics are also using author web pages and disciplinary repositories to share their work. Abdullah (2009:20) reported on a study by Davis and Connolly (2007) on the use of the Cornell University IR. It was established that the university IR was not sufficiently used by faculty and did not have as much content compared to the research output of the institution. It was further revealed that "faculty had little knowledge of and little motivation to use the IR as the majority of them had alternatives such as webpages and disciplinary repositories to archive their work" (Abdullah 2009:21). Foster and Gibbons (2005) examined the difficulty of recruiting content for the IR at the University of Rochester and found a disconnect between the needs of the faculty and the services that were offered by their IR. In a similar study conducted by Davis and Connolly (2007), academics indicated that they had little incentive to use the IR because their needs were met through personal websites and disciplinary repositories. The use of author web pages and disciplinary or subject repositories is prevalent amongst many academics and researchers. A survey conducted by Ware and Mabe (2015:156) revealed that subject repositories like PubMed Central and arXiv remain more attractive to researchers, both as authors and readers. Kim (2010) studied academics' use of IRs in sixteen universities in the United States of America (USA) and reported that 70% of respondents had made research material publicly available via the Internet, 66% had used personal web pages, 51% research group websites, 41% departmental websites, 28% disciplinary repositories and 22% IRs (Bjork et al. 2014:14). One international survey on research dissemination (Bjork et al. 2014:14 cited Gadd et al. 2003) found that 72% of authors deposited their papers on their own web pages, 37% in a subject repository, 15% in an IR and 11 % on other websites.

The use of IRs remains of limited interest to much of the scholarly community because of alternative competing platforms, which are meeting their basic research needs and raising their research profiles. However, although these new technologies have exhibited attractive features, most of them are unsystematic, unstructured, and unstable, and are not designed for posterity. IRs collect only intellectual output of an institution and record it in a form that can be preserved and exploited (Yeates 2003:96). IR content is exclusively scholarly, in digital form, specific to an institution, cumulative and perpetual and available for OA (Shearer 2004:2-3). These

features make the IR unique, and therefore make it the best technology academics should embrace in disseminating their work.

3.11.4 Individual traits

Studies have revealed that individual traits or characteristics determine the self-archiving behaviour of academics (Abdullah 2009; Dulle 2010; Kim 2010, Kim 2011; Bjork et al. 2014; Lwoga and Quester 2014). Characteristics such as rank in faculty, the number of publications, technical skills and age, impact on an individual's willingness to perform OA practices such as self-archiving (Dulle 2010; Kim 2011; Bjork et al. 2014; Lwoga and Questier 2014).

The most commonly identified characteristic relating to OA failure is attributed towards technical skills. The ever evolving computer technologies have a bearing on individual's computer literacy and keeping up proves to be a challenge for many. OA, which requires one's ability to deposit, search and retrieve content online become compromised. A study by Rugut (2015) to determine OA adoption by academics in selected universities in Kenya found that one of the main reasons for failure to use OA outlets was due to lack of adequate skills to publish in OA outlets (Rugut 2015:50). Abdullah (2009:20 cited Swan and Brown 2005) reported that authors' reluctance to self-archive their work was due to the technical difficulties in carrying out the activity. In his analysis of OA scholarly publishing in Tanzanian universities, Dulle (2010:177) stated that about 61% of the academics agreed to lacking adequate skills for OA publishing. Kim (2010) studied the motivations and barriers for author self-archiving and found that one of the significant factors influencing self-archiving behaviour among authors included technical skills.

Apart from technical skills, Swan and Brown (2005:71) outlined that the more the number of publications an author has, the more likely the author engages in self-archiving practices. This was however refuted by Kim (2010:1915) who found no obvious linear trend in the relationship between the number of publications and self-archiving in IRs. Although Kim (2010) argued that the number of publications was not associated with self-archiving, his study focused on the number of publications per year, while Swan and Brown (2005) were not time specific, but generally noted that "it is likely that as a greater number of the most productive authors become aware of self-archiving, the number of articles in OA repositories will rise quite steeply". This observation is true because it has become a common phenomenon for prolific authors, who

have become aware of the benefits of self-archiving, to deposit their research output in IRs and other OA platforms.

Venkatesh et al. (2003) theorised that age significantly moderates a person's behavioural intention to use a technology; younger workers are found to be more likely to use a technology (Venkatesh et al. 2003:467) while older adults have difficulty in adapting to new technological changes (Czaja and Lee 2007:341). In contrast, Zhu (2017:572) found that age and seniority of academics had significant effects on OA publishing, suggesting that these academics were likely to embrace self-archiving because they had produced more than upcoming researchers. As younger researchers can easily adapt to technology, awareness and training needs on self-archiving should focus more on older academics, specifically because of their age, in relationship to technology adoption, and more so because of how much they have published. However, placing all dissemination responsibilities on faculty can limit the growth of IRs (Armstrong 2014:44).

3.11.5 Quality of IR content

A university's IR is characterised by exhibiting intellectual products created by its research community. This includes theses and dissertations, articles published in scientific journals, conference proceedings, classroom teaching materials, the university's annual reports, video recordings, computer programmes, data sets, photographs, art works and 'virtually any digital material' that the institution wishes to preserve (Crow 2002:4). The fact that an institution is at liberty to publish any digital material on their IR has left many scholars sceptical about online scholarship, particularly the quality of OA repositories, as some of the IR content have not gone through evaluations such as peer review (Bankier and Perciali 2008:23). Scholarly communication, which has not been subjected to peer review and lacking recognised means of attribution, is not trusted by academics (Ware and Mabe 2015:8). From an author's perspective, the traditional peer-reviewing of scholarly work has been the best, tried-and-tested method to organise scholarship and to create academic value. The IRs are perceived to be of low quality and academics fear jeopardising their integrity by publishing in them (Dulle 2010:63 cited Fang and Zhu 2006).

Authors, however, have to remember that the institution's repository serves as the major qualitative filter and a significant indicator of the institution's academic quality (Crow 2002:4).

The traditional publishing model is a closed system that does not display the quality, and more so the quantity, of research done by a university. Grey literature, though not formally refereed, constitutes a huge amount of a university's important research output, yet it does not reach the formal publishing industry (Correia and Teixeria 2005:354). Peer-reviewed journals are a snippet of what a university produces. IRs encompass all, giving a full picture of the research output, the locus in which a university's intellectual production is collected, stored and distributed (Vos 2015:9). In fact, OA promotes quality research. A university's research output is open for evaluation by the global community because it has been made visible and accessible online (Ghosh and Kumar 2007:248). Openness is a sign of integrity that researchers should embrace to advance meaningful research and avoid re-inventing the wheel.

Researchers are reminded that OA has never been about bypassing peer review but essentially to remove barriers to access, and not quality, filters (Iton and Iton 2016:26 cited Suber 2009). The Budapest Open Access Initiative (2002) explicitly states that "OA to peer-reviewed journal literature is the goal". About 33% of publishers registered with Sherpa/RoMEO allow authors to self-archive post-prints (Sherpa/RoMEO: RoMEO Statistics 2017), which are final peer-reviewed drafts. Besides, "theses and dissertations in OA repositories pass through rigorous review process and therefore any claim to the contrary may not necessarily always be true" (Dulle 2010:64).

Apart from the major aforementioned reasons, Abdullah (2009:20) found that faculty members were discouraged because they perceived depositing as additional work which would require them to create metadata records for contributed works. Libraries need to be clear to academics on what their responsibilities are in OA publishing. Populating the IR has been a library task in many institutions. Finally, the development of IRs is a capital intensive project requiring functional and flexible technological infrastructure to build on. Inadequate technological infrastructure has been cited as a hindrance to OA adoption, especially in developing countries (Dulle 2010:68). Unstable internet connections, poor electricity supply, lack adequate computer equipment and appropriate software (Okhakhu: 2015:5-6), are some of the major challenges that have been revealed. While this remains a major obstacle in some countries, infrastructure development has improved in some developing countries including South Africa.

3.12 Factors contributing to increased rates of IR deposit

Literature has identified various factors as motivators of OA adoption and a number of them have been highlighted earlier in this chapter. Management's financial and human resource support, as well as policy implementations; library interventions in bringing OA awareness to academics and the availability of infrastructure are some of the aspects mentioned earlier. This section will discuss in greater detail: policies, incentives (Tapfuma 2016:140 cited Jain 2010), value-added services (Zhang, Boock and Wirth 2015:3) and promotional efforts as some of the factors influencing increased use of IRs.

3.12.1 OA policies

Research funder policies were identified as the most important factor in creating an environment for OA (Axelsson 2012:11). Johnson et al. (2017:4) observed that "OA had made progress where research funders had issued firm mandates in the public interest." Ware and Mabe (2015:11) acknowledged the role played by research funders in increasing the dissemination of scholarly communication through enforcing mandates for OA. The authors explained that:

> "OA entered the policy agenda with the 2003 Berlin Declaration, which is now supported by 580 institutions across Europe. Today, there are at least 71 OA policies from research funders in Europe, whose ostensible focus is to support a transition from paid access to OA".

The USA National Institutes of Health introduced an OA policy in 2004 encouraging researchers to deposit its funded research manuscripts in the PubMed Central repository, but because deposits were very low, a firm mandate was implemented in 2008 requiring researchers to deposit research within 12 months of publication (Ware and Mabe 2015 :109). It was until then that the policy received much attention. In 2012, the United Kingdom (UK) government made a clear shift in policy in favour of OA, stating that the "principle that the results of research that has been publicly funded should be freely accessible in the public domain is a compelling one, and fundamentally unanswerable" (Ware and Mabe 2015:89). Unlike the western counterparts, Zhong and Jiang (2016:740) reported a lack of government policy support and recognition as reasons slowing down IR development in China. Czerniewicz and Goodier (2014:8) lamented the absence of a national OA policy in South Africa as a hindrance to the development, growth and availability of local research to the global

community. The passing of the OA statement in 2015 by the NRF of South Africa, gave some hope of increased IR deposits within institutions in South Africa. In the statement, NRF mandated that:

> "From 01 March 2015, authors of research papers generated from research, either fully or partially funded by NRF, when submitting and publishing in academic journals, should deposit their final peer-reviewed manuscripts that have been accepted by the journals, to the administering Institution Repository with an embargo period of no more than 12 months" (NRF: Statement on Open Access to Research Publications from the National Research Foundation (NRF)-Funded Research 2018).

NRF is one of the biggest research funders supporting universities and research institutions in South Africa. At UKZN, for example, over 80% of research published between 2005 and 2017 was funded by NRF (Web of Science: Data citation index 2018). As an agent that has funded a lot of research in South Africa, access to local research is expected to improve immensely. However, the effectiveness of the NRF mandate is yet to be investigated. Zhang, Boock and Wirth (2015:9) advised that the passing of OA policies alone is not a guarantee that academics will deposit, there is need to implement effective mechanisms to monitor policy compliance (Johnson et al. 2017:8). Regrettably, monitoring and enforcement of OA policies tend to be given a low priority (Ware and Mabe 2015:110). Ratanya (2017:279 cited Kelly 2015) advised that "policies for library publishing in an IR require monitoring, to make sure they are providing the highest quality services for faculty and staff publishing material in the IR." A handful of universities have developed policies on OA in South Africa, but literature has not reported on the effectiveness of such policies and how non-compliance is being dealt with.

Strong OA policies have been found to have a positive effect on IR deposits (Zhang, Boock and Wirth 2015:3 cited Gargouri et al. 2012). Without a mandatory policy, academics' intellectual consciousness of sharing human knowledge is weak (Zhong and Jiang 2016:740-743). Although mandates are seen as somewhat slow in recruiting content, they are an effective mechanism that ensures IR development (Tapfuma 2016:144 cited Mercer, Rosenblum and Emmett 2007).

3.12.2 Incentives

Zhang, Boock and Wirth (2015:3 cited Xia et al. 2012) suggested that the passing of a policy on its own does not change faculty attitudes regarding OA practices. Tapfuma (2016:144 cited Jantz and Wilson 2007) concurred that "a university mandate void of 'incentive structures' is bound to fail". In one study, academics themselves vouched that a university mandate without proper incentive structures will not be successful in attracting faculty to deposit their research output (Jantz and Wilson 2008:193). In this regard, institutional mandates, along with incentives linked to OA productivity, would encourage authors to deposit in OA repositories. OA policy needs to reward faculty who deposit their research output in an OA repository as part of the tenure process. Academics are not motivated to contribute their scholarly output in IRs in the absence of incentives, especially if they can get incentives from other platforms or publishing houses (Ratanya 2017:279). While easy online access, dissemination and exposure to global research are primary OA incentives, prizes, gifts, financial rewards and professional recognition are necessary incentives to boost the morale of individual academics. An analysis by Harnad et al. (2004:314) revealed that universities and funder incentives have the potential to induce about 61% of academic authors who have not started self-archiving to consider doing so.

3.12.3 Value-added services

Value-added services such as downloading of usage statistics (Zhang, Boock and Wirth 2015:3) can also be used as one of the motivating factors in improving IR deposits by academics. Librarians can extract citation statistics of OA research output so that academics can assess the impact of their research within a particular subject field. Ibinaiye et al. (2015:17 cited Salo 2008) expressed that:

> "useful statistics system … must count accesses per author and per collection as well as per item and per file, and must provide information about these accesses over defined periods of time. It should track referring links and reader locations as well, so that authors can watch their work spread and participate in online conversations about it".

Antelman (2004:373) admit that citations cannot in themselves be said to measure research impact, but "citedness is a measure that is commonly relied on as a surrogate for such impact".

3.12.4 OA promotion

Libraries have the capacity to influence academics' use of OA repositories through marketing. OA promotions entail publicising the existence of the movement and bringing an awareness of the IR within a university community. Conducting promotional programmes continuously is necessary as universities employ new academics who may not be aware of OA publishing. In promoting OA, academic libraries can record OA content in their public catalogues, collaborate with their parent institutions in establishing IRs, participate in institutional initiatives to encourage faculties to deposit their research outputs in the institution's repository, and become active OA journal publishers (Kassahun and Nsala 2015:4 cited Cryler and Colline 2011). Some libraries are conducting training workshops, distributing fliers (Ukwoma and Okafor 2017:50); recommending OA resources to library patrons, encouraging academics to practice OA via emails and notice boards (Kassahun and Nsala 2015:8); taking over academic responsibility for copyright clearance, metadata creation, and submission of materials on the IR (Engeszer and Sarli 2014:5); maintaining scholarly communication websites and advocating through university governance and administrative channels to shape discussions of OA policies (Engeszer and Sarli 2014:3 cited Rosenblum 2010). Others are engaging faculty in serious dialogue to understand their faculty research culture and the state of publishing in their fields, establishing their knowledge about OA publishing, their rights and privileges as authors; how they perceive digital preservation of their scholarship, and also bringing an awareness of the risks, rewards and responsibilities of OA (Ramsey 2014:2-3). In addition, libraries across the globe celebrate the International Open Access Week annually in the month of October. This is an opportunity for libraries to promote OA publishing amongst their academics, researchers, authors, Masters and Doctoral students. OA has made librarians natural advocates for promoting greater access to scholarly information because fundamentally, the mission of any library is to connect its clients with information, which is the goal of OA (Engeszer and Sarli 2014:2).

3.13 Summary of the chapter

The purpose of this chapter was to review literature on OA and particularly OAIRs. A historical background on humanity's need to access information formed the basis of the chapter. Within the scholarly communication publishing, there were a sequence of events, such as the serial crisis, the big deals and global financial crises suffered by libraries that compelled the shift to OA. A series of OA initiatives by advocates of the movement, which included the Budapest

Open Access Initiative, the Bethesda Statement on Open Access Publishing and the Berlin Declaration of 2003 were also backing OA. The emergence of IRs came as a solution to access the once inaccessible research literature that was available under the subscription model plus grey literature. IRs were defined as important assets of universities because of their ability to capture, preserve and disseminate intellectual output of a university community to the world. IRs increase visibility and accessibility to global scholarly information, improve a university's research impact, improve sharing of scholarly material, expands the range of knowledge shared and preserves scholarly research output.

The first research question of this study sought to outline developments in IRs. Globally, though at different rates, IRs have continued to grow as reflected by statistics of the number of repositories worldwide and also the diversity and number of content items loaded on IRs. To a greater extent, this growth is propelled by enabling online tools such as free open source software: DSpace and OA aggregators like OpenDOAR. A review of studies has shown differences in OA adoption between developed and developing countries; observed to be emanating from cultural and financial differences. The aim of the second research question was to identify the roles of the university in developing IRs. A university's financial support to secure infrastructure and personnel with relevant skills, among other resources, is critical. A commitment to support OA initiatives, working hand in hand with the library, developing policies that favour OA and incentivising academics for practising self-archiving are some of the roles a university can assume. Roles of the library in the development of IRs were discussed in various studies, with many agreeing that libraries should host IRs, conduct IR awareness to academics and deposit on behalf of the academics. Literature does not seem to give much attention to whether or not librarians are willing to take this new role as this requires new skills and knowledge, which they did not acquire during their training. A negative attitude portrayed by librarians discourages the growth of IRs, hence management need to commit to skilling and preparing the library staff for this new role. Literature discussing academics attitude and perceptions towards IRs has revealed that academics agree with the intentions of OA but their participation on self-archiving is low because they are not fully aware of OA and IRs, there are concerns about copyright, some already share their research output using other platforms and some do not trust IRs. To improve deposits, it is necessary that these academic concerns are addressed. Libraries should engage academics in OA activities and ensure that they receive adequate knowledge about OA and IRs. Continuous promotion and marketing is necessary to

ensure that even new faculty members become aware of OA and IRs. Besides, institutions should motivate academics by giving them incentives for self-archiving and invest in human and financial resources to implement and maintain viable repositories. Overall, acceptance and use of IRs does not only relate to academics, it also requires university management and the library to commit for the same cause.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

The research methodology outlines, in an organised way, how research questions are answered through the application of scientific procedures (Kothari 2004:2). It is a "rigorous, controlled, systematic, valid and verifiable, empirical and critical" process (Kumar 2005:7), which clearly and precisely describes what was done to answer the research questions, how it was done, providing reasons why specific procedures were chosen and explaining how results were analysed (Kallet 2004:1229). These processes are presented in the research paradigm, research methods, research design, population of the study, sampling procedures, data collection methods and data analysis processes. Ethical considerations and a summary of the study are also presented in this chapter.

4.2 Research paradigm

Introduced by Thomas Kuhn (1962) in the book *The structure of scientific revolutions*, paradigms have become a central concept in scholarly work. The author described paradigms as associated "with a set of beliefs, values and assumptions that a community of researchers has in common regarding the nature and conduct of research" (Kuhn 1970:175). In other terms, paradigms are philosophical views formulated into laws and are designed to guide social science researchers on how research should be conducted. They inherently reflect our beliefs about the world we live in and the one we want to live in (Street 1992:15 cited Lather 1985). They reflect opinions and guide the decisions researchers make (Tashakkori and Teddlie 1998:23). They influence what should be studied, how research should be done and how results should be interpreted by researchers of a particular discipline (Armitage 2007:1 cited Bryman 2004:453). Finally, they serve as a frame of reference through which to observe and understand (Babbie 2013:57). Researchers are forced to conduct research following a particular pattern, structure or framework and come up with results that could otherwise be unimaginable (Kuhn 1962:24). A variety of research paradigms exist to guide studies in different disciplines. According to Wisker (2008:68) there are two dominant research paradigms, namely positivism and interpretivism, which are associated with social science research.

4.2.1 Positivist paradigm

Positivism claims that all genuine knowledge is based on sense experience and can be advanced only by means of observation and experiment (Cohen, Manion and Morrison 2007:9). Positivists believe that behaviour is caused or initiated by something, which if understood, could be applied to explain and predict human behaviour (Vosloo 2014:304 cited Livesey 2011). Positivistic thinkers adopt scientific methods and systematise the knowledge generation process with the help of quantification to enhance precision in the description of parameters and the relationships among them (Thomas 2010:294 cited Henning, van Rensburg and Smit 2004). Characteristics of positivist research include an emphasis on scientific research, observation and description of phenomena, discovery of causal laws, presentation of hypotheses and inferential statistics to test hypotheses, quantifiable observations, statistical analysis, verification, replication and generalisable findings (Ponterotto 2005:128; Neumann 2011:81; Owolabi 2016:68 cited Blaikie 2007). Positivistic inquiries aim to provide explanations that lead to prediction and control of phenomena (Ponterotto 2005:128). Such studies favour quantitative methods that can be presented in mathematical formulas to express functional relationships between variables (Ponterotto 2005:128). Positivist researchers adopt a distant, detached, neutral and non-interactive position during the research but they exercise control over participants (Morris 2006:3).

4.2.2 Interpretive paradigm

Developed based on the critique of positivism, interpretivism assumes that knowledge and meaning are acts of interpretation (Ponterotto 2005:128). Interpretivists believe that reality is constructed in the mind of the individual, rather than it being an externally singular entity that can be observed (Ponterotto 2005:129 cited Hansen 2004). Actual meanings of behaviour are hidden and must be brought to surface through deep reflection stimulated by the interactive researcher–participant dialogue (Ponterotto 2005:129 cited Hansen 2004). Studies are conducted with participants in their natural environments. This presents an opportunity to understand how people define and interpret their situations and how they construct realities within different social contexts (Machimbidza 2016:98 cited Livesey 2006). This paradigm collects information by observing events and constructing the meaning of that information by drawing inferences or by judging the match between the information and some abstract pattern (Thomas 2010:296 cited Aikenhead 1997). Interpretivistic views tend to show a preference for methods which do not only produce facts, but analyse and describe the meaning of the social world (Mugwisi 2013:151 cited Gephart 1999). Observations and interviews are the key data

collection methods for interpretive studies (Owolabi 2016:106 cited Cohen 2008), and these lean towards the collection of qualitative data (Creswell 2014:99).

4.2.3 Post-positivist paradigm

Bridging the gap between the positivist-interpretivist divide was the post-positivist approach which conveyed a much greater openness to different methodological approaches, including both qualitative and quantitative methods. As stated by Creswell (2014:7), "we cannot be positive about our claims of knowledge when studying the behaviour and actions of humans". Within the post-positivist framework "reality is multiple, subjective, and mentally constructed by individuals" (Crossan 2003:54). Post-positivists believe that research is a process of logically related steps drawing multiple perspectives from participants rather than a single reality (Creswell 2014:20). Strictly speaking, neither a quantitative nor qualitative approach can fully explore every social behaviour. Although emphasis is on quantitative methods (Teddlie and Tashakkori 2009:5), the flexibility of the paradigm allows for the development of alternative research strategies (Glicken 2003:28). Most post-positivist studies are theory-driven and mainly concerned with testing or verifying theories, rather than developing them (Creswell 2014:7; Muchaonyerwa 2016:16 cited Wildemuth 1993). The paradigm is characterised by being "reductionistic, logical, empirical, cause-and-effect oriented, and deterministic based on priori theories" (Creswell 2014:24). In addition, "developing numeric measures of observations and studying behaviour is paramount" (Creswell 2014:7) for such studies.

This study adopted the post-positivist paradigm to assess the development of UKZN's IR as well as to evaluate extent of use by academics at the UKZN. Pragmatism, which adopts the philosophy of integrating qualitative-quantitative methods, was found suitable to inform this study because it is oriented towards solving practical problems rather than on assumptions about the nature of knowledge (Feilzer 2010:8). The pragmatist paradigm places the research problem as central and applies all approaches to understanding the problem (Creswell 2014:10). Studies are not constrained by the prescriptive nature of post-positivism and constructivism. Rather, they adopt 'what works' tactics, which gives the researcher the flexibility of selecting methods, techniques and procedures to address questions that do not sit comfortably within a wholly quantitative or qualitative approach (Armitage 2007:3). Quantitative and qualitative data is drawn in a single study and is integrated at different stages in the research process (Creswell 2014:4). As a result, advantages of both methods are presented in one study which highlights the significant contributions of each method in the

study. Besides, "the quality of a study can be improved when the biases, limitations, and weaknesses of a method following an approach counterbalance each other" (Fidel 2008:265).

Pragmatism was chosen because its fundamental principles are well suited to the analysis of problem solving which is the goal of this study that seeks to establish the reasons why OA has not been fully embraced at UKZN, and further to propose strategies to improve adoption. Creswell (2014:7) concurs that problems studied using the pragmatic paradigm reflect a need to identify and assess the causes that influence outcomes. The intention of pragmatic studies is to relieve and benefit the condition of man by enabling them to cope more successfully with the physical environment and with each other (Pansiri 2005:196 cited Rorty 1991); a stance that fully aligns with the motive of this study. Therefore, both quantitative and qualitative approaches were adopted in this study to gain a fuller picture of the research problem so that practical solutions to multifaceted research problems can be yielded (Johnson and Onwuegbuzie 2004:17).

4.3 Research methods

Research methods revolve around two major approaches: quantitative and qualitative. The quantitative approach, rooted in the positivism paradigm, is credited as the oldest approach that has made a significant impact in the foundations of social science research (Locke, Silverman and Spirduso 2010:124). Quantitative studies are structured, focusing on strict quantification of data and careful control of empirical variables (Ponterotto 2005:128). It identifies general patterns and relationships among variables, often incorporates large-scale sampling, tests hypotheses and theories in order to make predictions, uses statistical procedures to examine group means and variances and stresses the measurement and analysis of causal or correlational relationships between variables (Ponterotto 2005:128).

On the other hand, qualitative methods, which emerged from the interpretivist paradigm, have their historic origins from anthropology, sociology and the humanities (Creswell 2014:13). Their purpose is primarily to "describe and interpret the experiences of research participants in a context-specific setting" (Ponterotto 2005:128 cited Denzin and Lincoln 2000). This means qualitative researchers have to be "inextricably immersed in the research" (Darlington and Scott 2002:18). Data is gathered using unstructured methods and participants' own words are used to describe a psychological event, experience, or phenomenon (Ponterotto 2005:128 cited

Taylor and Bogdan 1998). Emphasis is on words in the collection and analysis of data (Machimbidza 2016:100 cited Bryman 2001).

Overall, the basic distinct feature between quantitative and qualitative is that the former is framed in terms of numbers obtained using close-ended questions while the latter focuses on interpreting words gathered through open-ended questions.

A third methodological movement, the mixed method approach, emerged to serve researchers from limiting themselves to either a quantitative or qualitative approach (Tashakkori and Teddlie 1998:43). A mixed method is "a type of research design where qualitative and quantitative approaches are used in the types of questions, research methods, data collection and analysis procedures and/or inferences" (Tashakkori and Teddlie 2003:711). Creswell et al. (2003:212) further clarifies that these methods are used concurrently or sequentially in one study. The history of mixed methods show that it has been systematically developing, being identified in old literature as cross-method triangulation (Denzin 1970, Jick 1979); interrelating qualitative and quantitative data (Fielding and Fielding 1986). Later, names such as multi-methodology research (Hugentobler, Israel and Schurman 1992), integrating qualitative and quantitative methods (Steckler et al. 1992) and multi-method study (Snow and Thomas 1994) emerged, and were eventually superseded by the term mixed methods as coined by Tashakkori and Teddlie (2003) and Creswell et al. (2003). The goal of mixed methods is to draw the strengths of quantitative and qualitative methods in one study and minimise any possible weaknesses (Johnson and Onwuegbuzie 2004:14). It encompasses approaches from both methods as reflected in Table 4.1, giving a more holistic picture of the phenomenon under study.

Table 4.1: Characteristics of research methods

Quantitative methods	Mixed methods	Qualitative methods
Pre-determined	Both predetermined and emerging methods	Emerging methods
Instrument based questions	Both open - and closed - ended questions	Open-ended questions
Performance data, attitude data, observational data, and census data	Multiple forms of data drawing on all possibilities	Interview data, observation data, document data, and audio-visual data
Statistical analysis	Statistical and text analysis	Text and image analysis
Statistical interpretation	Across databases interpretation	Themes, patterns interpretation

Source: Creswell (2014:17)

This study adopted the mixed methods approach which is often linked with the pragmatic paradigm (Teddlie and Tashakkori 1998:29). This method was chosen because it bases knowledge claims on pragmatic grounds, which focus on employing strategies that best address the research problem (Pansiri 2005:197 cited Creswell 2003). It's flexibility in selecting methods, techniques and procedures of research, helps the researcher to find out what s/he wants to know. Denscombe (2008:279) explained that the aim of combining quantitative and qualitative methods is to get more accurate results and not to explore the complexities and contradictions. Thus, the researcher was motivated to use this method to broaden the scope and range of data, giving a fuller picture of the study and improving understanding of relationships between variables. While both methods were employed to collect quantitative and qualitative data, quantitative methods were used mainly to collect data on use of the IR by academics while qualitative methods were predominantly used to collect data on the development of the IR.

A number of studies employed the mixed method approach to investigate OA adoption by academics and researchers. Dulle (2010) conducted an analysis of OA scholarly communication in Tanzanian public universities. Data from questionnaires, interviews and documents were triangulated. Creaser et al. (2010) investigated authors' awareness and attitudes toward OA repositories. Quantitative and qualitative methods of data analysis were

used to interpret data obtained from a web-based survey and focus groups discussions that were conducted with academics across Europe. Mutwiri (2014) employed open-ended and close-ended questions to gather quantitative and qualitative data on the challenges facing academics in adopting OA outlets for disseminating research findings in selected university libraries in Kenya. Fox and Hanlon (2015) explored the barriers to OA uptake by researchers in Africa. Data obtained from secondary sources such as OpenDOAR, and the ranking web of repositories was analysed using quantitative methods while OA foundation documents such as the BOAI, Bethesda Statement on OA publishing and the Berlin Declaration on OA were analysed using thematic analysis. Tapfuma (2016) combined quantitative and qualitative methods to investigate the utilisation of OA institutional repositories in Zimbabwe's public universities using questionnaires, interviews and documents. These studies reflect that mixed methods is gaining popularity and has greatly influenced research in modern communities (Hamutumwa 2014:9 cited Johnson, Onwuegbuzie and Turner 2007). This is true considering that mixed methods has significantly been used in fairly new topics such as OA as reflected in the studies above. Hence, this study adopted the mixed method approach to examine the development, and use of the IR by academics at the UKZN.

4.4 Research design

A research design is a series of logical decisions taken by the researcher to help with the structuring of data collection, analysis and interpretation (Frankfort-Nachmias and Nachmias 1996:99). The design defines who will be studied, what will be observed, when observations will be made and how data will be collected (Frankfort-Nachmias and Nachmias 1996:98). Research designs fall within the quantitative, qualitative and mixed methods approaches. As this study adopted the mixed method approach, a mixed method design was chosen where quantitative and qualitative methods merge in one study with the aim of providing a comprehensive analysis of the research problem. Different, but complementary data on the same topic was obtained to best understand the research problem. Mixed method designs bring together the differing strengths and non-overlapping weaknesses of quantitative methods with those of qualitative methods.

Concurrent triangulation method was used where quantitative and qualitative data was collected concurrently and then integrated in the interpretation of the overall findings (Creswell 2014:15). Multiple perspectives on the same issue are gathered using different data sources,

methods and informants. Data is analysed separately and then compared and/or combined to expand on the results in order to gain a more complete understanding of the problem. This method was used in this study for the purposes of confirming, cross-validating, augmenting and corroborating findings. Yin (2003:122) added that triangulation arose from an ethical need to confirm the validity of the research processes.

This study used the survey approach which is a quantitative method that "provides numeric descriptions of trends, attitudes, or opinions of a population by studying a sample of that population" (Creswell 2014:13). The survey method was chosen because it is probably the best data collection method in the social sciences that has been used extensively to collect information on numerous subjects of research, including those in library and information studies (Babbie 2013:270). Besides, it is believed to be the best method available to social science researchers interested in collecting original data that describes and measures attitudes and orientations in large populations (Babbie 2013:270). The implication of surveys is a very common practice in technology acceptance studies where variables are evaluated using validated tools developed from theories such as UTAUT. Survey questionnaires are a common method of data collection and were employed in the current study.

The qualitative aspect was incorporated in that this is a case study in which the researcher aims to develop an in-depth analysis of the UKZN by asking open-ended questions to understand academics opinions and motivations regarding OA. The purpose of conducting a case study is "not to prove, but improve" (Stufflebeam, Madaus and Kellaghan 2000:283) the understanding of the extent of use by UKZN academics exhaustively. Vosloo (2010:310 cited Tellis 1997) explained that case studies do not necessarily claim to be representative, but the emphasis is on what can be learned from a single case. Open-ended questions designed in the questionnaire, as well as the interviews, were used to gather qualitative data for this study.

4.5 Population of the study

The population is "an aggregate or totality of all the objects, subjects or members that conform to a set of specifications" (Polit and Hungler 1999:37), from which research data can potentially be collected. Members that form the population are generally characterised by having in common, at least one characteristic, that the researcher is interested in investigating (Busha and Harter 1980:57). Besides being affiliated to the same institution of the UKZN, individuals

likely to influence OA adoption were targeted as the population of this study. The population was drawn from UKZN's five campuses: Westville, Howard, Medical School, Edgewood and Pietermaritzburg.

The study population consisted of all UKZN academics amounting to a total of 1,190, according to the statistics drawn from the university's 2018 college handbooks. Research associates, emeritus and honorary appointees, and part-time lecturers were not included in the study as they were not fully engaged with the university and were thought not to be easy to reach. New Generation of Academics Programme (nGAP) lecturers, Accelerated Academic Development Programme (AADP) lecturers and tutors were excluded in the study as the researcher assumed that these individuals did not have much experience in research and supervision, and their contribution to the study could be insignificant. Besides, the UKZN academic staff complement was so huge that eliminating those with lesser attributes was necessary to remain with a more homogenous population. While most departments clearly identified the different groups of academics, some did not, particularly for nGAP and AADP lecturers. This was revealed during data analysis where some respondents specified their academic rank as nGAP and AADP lecturers. Responses from these participants were disregarded.

The study therefore limited the population to permanent fulltime lecturers, senior lecturers and professors (associate, full and senior professors), and these amounted to 847. It was assumed that these groups of academics were the most appropriate participants who engage in research activities at UKZN. Most of them had doctorates (UKZN Research Report 2016:5), meaning they were exposed to research and publishing. Academics were considered the prime determinants of OA in terms of its usage, particularly in disseminating scholarly content. Table 4.2 presents the distribution of academics according to the four colleges.

The DVC – Research as well as the Director of Library Services participated in this study as management officials responsible for the enforcement of university policies likely to influence the development, adoption and use of OA. In addition, management is responsible for financial and human resource support, which are essential inputs aiding the adoption of OA. Finally, the IR Librarian was involved in this study, as the one who is responsible for managing and administering the university's IR.

Table 4.2: Population size

UKZN Colleges	Professor	Lecturer Senior	Lecturer	Total number of academics per college
College of Agriculture, Engineering and Science	83	56	102	**241**
College of Humanities	81	46	129	**256**
College of Health Sciences	67	43	103	**213**
College of Law and Management Studies	32	35	70	**137**
Total number of academics				**847**

Source: UKZN College handbooks (2018)

4.6 Sampling procedure

With a large population of over 800 academics, "it is impractical and uneconomical to involve all members of the population" (Welman, Kruger and Mitchell 2005:55). Sampling is necessary so that a smaller representation of the population is selected that truly reflects and represents the universe population (Saravanavel 1991:117). The sample becomes the source of data and results are generalised back to the population from which they were chosen (Nachmias and Nachmias 1981:295). The main challenge in sampling is selecting a sample using an appropriate technique that ensures the sample is representative of the population and, as far as possible, not biased in any way (Burns 2000:83). Sample size, according to Neumann (2006:242), should be regulated by "the degree of accuracy required; the degree of variability or diversity in the population; and the number of different variables examined simultaneously". Nolan, Macfarlane and Cartmel (2013:125) advise researchers to develop a specific list that closely approximates all elements of the population. However, Hill (1998:3 cited Alreck and Settle 1995) noted that:

> "The choice of sample size is often as much a budgetary consideration as a statistical one, and by budget it is useful to think of all resources (time, space and energy) not just money".

The most important factor, as explained by Hill (1998:3 cited Miles and Huberman 1994), is being explicit about what you want to study and why, otherwise the researcher may "suffer the pitfalls of vacuum-cleaner-like collection of every datum". This study focused on collecting

data on the development of the UKZN's IR and assessing the extent of use of the repository by academics. Appropriate techniques and precautionary measures discussed above were taken into consideration in coming up with a representative sample for this study.

The sample was drawn using probability sampling which involves:

> "… selecting a relatively large number of units from a population, or from specific subgroups (strata) of a population, in a random manner where the probability of inclusion for every member of the population is determinable" (Tashakkori and Teddlie 2003:713).

Stratified random sampling was employed where the researcher first identified "a set of mutually exclusive and exhaustive categories, divides the sampling frame by categories, and then use random selection to select cases from each category" (Neuman 2006:231). Academics were grouped according to their colleges, that is, College of Agriculture, Engineering and Science, College of Humanities, College of Health Sciences and College of Law and Management Studies. The ultimate purpose of stratified sampling is to organise population into homogenous subsets and to select the appropriate number of elements from each (Babbie 2013:166). Although these academics hold different ranks, that is, lecturers, senior lecturers, associate professors, professors and senior professors, it is assumed that they are a homogenous group actively involved in publishing and post-graduate supervision to meet the goals of UKZN as a research-intensive institution.

Sample sizes were calculated using Krejcie and Morgan's (1970) generalised scientific guideline for sample size. According to their guidelines:

- If the population (N) = 1000, the sample size (*S*) needed should be = 278.
- If N = 900, the sample size (*S*) needed should be = 269 (Krejcie and Morgan 1970:2).

Therefore, if the population in this study (N) = 847, the sample size (*S*) needed should be = 260 (Krejcie and Morgan 1970:2). This means that a total population of 847 equates to 100%. Table 4.3 demonstrates how samples from each college were drawn up.

Table 4.3: Sample sizes

UKZN Colleges	Academics sample size by College
College of Agriculture, Engineering and Sciences	$^{241}/_{847} \times 100 \times 260 = \textbf{74}$
College of Humanities	$^{256}/_{847} \times 100 \times 260 = \textbf{79}$
College of Health Sciences	$^{213}/_{847} \times 100 \times 260 = \textbf{65}$
College of Law and Management Studies	$^{137}/_{847} \times 100 \times 260 = \textbf{42}$
Total Sample Size	**260**

Source: Krejcie and Morgan (1970)

After samples were drawn, distribution of the questionnaire was conducted using simple random sampling, with stratification by college.

4.7 Data collection procedure

Data collection is basically about getting answers to a set of questions from a chosen group of participants. In research, the process entails gathering data using selected research instruments to answer the pre-defined research questions of a study (Dulle 2014:120 cited Onyango 2002). While data collection methods are many, instruments chosen for this study were designed to satisfy the research objectives through the measurement of the independent and dependent variables of interest. This study addressed two research objectives:

1. To examine the development of the institutional repository at the University of KwaZulu-Natal.
2. To investigate the extent of use of the institutional repository by academics at the University of KwaZulu-Natal.

As the study falls within the mixed method research design, qualitative and quantitative methods were implemented for data collection. Questionnaires, interviews and document reviews were the instruments chosen for this study.

4.7.1. Questionnaires

The survey questionnaire was used as the primary instrument for data on the use of the IR by academics. Questionnaires are a common and powerful method that has frequently been used in studies investigating user needs and evaluating services within library and information studies even here in South Africa (Hoskins 2009; Majyambere 2014; Muchaonyerwa 2015;

Sejane 2017). A semi-structured questionnaire containing open-ended and close-ended questions was developed to yield both qualitative and quantitative data. The questionnaire was chosen because of its ability to collect large amounts of data within a short period of time from scattered large populations. The sample size of this study was 260 respondents, dispersed in four campuses of the UKZN. Proportional distribution was applied guided by the size of samples in each college as follows:

- College of Agriculture, Engineering and Sciences 74;
- College of Humanities 79;
- College of Health Sciences 65; and
- College of Law and Management Studies 42 respondents.

Administration of the questionnaire within each college was random; it was not guided by rank, gender or age of academics but the mere fact of belonging to a specific college. Initially, the researcher printed copies of the questionnaire and visited academics one by one. This proved to be a tedious and long process as UKZN has five campuses scattered in Durban and Pietermaritzburg. In addition, getting academics in their offices was a challenge as data collection commenced on 25 June 2018 when semester break had just commenced. The researcher decided to email the questionnaire to academics but received a very poor response rate. An alternative plan was reached to reformat the questionnaire using Google forms because it was more friendly, easier and faster to complete. A link to the online questionnaire was emailed to selected UKZN academics. Three email reminders were sent and data collection was stopped on 29 August 2018.

The questionnaire had seven sections (see Appendix 1). Section A contained demographic and background information. Demographic variables have been found to play significant roles in influencing technology use (Venkatesh et al. 2003:456). Section B comprised items on the development of the IR, in terms of academics' awareness of the OA movement, and specifically the university's IR. Awareness is measured as a form of development because when academics are knowledgeable about OA, they are clear of what is expected of them in growing the IR. Section C sought academic's view on the role of the library regarding the development of the IR. Section D items were mapped towards the four UTAUT independent variables that are perceived to influence IR use, namely, performance expectancy, effort expectancy, social influence and facilitating conditions. Section E of the questionnaire contained items on the attitudes of academics towards the use of the IR. A five-point Likert scale with responses:

strongly disagree, disagree, neutral, agree and strongly agree, were used to measure items in section D and E as they contained close-ended questions. Section F of the questionnaire contained questions on challenges academics face in using the IR. Finally, section G sought information on strategies that could be employed to improve IR use. Except for sections D and E, where the Likert scale was applied, the rest of the questionnaire had both closed and open-ended questions aimed at gathering both quantitative and qualitative data.

4.7.2 Interviews

Interviews are a method of data collection conducted either face-to-face or over the telephone between the interviewer and the research participant (Babbie 2013:229). Verbal information is gathered through a conversation guided by a 'mental agenda' where the interviewer asks questions and records responses from respondents (Yin 2014:239). Semi-structured interviews, which are often associated with collecting qualitative data, were employed to gather data in this study. Questions designed for semi-structured interviews are open-ended, allowing the generation of considerable information, which may lead to reconceptualisation of the issues under study (Mutsvunguma 2013:50 cited Teddlie and Tashakkori 2009). This mode of interviewing allowed the researcher to develop and follow standard questions and still have the flexibility to probe for further views (Gray 2009:373; Leedy and Ormrod 2010:188). In doing this, an in-depth understanding and a clear picture on the development of the IR at UKZN was delineated. Although semi-structured interviews seem to be long and time consuming, they are an effective way of gathering detailed information, both verbal and non-verbal. Thus, deep qualitative information and perceptions are gathered (Thomas 2010:297 cited Lester 1999).

Three different interview schedules (see Appendices 2, 3 and 4) were prepared for the Library Director, the IR Librarian and DVC Research. Interviews were conducted and recorded personally by the researcher. Each interview schedule had six sections where section A gathered data on the progress made towards the growth of the university's IR since its inception in 2009; section B had items on the role of the library; section C had items on usage of the IR by academics, section D inquired about academics' attitude towards the IR, section E had items on challenges faced when conducting IR functions and section F sought for strategies to improve acceptance and use of the IR.

4.7.3 Documents

It is possible that some documented data, either print or electronic, collected by someone else for other purposes, can serve to satisfy the research requirements of a particular study (Babbie 2013:209; Mugwisi 2013:169 cited Rea and Parker 2005). Documents are reviewed and analysed in order to elicit meaning, gain understanding and develop empirical knowledge on the problem under study (Bowen 2009:27). Researchers are however cautioned to treat documents, not as necessarily precise, accurate, or complete, but should establish the meaning of the document and its contribution to the issues being explored (Bowen 2009:33). In the light of this, documents chosen for this study were incorporated to corroborate and augment evidence from interviews and the questionnaire so that a better understanding of the phenomenon of interest, and the context in which that phenomenon is occurring is developed (Yin 2003:87). Documents reviewed in this study included UKZN annual reports, library newsletters, library annual reviews, policies and other documented literature that assisted in addressing the research questions of the study. Documented statistical data from bibliometric database OpenDOAR, UKZN IR, and ResearchSpace were also used to complement the field data.

4.8 Data analysis procedures

The purpose of this study was to evaluate the development of the IR at the UKZN and assess the extent of use by academics. The analysis stage in the research process is concerned with bringing order, structure and meaning to large amounts of data collected using various methods to address the research questions of the study. It is described by Bellamy (2012:10) as "procedures for manipulating data so that the research questions can be answered, usually by identifying important patterns". In line with the mixed method approach, this study collected both quantitative and qualitative data using the questionnaire, interviews and documents. Hence, both deductive and inductive data analysis approaches were applied.

4.8.1 Quantitative data analysis

Quantitative data was generated from close-ended questions from the survey questionnaire. Before the collected data was analysed, it underwent data cleaning to check for accuracy and completeness of data (Brink, van der Walt and van Rensburg 2006:55). This was done by reviewing individual responses before compiling a summary of all responses. Since quantitative data was gathered using Google forms, survey responses from close-ended

questions were automatically analysed and presented as charts and graphs, with totals and percentages values. At the same time, all data was automatically recorded in Google spreadsheets. As graphs and charts could not be exported from Google forms, MS Office Excel spreadsheet was used to produce desired graphs, charts and tables using existing totals and percentages provided in Google forms.

4.8.2 Qualitative data analysis

Gray, Grove and Sutherland (2016:269) found qualitative data analysis to be "creative, challenging, time-consuming and consequently expensive". This is because data collected using qualitative methods is usually too voluminous. Data gathered from open-ended questions from questionnaires, interviews and documents were analysed qualitatively in this study. Data reduction was done to lessen the volume of raw data to only meaningful facts so that it becomes manageable and focused on the objectives of the study (Muchaonyerwa 2016:96 cited Miles and Huberman 1994). Data was coded and grouped into themes according to the research questions, and presented in the form of figures, narratives as well as verbal descriptions. Thematic content analysis, according to Weber (1990:15), "is a process by which many words of a text are classified into fewer categories/themes". The researcher was able to sort and group data, and examine relationships using NVIVO software. Google forms also analysed and gave totals where two or more same narrative responses were given, for example, '*I do not know* (9)' and '*I am not sure* (12)'.

The objectives of this study were to examine the development of the institutional repository at the UKZN and to assess the extent of use of the IR by academics. Six research questions were developed. Table 4.4 aligns the research questions to data collection instruments and analysis procedures used to address the research problem of the study. Research methodologies adopted following the mixed methods approach are summarised in this table.

Table 4.4: Mapping research questions to sources of data and data analysis methods

Research Questions	Respondents	Instruments	Data analysis procedure
1. What developments have been made towards the growth of the university's IR?	DVC Research Library Director IR Librarian Academics	Interviews Questionnaire Document reviews	Thematic analysis Descriptive statistics
2. What are the roles of the library in the development of the university's IR?	DVC Research Library Director IR Librarian Academics	Interviews Document reviews Questionnaire	Thematic analysis Descriptive statistics
3. To what extent are the academics using the university's IR?	DVC Research Library Director IR Librarian Academics	Questionnaire Interviews Document reviews	Thematic analysis Descriptive statistics
4. What is the academic's attitude towards self-archiving?	Academics IR Librarian Library Director	Questionnaire Interviews	Thematic analysis Descriptive statistics
5. What challenges are hindering IR use at UKZN?	Academics Library Director IR Librarian DVC Research	Questionnaire Interviews Document reviews	Thematic analysis Descriptive statistics
6. What strategies can be employed to improve acceptance and use of the IR at UKZN?	DVC Research Library Director IR Librarian Academics	Document reviews Questionnaires Interviews	Thematic analysis Descriptive statistics

4.9 Reliability and validity

Tashakkori and Teddlie (1998:82) define reliability as "the degree to which the results of a measurement accurately represent the true magnitude or quality of a construct". It is concerned with precision, reproducibility and comparability of a measurement method (Gray, Grove and Sutherland 2016:370 cited Bartlett and Frost 2008). Babbie (2013:113-114) view it as a matter of whether a particular instrument, applied repeatedly to the same study, would yield the same results each time. Validity on the other hand, refers to "the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration" (Babbie 2013:117). Kim (2000:30 cited Shaw and Wright 1967) defined validity as "the degree to which the scale measures what it is supposed to measure". It has however been argued that, no matter how carefully designed a data collection instrument is, there is always a possibility of error

(Babbie 2013:244); reliability and validity in research are virtually impossible to achieve (Neumann 2000:157).

However, researchers are encouraged to engage in activities that improve the quality of instruments and overall, the research process. To enhance validity and reliability of instruments in this study, some of the questionnaire items measuring the use of a computer technology were adapted from similar previous studies, where the scale items were found to be valid. Construct validity was achieved by linking instruments to UTAUT variables. A pre-test of the questionnaire was done with a small group of academics at the University of Zululand, Department of Library and Information Studies, to identify possible problems and correct them before the actual data collection started. A pre-test of the interviews was conducted at the University of Zululand Library with senior librarians and the Information Librarian who uploads content on the university's IR. Unclear instructions, inappropriate terminology, structure and order of questions, ambiguous and unclear questions and difficult questions were some of the problems identified after the pre-test (Saunders, Lewis and Thornhill 2000:306). The choice of conducting the pre-test at University of Zululand was because it has an institutional repository, and the researcher, as an employee of the institution, was aware that academic staff members were encouraged to deposit in it. In addition, peer reviewing to evaluate the quality and effectiveness of the instruments was also done by senior librarians at University of Zululand Library.

The descriptive statistics, which included frequency distribution, percentages, mean and standard deviation, were obtained through the use of the Statistical Package for Social Science (SPSS) version 21 to summarise quantitative data. The Cronbach's coefficient alpha of reliability and consistency was used during analysis to measure the consistency of some of the questionnaire items of the variables in the questions. The four UTAUT constructs perceived to influence IR use, as well as the attitude construct, were analysed using Cronbach's alpha. A five-point Likert scale was used to measure respondents' opinions. According to Kripanont (2007:128 cited Sekaran 2000), the closer Cronbach's alpha is to 1.0, the greater the internal consistency of the items in the scale. In other terms, the greater the number, the higher the degree of reliability of the questionnaire. Higher values are an indication that the item responses are collectively and empirically consistent with what they are measuring (Ooko 2016:95 cited Field 2000). Table 4.5 presents the values of constructs which reveal high reliability of items measuring factors perceived to influence academics use of the IR.

Table 4.5: Cronbach's Alpha Statistics

Construct	Cronbach's coefficient	Number of Items
Performance expectancy	.890	6
Effort expectancy	.915	5
Social influence	.909	4
Facilitating conditions	.724	6
Attitude	.676	6

Regarding interviews, Kuzmanic (2009:47 cited Merrick 1999) argued that it is difficult, and perhaps unnecessary, to establish validity of interviews because it is not solely a property of the research tool but it also depends on the relationship the researcher establishes with the interviewee. The researcher could only make sure that the questions were appropriate and in line with the objectives of the study.

The idea of adopting a mixed method design where different methods were triangulated can also be viewed as a way of improving validity and reliability of the study. Using qualitative and quantitative approaches at various stages of the research helped the researcher "to eliminate the inherent biases associated with using only one method" (Ngulube 2010:255). Engaging different participants, using different data collection instruments and analysis strategies aided in improving the validity and reliability of this study. Yin (2003:122) asserted that the need for triangulation is based on the ethical need to assure the validity of research processes. Thus, the quality of this study was improved because the limitations and weaknesses of following either a qualitative or quantitative approach were neutralised because both approaches were used (Fidel 2008:265).

4.10 Ethical considerations

Ethics refer to principles of conduct that are considered correct by a given profession (Bailey 1994:420). Aina (2002:93) referred to ethics as "principles of good behaviour" that should be adhered to during the research process, particularly in data collection, analysis and in the presentation of findings. Major ethical issues in conducting research include informed consent, beneficence – do not harm, respect for anonymity and confidentiality and respect for privacy (Fouka and Mantzorou 2011:4-7). Informed consent is the "procedures in which individuals

choose whether to participate in an investigation being informed of facts that would be likely to influence their decisions" (Diener and Crandall 1978:57). In other terms, "it means that a person knowingly, voluntarily and intelligently, and in a clear and manifest way, gives his consent" (Fouka and Mantzorou 2011:4 cited Armiger 1997). The informed consent becomes part of an agreement between the researcher and the participant that creates a mutual understanding that remains constant throughout the research (Pickard 2007:74). A written informed consent letter (see Appendix 6) was issued to all participants in this study, clearly indicating that participation in the study was voluntary and that one was free to withdraw at any time during the research process. In addition, the purpose of the study and how results would be distributed were explained. Prior to this, the researcher sought permission to conduct the study at the UKZN and specified targeted participants of the study (see Appendix 7). A gatekeeper's permission was granted (see Appendix 8). An ethical clearance letter (see Appendix 9) was granted and this was shared with the participants to assure them of the legitimacy of the study.

Methods of data collection employed were in no way harmful to the participants. According to Gray, Grove and Sutherland (2016:173), harm can either be physiological, emotional, social or economic. The researcher took this into account and ensured that questions asked were appropriate and not offensive. A peer review of instruments by colleagues at the University of Zululand Library helped to identify any irregularities that could otherwise be viewed by participants as improper. Besides, if participants felt any form of harm as described above, consent letters clearly stated that they were free to withdraw at any stage during the research process and that participation was voluntary. Respect of anonymity and confidentiality of information was maintained during data collection, presentation, interpretation and analysis. All data gathered was correctly analysed and presented to avoid misinterpretation.

Dulle (2010:146 cited Aina 2002) noted that "fabrication and falsification of data, copyright violation and plagiarism and double publishing" are also considered unethical issues that researchers should avoid when conducting research. This study referenced accurately, reflecting all sources consulted in this study. A Turnitin report was attached to the completed study as evidence of correctly citing sources. The researcher further observed research ethical guidelines as outlined by the UKZN Research Ethics Policy.

4.11 Summary of the chapter

Chapter Four discussed the research methodologies adopted to address the research problem of the study. The pragmatic paradigm, which falls under the post-positivism philosophy was described as the suitable paradigm to inform the study. The mixed method approach, which incorporates quantitative and qualitative methods, was chosen; as well as the mixed method design. The population of the study included the management staff, UKZN DVC Research and Library Director; and administration staff, IR librarian, and academics from the four colleges: College of Agriculture, Engineering and Science, College of Humanities, College of Health Sciences and College of Law and Management Studies. The total population of academics was 847 and a sample size of 260 was drawn. Data was collected using questionnaires which were administered to academics and interviews were conducted with the DVC Research, Library Director and IR librarian. Documents were also reviewed to corroborate and augment data. Pre-testing, peer reviewing and triangulation were some of the methods used to ensure validity and reliability of the study. Descriptive statistics were used to analyse quantitative data while thematic content analysis was applied for qualitative data. Ethical issues that ensure good behaviour and conduct during the research process were discussed. The next chapter will report and present the findings.

CHAPTER FIVE

DATA ANALYSIS AND PRESENTATION OF RESULTS

5.1 Introduction

The purpose of this study was to examine the development, and extent of use of the IR by UKZN academics with the intention of uncovering ways to enhance acceptance and use of the repository. This chapter presents findings from the data collected using questionnaires, interviews, documents and bibliometric databases. The questionnaire was the main data gathering tool administered to academics. Though the quantitative analysis component is given significantly higher priority, the researcher believes that simultaneous inclusion of qualitative data and analysis is likely to increase the understanding of the underlying phenomenon (Onwuegbuzie and Combs 2011:5 cited Johnson, Onwuegbuzie and Turner 2007). Hence, data generated from interviews, documents and bibliometric databases were triangulated to augment and clarify questionnaire data. Interview data was collected from the DVC Research, Library Director and IR Librarian. Documentary evidence was integrated into the analyses and interpretations of findings, whenever possible, for corroboration and to elicit a deep and enriched analysis of the problem. As a mixed method study, quantitative data was analysed using quantitative methods while qualitative data used qualitative methods (Creswell and Plano Clark 2007:128).

Apart from the demographic characteristics of the respondents, this chapter presents the findings in the form of themes derived from the research questions of the study as follows:

- Status on the progress towards the UKZN repository,
- Role of the library,
- Factors perceived to influence IR use,
- Academics' attitude towards the use of the IR,
- Challenges of using the IR, and
- Strategies to improve IR use.

As mentioned earlier, quantitative and qualitative findings addressing a research question were analysed and presented concurrently to ensure an explicit understanding of the problem. This approach was preferred so that presentation of data analyses provides maximum detail for each theme, preventing cluttering them around.

5.2 Response rate

Overall, the expected number of respondents from the questionnaire was 260 but 165 responses were received, yielding a response rate of 63.5%. Getting a 100% response rate for such surveys is often impossible. While the success of response rate can be improved by follow-ups and the type of questionnaire delivery system adopted, academic studies should generally yield a response rate above 55.6% (Baruch 1999:421). Within the social sciences, a response rate of 60% is good (Babbie 2013:261). To achieve the 63.5% response rate, the researcher had to reformat the questionnaire into google forms, which proved to be a more acceptable setup for most respondents. In addition, three e-mail reminders were sent out.

The response rate for interviews was 100%. All interviews were conducted telephonically. The interview with the Library Director was conducted on 26 July, the IR Librarian on 7 August and the DVC Research on 14 August 2018. Analyses and presentation of interview data did not identify these respondents to protect their confidentiality.

5.3 Demographic profile of respondents'

The demographic data of the surveyed academics was obtained from seven questions (Q1 to Q7) which gathered data on gender composition, age, highest academic qualification, academic rank, UKZN College from which the respondents belong, duration as UKZN academic, and respondents' internet skills in terms of retrieving and disseminating scholarly content. Table 5.1 provides a summary of all the demographic data variables where N=165 is the total number of respondents that completed the questionnaire.

Close to half of the respondents 81 (49.1%) were male while 78 (47.3%) were female. Six (3.6%) respondents did not specify their gender. Distribution by age revealed that 10 (6%) respondents were aged between 21 to 30 years, 39 (23.5%) were in the category of 31 to 40 years, while a majority, 59 (36%), were aged between 41 to 50, followed by 52 (32%) respondents who were aged between 51 to 60. Only three (1.5%) respondents were over 61 years. Two (1%) respondents did not specify their age. Regarding the highest qualifications, a majority of them, 112 (68%) had PhDs, 51 (31%) had Masters and two (1%) had Honours, reflecting a highly qualified academic complement often associated with higher levels of understanding and experience in the manipulation of online scholarly literature. While reporting on the success of the university's research output, the DVC Research highlighted that, about 55% of academics had doctorates (UKZN Research Report 2016:5). The statistics

reported align with the findings of this study which showed a high complement of academics with doctorates. Regarding academic rank, most respondents were at the level of lecturer 96 (58.2%), followed by senior lecturers 35 (21.2%). Associate professors were 18 (11%), full professors 14 (8.4%) and two (1.2%) did not specify their academic rank. Overall, 131 (79.4%) were at lecturer level (senior lecturer and lecturer) while professors (full and associate professor) amounted to 32 (19.4%).

Distribution by college affiliation showed that most respondents were from the College of Humanities 73 (44%), followed by the College of Law and Management Studies 38 (23%), then College of Agriculture, Engineering and Science 33 (20%) and lastly 21 (13%) from the College of Health Sciences. Respondents were asked to state the number of years they had been employed as academics at UKZN. Fifty-one (31%) had between 0 to 5 years, 52 (31.5%) had between 6 to 10 years, 26 (16%) had between 11 to 15 years, 14 (8.5%) had between 16 to 20 and 22 (33%) had 21 years and over. Thus, close to 70% of respondents had been with the university for over five years, portraying some form of loyalty to the institution.

The last set of demographic data relate to the respondents' internet usage skills. Internet skills are required for academic staff to be able to access or disseminate content in the IR. To determine this skill, respondents were required to state their internet usage skills in terms of retrieving scholarly content online. Overall, 150 (91%) were good at retrieving content while 13 (8%) had average skills and two (1%) had no skills. Furthermore, respondents were asked to state their level of internet usage skills in terms of disseminating scholarly content. Respondents with very good skills amounted to 35 (21%); 64 (39%) indicated they were good, 47 (28.5%) had average skills and 19 (11.5%) indicated their skills were poor. Thus, a majority of respondents (91%) were more skilful in retrieving than in disseminating (60%) scholarly content online.

Table 5.1: Demographic data of the respondents (N=165)

Variable		Frequency	Percentage
Gender	Male	81	49.1
	Female	78	47.3
	Not specified	6	3.6
Age	21-30 years	10	6.0
	31-40 years	39	23.5
	41-50 years	59	36.0
	51-60 years	52	32.0
	61+ years	3	1.5
	Not specified	2	1.0
Highest Academic Qualification	PhD	112	68.0
	Masters	51	31.0
	Honours	2	1.0
Academic Rank	Full Professor	14	8.4
	Associate Professor	18	11.0
	Senior Lecturer	35	21.2
	Lecturer	96	58.2
	Not specified	2	1.2
UKZN College	College of Humanities	73	44.0
	College of Law and Management Studies	38	23.0
	College of Agriculture, Engineering and Science	33	20.0
	College of Health Sciences	21	13.0
Duration as a UKZN academic	0-5 years	51	31.0
	6-10 years	52	31.5
	11-15 years	26	16.0
	16-20 years	14	8.5
	21+ years	22	13.0
Internet skills in retrieving scholarly content	Very Good	69	42.0
	Good	81	49.0
	Average	13	8.0
	Poor	2	1.0
Internet skills in disseminating scholarly content	Very Good	35	21.0
	Good	64	39.0
	Average	47	28.5
	Poor	19	11.5

Source: Field data (2018)

5.4 Status of progress of the UKZN repository

To establish the status of the IR at UKZN, eight questions were asked in the questionnaire (Q11 to 17) and these related to attributes and conditions perceived favourable for the development of the IR and the actual usage of it. Findings relating to developments achieved by the institution with regards to the IR were generated from the interviews. The finding were presented under these headings;

i) Awareness of the existence of the UKZN IR;

ii) How participants got to know about the IR;

iii) Existence of valuable unpublished research;

iv) Masters and PhD supervision;

v) The content type participants were willing to share or search for on the IR;

vi) If they could recommend the IR to students or colleagues;

vii) If they were aware of any conditions set for IR use;

viii) How they rated the IR for archiving and dissemination of information;

ix) Usage of the IR by respondents;

x) IR contributions made by the university.

5.4.1 Awareness of the existence of the UKZN IR

The first variable used to measure IR progress was awareness of the respondents. Self-awareness is regarded fundamental to unlocking a person's potential to grow or progress. Awareness was considered one of the important aspects that evoke development, and a lack of it was perceived to prevent academics from using the IR. While academics can either choose to use or not use the IR, establishing whether they knew of its existence or not was considered important. Respondents were requested to state whether or not they were aware of the existence of the UKZN IR. As shown in Figure 5.1, a majority, 122 (74%), indicated that they were aware, while 43 (26%), indicated that they were not aware.
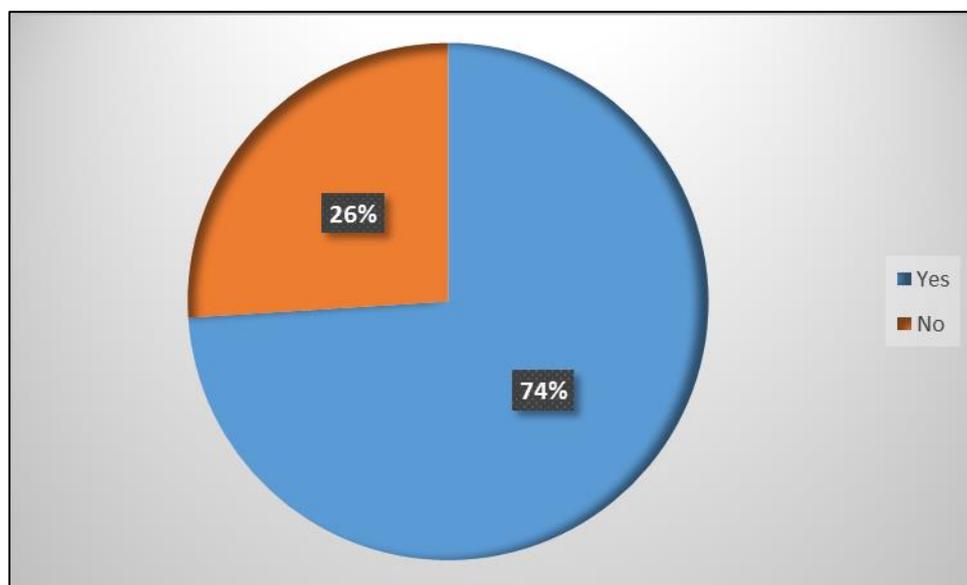
Figure 5.1: Awareness of the UKZN IR (N=165)

Source: Field data (2018)

5.4.2 How participants got to know about the IR

The respondents were further asked to indicate how they got to know about the UKZN IR. Participants were allowed to select more than one response and could also provide their own responses. Figure 5.2 below summarises the results. Of all the respondents, 75 participants indicated they heard of the IR from the library, 37 indicated from the internet, 24 said from colleagues, 22 heard of the IR during work meetings, 8 read about the IR in the library newsletter, eight through social media and 31 affirmed that they had not heard about the UKZN IR. Twelve respondents indicated they heard about the IR through other means. Of these, three respondents explained that they knew about the IR through their supervisors when they were still UKZN students, one respondent indicated they heard from a publisher and the rest, eight, did not specify.
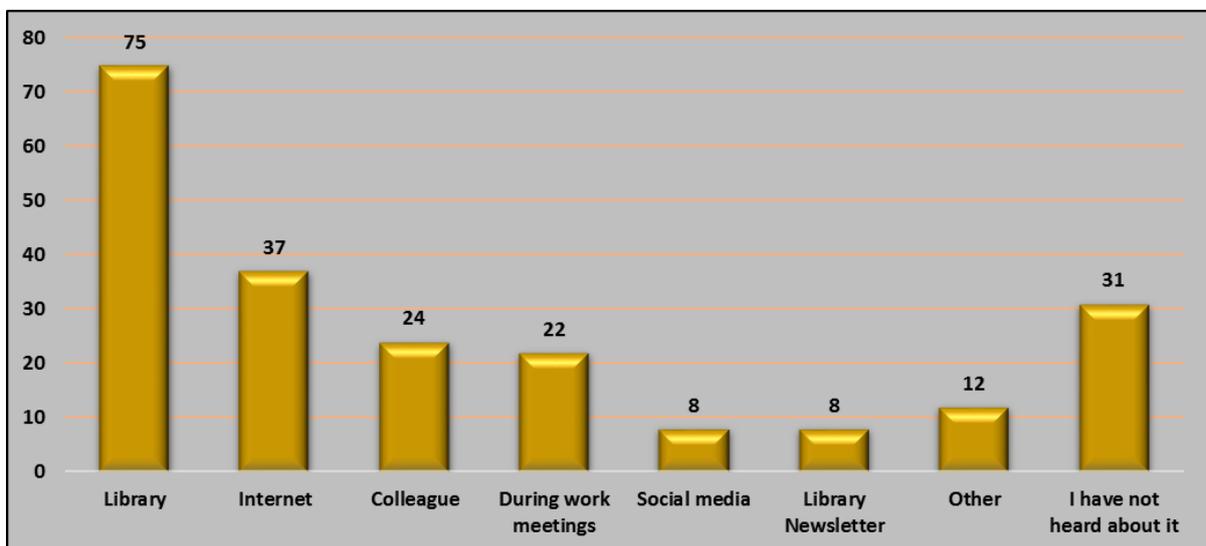
Figure 5.2: How they got to know about the IR

Source: Field data (2018)

Results of the interviews showed that the library played a significant role in promoting and bringing an awareness to the university's IR. One interviewee stated that marketing of the IR was done during staff induction, OA Week, Library Week and during students' orientation. In addition, it was disclosed that Subject Librarians were requested to include the ResearchSpace when training users on the use of databases and also to recommend it to users with research needs. A retrospective review conducted to trace the development of the IR established that, in 2011, the UKZN Library was extensively involved in the marketing of the IR by conducting presentations entitled 'Making your thesis visible to the world,' to all UKZN communities (Library Annual Review 2011:8). The library engaged in a number of activities as outlined in

section 1.3 to promote the IR to academics. This shows that marketing of the IR to the university community was mostly driven by the library as confirmed by Figure 5.2.

5.4.3 Existence of valuable unpublished research

For a variety of reasons, much of the scholarly literature produced by the academics does not find its way to the publishing house yet it is useful content that can be of benefit to the university community. Such content, often known as grey literature, is content that can be loaded on the IR. Respondents were required to state whether they had such content in their private silos. Figure 5.3 below illustrates that more than half of the respondents 84 (51%), had valuable research that was not published anywhere while 81 (49%) indicated they had none.
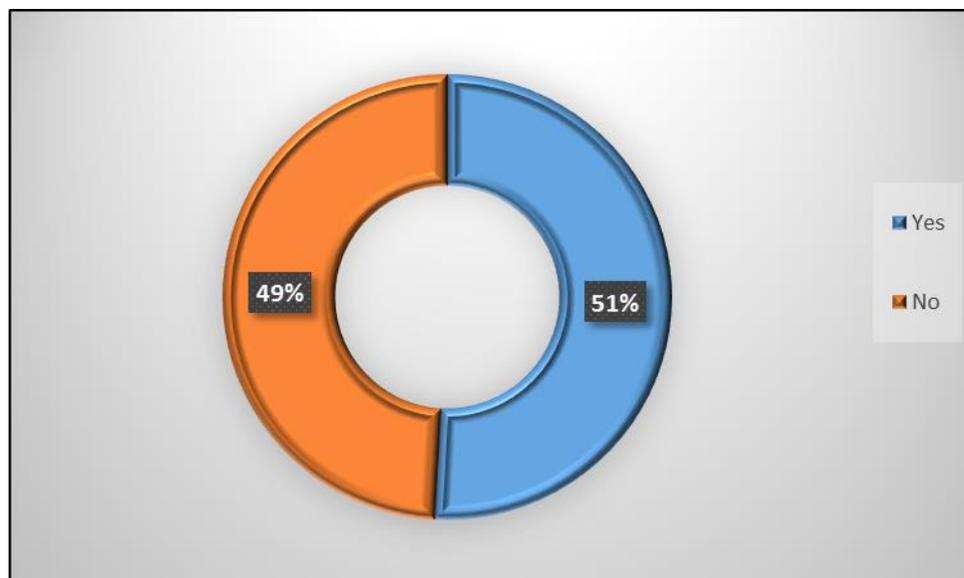
Figure 5.3: Valuable unpublished research (N=165)

Source: Field data (2018)

5.4.4 Masters and PhD supervision

One of the most common content types loaded on university IRs is the theses and dissertations of Masters and (Doctor of Philosophy) PhD students. Academics with a highest qualification of a Masters or PhD are eligible to supervise postgraduate students, and these form the majority of the UKZN academic community as shown in Table 5.1. To ascertain whether participants were involved in supervision, respondents were asked to state whether they had supervised Masters or PhD students within their colleges. A majority, 141 (86%), indicated they had supervised, while only 23 (14%) had not supervised. With most of the respondents having

supervised, they had, knowingly or unknowingly, contributed to the current content loaded on the IR.

5.4.5 The content respondents were willing to share via the IR

A question requiring multi-responses was asked to determine the content types that respondents were willing to share via the IR. Table 5.2 show that a majority of respondents 136 (82.9%), were willing to share theses and dissertations while 133 (81.1%) respondents were willing to share their research articles (pre-print or post-print). Eighty-five (51.8%) respondents indicated that they were willing to share conference and workshop papers. Respondents who indicated they were willing to share their book chapters on the IR were 68 (41.5%) and those that showed interest in uploading teaching material were 55 (33.5%). Regarding reports, 49 (29.9%) respondents indicated they would share this content type. Three (1.8%) respondents proposed what they would want to share on the IR. One said videos, another photographic essays and the other, patents.

Table 5.2 Preferred content to share on the IR

Type of content	Frequency	Percentage
Theses/dissertations	136	82.9
Research articles (pre-print or post-print)	133	81.1
Conference/workshop papers and presentations	85	51.8
Book chapters	68	41.5
Teaching material	55	33.5
Reports	49	29.9
Other (videos)	1	0.6
Other (photographic essays)	1	0.6
Other (patents)	1	0.6

Source: Field data (2018)

Overall, most respondents were willing to share research articles, theses and dissertations, conference papers and presentations, as well as book chapters, more than other content types. Analysis of content types on university repositories worldwide showed that the most common content types shared were journal articles, theses and dissertations, book chapters and conference and workshop papers respectively (OpenDOAR: Content types in OpenDOAR

Repositories – Worldwide: 2018). Within the African region, articles, theses and dissertations were the most popular content types loaded on IRs.
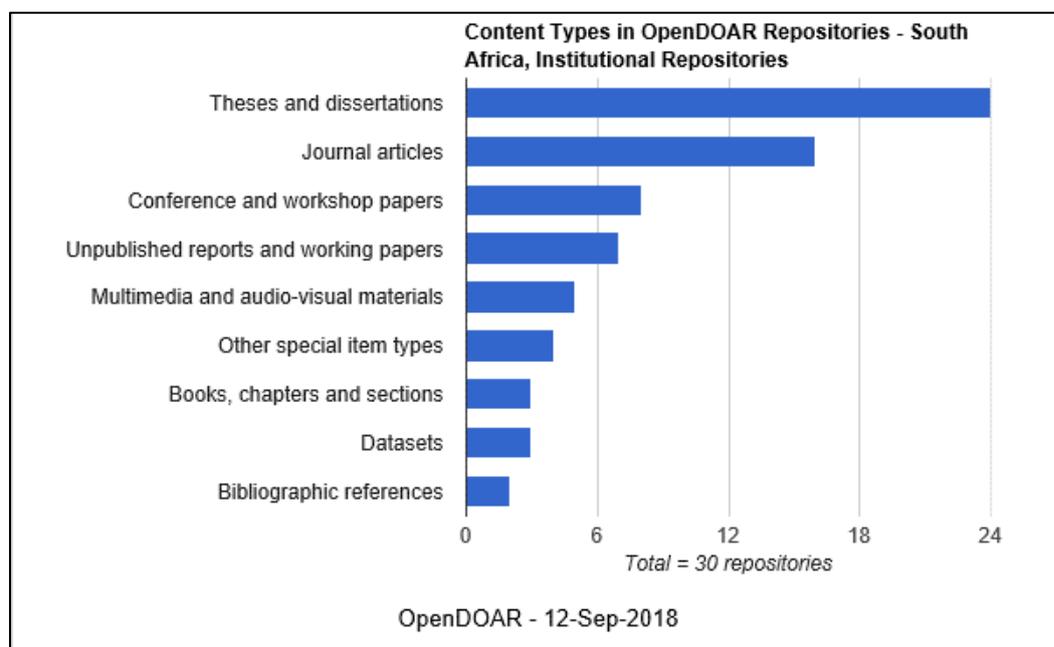
Figure 5.4: Content types in South African university IRs

Source: OpenDOAR: Content Types in OpenDOAR Repositories - South Africa, Institutional Repositories 2018

Analysis of OpenDOAR on IRs in South African universities disclosed that, theses and dissertations were most popular, followed by journal articles as shown in Figure 5.4. A further analysis of the UKZN IR, ResearchSpace revealed that the most favoured content types were theses and dissertations, and articles (ResearchSpace: Content Type: 2018). Thus, there is consistency in terms of content types that academics are willing to share the world over.

5.4.6 The content respondents would search for on the IR

After investigating the content types respondents were willing to share, they were further asked to indicate the different content types they would search for on the IR. Respondents were asked to choose more than response. Table 5.3 summarises the responses. A majority of 141 (86%) respondents, indicated they would search for theses and dissertations, while 130 (79.3%) respondents would search for articles. Book chapters would be searched by 87 (53%) respondents, conference/workshop papers and presentations 77 (47%) and 54 (32.9%) would search for teaching material. Only 47 (28.7%) showed they would search for reports on the IR.

Table 5.3: Preferred content to search for on the IR

Type of content	Frequency	Percentage
Theses/dissertations	141	86
Research articles (pre-print or post-print)	130	79.3
Book chapters	87	53
Conference/workshop papers and presentations	77	47
Teaching material	54	32.9
Reports	47	28.7
Other	0	0

Source: Field data (2018)

5.4.7 Conditions set for depositing in the IR

It is a challenge for an institution to develop a successful IR without giving serious consideration to the implementation of a policy that governs its structure and design (Billings 2009:7). Without a policy, it becomes difficult to enforce compliance and this impacts on the growth of the IR. An open-ended question, which sought respondents' knowledge on the existence of IR policies, mandates or any conditions academics needed to comply with regarding deposits to the IR, was asked. Of the 165 respondents, a majority of 141 (85.5%) respondents attempted this question. Forty-eight (34%) participants spoke about the policy. Of these, a majority, 36 (26%), were completely clear that there was a policy in place for the submission of theses and dissertations and did not mention much about other content types. Some of the responses were;

- *"It's university policy that every supervised work must be published on our institutional repository",*
- *"The policy states that when one finishes a degree like Masters and PhD, they have to submit electronic copies of the dissertations/thesis for inputting on the repository",*
- *"It's a mandate that all thesis and dissertations done with the university be put in the institutional repository",*
- *"My understanding is that all completed theses are placed on the IR. I have no knowledge of other work being placed in the IR".*

Responses above referred to the IP policy as discussed in section 5.3.3. The interviews confirmed that there was no OA policy, but a draft had been developed and was yet to be

approved by the university senate. One interviewee mentioned that there were guidelines developed to govern academics on what they could and could not submit on the IR.

Twenty-nine (20.5%) respondents indicated they were not sure if there was anything in place, while 34 (24%) stated they did not know. Only 5 (3.5%) were sure that there were no conditions in place, with one clearly stating that, "*no conditions other than individual drive*".

5.4.8 Rating the importance of the IR

To evaluate the importance of the IR to the respondents, two questions were asked. The first question required respondents to rate the importance of the IR for archiving and wider dissemination of information. Responses received were 162, where 80 (49.4%) stated that the IR was very important, 73 (45.1%) indicated it was important and only 9 (5.5%) participants believed it was not important. The results generally showed that a majority of respondents, 153 (94.5%), agreed to the importance of the IR within a university. However, one interview disclosed that, although academics agreed that the IR was important, they preferred to search for information on the traditional library databases. This, nevertheless, does not denounce their anticipated value of the IR.

Interviewees were also asked of their view regarding the IR. One interviewee explained that;

> "*A repository is not an optional infrastructure anymore, it has become compulsory for all higher education institutions, whether we like it or not, it's a reality that has hit the higher education sector. We have adjusted just like the world over and its presence has caused significant changes in terms of access to information.*"

In agreement, another interview participant explained that;

> "*For far too long what has been happening is that we undertake research and we produce outputs like journal papers, which the copyright then belongs to the publishing houses. As an institution, we go and pay subscription to get access to work that has been done within our institution. For this reason, we promote OA and we need to spend more resources making research that has been undertaken at the university freely available to anyone who wants to access the resource. By doing this, we break these ways in which publishing houses monopolise access to knowledge, especially that which is coming out of research findings.*"

There was a general consensus amongst interviewees on the importance of the IR, not only as an alternative additional platform to access information, but also as a repository for promoting visibility of UKZN research and ultimately improving citations.

The second question determining IR importance required respondents to state whether they would recommend the IR to their colleagues or students. Only one respondent did not answer the question. Almost all respondents, 156 (95.1%), revealed that they would recommend while only eight (4.9%), indicated they would not. A follow-up question was asked in which respondents were required to state reasons why they would or would not recommend the IR. Respondents who attempted this question were 121 (73.3%) and a majority of them, 102 (84%), were happy to recommend the IR. The responses were grouped into themes below.

A number of respondents indicated they would recommend the IR because they thought of the IR as a useful source of information that is easy to access. Some of the responses were as follows:

- *"It is a valuable tool to find sources that may not be available elsewhere"*,
- *"Because it gives access to a wide range of scholarly publications"*,
- *"Easily accessible and useful"*,
- *"It is easily accessible. Normally in full-text documents"*,
- *"Most sources will need payment whilst IR is free"*,
- *"With the limited availability of library journal resources, it would be useful"*.

Other responses given were quite short, for example, '*It's a good idea', 'Important for research', Good resource' and 'useful'.*

Another group of respondents said they would recommend the IR because they viewed it as a valuable tool to consult when conducting research. The responses were as follows:

- *"It provides a good starting point for research"*,
- *"Something I do already. Good for preliminary research"*,
- *"I tell my PG students to search the thesis section to see what research other students have already done in the field"*,
- *"For looking at previous dissertations in their field"*,
- *"To check for current research topics in an area"*,
- *"It has good literary style of academic writing and research concepts"*,

- "*It's a further guide to the quality of research that is expected of them*",
- "*It is a valuable tool for current students to get an idea of the methodologies, literature review and previous data on a topic of interest*",
- "*It contains current and relevant information and has authors with good reputation in publishing. It has reliable information*".

There were also respondents who indicated they would advise their colleagues and students to use the IR because of its benefits to the institution. The results showed that the IR was seen as a way of showcasing UKZN's academic content. One respondent highlighted that the IR gives, "*value to the institute at international and national levels*". Another respondent added that the IR was a platform to:

> "*showcase the type and nature of research initiatives undertaken by a university. In a way, it markets the university to potential students who might be interested in doing research in a particular area that the university has interest in*".

Furthermore, it was highlighted that the IR played a major role in opening up opportunities for collaborations in research.

Two respondents noted that they would recommend IR use to their colleagues and students because they felt it was important to make use of scholarly literature produced by the university community. One respondent pointed out that, "*In addition to seeking to consume literature produced elsewhere, it is logical to start from the local*". Local scholarly content is often inaccessible because the library cannot afford subscribing to high ranking international journals that most academics publish in, but if such content is uploaded on the IR, it becomes accessible to the university and the world over. Another respondent noted that, "*In this era of university rankings, all staff and students need to contribute towards enriching their own institution*".

While the majority of the respondents showed some knowledge about the IR, there were a few, 14 (11%), whose responses showed some lack of awareness and understanding of the IR. Responses listed below disclose this condition;

- "*I have not much knowledge of how it works*",
- "*It seems like a useful source of information*",
- "*It seems user friendly, reliable and cheap*",
- "*I have not done that previously but will do so now*",

- *"Could be useful",*
- *"I didn't know that there were other items available on the IR".*

Results in section 5.4.1 on awareness of the IR revealed that 43 (26%) of the participants were unaware of the existence of the IR. Analysed with the current results, it can be assumed that, respondents who indicated they would not recommend the IR, did not have much knowledge about it.

The findings also revealed that, although some respondents were not aware of the IR, they would still recommend it to others. One respondent explained that he/she would recommend, explaining that '*That is how we all learn',* while another admitted that, even though he/she was not fully aware of it, he/she would advise others who can benefit from it. On the contrary, there were five (4.1%) respondents who clearly indicated they would neither recommend the IR to students nor recommend it to colleagues. One of the reasons stated was that it was difficult to use. Another reason given was that it was an irrelevant platform that did not contain useful information for their kind of needs; they further pointed out that there were better alternatives, such as arXiv.org. One respondent explained that;

> *"I work in astrophysics. We already have 'green' OA through https://arxiv.org/. This renders an institutional repository worthless. I just don't think it's useful for research papers, as it has zero visibility compared to https://arxiv.org/".*

Another respondent mentioned that there were better alternatives such as ResearchGate. Furthermore, one respondent saw no good reason for recommending the IR and explained that "*Theses and dissertations come up automatically on search engines, therefore no need to recommend".* Such a response reveal that there was lack of awareness of the various content types that can be loaded on the IR apart from the theses and dissertations.

5.4.9 What the repository was used for

Regarding the use of the IR, the results showed that 36 (22%) participants used the IR to deposit their own research, while a majority 127 (78%), maintained that they had not deposited any content on the IR as reflected in Table 5.4. Content types available on the IR included theses and dissertations, book chapters, journal articles, videos, conference papers, presentations and working papers (ResearchSpace: Browsing by type 2018). An analysis of the ResearchSpace as of 31 July 2018 revealed that 13,732 items were recorded on the repository and close to

13,000 were thesis and dissertations (ResearchSpace 2018). The interview findings disclosed that, according to the university policy, it was compulsory for all completed Masters and PhD theses to be archived by the library. The UKZN IP policy section 5.2 states that, students' must;

> "…forward master copies and electronic copies of the treatise, dissertation or thesis to UKZN Libraries by the date, in the numbers and in the format for the time being stipulated by the Libraries in their policies" (UKZN Intellectual Property Policy 2010:31).

The policy further clarifies that ownership of full copyright in all dissertations conferred by UKZN will vest in UKZN (UKZN Intellectual Property Policy 2010:15). It is therefore mandatory to submit Masters and PhD theses to the library; hence they constitute a larger part of the collection. Findings from the interviews showed that the library uploads these to the IR and submission of other content types was left to the academics to voluntarily upload their own work. It was further reported that a majority of academics were reluctant to self-archive because they saw no value in doing it. With only 22% of participants 'voluntarily' uploading their content on the IR, and with statistics of other content types loaded on the IR amounting to only about 732 items, it can be conceded that deposits of content to the IR by academics was low.

Table 5.4: What the IR was used for

	Total respondents	Frequency	Percentage	Frequency	Percentage
		YES		NO	
Deposit own research	N=163	36	22	127	78
Search for information	N=164	84	51	80	49

Source: Field data (2018)

While this study focused on academics' use of the IR in terms of depositing scholarly content, establishing whether participants ever visited the IR to search for information was considered important to ascertain their knowledge of the platform, its contents as well as its usefulness to their teaching and research activities. Respondents were asked to indicate whether they had ever used the IR to search for information. A total of 164 participants responded to this question, with more than half, 84 (51%), agreeing to have searched for information on the IR

while 80 (49%) had not. Although results from the interviews could not ascertain the number of UKZN academics searching for information on the IR, usage was reported to be generally high.

One interviewee explained that;

> *"Based on the statistics of this month (July 2018) alone, we are looking at more than 500,000 hits. The presence of it cannot be denied, it is being used but whether one can be in a position to measure the internal use versus the external use, it will be very hard to comment on those grounds".*

Another interviewee agreed that usage was very high and noted that while South Africa was leading in terms of usage, other countries in Africa, India and the USA were also actively using the ResearchSpace; alluding to the fact that statistics were not representing UKZN community use only.

To further try and establish use at UKZN, one way of telling if people are using a service or not is when there is an unexpected glitch and the system breaks down. One interviewee was asked if this had ever happened with the IR and the response was:

> *"It is hard to note such because there has never been a time where the ResearchSpace has been down for a week or so where then you can establish people screaming or complaining to show that its being used. This has not been evident so far".*

The interviewee added that, often, change of platforms bring glitches but they work closely with the Information and Communication Services (ICS) department such that they always have a backup and issues are resolved quickly.

While it proved difficult to determine UKZN academics' use of the repository, there were responses from the questionnaire that gave an indication of IR usage by respondents. For example, question 16 in the questionnaire, '*Would you recommend your students or colleagues to use the institutional repository'* revealed that quite a number of academics were using the IR judging from their responses. A response such as '*Something I do already. Good for preliminary research',* indicate that apart from referring other people, the respondent was also searching for information on the IR. Similar responses were recorded in section 5.3.8 where respondents were outlining the importance of the IR. Thus, it can be deduced that a significant number of respondents were using the IR to search for information.

5.4.10 IR contributions made by the university

The university has since been fully supporting the development of the IR since its inception in 2009 as outlined in section 1.3 and section 5.3.2, particularly on promoting, educating and training the university community. During the interviews, participants were requested to highlight the recent efforts undertaken by the university to promote and advance the IR. One of the significant moves highlighted was the appointment of a fulltime IR Librarian in 2014 to manage and administer the IR. Previously, IR responsibilities were fragmented and shared amongst Subject Librarians who attended to IR duties when they had time. The findings disclosed that, the IR Librarian was sent for a one-month Carnegie Continuing Professional Development (CPD) programme in Pretoria where she received training on DSpace. It was further revealed that, although there were no formal programmes designed to train DSpace administrators within South African institutions of higher learning during that time, the university supported the IR Librarian by allowing her to continuously engage in OA workshops around the country for upskilling and keeping abreast with developments in OA.

One other development raised during the interviews was the recent upgrade to DSpace 5.2, which was released in 2015, as a 'bug fixer' to resolve problems encountered with previous DSpace versions. With this recent development, an IT person was appointed to conduct in-house training for the library staff so that they can familiarise themselves with the new version.

The availability of an OA draft policy was raised by one interview participant, as one of the latest key indicators of the university's commitment to the OA movement. In support of this view, another interviewee highlighted that:

> "We definitely are in support of having the OA policy. In bureaucratic organisations as universities are, it means that we are going to develop a policy in that regard and the policy has got to be developed coming through the library. It's something l have made the library aware of, and it is working on a draft policy which will need consultation across the university before we can get it approved and then implement it".

Apart from the draft policy, it was raised by the interviewees that there has also been full support of the repository in terms of infrastructure, funding, and resources needed to make it fully functional, and to improve its functionality.

One of the latest moves introduced in 2018 was the shift from submission of hard copy theses to electronic copies to the library. It was highlighted in the interview that students will not require to submit hard copy theses to the library. Electronic copies will be harvested by college administrators into the cloud and the library will download them from there for archiving on the IR. This means that no hard copies of such will be available on the shelf, leaving users with no choice but to search the IR for theses and dissertations.

Apart from contributions made towards the development of the university IR, advancing OA in general was identified as crucial by one interviewee who concluded with these remarks:

> *"As an institution we are pushing forward and promoting OA in general, and at the same time strengthening our internal systems for OA. We encourage our academics to publish their work on platforms that promote OA, not only the IR but also on ResearchGate and Google scholar which are freely available".*

In line with the support for OA, one interviewee mentioned that in October 2018, the university will be launching the Open Journal Systems (OJS) during the OA week aimed at encouraging academics to publish in OA journals.

5.5 Role of the library

Initiatives related to OA are a logical extension of the library's scholarly communication agenda (Sterman 2014:361). In order to determine how the UKZN Library staff were involved in the development of the IR, four questions (Q18 to 21) were asked in the questionnaire. The first question required participants to state whether the library offered any training to bring an awareness to the university's IR. As shown in Figure 5.4, more than half, 89 (54%), were not sure if the library offered training, 21 (13%) were certain that the library did not offer training and 55 (33%) stated that the library does offer training. Largely, many participants were not aware of the role of the library in terms of bringing an awareness to the university's IR.
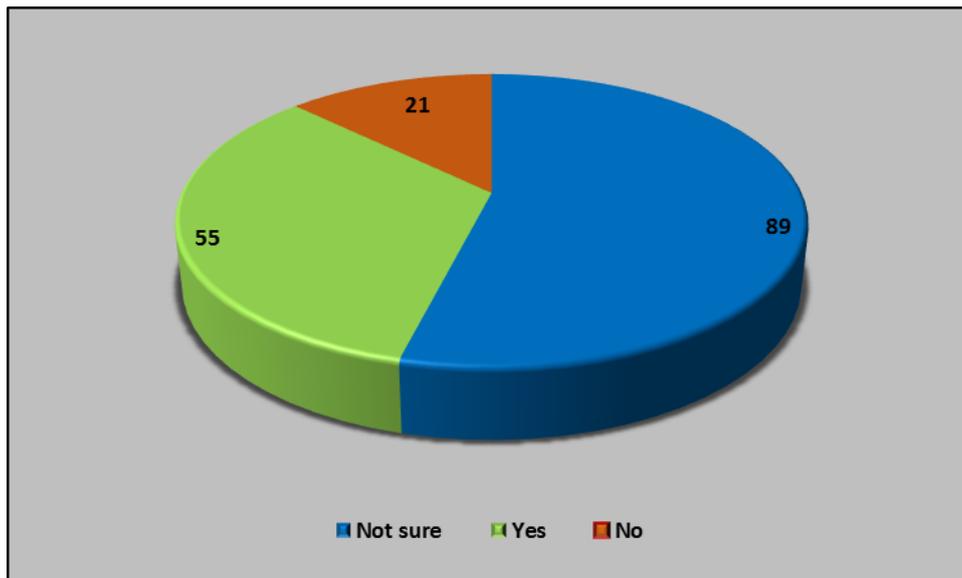
Figure 5.5: Training on IR use (N=165)

Source: Field data (2018)

Interview results on training disclosed that, while no schedules were designed to train academics on how to upload content on the IR, one on one training sessions were conducted with academics upon request. One interviewee stated that, "*Those who became aware of the IR and were interested in uploading their work approached the library*". Furthermore, it emerged that, since reaching out to academics was not as easy, a step-by-step submission guide was developed and uploaded onto the main page of the university repository, ResearchSpace. A pamphlet was also developed, giving a brief introduction of the ResearchSpace, what content could be uploaded, steps to upload and contact details of library staff responsible for the IR. Reflecting on the competence of academics, one interviewee pointed out that, "*Marketing of IR is done but use of the tool comes natural to most academics*". The belief was that the IR was easy to understand and academics would not find it difficult to use.

Further to the first question on training, respondents were asked to indicate whether they would be interested in receiving training. The findings revealed that only 31 (18.9%) were not interested in receiving training while 133 (81.1%) were kin to be trained. One participant did not respond to this question. This suggests that a majority of the participants were not familiar with how to use the IR.

The second question in this section required respondents to indicate the kind of help they would want to receive from the library. Respondents were allowed to select more than one answer as

reflected in Figure 5.6. Receiving training on how to deposit on the IR was popular amongst respondents 125 (75.8%), 104 (63%) respondents wanted the library to educate them more on issues around copyright, 102 (61.8%) wanted to be informed when they can self-archive, and 95 (57.6%) indicated they would prefer the library to deposit for them. Nine (5.4%) respondents advised on the type of help they would require. Of these, two indicated that it was necessary for the library to support and assist academics to deposit, while another expected the library to drive the process in a proactive way. One participant indicated that, "*at my age, none*", giving the impression that this respondent was close to retirement and would not be doing self-archiving. Overall, respondents were keen to engage with the library to improve on the development of the IR.
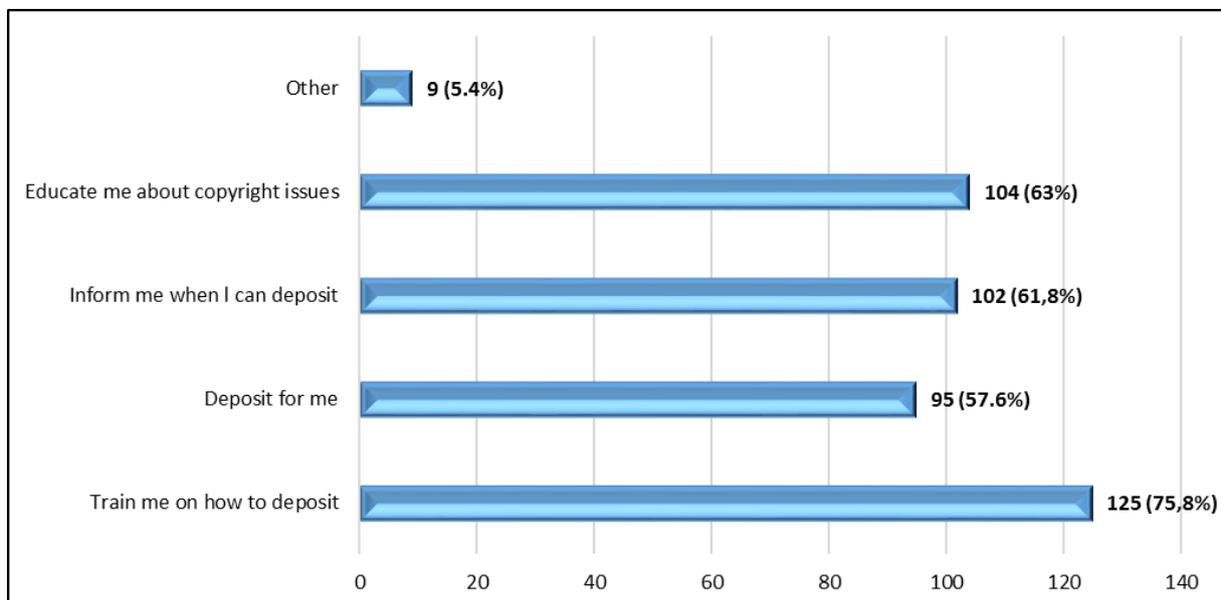
Figure 5.6: Help anticipated from the library (N=165)
Source: Field data (2018)

To ascertain other roles that were conducted by the library apart from those that were directly related to supporting academics and promoting use, the interviews revealed other back end responsibilities that the IR Librarian undertook in developing the IR. It was reported that, the IR Librarian received content from all the UKZN colleges, which comprise mainly theses and dissertations. These were manually captured to the ResearchSpace and metadata was created. For content that was loaded by academics, it was stated that the IR Librarian approved the archiving of articles by checking the Sherpa/Romeo database to see if archival rights were adhered to. In addition, the IR Librarian verified and ensured that all metadata was up to

standard. In certain instances, the IR Librarian requested for copyright on behalf of the academics when they want their articles uploaded on the IR. Overall, the IR Librarian was said to be responsible for the day to day running of the IR and addressed all IR-related enquiries.

The final question in this section asked respondents to indicate whether or not the library was the most appropriate department within the university structures to administer the IR. While academic libraries' have assumed the new role of driving OA in terms of building, managing and running the university's IR, this study sought to establish if academics consented with this responsibility. The results showed that, a majority, 157 (95.7%), agreed it was the library's duty while seven (4.3%) did not agree. A follow-up question requiring respondents to explain their answers showed that there was a general understanding that it was the responsibility of the library to manage information sources. Responses such as "*It is the information centre of the university*", and that "*It is a central source that controls information,*" pointed to the same fact. Another respondent agreed by saying; "*The library manages books and journals as well as online journal articles, so they will have the most qualified staff to administer the university's IR*". Respondents felt that the library has the know-how of dealing with information as expressed by another respondent who said:

> "*Surely this would be an extension of the function of what libraries and librarians already do. One would expect librarians to have the necessary skills to administer and run the University's IR. They would also be best placed to disseminate information and train people on how to gain the most from the IR facility*".

The library was described by some as a gateway to information that is easily accessible to both academics and students, and also seen as "*the largest physical resource*", and as "*… the default go-to centre, whether physically or virtually when a student or lecturer alike seeks information*".

The library was also identified by some respondents as an archive that preserves and stores all scholarly content of the university. One respondent noted that libraries, "*are in the business of curating content and are often identified as repositories of scholarly content*".

There was also an understanding that; "*The library is where one goes to access information and to get help accessing information*", and was associated with "*… facilitating access to research*". To support this library role as the 'facilitator' in accessing information, one respondent lamented that, while "*the library has the capacity and know-how to manage*

repository, they need to do training regularly on all departments". Another respondent complained that, "… *the library staff must change from coming to work to performing their duty with pride and passion".* However, it was revealed by many respondents that the library staff were trained and had the expertise in handling information and helping users gain access to the information. It was clearly stated that they could not think of any other department in the university that could be suitable to manage the IR than the library. While they agreed it was the library's responsibility, the issue of change of attitude was stressed.

There were respondents who felt that the library alone could not fully manage the IR. Some respondents noted that the IR could best be managed if the library could cooperate with the ICT department, highlighting that the library has experience with managing information, and ICT, with technological developments.

A few felt that it would be ideal if the repository could be run by the library, hand-in-hand with the research office. According to the university structures, and as explained by one interviewee, the library is a subset of the research division that reports to the DVC Research and works towards fulfilling the goals of the research division.

On the other hand, there were two participants who completely did not believe in the library assuming IR responsibilities. One respondent did not give reasons and the other explained that there were seasoned academics who were proficient in OA who could handle this responsibility.

5.6 Factors perceived to influence IR use

To determine academics perceptions on IR use, four questions (Q22 to 25) were asked, based on the UTAUT constructs: performance expectancy, effort expectancy, social influence and facilitating conditions. These variables were measured using a multiple-item scale. A five point Likert scale, with 1 for 'strongly agree', and 5 'strongly disagree', was used to determine how a participant agreed or disagreed with a particular statement.

5.6.1 Performance expectancy

Performance expectancy was measured using six items. Table 5.5 summarises the findings on respondents' perceived outcomes of the IR. On average, 44 (26.7%) respondents strongly agreed that the IR could improve their work outcome, while 57 (34.5%) agreed. Forty-eight

(29.1%) were neutral to the statement, 9 (5.5%) disagreed and seven (4.2%) strongly disagreed. Overall, a majority of 101 (61.2%) (strongly agree + agree) support that the IR can help improve their work while 16 (9.7%) disagreed (disagree + strongly disagree). The average mean was 2.25, indicating that a majority of respondents believed that using the IR would improve their work.

Table 5.5: Performance expectancy (N=165)

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean	SD
The IR enables me to publish more quickly (turnaround time from submission to publishing is short)	23 (13.9%)	31 (18.8%)	82 (49.7)	14 (8.5%)	15 (9.1%)	2.7950	1.08465
Publishing on the IR will increase usage of my work	36 (21.8%)	60 (36.4%)	51 (30.9%)	10 (6.1%)	8 (4.8%)	2.3540	1.05125
The IR allows for global access to scholarly literature	47 (28.5%)	65 (39.4%)	38 (23%)	9 (5.5%)	6 (3.6%)	2.1615	1.03017
The IR enables researchers to access literature more easily	63 (38.2%)	69 (41.8%)	27 (16.4%)	3 (1.8%)	3 (1.8%)	1.8696	0.88127
The IR will increase visibility of my work	51 (30.9%)	67 (40.6%)	39 (23.6%)	5 (3.1%)	3 (1.8%)	2.0248	0.91481
The IR will enable me to conduct my research more quickly.	42 (25.5%)	51 (30.9%)	55 (33.3%)	12 (7.3%)	5 (3%)	2.3043	1.03708

Average mean 2.25

Source: Field data (2018)

A reliability test on performance expectancy, as shown in Table 5.6, yielded a Cronbach's coefficient alpha value of 0.890, implying that the items six items tested were consistent and valid to measure this UTAUT construct.

Table 5.6: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.890	.892	6

5.6.2 Effort expectancy

Effort expectancy was measured using five items and results are presented in Table 5.7. There was a general belief among most respondents (107, 64.9%) that using the IR would not be complicated for them. Fifty-two (31.5%) respondents could neither agree nor disagree and only six (3.6%) perceived the IR to be challenging for them to use. The average weighted mean was 2.14, implying that respondents would find it easy to use the IR.

Table 5.7: Effort expectancy (N=165)

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean	SD
It will be easy for me to use the IR	34 (20.6%)	58 (35.2%)	66 (40%)	6 (3.6%)	1 (0.6%)	2.2875	0.8569
Using the repository will not be difficult for me to learn	40 (24.2%)	77 (46.7%)	43 (26.1%)	3 (1.8%)	2 (1.2%)	2.0750	0.8283
I would not find using the IR difficult to understand	44 (26.7%)	64 (38.8%)	51 (30.9%)	4 (2.4%)	2 (1.2%)	2.1313	0.8839
It will be simple for me to become good at using the repository	44 (26.7%)	67 (40.6%)	51 (30.9%)	2 (1.2%)	1 (0.6%)	2.1063	0.8210
I would not find navigating the repository needing advanced internet skills	45 (27.3%)	64 (38.8%)	50 (30.3%)	5 (3%)	1 (0.6%)	2.1000	0.8556

Average mean 2.14

Source: Field data (2018)

Items measuring effort expectancy were found to be very reliable and consistent measures of IR use as reflected by the internal consistency measure of the Cronbach's Alpha coefficient of 0.915. Table 5.8 presents the statistics.

Table 5.8: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.915	.915	5

5.6.3 Social influence

Table 5.9 summarises results on respondents' perceptions on the impact of social influence towards the use of the IR. On average, 74 (44.9%) respondents strongly agreed that social influence can motivate them to use the IR, 57 (34.5%) agreed, 23 (14%) were neutral, six (3.6%) disagreed and five (3%) strongly disagreed. Thus, a majority of respondents concur that social influence can impact on their decision to use the repository as reflected by the average mean of 1.85. This suggests that, if those that academics look up to are using the IR, it will be easier for them to follow suit. In addition, if the university and funders would look favourably on them, they will self-archive their work.

Table 5.9: Social influence (N=165)

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean	SD
I will be motivated if leading researchers in my field are using the IR	77 (46.7%)	54 (32.7%)	23 (14%)	7 (4.2%)	4 (2.4%)	1.8303	0.98541
I will be motivated to use the repository if my colleagues are also using it	62 (37.6%)	61 (37%)	29 (17.5%)	10 (6.1%)	3 (1.8%)	1.9758	0.98124
I will feel encouraged if the research funders supporting me would look favourably on me for publishing on the IR	75 (45.5%)	60 (36.4%)	19 (11.5%)	6 (3.6%)	5 (3%)	1.8242	0.98124
I will be motivated if UKZN would look favourably on me for publishing on the IR	82 (49.7%)	53 (32.2%)	20 (12.1%)	3 (1.8)	7 (4.2%)	1.7879	1.01686

Average mean of 1.85

Source: Field data (2018)

Table 5.10 shows the value for the Cronbach's coefficient alpha was 0.909. Thus, the four items used to measure effort expectancy were confirmed to be valid and reliable for this study.

Table 5.10: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.909	.909	4

5.6.4 Facilitating conditions

Facilitating conditions are considered as critical determinants of IR use. Participants of this study were asked to indicate the availability of certain facilities and conditions that were regarded influential in creating a conducive environment for archiving content on the IR. Six statements were given. Facilitating conditions measured in this study were those that were directly related to IR use. Rewards, infrastructure, skills and knowledge have no direct link to each other, yet they are all necessary for self-archiving. The purpose of this variable was to determine what was in place to cater for self-archiving. For this reason, establishing the average mean did not have a significance as items were assessed individually.

The first statement, '*I have adequate infrastructure (e.g. computer, internet, power supply) to publish my content on the IR,*' had a majority of 128 (77.6%) participants agreeing to the statement, seven (4.2%) did not agree and 30 (18.2%) were neutral. When asked if they had time to load content on the IR, 59 (35.7%) indicated they did not have time and the same number of participants 59 (35.7%) claimed they had time. Forty-seven (28.5%) were neutral. Results on the statement, '*I have enough knowledge to publish my work on the IR'*, showed that only 55 (33.3%) had knowledge on publishing on the IR and the rest 110 (66.7%) did not. Regarding the availability of rewards for publishing on the IR, 68 (41.2%) were not sure if the university had a reward system, 79 (47.9%) indicated there were no rewards offered by the university for publishing on the IR while 18 (10.9%) indicated there were rewards. The statement, '*The library trained me on how to use the repository*', had a majority of 113 (68.4%) respondents disagreeing, 31 (18.8%) were neutral and 21 (12.8%) agreed to the statement. The last statement, '*The library is available to deposit my work on my behalf*', showed that 49 (29.7%) agreed to the statement, 35 (21.2%) disagreed and 81 (49.1%) were neutral.

A summary of these findings is presented in Table 5.11. On average, most respondents agreed that they had enough infrastructures; there was no agreement on time as an equal number of respondents agreed and disagreed. In addition, most respondents indicated that they did not have enough knowledge on self-archiving; and they did not agree that the university rewarded, or that the library trained them on how to self-archive. Finally, a majority of respondents were neutral regarding the library depositing their works on their behalf. They were not sure if the library was available to do that for them.

Table 5.11: Facilitating conditions (N=165)

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean	SD
I have adequate infrastructure (e.g. computer, internet, power supply) to publish my content on the institutional repository	70 (42.4%)	58 (35.2%)	30 (18.2%)	5 (3%)	2 (1.2%)	1.8491	.91533
I have enough time to load my content on the repository	24 (14.5%)	35 (21.2%)	47 (28.5%)	34 (20.6%)	25 (15.2%)	2.9937	1.28031
I have enough knowledge to publish my research work on the repository	25 (15.2%)	30 (18.1%)	48 (29.1)	47 (28.5%)	15 (9.1%)	2.9623	1.20593
The university rewards me for publishing on the repository	8 (4.8)	10 (6.1%)	68 (41.2%)	32 (19.4%)	47 (28.5%)	3.5975	1.10304
The library trained me on how to deposit and access information on the repository	9 (5.5%)	12 (7.3%)	31 (18.8%)	46 (27.8%)	67 (40.6%)	3.9245	1.16677
The library is available to deposit my research work on my behalf	22 (13.3%)	27 (16.4%)	81 (49.1%)	24 (14.5%)	11 (6.7%)	2.8176	1.03640

Source: Field data (2018)

Table 5.12: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.724	.718	6

Items measuring facilitating conditions were found to be reliable and consistent measures of IR use as reflected by the internal consistency measure of 0.724 as shown in Table 5.12.

5.7 Attitude towards use of the IR

To examine the attitude of respondents towards the use of the IR, one question (Q26) was asked with five items. The attitude construct, though not a part of the UTAUT construct, was included in this study, because it is believed to reflect an individual's favourable or unfavourable feelings towards using the IR (Davis, Bagozzi and Warshaw 1989:985). Items presented to determine this variable were, '*Using the IR is a good idea*', '*It is wise to decide on using the IR*', '*Using the IR is favourable for me*', '*It is beneficial for me to use the IR*', and '*I am positive*

138

towards using the IR'. Overall, a majority of the respondents, 120 (73%), indicated a positive attitude towards the IR. Only eight (5%) were pessimistic about IR use and 37 (22%) could not really state their position regarding the IR. With a mean of 2.46, it can be deduced that a majority of participants had a positive attitude towards the IR.

Table 5.13: Attitude on IR use (N=165)

Statement	Mean	SD
Using the IR is good idea	1.8994	.87290
It is wise to decide on using the IR	2.0503	.84792
Using the IR is favourable for me	3.4214	1.16588
It is beneficial for me to use the institutional repository	2.4528	.85461
I am positive towards using the IR	2.2264	.87818

Average mean 2.46

Source: Field data (2018)

Table 5.14 presents a reliability test on attitude construct items which yielded a Cronbach's alpha value of 0.676, with a standardised value of 0.742 which is considered acceptable. Although the alpha scale considers values between 0.6 and 0.7 as questionable, according to Sekaran (2000:290), a Cronbach's coefficient alpha of 0.676 is also acceptable.

Table 5.14: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.676	.724	6

In addition to the questionnaire, the findings from the interviews revealed that a majority of academics had a positive attitude towards OA. One interviewee explained that, "*Most academics are for the idea of OA. They are tired of us being hamstrung by the publishing houses because of the control they exercise over our research output*". Another interviewee said, "*One thing about academics is that what they do not like, they speak. When we cancel databases and they were using them, they complain*". This gives the impression that, if academics were not for the IR, it would not be difficult for them to convey the message. On the contrary, it was noted in the interviews that it had been difficult to get hold of academics to discuss OA and the IR. One interviewee stated that efforts were made several times to meet

with academics during deans' meetings or monthly meetings to discuss the IR but with no success. In addition, it was reported that emails were sent to some academics but no responses were received; and in some cases, promises were made but never fulfilled. One interviewee went to the extent of requesting principal librarians who sit at board meetings to market the university IR to the academics.

5.8 Challenges of using the IR

Question 27 and 28 addressed the challenges on the use of the IR. Respondents of this study were required to state the challenges they were facing in using the IR. Challenges faced by academics were gathered using the questionnaire while interviews focused on establishing those faced by the library in growing the university's IR.

5.8.1 Challenges faced by academics

To establish the challenges facing academic staff in using the IR, one question (Q27), with five items was asked and measured using the Likert scale. The first statement, '*I do not have adequate knowledge on OA publishing*' received a response from 163 respondents. Of these, 73 (44.8%) respondents agreed they had adequate knowledge, 55 (33.7%) indicated they did not adequate knowledge, and 35 (21.5%) were neutral. Responding to the statement, '*IRs will expose more research to plagiarism*', 164 responses were received. Fifty-five (33.5%) participants neither agreed nor disagreed with the statement; they were not sure. Twenty-three (14%) strongly agreed that the IR will expose research to plagiarism, 32 (19.5%) agreed, 31 (19%) disagreed and 23 (14%) strongly disagreed. With 33.5% (strongly agree + agree) of the respondents believing that IRs will expose research to plagiarism, and another 33.5% who were not sure, it can be assumed that participants had limited knowledge about OA and the IR.

The availability of other OA platforms has been an impediment to the development of IRs in universities. To assess if this was of any concern at UKZN, respondents were required to indicate if they published their work on other platforms, such as subject repositories, personal websites or social media platforms like ResearchGate. One hundred and sixty-two respondents attended to this question. Altogether, those who agreed to have published on other platforms were 92 (56.8%), and those who had not were 46 (28.4%). Twenty-four (14.8%) were neutral, giving an impression of uncertainty. When asked if they thought IRs reduce the value of the peer review process, 75 (45.7%) were neutral, suggesting that they did not know, 42 (25.7%)

claimed IRs threaten the value of peer review and 47 (28.6%) were certain it did not. The final statement, '*Lack of peer review in repositories will undermine my work*', had 163 respondents. Generally, those who agreed to the statement were 67 (41.1%), 66 (40.5%) were neutral and 30 (18.4%) disagreed. The pattern of responses to this question showed that many respondents chose to be neutral in addressing the challenges they faced in using the IR. It can be assumed that, because a majority of them were not using the system, they could not identify the challenges.

Apart from the proposed challenges, respondents were further asked to identify any other challenges they were facing or might have faced in using the IR. Only 36 (22%) respondents gave feedback to this question. Challenges raised by some respondents pertained to quality control, stressing on the lack of peer review process on content loaded on the IR.

The issue of lack of time in uploading content on the IR was emphasised. This was attributed to the lack of value to conduct the duty of self-archiving on the IR, as it was not part of their key performance areas (KPA), and academics were not in any way rewarded for this compared to productivity units.

Another challenge mentioned was that of fear of plagiarism of their work by students and other academics. One respondent explained that by making unpublished scholarly content freely available to anyone online, researchers can copy ideas, publish it and present it as their own.

The issue of awareness and training was also identified as a challenge faced by academics. One respondent felt that the IR was not getting the attention from the rightful people because it was not well advertised. The respondent added that, if academics could be trained, usage could improve.

Seventeen (10%) respondents indicated they had no challenges. Finally, there were a few responses which showed a lack of knowledge of the IR on the part of the respondent. These included:
- "*I do not know enough to list challenges*",
- "*We do not have any information about IRs*",
- "*Not sure of any challenge since I do not give more attention to IR*",

- *"I have not used IR to deposit my work".*

5.8.2 Challenges faced by the library

Results from the interviews showed that one of the main challenges that hindered the growth of the IR was the academics' reluctance to self-archive or at least provide their work for uploading on the IR. It was also revealed that a majority of academics could not create time to learn about the IR from the library staff due to their busy work schedules. Awareness of OA and its benefits amongst academics was limited, with the exception of a few who were interested in uploading their work on the IR. Consequently, it became difficult for the library to recruit content types outside of theses and dissertations.

The interview results also showed that there was lack of adequate staff to support the IR functions. It was reported that, as a result of staff shortages, there was a backlog of theses waiting to be uploaded on the IR, more so with the recent introduction of two graduation ceremonies each year. Though subject librarians were said to be helpful, it was reported that their assistance was voluntary, so they uploaded when they had time, and at their own pace.

The absence of an OA policy was highlighted as an impediment to the growth of the IR. Although guidelines were set, these could not compel academics to archive.

Finally, embargos were identified as obstacles in developing the ResearchSpace. Academics could only archive their scholarly literature after embargo periods and in a way, this slowed down the growth of the IR.

5.9 Strategies to improve IR use

Question 30 required respondents to propose strategies they thought could assist in improving the growth of the IR. Respondents were asked to indicate strategies that the university, the library and the academics could adopt. Strategies proposed for each entity are presented separately.

5.9.1 What the university should do

A majority of respondents stressed the importance of the university advocating for OA, ensuring that both academics and students were trained and that they were aware of the benefits

of the IR. Furthermore, a number of respondents strongly spoke about the service being publicised to academics as most of them indicated they were not aware of their responsibilities and how they could benefit, with some even not knowing the IR existed. Below are some of the suggestions highlighted relating to awareness:

- *"The institution needs to increase awareness and host workshops/seminars pertaining to IR"*,
- *"More training and publicity of IRs"*,
- *"The university should teach all staff and students about IR and its benefits"*,
- *"Make staff and students know about it"*,
- *"Education, awareness, user training"*,
- *"More advocacy and efforts to train both students and staff"*,
- *"Educate more staff about its existence and advantages"*,
- *"More awareness and motivation"*,
- *"Make it known to academics that it exists and what it's benefits are"*,
- *"Teach researchers about the university IR"*,
- *"Offering in-service training to academics/researchers on the process of using IR, offering staff time to attend these training sessions as compulsory training"*,
- *"Academics need to understand if the IR is simply a storage place for already-published research. We need to have more information about its purpose"*.

One participant explained that academics are constantly moving from one institution to another looking for greener pastures. If they are not introduced to the repository during induction or early after joining the institution, chances are high that they will resist if this is introduced to them later.

It was also proposed that the university should support OA, '*morally and financially'*. A number of respondents felt that it would motivate staff if the university could come up with some form of incentive. One respondent explained that, for the academics to upload their work they needed to be incentivised, otherwise they would not create time for it. In the same vein, one respondent said, "*Acknowledge academics who deposit"*, another one said, "*Recognise work published in the IR"*, and quite a number indicated that the university should support academics. Thus, there is a general consensus that the university should give credit to those using the IR. It emerged in the interviews, as explained by one participant that:

"We have a gap in terms of incentivising the academics for uploading their research on the repository. To a larger extent, the incentives we have are for research and publishing that we receive from the department of higher education and training. We encourage our academics to publish on OA platforms. Whether we will have incentives schemes for that, l think it's something that we will have to discuss because incentives would normally have some form of financial implications attached to it. We will have to look carefully at what the overall benefits would be for the institution".

A few respondents cited the issue of developing an OA policy that will see all academics being mandated to submit their work on the IR. One respondent explained that; "*The university must have a policy that compels all academics and researchers to ensure that whatever work they are involved with need to be published through the IR".*

One respondent was of the opinion that the university should "*Assure academics of preservation and integrity of published works on the IR*". The same sentiments were shared by another who said, "*Integrity and safety of the ideas or information published on the IR must be upheld".* Long term planning and long term commitment to the IR was suggested as a strategy that the university could consider, otherwise, without a maintenance plan, it would be a waste of time.

Copyright issues are of concern in OA publishing. Some respondents suggested that the university should take responsibility of copyright issues and negotiate with publishers so that academics are able to publish in the IR. Some respondents felt that it was the responsibility of the university to educate academics and researchers about copyright and OA.

Providing more human resources to manage the IR functions was mentioned as one of the strategies the university could adopt to improve the IR. One respondent called for the appointment of an independent outside person to take charge while another highlighted that the few library staff that are available should show enthusiasm, such that academics are attracted to the service.

A significant number of respondents were unsure of what the university should do to improve the development of the IR. They clearly indicated '*unsure*', with some writing '*N/A'*, while another explained that, "*Due to my lack of information regarding IR, I am unable to respond*

to this question". In addition to this, there was one respondent who said, "*I don't know enough about the IR*".

This question requesting strategies was answered by 91 (55%) respondents, many could not propose any strategies while some had ideas as explained above.

The interviews yielded no feedback on what the university should work on to improve IR use. However, there was feedback on what the university is doing to advance OA. One interview participant highlighted that:

> "*At national level, there are discussions on how we store, access and utilise the knowledge that we produce. There is a strategy the university is taking, not only UKZN, but universities in South Africa, to go OA and discourage the publishing houses subscription model. In other countries like Germany, the government is now providing funding to the universities to publish with publishers like Elsevier, but on OA. Universities in South Africa are already developing a strategy in that regard. On top of this, one of the discussions we had with publishing houses like Elsevier, for example, was that, if we as an institution, purchase papers of our own authors, we should be given the opportunity to keep it in-house in our repository so that in the future, if we do not subscribe to Elsevier anymore, we still have access because it's our research that we produced*".

5.9.2 What the library should do

There was a strong call for the library to engage in training and creating awareness on both OA and IR to the university community. Most respondents felt that the library should take the leading role in promoting the IR and continuously educating academics and researchers about OA and its benefits. Some of the responses included:

- "*Librarians must visit all university departments and talk about IR, encourage academics and researchers to submit their published work*",
- "*Make it known to academics that the IR exists and what it's benefits are*",
- "*Improve awareness among students and academics about the IR. Some basic training for both academics and students*",
- "*Clarify the usefulness and benefits of the IR, offer training*",
- "*Train, educate, inform*",

- *"Work closely with the University to publicise the benefits of IRs",*
- *"Promote the use of and frequently refer post graduate students who walk into the library to the university's IR as a first option to finding any knowledge they seek",*
- *"Workshop early career academics on IR and OA publishing",*
- *"Advertise and have workshops for both undergraduate and postgraduate students. Also provide information emails",*
- *"Tutoring on how this is done - publishing your work, or searching at the IR for different types of work",*
- *"Educate the university community about copyright and OA publishing".*

It was also suggested that training should be done on a regular basis to cater for new members of the community who may be unaware of the university's IR and their responsibilities thereof. Furthermore, respondents advised that the library should send reminders to academics and possibly "*... a quarterly OA newsletter that can be shared online highlighting all new deposits and articles published on the IR".* One respondent raised the point that the library needed to provide usage and/or downloads statistics to improve the functionality of the IR. This, it was said, could capture the attention of the academics.

Some respondents were of the opinion that, if the library could reach out and assist academics with uploading their contents, it will improve the growth of the IR. One respondent suggested that the library, "*support academics by uploading research for them".* Another concurred by saying, "*upload to repository once published to a journal and acquire permission to go OA*". Thus, respondents advised the library staff to give assistance in the form of uploading for academics, showing them how to do it or advising them when to do it. One respondent further recommended that the library staff should stay up-to-date with copyright issues and inform academics when necessary.

Committing more staff and resources towards the development of the IR was proposed as a strategy to grow the IR by respondents. One respondent pointed out that those responsible for the IR within the library should be clearly identified and made known to the academics so that they know who to contact when faced with IR enquiries. In addition, there was a call for the library staff to change their attitude and be passionate about helping and understanding user

needs. One respondent explained that, "*The core of information is online and OA. The library has to change its reason for existing*".

There were few respondents who indicated they could not advise on the strategies because they did not have adequate knowledge about the IR and OA. There were also a large number of respondents that were not sure what they could advise on to improve the development of the IR.

The strategies raised in the interviews related to the establishment of the OA policy. It was highlighted that, it was easy to recruit theses and dissertations because it was stated in the IP policy that its compulsory to submit copies to the library, and should the same happen with other content types, UKZN would exhibit a rich repository as research output is generally high within the institution. While it is the responsibility of the university to approve the policy, it was raised that the initiative to draft the policy should come from the library. However, it was revealed in the interviews that the library had already drafted an OA policy and was awaiting approval by the senate and other university structures.

5.9.3 What academics should do

As academics of the UKZN, respondents were required to state what they felt was necessary for them to do in order to improve use of the IR. A general view was that academics needed to upload their work. Below are some of the responses that were given:

- "*Being more proactive about the use of the IR, both in terms of depositing and drawing therefrom*",
- "*Contribute*",
- "*Participate*",
- "*Use the IR*",
- "*Share their research*",
- "*Use the IR to display their work*",
- "*Strive to put their work on the IR*",
- "*Treat IR as a mandated repository*",
- "*Find time to do this*",
- "*To publish their work on the IR after clearing the copyright rights with the publishers and then refer students that are studying postgraduate studies to the IR*".

The results also revealed that some respondents felt they needed to work together and encourage each other, as well as their students, to use the IR. Responses pointing to this fact are presented below:

- *"We probably need a stronger collaboration mind-set"*,
- *"Mentoring junior staff members and conducting informal discussions about IR"*,
- *"Talking about it and sharing the pros and cons"*,
- *"Share with colleagues that they are using the IR"*,
- *"Jointly working with students to have this realised"*,
- *"Academics and researchers must encourage their students to also publish through IR"*.

The idea of referring students to the IR was upheld by some respondents who believed that, if academics could refer their students often to the IR, visibility would improve.

There were respondents who felt that input into the IR was only possible if academics published more. One respondent clearly mentioned that, "*Let's encourage each other to write because we have a place for our work*". Furthermore, the results revealed that academics were encouraged to exercise *"academic rigour and produce quality instead of quantity"*, respecting "*each other's niche research areas*" and "*following relevant procedures and behaving ethically*".

Some respondents highlighted the need for academics to develop a positive attitude towards the IR and learn how to use it. Academics were encouraged to develop a willingness to learn about the IR and create time to attend library training sessions. Exploring the IR, knowing its benefits and familiarising with the platform were recommended as ways that would help grow the IR. One respondent strongly felt that academics needed to be proactive and do their part in developing the IR and should "*stop complaining and moaning and start using the excellent resource*". Another respondent advised academics to "*Learn more about OA and embrace it, improve the quality of articles put in the IR (this will make the IR a go to area when in need of some research material)*".

A few respondents indicated they were unsure of strategies they could recommend to improve the IR. One respondent claimed not to be conversant with the IR, hence was not in a position to propose strategies for improvement.

Interview responses suggested that academics should develop an interest in OA and learn how they can benefit from it. One interview participant admitted that the library had done all it could to gain academics attention; it was up to each individual academic to make a choice either to participate or to remain ignorant.

5.10 Summary of the chapter

This chapter presented the analysis of data collected on IR use by academics at the UKZN. The questionnaire was the main source of data, substantiated by interviews, documents and bibliometric databases. Findings were presented based on the research questions of the study in the form of graphs, tables, frequencies and percentages. The results revealed that there was considerable progress in creating a conducive environment at UKZN to foster IR use by academics. Overall, academics' awareness of the IR, appreciation of the importance of the IR, the availability of content for loading on the IR and usage of the IR were some of the positive attributes revealed by most respondents. There were mixed reactions on the role of the library, but many respondents showed some understanding on the functions of the library with regards to the IR. Further, interview responses disclosed some of the responsibilities assumed by the library, in addition to those specified in the questionnaire. Results on factors perceived to influence IR use showed that, performance expectancy, effort expectancy, social influence, facilitating conditions and attitude had a significant relationship with academics use of the repository. Most respondents felt that using the IR would improve their performance and ultimately their work output, and they would require minimal effort to use it. In addition, the findings revealed that social influence and the availability of adequate infrastructure would motivate them to deposit on the IR. The results also showed that academics had a positive attitude towards OA. Results on challenges revealed that problems encountered by the library gleaned more towards academics' reluctance to adopt OA while academics stressed the need for the library to be more vigorous in educating and bringing awareness to OA. Findings on the strategies to be adopted to improve IR use included the development of an OA policy, addressing the issue of shortage of staff in the library and a call for academics to embrace OA and participate in the process. These findings will be systematically interpreted in Chapter Six.

CHAPTER SIX

DISCUSSION OF FINDINGS

6.1 Introduction

The purpose of this chapter is to explain the meaning of the results presented in the previous chapter. Kothari (2004:344) highlighted that proper interpretation of results determines the usefulness and effectiveness of research findings. The discussion should "establish relationships within the collected data, partially overlapping analysis" (Kothari 2004:344), as well as relating study findings to those of other similar studies previously conducted to allow continuity in research (Hess 2004:1239). During this process, the researcher is cautioned to remain focused on the research problem and study results (Hess 2004:1240). In the light of this, the discussion of the findings was guided by the two research objectives of the study which were to examine the development of the IR at the UKZN, and to assess the extent of use of the IR by academics at the university. In this study, the term 'use' was largely used to refer to 'depositing' of content to the IR. The discussion themes were drawn from the following research questions of the study:

1. What developments have been made towards the growth of the university's IR?
2. What are the roles of the library in the development of the university's IR?
3. To what extent are the academics using the university's IR?
4. What is the academic's attitude towards self-archiving?
5. What challenges are hindering IR use at UKZN?
6. What strategies can be employed to improve acceptance and use of the IR at UKZN?

6.2 Respondents' background

Background information is necessary to help the researcher understand the characteristics of the respondents. Biographical data necessary for the interviews was that of identifying their positions, that is, The DVC Research, the Library Director and the IR Librarian. The standard profile information gathered in surveys is the age and gender of respondents. In this study, the ratio of male to female respondents was almost equal, 81 (49.1%) and 78 (47.3%) respectively. Within this homogenous group of academics, most were within the age range of 21 and 50 (65.5%), which are likely to be an active group working on developing their academic profiles. Other background information sought in some studies evaluating academics use of OA outlets

vary. Okendo and Mligite (2014) studied academics level of awareness in relation to scholarly communication in Tanzanian universities. Background information sought included academics internet usage skills in terms of accessing and disseminating scholarly information. Kennan (2007) considered academics rank and discipline as profile information to investigate scholarly OA publishing by academics at one university in Australia. Obuh and Bozimo (2012) sought for only academic rank while investigating awareness and use of OA scholarly publications amongst Library and Information Studies (LIS) lecturers in Southern Nigeria. Lercher (2007) gathered information on academic departments while surveying academics attitudes about digital repositories at Louisiana State University. In this study, attributes that were considered important in shaping up OA to scholarly communication included highest academic qualification, internet skills in retrieving scholarly content and internet skills in disseminating scholarly content. Findings of this study revealed that a majority of respondents, 112 (68%), had PhDs and 51 (31%) had Masters. This shows that 98.8% of the participants were eligible authors. Besides, the level of engagement and understanding of individuals with these levels of education on various technological aspects is often high; and also considering that all UKZN academics have computers. Findings from this study revealed that a majority of academics with these qualifications, 150 (90.9%) possessed good internet skills, particularly in terms of accessing scholarly content online while 99 (60%) had skills to disseminate. This suggests that, the likelihood of academics adopting and using the IR was high because they were familiar with online scholarly communication and they were likely to be engaged in publishing based on their academic qualifications.

6.3 Developments towards the university's IR

Results presented in Chapter Five identified a number of factors pointing towards the development of the university's IR. The major developments pertain to the growing size of the repository, signing of the Berlin Declaration, the appointment of the IR Librarian and drafting of the OA policy. These are discussed in details below.

6.3.1 Growth of the UKZN repository

The UKZN IR has been growing in terms of size since it was launched in 2009. A literature review on the establishment of the IR revealed that there were only 794 theses and dissertations when the repository was launched; and by 31 December 2010, the number grew to 2,472 (UKZN Library Annual Review 2010:2), and to 4,901 by end of December 2011 (UKZN

Library Annual Review 2011:6). In 2013, the number of theses and dissertations rose to 8,659; with the introduction of other content types, such as journal articles (366), book chapters (4) and Masters research reports (16) (UKZN Library Annual Review 2013:5). The latest statistics extracted in July 2018 showed that 13,732 items were loaded, with new content types that included videos, software, presentations and working papers (UKZN ResearchSpace: Browsing by type 2018).   Continuous growth in terms of size and diversity of content of the repository will improve as OA publishing becomes more acceptable by academics.

An analysis of repositories in South Africa revealed that UKZN has not managed to recruit as much diversified content types when compared with other universities of its level. An extract from the repository presented in Table 1.3 showed that content type, other than theses and dissertations had very few items. For example, there were eight book chapters, two videos, one conference paper and 10 presentations (UKZN ResearchSpace: Browse by content type 2018). On the other hand, UP had 18 different content types, with 84 book chapters, 355 books and 17,718 articles, to mention a few (UPSpace: Browse by type 2018). University of Stellenbosch had over 15 different content types, including proceedings, videos, recordings, datasets and musical scores. Success in the growth of these repositories can be attributed to the OA policy that both institutions adopted. UKZN has the potential to grow its IR because already it has published a lot but academics do not have the mandate to submit their work on the IR.

In Zimbabwe, while most universities claim to have functional repositories, Tapfuma (2016) found that they were very small, with items ranging from 200 to 1,721. A common phenomenon was the existence of unofficial repositories that were only accessible to the university community on intranet where examination papers and undergraduate dissertations were uploaded (Tapfuma 2016:174). In Nigeria, the University of Nigeria, Nsukka had the highest volume, with 21,461 items, and the highest varieties of content types, which included theses and dissertations, journal articles, conference proceedings, university publications and student term papers (Ukwoma and Okafor (2017:46). Low content and limited content types are what define repositories in the region (Ratanya 2017, Chilimo 2016; Dulle 2010). This shows that South African universities are leading in terms of OA adoption, not only because it has relatively strong culture of research production, but because it has good information technology infrastructure compared with other countries in Africa. For South Africa, taking

full advantage of these conditions and embracing OA would not only be a benefit to the country, but to the continent, as it puts research published in Africa on the map.

6.3.2 Signing of the Berlin Declaration

UKZN became the seventh university in South Africa to sign the Berlin Declaration on 22 October 2012; after University of Stellenbosch, UJ, UP, UFS, UCT and UNISA. As of November 2018, there were 626 organisations who were signatories of the Berlin Declaration globally (Berlin Declaration: Signatories 2018). By signing the declaration, these institutions were committing, "to promote the internet as a functional instrument for a global scientific knowledge base…," sharing the belief that knowledge dissemination is incomplete unless information is made widely and readily available to the society through the OA paradigm via the internet (Berlin Declaration: Preface 2018). Like other universities, the UKZN declaration was signed by the then Vice-Chancellor, Professor M.W. Makgoba, showing the university's commitment to support OA initiatives. A lack of institutional support for OA was found to be one of the negative effects dragging the adoption and use of OA in many developing countries (Christian 2008; Chilimo 2016; Kamanzi and Damen 2016; Zhong and Jiang 2016). Thus, for UKZN, by publicly declaring to be in favour of the OA principle, it is bound to support the library in creating an environment conducive for the OA concept and practice.

6.3.3 The appointment of the IR Librarian

Most academic libraries initiated the deployment of IRs to supplement the decreasing information sources caused by escalating subscriptions and IR responsibilities were shared amongst the existing librarians who did not have the expertise required to manage and administer IR duties. A literature review on the current study revealed that UKZN launched the IR under similar circumstances. IR duties were shared amongst subject librarians but OA work was not a priority, they uploaded theses and dissertations when they had time. A commitment to the project led to the appointment of a librarian dedicated to the overall running of the IR in 2014 (see section 5.4.10). Furthermore, results revealed that the IR Librarian was given the necessary support to gain knowledge and skills on OA publishing and the DSpace software. The IR Librarian was also afforded time to continuously attend workshops on OA in order to keep up with the new knowledge and trends. Findings in section 5.5 presented the IR Librarian's duties to include training academics on how to self-archive, uploading theses and dissertations, creating metadata records, performing quality control checks for content loaded

by academics, and requesting copyright permission on behalf of the academics. As part of promoting and marketing IR use, the librarian created a self-help guide on how to self-archive, and this is available on the repository page. The Sherpa/ROMEO link is also provided on the repository webpage for easy access to check copyright before submission. With the support of the library, the IR Librarian organises events to market and promote the repository. A recent event was the celebration of the OA International Week from 23 to 25 October 2018 under the theme, 'Open in order to make scholarly research visible'. The library hosted a conference with the aim to, "provide awareness, advocacy and contributions towards OA movement and the global call for freeing research from the chains of commercialisation" (LiASA in touch 2018:13). These duties are in line with those identified by Kamraninia and Abrizah (2010:193-195) which include:

> "collection management and its stewardship, understanding of software and giving training to authors, establishing a standard metadata and comprehensive catalogue system, reviewing submission for quality of content, persuading authors to contribute with self-archiving, training users search technique in institutional repository and promotion and marketing".

Armstrong (2014:48) added that IR Librarians should have:
> "… high quality customer service to solicit author permissions and manuscripts, sufficient level of expertise to review copyright transfer agreements, establish procedures that most effectively support author rights, possess technical expertise to be able to efficiently manage bibliographic information and upload quality metadata and have adequate knowledge to respond to unique requests from faculty and departments".

Alam (2014:454) notes that IR Librarians require expertise in bibliometrics to enable them to determine the scholarly impact of materials deposited in IRs. Such value added services are necessary when advocating for academics' support, especially where buy-ins are low, as reported in this study. Chilimo (2016:31 cited Kelly, Sheppard and Delasalle 2012) explained that:

> "There is a need for quantitative evidence in order to help demonstrate the value of online services, such as IRs, as such evidence can also help to detect emerging patterns of usage and identify associated operational best practices. Usage and citation statistics can reveal the demographics of those accessing materials in IRs and the type of content that is most popular".

It was established in this study that no formal training programmes are offered by institutions of higher learning here in South Africa, to equip IR Librarians with the necessary skills and knowledge to effectively manage IRs. However, it was disclosed in the interviews that librarians were collaborating and helping each other improve their IR services by sharing ideas on the IR Talk blog. Considering that South Africa is leading OA in Africa, training programmes are likely to be championed by it. On the contrary, pioneers of OA such as the USA have a number of universities and colleges that offer short courses for institutional repository administrators to help them develop crucial skills and expertise on identifying and recruiting scholarly work, as well as learning the best practices for outreach and promotion of the IR's services (Bepress: Repository Manager Certification Course 2018).

While the appointment of the IR Librarian is regarded as a positive move towards advancing the repository, results of the study established that the presence of the IR Librarian was not felt by many. The fact that 83% of the academics were not sure if the library offered training on IR, or not, shows that no frequent awareness programmes were being conducted within the institution. This is supported by findings in section 5.9.2, where a number of academics highlighted the need for regular awareness campaigns and workshops aimed at educating the university community about the IR, its benefits and the role of the academics. In addition, there were a significant number of academics who indicated that they could not provide challenges they were facing when using the IR because they were not familiar with the practice (see section 5.8.1). Furthermore, findings on challenges faced by the library (section 5.8.2) revealed that there was a backlog of theses and dissertations waiting to be uploaded as a result of staff shortages. The IR Librarian could not manage to conduct all IR duties on time. Literature discussing the role of the library in OA and the IR always identified IR duties as being administered by 'IR Librarians', 'IR staff' or 'Library staff' (Brewerton 2012; Armstrong 2014; Alam 2014; Engeszer and Sarli 2014) and never as an individual responsibility, as this often results in poor service or no service at all. Armstrong (2014:47) gave an example of Boise State University in USA, where the IR was run by three people, the Librarian who was the project manager "responsible for creating policies, establishing initial workflows, and problem-solving any issue outside of established practices"; a Library Assistant responsible for formatting and uploading documents and another Library Assistant "responsible for identifying eligible publications, reviewing publisher copyright policies, contacting academics, and maintaining individualised researcher pages". In developing countries however, many IRs are run by

librarians who have other library duties. It has to be acknowledged that, in developing countries, such as South Africa, IRs have not gained momentum to warrant huge financial investment from libraries, which are already facing budget cuts.

6.3.4 The UKZN OA draft policy

OA policies can potentially assist universities make institutional commitment to OA scholarly publications through IRs. As explained by Chilimo (2015:29 cited Suber 2012), OA policies are strategies universities implement as a way of encouraging or mandating academics to self-archive their scholarly work into repositories. To a greater extent, university IP policies have afforded libraries an opportunity to practice and promote OA by uploading theses and dissertations, which are often archived by libraries. Uploading of theses and dissertations is easier for libraries because the university holds the copyright and each student is required to submit a copy of their thesis before they can graduate. In the case of UKZN, the findings in section 5.4.9 were that, it is mandatory to submit completed thesis and dissertations in line with the university's IP policy. Similarly, University of Stellenbosch, states in its IP policy that it:

> "…holds the copyright of the assignment/thesis/dissertation and may publish the assignment/thesis/dissertation as it deems fit, including in paper or electronic format" (Stellenbosch University: Policy in respect of the commercial exploitation of intellectual property 2010:15).

UP also holds copyright to theses and dissertations (University of Pretoria: Intellectual Property Policy 2011: 15), and so do other universities in South Africa and outside. The effectiveness of mandatory submission can be witnessed by the number of thesis and dissertations universities have managed to upload to their repositories globally.

With regards to submission of other content types, a number of studies have shown that OA has made significant progress in institutions where mandating policies have been issued (Kumar, Chandra and Parthasarathi 2016; Zhong and Jiang 2016; Johnson et al. 2017). Findings of this study revealed that at UKZN, no policy was in place hence very little has been uploaded compared to what has been published. Results in section 5.4.10 revealed that a draft policy had been developed and was awaiting approval. A study by Mashroofa and Seneviratne (2016), examining Sri Lanka's OA publishing in IRs recommended that institutions needed to formulate policies and make self-archiving mandatory to ensure maximum openness to

scholarly content. The authors stressed that, it is important that universities wishing to invest in IRs develop OA policies (Mashroofa and Seneviratne 2016:187). Marsh (2015:172 cited Zhang 2013) emphasised policy development in China as a way of promoting OA, adding that its absence denotes lack of institutional support, and as a result, negatively impacts on the development of repositories. Ghosh (2011:19) challenged librarians to develop policies so that they are able to maintain sustainable repositories for their university communities.

Significant progress on OA has been recorded in countries where universities have taken policies seriously. While South Africa is the leading country in the region in terms of OA adoption, very little progress has been recorded in terms of policy implementation, meaning that more could be achieved if universities adopted OA policies. OpenDOAR (South Africa 2018) statistics showed that 26 universities have repositories and only eight universities have adopted OA policies (ROARMAP: South Africa 2018). On the contrary, UK, which was leading in Europe has 280 institutional repositories (OpenDOAR: Browse by country and region 2018), and 120 institutions have adopted OA policies (ROARMAP: Europe 2018). Further progress is being initiated in the European Union (EU) to advance a mandate for:

"immediate open access as the default by 2020, using the various models possible and in a cost-effective way, without embargoes or with as short as possible embargoes, and without financial and legal barriers, taking into account the diversity in research systems and disciplines." (SPARC: EU Statement on Making All Research Open by 2020 2018).

The legal requirement under Horizon 2020 is that "each beneficiary must ensure open access to all peer-reviewed scientific publications… the dominant type of scientific publication is the journal article" (European Commission: Open access and data management 2018). Six universities in South Africa: University of Stellenbosch, UCT, UFS, UP, UJ and UNISA have policies aligned to H2020 vision while UK has over a 100 of them (ROARMAP: Policy alignment to the H2020 2018). In these scenarios, the level of commitment to OA is evident, and success, to a greater extent, is aligned to the implementation of firm mandates.

However, as institutions and academics in South Africa begin to notice and enjoy the benefits of OA publishing, the likelihood that they would want to access more scholarly content on OA will rise. A positive development is that research intensive-institutions like UKZN are driving

towards the right direction of developing OA policies that will assist in the recruitment of other scholarly content types other than theses and dissertations.

Findings revealed what the library achieved by setting up and maintaining the repository. On the other hand, results also showed some positive features on academics that translate to progress that benefits the development of the IR. First, the fact that most academics were aware of the existence of the university's IR implies that the library had made progress in bringing awareness to the university community about OA. Results revealed that, generally, a majority of academics had a positive attitude towards IR; they believed it was important. This was revealed by the majority's willingness to receive training, share their research output, as well as recommend the repository to students and colleagues. Though not initiated by the presence of the IR, findings of the study revealed that a majority of academics had internet skills to access and disseminate information. Self-archiving would not be difficult for them because they were already familiar with online access to scholarly communication. In addition, a majority of them consented to having valuable scholarly work that was not published anywhere, but could be uploaded to the IR. Besides, all of them were eligible authors who had the capacity to produce scholarly literature.

6.4 The role of the library

Bailey (2005:266) identified the roles of the academic library in OA to include designing and establishing IRs, educating the academic community about OA, depositing digital materials for academics, metadata creation and maintenance, IR advocacy and promotion, as well as assisting in the creation of IR policies and procedures. Alam (2014:451) identified other duties to include digitising old university collections and making them available on OA, and collaborating with other institutions. Rodriguez (2017:273) added that, by meeting regularly with other universities and "sharing information as well as tasks, breaking down siloes, and thinking creatively about obstacles," there is great potential for improving IR success. There is an array of duties that a library can engage in, depending on the stage at which OA has been adopted within the institution. Duties of the IR Librarian tend to overlap with the role of the library. In any instance, the IR Librarian is a part of the library.

This study sought to establish duties assumed by the UKZN Library in advancing OAIR. Findings from the questionnaire, interviews and literature reviews revealed that the library was

actively involved in a number of tasks to advance the university's IR. Initially, it was the library that spearheaded the launch of the IR in 2009. Results of the study showed that, creating awareness, promoting and marketing the IR, uploading of thesis and dissertations, metadata creation and maintenance, mediated service, developing of OA policies and providing of usage statistics and metrics were some of the services offered by the library.

6.4.1 Creating awareness

Educating the academic community about OA was identified as one of the fundamental responsibilities of the library (Alam 2014; Rodriguez 2017; Daoutis and Rodriguez-Marquez 2018). Awareness is a pre-requisite to subsequent use of OAIR because it raises consciousness. Libraries need to develop training programmes and create a learning environment that empowers and educate academics about OA publishing, copyright and data management (Yang and Li 2015:17). In addition, knowledge about publishers' and funders' policies related to OA found on SHERPA/RoMEO and SHERPA/JULIET, licensing, and the general benefits of OA publishing, help academics cope with this change in scholarly communication. Conducting on-going education and training was found to improve academics attitude towards publishing in OA outlets (Mutwiri 2014:145), as well as enhancing their capability to use repository systems (Lwoga and Questier 2014:132). Thus, effort needed to use repositories is reduced and often leads to increased performance expectancy as well as higher intention to use the IR (Zuiderwijk, Janssen and Dwivedi 2015:436).

Findings from the questionnaire revealed (see section 5.5) high levels (89, 54%) of uncertainty amongst academics regarding the library's role in bringing awareness to OA and the university's IR. Teaching of the UKZN academic community about OA was low as shown by 133 (81.1%) respondents who indicated they would want to receive training. These findings concur with those from the interviews which revealed that no scheduled training sessions were organised by the library and that training was offered only upon request. While identifying the duties they expected the library to undertake, a number of respondents from the questionnaire stressed on the need for regular training. The words *'train', 'educate', 'tutor', 'inform'* and *'awaren*ess' were used in trying to describe the need for knowledge about OA amongst academics at the university. In addition, with 31 (22.3%) participants claiming not to have heard about the IR, it is almost clear that they did not have any knowledge about OA; which is a huge impediment to IR use. Current literature continues to reveal limited knowledge about

OA as well as limited awareness of the existence of IRs amongst academics in various universities (Iton and Iton 2016:27). In a study conducted by Bongiovani et al. (2014 cited by Serrano-Vicente, Melero and Abadal 2016:596) at the University of Rosario in Argentina, to obtain the views and practices of academics regarding OA and their needs for the IR, the results revealed that 80% of respondents were in agreement with the concept of OA, but only 13% used the IR to disseminate their research because of lack of awareness. These findings align well with the findings of this study. Ratanya (2017:277) observed that, in African universities, although a number of academic libraries took the initiative to develop and maintain IRs, many of them invested very little effort in creating awareness amongst academics on the usefulness and potential benefits of the IRs. Lack of awareness was also reported by Singeh, Abrizah and Karim (2013) as one of the inhibitors of self-archiving in OA repositories by academics in selected Malaysian universities. The authors highlighted that, having adequate knowledge on OA and self-archiving would pave way for greater participation and involvement (Singeh, Abrizah and Karim 2013:33). Even across the US, Western Europe and Australia, studies conducted around 2006 on IR use suggested lack of awareness on the concept of OA by academics, forcing librarians to archive on their behalf (Zhu 2017:559). Thus, if the library is not taking an active role in educating the academics about OA on an on-going basis, they are indirectly increasing their workload because OA repositories have become a reality in academic institutions the world over. It is essential to train academics non-stop to capture new academics joining the university and to strengthen the confidence of those already involved in self-archiving.

Repositories have become a huge investment for universities nowadays because university rankings are based on an institution's visibility in terms of its research output being online. They have become platforms for showcasing a university's research output to the global community online. Thus, participation by academics is critical, and so is educating them about OA publishing.

6.4.2 Advocacy

Apart from bringing awareness to OA, libraries ought to design advocacy programmes within their institutions that aimed at marketing and promoting repository use. Advocacy is about raising awareness on the concept of OA and publicising OA resources to academics and other

university stakeholders, such as students, university management and research funders. As defined by Ghosh (2011:19) advocacy is:

> "planned, deliberate, sustained effort to raise awareness on an on-going basis where support and understanding are built incrementally over an extended period of time and using a wide variety of marketing and public relations tools".

The basis of conducting advocacy programmes is to increase OA visibility by combining "lobbying activities with marketing and public relations skills to tell the library's story to the community and engage all stakeholders in the process" (Ghosh 2011:20). This study was interested in knowing what activities the library engaged in to market and promote OA and the university's IR to the academic community. It is important to note that there is an overlap on OA advocacy and awareness activities. Some of the activities may belong to both, for example, Morrison and Waller (2008:487) talked of education campaigns as a form of advocacy and these result in the same effect as that of educating the academics. Nagra (2013:147) identified advocacy in terms of giving "information to institutional community about IR and its benefits", and Abdelrahman (2017:107) understood advocacy programmes as those discussing the repository and its benefits to the academic community. Thus, advocacy encompasses marketing and promotion to bring awareness.

Findings from documents reviews revealed that marketing and promotion of the IR started in 2009 when the IR was launched (UKZN Library News: ResearchSpace goes to Senate 2010; UKZN Library Review 2012:1-3). Interviews reported that the library organised advocacy programmes to celebrate the International OA Week each year. Findings presented in section 5.4.2 stated that the library organised activities during the OA International Week as well as the Library Week to publicise OA and the university's IR. A literature review on recent campaign activities revealed that the library organised a conference to celebrate OA International Week with the aim of "providing awareness, advocacy and contribution towards OA movement" (LiASA 2018:13). Furthermore, results on contributions made by the university in section 5.4.10 revealed that, not only is the university promoting self-archiving, but OA in general as revealed by the launching of the Open Journal Systems (OJS) during the 2018 OA week. Such a move is supported by Morrison and Waller (2008:487) who urged libraries to support all forms of OA, be it green or gold OA. The authors further advised libraries to support academics to retain their copyright through the use of the CARL/SPARC Author's Addendum or Creative Commons licensing. At UKZN, it was revealed that the library

is "proactive in highlighting the benefits of publishing in OA journals as the rising journal costs and constrained library budgets negatively affect access to publications" (LiASA 2018:13). Library staff today are engaged in advising academics to consider publishing in OA journals. The rise of OA journals has seen the proliferation of predatory journals. It has become critical for libraries to educate academics and researchers about predatory publishing and how they can identify predatory journals. Library expertise is required now more than ever, to scrutinise OA journal publishers and correctly advise academics.

Ghosh (2011:22) outlined that "advocacy gives information and evidence of demonstrable impact" as a way of influencing the academics. This study revealed that usage statistics from Google analytics and download counts from DSpace were often shared with the university community to demonstrate how OA content has been accepted by other scholars. In such instances, it is necessary to ensure that academics are familiar with the concept of OA and particularly the existence of the repository for them to comprehend the meaning of the figures. Ghosh (2011:21) concluded that advocacy activities on OA should be presented in the context of the community's needs and the things they already value the most.

6.4.3 Uploading of content and metadata creation and maintenance

The findings of the study in section 5.5, on the role of the library, revealed that the IR Librarian was responsible for uploading theses and dissertations. Soft copies were submitted to the library for this purpose. However, uploading documents on its own is not enough until metadata for the content is made available so that it is discoverable and visible. It is the role of the library to be involved in creating the metadata for IR documents (Bailey 2005:266). Ukwoma and Okafor (2017:51) advised that, it is better for an institution to use universally accepted metadata standards so that other external systems can make use of metadata. The UKZN uses the DSpace open source repository software. It complies with the Open Archives Initiative (OAI) Protocol for Metadata Harvesting (PMH), which allows for seamless access to research outputs. Findings from the interviews regarding the library's role in metadata creation (see section 5.5) revealed that the university appointed an IR Librarian in 2014 who was responsible for creating metadata records for IR content. Furthermore, the IR Librarian checked the completeness and quality of metadata provided by academics to ensure that it was accurate and sufficiently detailed. Before the appointment of the IR Librarian, findings revealed that subject librarians were responsible for uploading and creating metadata for IR content when they had a chance. The metadata role is crucial as explained by Horwood et al. (2004:172) who indicated that

librarians should organise and maintain digital content submitted by institutional authors, and that they should "act as agents for quality control to ensure that records created comply with international standards" (Horwood et al. 2004:172 cited Pinfield 2001). The authors further highlighted that academics cannot be expected to correctly implement controlled vocabulary as professional librarians would do. Hence librarians are better positioned to provide subject headings and keywords that translate to better search terms likely to deliver better results (Horwood et al. 2004:172 cited McLeod 2000). Findings from a study by Abdullah (2009:28) showed that academics strongly believed that repository administrators are better positioned at standardising bibliographic information as highly specialised competencies are required for this role. Technical expertise to efficiently manage bibliographic information and upload quality metadata is important (Armstrong 2014:47). The results of this study showed that the IR Librarian received training and continuously attends OA workshops to improve IR skills.

6.4.4 Mediated deposits

One of the major challenges that has been identified as a drawback in developing IRs is the low recruitment of content as buy-ins from academics, who are the main contributors in scholarly publishing. Studies conducted within the region found that academics are reluctant to self-archive in the IR (Dulle 2010; Armstrong 2014; Mutwiri 2014; Chilimo 2016; Tapfuma 2017). Jain (2011:131) noted that academics "may be happy to contribute content but are reluctant to do it themselves". Foster and Gibbons (2005:3) observed that, "even those academics who are most committed complain of overwork, resist clerical responsibility, and resent any additional activity that cuts into their research and writing time". A possible solution would be for librarians to deposit on their behalf if such help is required (Bailey 2005:266). This study requested respondents to indicate if they would want their research to be submitted on their behalf. The findings in Figure 5.6 show that over half (95, 57.6%) of the respondents were willing to receive a mediated service. While this could be beneficial in terms of growing the IR, Armstrong (2014:47) cautioned of this 'do it for them' approach, citing that it may create work overload as it requires a good staff complement. Nonetheless, the author pointed out that, since the mediated deposit model involves skilled library staff, compliance with all copyright policies, quality control for the final document and metadata record can be guaranteed (Armstrong 2014:47). The University of Surrey Library offered a partially mediated service up until 2016 where:

"Academics logged into the University's publications database (Symplectic Elements) to approve or-more rarely-manually add their publication records and to upload full-text for open access. The Library would then check/update the metadata, check the version uploaded, check copyright/seek publishers' permissions, apply any necessary embargoes and make the paper public in the SRI Open Access repository" (Eprints). (Daoutis and Rodriguez-Marquez (2018: 20:2-3).

For the UKZN IR, findings were that all records created by academics were checked and approved by the IR Librarian before they could be accessed by the public. However, to adopt a full mediated service will pose major challenges at UKZN since only one person is designated for the IR.

6.4.5 Development of OA policies

Johnson (et al. 2017:4) observed that OA has made significant progress in institutions where firm OA policies have been implemented. Policies can create a positive effect that can impact on the rate of repository content accumulation (Chilimo 2016:29). It was discovered in this study that UKZN did not have an OA policy. Results from the questionnaire showed that a limited number of the academics (20.5%) were not sure if there was a policy while 26% mistook the IP policy to be OA policy. This was revealed by some responses highlighted in section 5.4.7 where explanations given were pointing towards the compulsory submission of supervised theses and dissertations, which is the IP policy. The strength of the IP policy is reflected by the number of theses and dissertations loaded on the IR, confirming the positive impact of having a policy. Findings from the interviews (see section 5.4.7) revealed that there was no OA policy in place yet, but rather a draft policy that was awaiting approval by the university senate. As a result, submission of content to the repository was voluntary, yielding a low turnout on content recruitment.

Eight South African universities registered their OA policies on ROARMAP (2018), and these include research intensive universities, such as UCT, UP and Stellenbosch University. Stellenbosch University adopted an OA policy in October 2010 (ROARMAP: Stellenbosch University 2018). As of November 2018, notwithstanding the huge number of theses and dissertations, the repository had over 11,880 articles, 2,094 non-subsidised journal articles, 4,129 subsidised journal articles, 2554 chapters in books and 705 conference papers, to mention a few (SUNscholar Research Repository: Browsing by type 2018). UCT, which has also

succeeded in recruiting large amounts of different content types, launched its IR in 2014 and within the same year, it passed its OA policy in June 2014 (ROARMAP: University of Cape Town 2018). Terms of the policy are that authors' final peer-reviewed versions of manuscripts are mandated for deposit into the IR when the publisher permits. UP has so far managed to recruit 17,609 articles, 353 books, 84 book chapters, 25 conference papers, 29 drawings, six animations and more different content types (University of Pretoria: UPSpace Institutional Repository - Browsing by type 2018). In 2003, UP mandated submission of theses and dissertations, and later in 2009, the university adopted a policy for mandatory submission of research papers by its staff, students and other affiliates (University of Pretoria: Open Access Mandate 2009). Success in the recruitment of various content types in these universities can be attributed to the adoption of OA policies. A lack of OA policy was found to be one of the biggest challenges in recruiting content at Uganda Christian University (Ibinaiye et al. 2015:16).

A recent study by Tapfuma (2016) revealed that some universities in Zimbabwe had OA policies but they were not readily available or publicly accessible online for academics to access. Furthermore, the study disclosed that none of the policies mandated academics to deposit their scholarly work on the IR (Tapfuma 2016:222). As a result, recruitment of content in these universities was significantly low. On the contrary, Europe and other developed countries have developed successful repositories by adopting OA policies (Palmer 2014; Tate 2015; Vincent-Lamarre et al. 2016; Johnson et al. 2017). Harvard University in USA was one of the pioneers in implementing the OA policy "which grant the university non-exclusive copyright licences to archive and publicly distribute all faculty-produced scholarly articles" (Chilimo 2016:29 cited Priest 2012). The University of Edinburgh in UK, which is also an advocate of OA, developed a comprehensive repository with various content types with the support of the university's research publications policy "which strongly endorses OA, with a stated preference for green OA" (Tate 2015:58). Having policies can be viewed as a strategy by universities to promote repositories because mandatory deposits signify the importance of the practice to the university. Besides, Daoutis and Rodriguez-Marquez (2018:5) discovered that it was through policy that academics developed stronger engagements with OA publishing and this led to increased awareness and growth of repositories. Universities across the globe are developing OA policies because the hope is that "policy interventions can drive the development of a more competitive and sustainable publishing market - increasing access

whilst simultaneously driving down the cost of scholarly communication" (Johnson et al. 2017:20). Thus, an OA policy can be viewed as a facilitating condition that can positively influence the adoption and use of the repositories.

In as much as universities are encouraged to adopt OA policies, Hartman and Wu (2018:1) advised that it is imperative for governments to adopt policies because access to information is a requirement for all. The seriousness of the matter is that government relies on research data for evidence-informed decision-making (Hartman and Wu 2018:1 cited Lavis et al. 2003). The whole nation will suffer should the government fail to access such data. The adoption of OA policies is a critical issue in Africa, and particularly South Africa, considering that its research output is by far the highest on the continent (Raju, Raju and Claassen 2015:267 cited Tise 2011). Hartman and Wu (2018:1) challenges South Africa saying:

> "As the European Union moves forward with open access policies, it will be crucial for African countries, especially South Africa, to take a strong stance in support of open access, not only to protect their research interests, but also to maintain the goal of increasing the global sharing of scientific knowledge. The reinvigorated open access movement in the EU presents a critical point for South African research communities. If open access is not addressed on a national level, South Africa may lose out on contributing to, and accessing this growing platform. Decision-makers in the government, researchers in a university or health-care workers all share the need for accessible scientific literature. As nations push forward with national open access policies, South Africa must act coherently to develop open access policies, which allow the country to access this growing market while addressing the challenges that come with the current paradigm of open access publishing".

However, within the parameters of this study, academics suggested that the university develop a functional OA policy to improve adoption of the repository at UKZN. Should, at a later stage, the South African government enact such a policy, it would not be difficult for the university to comply. However, while OA policies are believed to be a solution to the problem of content accumulation, academics compliance needs to be monitored (Ratanya 2017:279) and corrective measures, implemented.

6.4.6 Provision of usage statistics and metrics

Methods of quantitatively measuring the presence of scholarly literature online have become important for libraries that are faced with convincing academics to publish on OA platforms. If academics can see how visible repositories are, and how much content is being used, possibly they can be convinced to self-archive their own work. Online usage-based statistics, often referred to as altmetrics or metrics, are necessary to promote document deposit by academics as well as reinforcing the OA initiatives (Aguillo et al. 2010:2). As explained by Chilimo (2016:31 cited Kelly, Sheppard and Delasalle 2012), quantitative evidence assists in demonstrating the value and usefulness of the IR. Statistics such as "download counts at the collection and/or item level, search terms, page views, and social media and bookmarking metrics" (Konkiel and Scherer 2013:22), can be extracted from repository open source software to determine the scholarly impact of IR content. In addition, demographic statistics of people accessing scholarly content on the IR, and types of content popularly used, can also be extracted (Konkiel and Scherer 2013:23). Findings of this study in section 5.4.9 revealed that the UKZN Library provides usage statistics of the repository. In one interview, it was reported that the month of July 2017 had over 500,000 hits. The library also used Google analytics to calculate usage of the repository by counting the visits received each month in one country (UKZN Library Annual Review 2011:7). It was reported in the findings (section 5.4.9) that usage was high in South Africa, and other countries, such as USA and India. Such statistics help to quantitatively describe the visibility and impact of the repository. However, the findings could only reveal usage statistics and not citation counts and other metrics, such as mentions in blogs, social media platforms or news stories because these require installation of plug-ins and "backed repositories that can provide metrics at item level" (Konkiel and Scherer 2013:23). These metrics could not be provided because DSpace does not have these requirements. An analysis by Chilimo (2016:31) on previous studies on metrics on repositories found that a majority of libraries provided usage statistics, with only a handful providing citation counts and altmetrics. This is because the open source software, such as DSpace, which is used at UKZN and many other libraries, does not have the added functionalities to allow for those metrics. Salo (2008:22) however, assert that it is most useful to have a system that can provide statistics counting per author and per item, and within defined periods of time.

6.5 The extent to which academics were using the university's IR

The third research question of this study sought to assess to what extent academics were using the IR. The term 'use' in this study refers mainly to depositing content on the IR. The extent of use was measured using variables that have been proven to impact on use of a technology. The UTAUT variables were employed to inform and understand the possible determinants of IR use by academics at UKZN. The aim was to identify the determinants that could positively influence academics use of the IR, so that these could be enhanced and applied as strategies to improve IR use. Developed by Venkatesh et al. (2003), UTAUT identifies four key constructs: performance expectancy, effort expectancy, social influence and facilitating conditions, as factors that directly influence an individual's acceptance and use of a technology. The attitude construct was added to broaden the researchers understanding on how academics viewed the IR.

6.5.1 Performance expectancy

Performance expectancy defines the perceived benefits a user believes will be gained from using the technology in his or her job, either to improve productivity or the quality of services (Cohen, Bancillion and Jones, 2013:45). According to Venkatesh et al. (2003:447), the performance expectancy construct is the strongest predictor in the UTAUT Model. The belief is that; academics will give a high regard to the level at which the repository is useful to them in their daily work of research and teaching. In addition, the potential of the repository to assist academics to achieve tasks quickly will motivate them to adopt it. The usefulness of the IR was assessed at institutional as well as academic level.

At institutional level, the IR was perceived to be a useful tool developed to showcase their research output. One interviewee reported that having a repository was considered compulsory because that was the trend the world over in institutions of higher learning (section 5.4.8). In addition, it was revealed that UKZN management believed that OA had the potential of breaking the monopolistic practices of publishers. By supporting OA and developing the IR, it was believed that the UKZN community could access scholarly literature they previously had no access to, and more so, that which was published by their own researchers. They hoped that access to scholarly literature would improve if they invest more in the IR. Accordingly, section 5.4.10 revealed that the university invested in the repository by appointing a full-time IR Librarian, drafting an OA policy and upgrading the DSpace. Furthermore, findings on the role of the library, as presented in section 5.5, revealed that marketing and promotion of the

repository, as well as training of academics on the use of the IR were some of the activities engaged in, with the idea of improving the usefulness of the repository to the academics. Thus, as an institution, UKZN believed that a viable repository will improve the quality of research and teaching at the institution through improved access to scholarly communication.

Table 5.5 summarises the academics responses on the performance expectancy indicator statements. Of the six statements, the most positively rated statement with 80% (132) of the academics agreeing to it was, '*The IR enables researchers to access literature more quickly*' while '*The IR enables me to publish quickly*' was the least rated with 54 (32.7%) respondents agreeing to the statement. The general finding was that most academics, 101 (61.2%), believed that using the IR will benefit them in their job, with a mean value of 2.25. These findings were supported by their willingness to deposit content on the IR. Section 5.4.5 revealed that 81.1% were willing to deposit their research articles, 51.8% conference/workshop papers and presentations, and 41.5% would deposit their book chapters. Furthermore, results on rating the importance of the IR (section 5.4.8.) showed that, 94.5% of the academics believed there were benefits in using the IR, with 95.1% indicating that they would recommend it to their students and colleagues. Results in Table 5.4 showed that 22% of the academics were already self-archiving voluntarily, with the belief that it will improve their job performance and academic credibility.

A similar study by Singeh, Abrizah and Karim (2013) investigating academics acceptance to self-archiving in IRs in five research-intensive universities in Malaysia found that a majority of academics and researchers in Malaysia agreed that there were gains from self-archiving in research performance. Xu (2015) studied the factors affecting academics use of learning object repositories in selected colleges and universities in America and found that performance expectancy was one of the factors that could motivate or impede academics use of repositories. Dulle (2010) discovered that performance expectancy significantly determined the behavioural intention to use OA by academics and researchers of public universities in Tanzania. Outside of OA, several studies have found performance expectancy to be one of the strongest factors influencing acceptance and use of a technology (Sharifian et al. 2014; Nuq and Aubert 2013; Kijsanayotin Pannarunothai and Speedie 2009; Holtz and Krein 2011; Cheng, Liu, Song and Qian 2008). In contrast, performance expectancy was found not to be a predictive indicator of intention to use a technology in some studies. Sumak, Polancic and Hericko (2010) studied students' perceptions about using Moodle, an e-learning management system, and found that

performance expectancy was a non-significant predictor of behavioural intention. Heerink et al. (2009) researched the possibilities of using UTAUT for quantitative research on acceptance of assistive social robots on adults. The results were that performance expectancy was one of the UTAUT determinants that were non-significant in predicting use. Tibenderana and Ogao (2008) studied a structured PLS-Graph conceptual model predicting the intention to use electronic library services in Ugandan universities. Performance expectancy was found to be non-significant in predicting behavioural intention to use a system. Other UTAUT main constructs have also been found to be non-significant in predicting intention to use in these studies. With such inconsistencies, Taiwo and Downe (2013:51) concluded that the findings of the studies that employ UTAUT leave the output of the relationships in the model inconclusive.

In this study, performance expectancy was found to have a positive impact on academics use of the IR. However, it is important to note that the usefulness of the IR is negatively influenced by issues around copyright, fear of plagiarism, confusion and uncertainty about intellectual property issues, lack of OA policies, lack of familiarity with IRs, and lack of incentives and low levels of awareness (Kim 2011; Singeh, Abrizah and Karim 2013; Xu 2015). Kim (2011:1075) added that, lack of sufficient scholarly work to publish on the IR limits academics use of the repository. These negatively impact on academics' willingness to use repositories. Findings of this study revealed that over 50% of the academics had work that could be published on the IR (see section 5.4.3) and 141 (86%) of the academics had supervised Masters and/or doctoral thesis (see section 5.4.4), suggesting that they had published papers from these theses which could be uploaded on the IR. In addition, the DVC Research, Professor Deresh Ramjugernath's message on the 2016 research report mentioned that:

> "We have done exceptionally well as a university in that we have had year-on-year increases in our research outputs…. We have been able to build our research base over the years with about 80% of our academics and researchers now research active – that is a significant number" (UKZN Research Report 2016:5).

Thus, for UKZN, the issue of low publications is not of concern. Findings discussed in the previous chapter showed that UKZN was already in the process of adopting an OA policy (section 5.4.10) and training was being done, but not extensively, as most academics requested more frequent and consistent training programmes to educate them about the IR (section 5.9.2), and also about copyright and other issues (see section 5.5). Lwoga and Questier (2014:120) recommended that, for academics to realise how the IR can benefit them in their job, "extensive promotion of OA benefits is required to create more awareness and influence academics'

decision to participate in open access". Findings on rewards revealed that no reward system was in place yet to give credit to those that deposited their research work on the IR (section 5.9.1). Xu (2015:1075) advocated for the implementation of a reward system that recognises and gives credit to those using the repository as well as implementing policies that encourage academics to use the IR. However, results indicated that academics perceived the repository to be useful to them. As such, the library, with the support of the university, should consider addressing issues that affect academics confidence in using the IR so that usage can improve.

6.5.2 Effort expectancy

Effort expectancy perceives that academics are concerned with the ease that is associated with the use of the repository. Where use of the repository is perceived to be difficult, academics are not interested in adopting it. It was revealed that a majority of academics, with a mean of 2.14, agreed that they would find it easy to use the repository. Findings on rating of effort expectancy showed positive feedback on all statements from academics. '*Using the IR will not be difficult for me*' had the highest number of academics agreeing to it (117, 70.9%), whereas '*It will be simple for me to become good at using the IR*' had 111 (67.2%). 'I would not find navigating the IR needing advanced skills' had 109 (66.1%), '*I would not find using the IR difficult to understand*' had 108 (65.5%) and '*It will be easy for me to use the IR*' had 92 (55.8%) agreeing to the statement. The overall findings presented in section 5.6.2 show that, on average, 64.9% of the academics perceived the use of the IR to be easy for them while 3.6% believed otherwise. Thus, the effort expectancy variable has an influence on academics use of the repository at UKZN. Academics, who portrayed a positive attitude towards the repository, are likely to have high intentions to use it. Several studies have also found effort expectancy as a positive predictor of intention to use a technology (Venkatesh et al. 2003; Dulle and Minishi-Majanja 2011; Rahman, Jamaludin and Mahmud 2011; Singeh, Abrizah and Karim 2013; Tan 2013; Gbolahan 2014). A study by Singeh, Abrizah and Karim (2013) found that Malaysian authors generally agreed that learning to self-archive is an easy task and that the features of their IRs were easy to understand. Conversely, a number of studies have refuted the significance of effort expectancy in influencing intention to use a technology (Wu, Tao and Yang 2007; Cheng, Liu and Qian 2008; Cheng, Liu, Qian and Song 2008; Thomas, Singh and Gaffar 2013).

Ease of use of a system is often associated with high levels of knowledge and skills necessary to manipulate a technology. For academics to accept and use repositories, education and training are necessary to help them understand self-archiving, appreciate its benefits and be able to conduct the actual uploading of scholarly work on the IR. Findings on training needs in section 5.5 revealed that, although most academics did not have adequate knowledge of self-archiving, most of them (133; (81.1%) were willing to receive training, with 125 (75.8%) particularly requesting training on how to deposit their scholarly work on the IR. Lwoga and Questier (2014:132) advised that more training is required on the use of OA outlets to ensure that academics are able to use repositories, given that previous studies have shown that negative effects of effort expectancy can be minimised with experience. Training is important, especially now, considering that OA and self-archiving are relatively new concepts in most institutions in developing countries, including South Africa. No adequate experience has been gained yet, as usage is still limited to a few individuals as revealed in this study. However, the belief amongst most UKZN academics is that, if they get trained and receive the necessary support, self-archiving would not be difficult for them.

6.5.3 Social influence

According to Venkatesh et al. (2003:452-3), "individuals are more likely to comply with others' expectations when those referent others have the ability to reward or punish non-behaviour". Social influence gauges the social pressure of adopting and using the repository by UKZN academics. Pressure from the organisation or colleagues may affect a persons' intention to use a technology (Jen 2009:114). In addition, supervisors, managers, friends, family and other people, whom the person may consider important, have the potential to influence usage behaviour (Zuiderwijk, Janssen and Dwivedi 2015:431). In the context of this study, academics, researchers, the university and research funders were considered important in influencing academics behaviour to use the repository. Results presented in Table 5.9 indicate that, *'I will be motivated if leading researchers in my field are using the IR'* had 131 (79.3%) academics agreeing to it, 23 (14%) were neutral and 11 (6.7%) disagreed with the statement. *'I will be motivated to use the IR if my colleagues are also using it'* had 123 (74.5%) academics in agreement, 29 (17.5%) neutral and 13 (8%) disagreed. *'I will feel encouraged if research funders supporting me would look favourably on me for publishing on the IR'* had 135 (81.9%) agreeing, 19 (11.4%) were neutral and 11 (6.7%) disagreed. *'I will be motivated if UKZN would look favourably on me for publishing in the IR'* had 135 (81.9%) academics agreeing to the

statement, 20 (12.1%) were neutral, 10 (6%) disagreed. Overall, a mean of 1.85 indicate that a majority of academics perceived social influence to positively influence their willingness to use the repository. Thus, the more academics are socially influenced by the university, funding bodies, their colleagues and leading researchers in their field, the higher the behavioural intention to use the repositories.

A study by Zuiderwijk, Janssen and Dwivedi (2015) on acceptance and use predictors of open data technologies found that social influence was positively related with the behavioural intention to use and accept open data technologies. Rocker (2010) investigated the effect of social influence in the acceptance of future workplace systems and found that social influence significantly influences the acceptance of the system. Singeh, Abrizah and Harun (2013), reported that Malaysian authors agreed to self-archive because the institution thought they should self-archive and they believed that academics that support self-archiving were more prestigious than those who did not. Various studies found social influence to have a significant impact on intention to use a technology (Maldonado, Khan, Moon and Rho 2009; Sumak, Polancic and Hericko 2010; Dulle 2010).

On the contrary, in Kolkata, India; Deoghuria and Roy (2007) conducted a survey to assess researchers' attitude towards OA. Regarding social factors, the findings were that, out of the 125 participants, only two participants indicated they were told by renowned scientists in their field to publish in OA outlets, four mentioned that they were influenced by other researchers to publish their work on OA outlets and six indicated that their institution looked favourably on them for publishing in OA outlets (Deoghuria and Roy 2007:569). In the same study, a majority of researchers confirmed that their funding agencies were not supporting them for OA publishing and leading researchers were not practising OA publishing either. The authors noted that, the effect of social influence can positively impact on OA publishing if there is approval from parent institutions and funding bodies, and if leading researchers are taking part in OA publishing (Deoghuria and Roy 2007:569). Cullen and Chawner (2011:469) acknowledged that prior studies have suggested that academics continue to be strongly influenced by their disciplinary community, and that this is influencing their behaviour in relation to repository use. As Kennan (2007:144) puts it, they are driven by the need to 'communicate with peers' and advance knowledge.

Abdullah's (2009) study on awareness and attitude of academics towards IR revealed that, while a majority of the academics would publish in OA if encouraged by their research funders, they disagreed that they would deposit their work because of the university or department's action. Creaser's (2010) survey found that researchers were more aware of funding body policy than institutional policy. This suggests that academics respect funder policies more than their institutions' when it comes to OA publishing. Deoghuria and Roy (2007:569) agreed that funding agencies are best positioned to influence "authors' decisions to adopt policies encouraging or requiring authors to provide OA to their work". A number of funders have made considerable progress in making research publicly accessible. For example, the National Institutes of Health (NIH) in 2008 requested that final peer-reviewed manuscripts that arise from NIH funds be publicly accessible, and in 2011 the National Science Foundation (NSF) required grant applicants to disclose how research data will be shared with other researchers (Armstrong 2014:34). In South Africa, the NRF passed a statement in 2015 encouraging its stakeholder communities, which include SA universities, to "formulate detailed policies on Open Access of publications and data from its funded research" (NRF: Statement on Open Access to Research Publications from the National Research Foundation (NRF)-Funded Research 2015). Compliance to this requirement has not been established. However, findings of this study reveal that, UKZN academics are more likely to deposit their research if the NRF would look favourably on them. Generally, academics at UKZN believe that social factors can positively influence them to use the repository.

6.5.4 Facilitating conditions

Facilitating conditions pertain to resources available to support self-archiving. Such resources can be diverse depending on the technology to be adopted as well as the environment. In this study, facilitating conditions considered relevant ICT infrastructure such as computers, internet and power supply; time to conduct self-archiving duties, rewards for good practice, knowledge of how to self-archive, the availability of mediated service and skills on how to self-archive. Mubuke et al. (2017:337 cited Iqbal and Qureshi 2012) states that acceptance of any new technology is largely dependent on facilitating conditions.

Findings of this study suggest that UKZN academics had adequate ICT infrastructure to support self-archiving and IR usage. Results presented in Table 5.11 show that a majority, 128 (77.6%) of academics agreed that they had a computer, internet access and a steady power supply. Only

seven (4.2%) indicated they did not have one or all of these. Thirty (18.2%) academics were neutral, giving the impression that they were not sure what resources were needed to self-archive. In addition, from the findings in section 5.4.9, that only 36 (22%) academics had used the repository to self-archive, it can be assumed that the rest had not, and would possibly not know what is required to self-archive. Nonetheless, no results were found to suggest inadequacy of infrastructure in this study. When infrastructure is in place, barriers to OA publishing are limited. While infrastructure to support OA publishing was in place at UKZN, a majority of academics were not self-archiving. Thus, none use can be attributed to other reasons other than the unavailability of ICT infrastructure.

Time was considered a precondition for self-archiving. It is a process that can take considerable time, especially for first users. Interesting to note here is that 59 (35.7%) academics indicated they had time and the same number of academics indicated they did not. Forty-seven (28.5%) were neutral. One of the challenges raised in section 5.8.1 was lack of time to self-archive. Analysis of the results can confirm that academics were not short of time per se, but they were already swamped with teaching and research activities such that they were not willing to accept additional responsibilities; they had no time for it. It was raised by one academic that they were not obliged to self-archive because it was not in their KPAs and there was no policy to support it. The effect of time on the adoption and use of repositories is considered insignificant in this instance. These study findings corroborate those of Lwoga and Questier (2014:133) who studied academics usage behaviour of OA scholarly communication in universities in Tanzania. They found that time was not a factor in OA adoption and use amongst academics. As such, the issue of lack of time could not be considered a significant factor.

Offering rewards is a way of facilitating repository use. With regards to rewards, most academics (79, 47.9%) disagreed that the university rewarded them for self-archiving while 68 (41.2%) were not sure, probably because they were not practising it, and only 18 (10.9%) indicated the university did reward self-archiving. Findings from the interviews confirmed that there was no reward system in place to incentivise academics that were depositing their work in the repository. According to Lwoga and Questier (2014:121), academic reward can either inhibit or influence academics willingness to contribute their research materials into repositories. Findings in section 5.9.1 revealed that academics felt the university needed to give credit and rewards to those that published their scholarly work on the repository. One

respondent talked of either 'moral or financial' support. Rewards such as tenure/promotion and grants were found to be positively associated with academics' adoption and usage of repositories (Lwoga and Questier 2014:121 cited Kim 2010). Thus, a reward system will positively influence academics willingness to self-archive at UKZN. Therefore, some form of incentives will help improve IR use and adoption by academics at UKZN.

Having the know-how on self-archiving is a basic facilitating condition. Findings of this study showed that only 55 (33.3%) academics knew how to deposit, 48 (29.1) were not sure and 62 (37.6%) indicated they had inadequate knowledge on how to deposit their work on the IR. Related findings on training revealed that only 21 (12.7%) had received training from the library on how to deposit, 113 (68.5%) had not received any training and 31 (18.8%) were neutral. From the two findings, it can be deduced that, most academics did not know how to self-archive because they were not trained on how to do it. This possibly explains why a majority, 127 (78%), of academics had not deposited any of their scholarly work on the repository. In addition, it was emphasised in section 5.9.1 that the library needed to organise more training sessions to 'educate, train, teach, increase awareness' and provide more information for academics about OA publishing on a more regular basis. While most academics acquire skills through self-training (Okendo and Mligite 2014:10), it is imperative that academic libraries lobby for OA through training, and offering guidance and technical support to facilitate acceptance and use of OA publishing.

Availing staff to deposit scholarly work on behalf of the academics was considered a facilitating condition that could increase the recruitment of content on the IR. Findings in section 5.5 on the help that academics anticipated to receive from the library indicated that, 95 (57.6%) academics would appreciate it if the library could deposit on their behalf. Zhang, Boock and Wirth (2015:3 cited Dubinsky 2014) found that the growth rate of IRs was as a result of libraries uploading content other than academics self-archiving their own content. Thus, UKZN believed that recruitment of content to the IR would improve if library staff could do it for them. A recent study by Bamigbola and Adetimirin (2017) revealed that academics in universities in Nigeria preferred a mediated service. They believed that since the library is the custodian of knowledge, the onus was upon it to archive the scholarly content on behalf of the academics. Afshari and Jones (2007:348) believed that a mediated service would ensure quality and consistent metadata since it is done by qualified library personnel. For UKZN, this would

mean additional staff would be required since only one person is so far dedicated to conducting repository duties.

It was not the aim of this study to average the influence of facilitating conditions because each factor was completely different from the other. In addition, establishing the availability of each factor was necessary to show what needed to be improved to enhance usage. Unlike facilitating conditions that could not be summed up, performance expectancy and effort expectancy had the majority of academics agreeing that these two were strongly significant in influencing their use of the IR. This finding supports what Venkatesh et al. (2003:454) established, that facilitating conditions become non-significant in predicting behavioural intention when performance expectancy and effort expectancy are present.

In a study conducted by Moodley and Govender (2016) on the same participants, it was found that facilitating conditions, measured with statements, '*I have generally received enough information about internet banking*' and '*internet banking is more cost effective than traditional banking*' were a significant factor in influencing the use of internet banking by UKZN academics. Studies conducted in Tanzanian public universities as well as Zimbabwean universities on OA publishing proved that facilitating conditions significantly influenced usage of OA outlets (Dulle 2010; Tapfuma 2016). In this study, some facilitating conditions such as computer infrastructure, proved not to have significant roles in influencing academics acceptance and use of the repository at UKZN. Some studies could not establish the significance of facilitating conditions (Williams, Rana and Dwivedi 2015; Zuiderwijk, Janssen and Dwivedi 2015). At UKZN, the decision to adopt the IR is not dependent on the availability of factors such as infrastructure and time, but having the know-how, rewards and having a mediated service could positively influence academics use of the IR.

6.6 Academic's attitude towards self-archiving

The fourth research question of this study sought to establish the attitude of academics towards OA and IRs. Generally, a person feels encouraged towards performing a certain action if the results are believed to be good. Conversely, there is no motivation to conduct certain activities if there are no positive results or if the results are not known. In the context of this study, the academic's attitude towards OA and IRs was believed to positively or negatively affect their acceptance or rejection to conduct their IR duties. The results from the questionnaire (see

section 5.7) showed that most of the academics 120 (73%) had a positive attitude towards IRs, with only eight (5%) clearly showing a negative attitude towards the IR. In addition, a significant number, 37 (22%), were not sure of their position regarding the IR; they had little or no knowledge of OA and IRs. To further evaluate attitude towards the behaviour, respondents were asked if they could recommend their colleagues or students to use the IR. The findings (see section 5.4.8) were that almost all of them, 156 (95.1%), were happy to recommend the IR to the university community, portraying a positive attitude towards IR.

While most academics showed a positive attitude towards the IR, real action of self-archiving their scholarly communication in the university's IR was not evident. As of 11 November 2018, statistics of content loaded on the ResearchSpace repository showed that there were 13,319 theses and dissertations, 573 peer reviewed articles, 44 journal articles, 11 presentations, eight book chapters, four technical reports, three working papers, two videos and one software (ResearchSpace: Browsing by content 2018). Theses and dissertations formed the bulk of the content because UKZN's IP policy mandates all completed Masters and PhD theses to be submitted to the library for archiving on the IR. According to the UKZN Annual Report (2016:42-43), the UKZN has been recognised as one of the most productive research universities in the country, and for three consecutive years, UKZN was ranked the top university in South Africa in terms of research productivity output (UKZN Annual Report 2015:67). It was reported that:

> "Steady and sustained growth in research productivity resulted in UKZN occupying the number one position in the country in terms of Department of Higher Education and Technology (DHET) recognised research outputs for 2012, 2013 and 2014. While the latest report (focusing on 2015 outputs) showed that UKZN was the second most productive university in South Africa, it is important to note that the University improved from sixth place in 2014 to fourth in terms of weighted research outputs (from 1.31 to 2.67)" (UKZN Annual Report 2016:42).

In terms of figures, for the last three years, UKZN produced 2,514 research outputs in 2016, 2,386 in 2017 and 1,966 so far in 2018 (Web of Science: organisation-enhanced: University of KwaZulu-Natal 2018). An analysis of the university's IR clearly showed that most of this research output is not available on the repository. However, it is the choice of the academics to self-archive their research output. As highlighted earlier, a positive attitude drives an individual into action. For some reason, UKZN academics, though positive about OA, and acknowledging

the importance of it for research purposes, were failing to upload their work on the IR. Similarly, Zhu (2017) studied UK academics' attitude towards the practice of OA publishing. The author observed that, for a long time, UK academics were required to publish through OA channels but little was known on the extent to which this was done. The study explored academics support and use of OA, and factors associated with OA publishing. The study found that, although most academics were in agreement with the OA principle of making knowledge freely available, OA publishing was very limited. Of the 1,722 academic respondents of the study, a vast majority of 93% acknowledged the importance of OA publishing, but highlighted potential problems, such as copyright, that discouraged them from self-archiving (Zhu 2017:563).

At the University of Khartoum in Sudan, Abdelrahman (2017) investigated attitudes towards IR use and found that a majority of the respondents indicated a willingness to use the IR and recommend it to colleagues. The author attributed the positive attitude to "an apparent lack of traditional library and information resources at the university" (Abdelrahman 2017:107). In this study, results from this study revealed that, a majority of academics were in agreement with OA, but were reluctant to self-archive because some feared their work could be plagiarised, some felt IR content lacked peer-review while others could not commit their time to work that was not part of their KPAs. Singeh, Abrizah and Karim (2013) examined conditions inhibiting academics at University of Malaya from self-archiving in OA repositories and found that a majority of academics feared plagiarism. At Texas A and M University in the USA, Yang and Li's study (2015) found that there were low levels of awareness on the existence of the university's IR and most academics were unaware of newer OA trends. Results of this study also revealed lack of awareness on the existence of the IR, with a majority of the respondents requesting for training. The concerns raised in the studies may explain the differences between attitudes regarding the importance and the reported experiences of OA publishing (Zhu 2017:563). Thus, irrespective of the positive attitude towards OA to scholarly content, factors mentioned above inhibited them from participating in self-archiving because they could not discern the importance of OA publishing in the IR. Overall, with a mean of 2.46, a majority of academics were positive about OA. Attention should therefore be focused on educating academics about OA to alleviate the fears discouraging them from self-archiving, and to enlighten them on the benefits of OA publishing.

6.7 Hindrances to IR use

The fifth research question of this study investigated the challenges that inhibited academics from adopting and using the university's repository. The major challenge raised was a lack of knowledge about OA. A majority of the academics were not participating because they did not have adequate knowledge on how they should contribute towards the growth of the IR. Furthermore, section 5.8.1 reported that some academics had not even used the repository because they were not aware of its existence. This resulted in academics falling short of technical skills on how to use the repository. Similarly, at Mwenge University College of Education (MWUCE) and Moshi University College of Cooperative and Business Studies (MUCCoBS) in Tanzania, it was found that academics lacked knowledge and skills of accessing and disseminating scholarly information on OA platforms (Okendo and Mligite 2014:7). As a result of this gap, in Kenya, Chilimo (2016:12) found that academics preferred that the library staff self-archive for them as they were not confident of doing it themselves.

Lack of adequate ICT infrastructure has been a hindrance to OA use in many developing countries in Africa. A study conducted on OA knowledge in selected universities within the Southern African Development Community (SADC) region in 2008 found that Southern African countries were struggling with technology infrastructure and electronic networked environments (Abrahams et al. 2008:43) to capacitate OA publishing. Bezuidenhout and Rappert (2016:5-6) studied South African and Kenyan progress on OA movement and discovered that physical infrastructure such as limited connectivity, personal internet provision, off campus access and disruption of power outages inhibited the advancement of OA. In addition, funding and support services such as training, hardware or software ICT support and other technical support services were challenges faced in making content accessible. However, while ICT infrastructure necessary to sustain the development of IRs in developing countries has been a challenge, this has changed considerably in recent years (Christian 2008; Ghosh and Kumar 2007; Jain 2012). Findings of this study, presented in section 5.8.1, showed that a majority of the academics, 128 (77.6%), agreed to having adequate infrastructure. It can be assumed that, those who did not agree were not aware of the infrastructure needed to self-archive. Only a handful had actually done the uploading of work, the rest had not. Besides, interviews confirmed that all academic staff had computers and the university has stable internet connections needed for self-archiving. However, the practice of self-archiving is

dependent upon internet technologies, which possibly explains the differences in OA development between developing and developed nations.

Furthermore, lack of time to upload scholarly work on the IR was revealed in this study as a challenge that prohibited academics from disseminating their work on the IR. Singeh, Abrizah, and Karim (2013) shared the case of Malaysia by investigating conditions that inhibited academics from self-archiving in OA repositories. One of the key findings was that while the principle of OA was endorsed by many academics, the practice of self-archiving was time consuming for them (Singeh, Abrizah and Karim 2013:33). Issues relating to time in terms of entering bibliographic data and having to learn about OA and self-archiving was described as difficult and deterring by academics (Singeh, Abrizah and Karim 2013:33 cited Hey 2004; Davis and Connolly 2007; Salo 2008; Chilimo 2016). At UKZN, academics felt that they were already overloaded with teaching, research, administrative and community engagement work and had no time for IR duties.

Insecurity of plagiarism was also found to be a challenge preventing academics at UKZN from disseminating their work on the IR. Allowing students and academics full-text access to scholarly literature via the IR is believed to promote plagiarism. Fear of plagiarism has been reported in many studies evaluating inhibitors of OA adoption by academics (Davis and Cannolly 2007; Munge, Kimilie and Nasieku 2012; Singeh, Abrizah and Karim 2013; Bamigbola and Adetimirin 2017). Researchers are encouraged to practice cultural ethos of properly acknowledging reference sources used in their work, presenting truthful data, and also avoiding bias in their interpretations (Chaputula 2016:128 cited Walliman 2011). By doing this, on-going concerns about plagiarism that affect the growth of IRs, can diminish.

A minority of respondents in this study indicated that they were not disseminating their work on the IR because they felt their work will be undermined by lack of peer review. In Zimbabwean universities, this was found to be a significant inhibiting factor amongst academics (Tapfuma 2016:295). The belief was that IRs reduce the value of peer review as grey literature, which often form a large amount of content loaded on IRs, does not go through rigorous peer review, compared to scholarly work that is published in journals. As such, academics felt that, uploading their work on the IR would reduce the value and quality because it is mixed with grey literature which may not have been peer-reviewed. Chilimo (2016:8)

advised that universities should put in place mechanisms that address issues of quality assurance to win the confidence of academics.

The availability of alternative OA platforms was found to be one of the challenges discouraging the development of UKZN's IR. Findings on the importance of the UKZN IR (section 5.4.8) revealed that they were academics who preferred depositing their work in subject specific IRs such as arXiv.org, as well as social network platforms like ResearchGate. Cullen and Chawner (2011: 463) observed that "prior studies have suggested that academics continue to be strongly influenced by their disciplinary community, and that this is influencing their behaviour in relation to IRs". As such, academics prefer subject specific IRs as better because they believe that disseminating scholarly content to a relevant audience is more meaningful and most likely to benefit them in return.

6.8 Strategies to improve acceptance and use

The last research question of this study sought to establish strategies that could help improve IR use by academics at UKZN. Though raised in many different ways, suggestions were around improving awareness, policy implementation, more human resources to administer IR duties, rewarding self-archiving, assisting academics with uploading their work, assuring them of preservation and integrity of their work, and referring students to the IR.

6.8.1 Improve awareness

To realise the maximum potential of OA, participants of this study suggested that there was a need to improve and increase the frequency of conducting OA training programmes with the academic community. Findings in section 5.9.1 revealed that academics suggested that the library should engage in more training activities to improve awareness. It was reported that some academics were not participating because they were not aware of their roles and more so, of the existence of the repository. Narayan and Luca (2017:2 cited Lagzian and Abrizah 2015) observed that there is a significant gap in the understanding of IRs between library staff, whose role is to design and maintain repositories, and the academics, who deposit their outputs into them. Library staff know more about OA because they initiate, promote and advocate for the movement in universities. They seek to learn more about OA so that they can market it with confidence. On the other hand, academics do not have as much knowledge and appreciation of

OA, yet libraries rely on them to upload their scholarly work on the IR, or at least provide their work for a mediated service.

In terms of academics understanding OA, its benefits and how they can contribute, participants of this study believed that the UKZN repository would grow at a faster rate than it is now. Nonetheless, an appeal was raised by one interviewee that academics should show interest in OA. Efforts were made (see section 5.7) to reach out to them but little or no interest was shown. It was also raised in one of the interviews that it was up to individual academics to embrace the new mode of scholarly publishing because the library had done all it could to reach out to them and offer the necessary support.

6.8.2 Implementation of the OA policy

Participants of this study suggested that if the university could adopt an OA policy, recruitment of content and development of the repository would improve. Policy implementation is one of the pillars in setting up viable repositories. Section 6.3.5 discussed how OA policies are an effective way of building repositories, especially in large institutions such as universities. It was revealed in this study that at UKZN, the OA policy was still a draft awaiting approval by the university senate. Thus, from the period the IR was launched in 2009 until the time of this research, academics use of the IR was of free will.

6.8.3 Reward self-archiving

It was proposed by some academics that, to improve acceptance and use of the IR, the university needed to introduce a reward system to lure academics who were not self-archiving, and at the same time motivate those self-archiving to continue uploading their scholarly work on the IR. Moral and/or financial support, acknowledging and recognising academics that self-archive were alternatives raised and considered necessary to foster the development of the repository. Based on a study conducted in major universities in USA, Lwoga and Questier (2014:118 cited Kim 2010) found that benefits or extrinsic factors such as academic reward, professional recognition, accessibility, publicity and trustworthiness would motivate academics to adopt a self-archiving behaviour. Cullen and Chawner (2011:462) identified the problem as, "the existing reward systems of tenure/promotion (and even grant making) which favour traditional publishing forms and venues". Academics have no time for OA because universities are rewarding them for publishing in prestigious journals. They have little or no

awareness of opportunities available from OA publishing. In as much as university rewards are important, publishing in OA outlets is rewarding in itself. When scholarly work is out there, people will read and cite it; experts within the field will critique and this helps the author to improve his/her work. With time, and as more and more of the authors work gets available on OA, researchers will trust the work (openness); the author will be identified with a particular field of study and will begin to work in collaboration with other experts in the field across the globe. The opportunities are endless. Perhaps if universities kick start rewarding OA publishing, the system itself will reward academics more in the long run. Hence, the proposed idea of rewarding OA publishing will attract more benefits to academics and researchers.

6.8.4 Recruit more staff for the IR

The academics believed that if more staff could be employed to manage and administer the repository, acceptance and use will improve. Currently, the IR Librarian is responsible for training, marketing, uploading of thesis and dissertation, creating metadata records, quality control, attending to IR enquiries and all other responsibilities regarding the repository. It is difficult for one individual to manage all these duties and give academics adequate attention. Thus, if more staff could be allocated for the IR, academics felt that work could be distributed and this will eventually improve services rendered by the IR to the university community.

6.8.5 Assure academics of preservation and integrity of their work

Results revealed that academics felt that if they could be assured of preservation and integrity of their works, there were chances that more academics will start uploading their works on the repository. Permanent access and storage of uploaded scholarly content, and preserving the integrity of scholarship resources, is a continuous long lasting commitment that libraries need to provide when setting up repositories. Westell (2006: 218) pointed out that, a preservation strategy is an important indicator of the seriousness with which a university holds its repository. Academics at UKZN needed assurance that the library has a system that will allow permanent access to their knowledge for future generations.

6.8.6 Refer students to the repository

Introducing the repository to students, particularly Masters and PhD students was identified as another possible way of increasing usage of the IR. This does not only improve access to

scholarly communication, but also builds the culture of accepting the repository as an authentic source of information. Besides, some postgraduate students will become lecturers after graduating and will be required to submit their work on the IR. If the repository was being used during studies, it is likely that the idea will be embraced without much resistance. Findings revealed that there were some academics who were referring students to the repository to help combat the challenges of accessing relevant literature and also to help familiarise with the acceptable research standards by accessing thesis and dissertations and journal articles (pre- and post-prints) from their institution's repository, and even that of other institutions. Access to literature will improve the quality of scholarly work and if the IR is given reference to as a source of the information, academics will be encouraged to upload more work.

6.8.7 Assist academics with uploading their work

Academics requested that the IR Librarian should assist them in uploading their scholarly work on the IR. The need for assistance could mean that they did not have time to upload their own work and they were requesting the librarian to do it on their behalf; or, they needed to be shown how to go about self-archiving their own work. It was revealed in the findings that the IR Librarian was happy to set-up one-on-one meetings with academics to help them with their IR queries, including how to upload. In addition, a step-by-step guide was uploaded on the IR page to assist and direct academics on how they can conduct self-archiving.

6.9 Summary of the chapter

The purpose of this chapter was to discuss the findings on the development of the UKZN IR and its use by academics. With regards to IR developments, there was a steady growth of the IR since 2009 in terms of number of items uploaded. Theses and dissertations were initially the only content type loaded on the IR but journal articles, book chapters and conference papers were added to the repository. At institutional level, the university was in full support of the IR. Human, financial and infrastructure support were provided to promote the development of the IR. Further support was witnessed by the signing of the Berlin Declaration in 2012 by the university Vice-Chancellor and the appointment of a full-time IR Librarian. Other developments were the results of various efforts made by the library. The library organised OA awareness campaigns to promote use of the repository by academics. Training, assistance with uploading of content, seeking of copyright permission on behalf of academics, checking of

metadata records and the provision of usage statistics was done by the library through the IR Librarian. An OA policy was drafted and was awaiting approval by the university senate. Upgrading of the DSpace open source software was another development aimed at improving the usability of the repository. Regarding academics, a positive development was that a majority of them had become aware of the repository and had content that could be loaded to the IR, with some already loaded, and others had used the IR to search for information. A majority of them were willing to share journal articles, which are targeted for OA publishing. Academics realisation of the importance of the IR was a positive factor towards the development of the IR. On factors that could influence academics use of the IR, the presence of performance expectancy, effort expectancy and social influence affected their decision to use the repository. Facilitating conditions did not have a significant influence on academics use of the IR. Overall, they had a positive attitude towards the IR but were hindered by lack of time, fear of plagiarism, perceived view that OA content is of poor quality and the availability of other OA outlets which they were subscribing to. Strategies to improve IR use included the implementation of a functional OA policy, a reward system, mediated service, more staff dedicated to the repository, assurance of preservation and integrity of work, and developing a habit of referring students to the repository.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The purpose of this study was to examine the development of the UKZN repository and to assess extent of use by academics of the institution. The following research questions were addressed: -

1. What developments have been made towards the growth of the university's IR?
2. What are the roles of the library in developing the IR?
3. To what extent are the academics using the university's IR?
4. What is the academic's attitude towards self-archiving?
5. What challenges are hindering IR use at UKZN?
6. What strategies can be employed to improve acceptance and use of the IR at UKZN?

This chapter presents a summary of the findings of the study, conclusions and recommendations that arose from the findings. Suggestions for further research are also discussed at the end of this chapter. An overview of the seven chapters that make up this study are presented first to sum up the contents of the entire research.

7.2 Summary of the thesis

Chapter One provides an overview on OA access to scholarly literature and the emergence of IRs. A description on the development of IR in universities is provided, cascading down to UKZN which was the case under study. A statement of the problem, aim of the study, research objectives, research questions, scope and delimitations as well as the significance of the study were presented. A brief overview of the methods and theory adopted by the study were also provided.

Chapter Two presented the theoretical models capable of evaluating technology acceptance by academics at the UKZN. Relevant theories which include, Theory of Reasoned Action, Theory of Planned Behaviour, Innovation Diffusion Theory, Social Cognitive Theory, Motivational Model, Technology Acceptance Model, Model of Personal Computer Utilisation, Combined TAM and TPB, the Attribution Theory and Model of Acceptance with Peer Support were

discussed. The Unified Theory of Acceptance and Use of Technology, which integrates constructs of all the above mentioned theories and models, was the appropriate model chosen to inform this study. Relevance of the UTAUT model to the study was discussed in this chapter.

Chapter Three discussed related literature pertaining to OA and IRs. Factors that gave rise to OA, the initiatives undertaken by advocates of the movement, OA routes and the benefits of having repositories is presented in this chapter. Global IR developments, as well as within South African universities, were discussed. Academics' views and perceptions about OA, and factors contributing to increased rates of IR deposit were presented.

Chapter Four presented and discussed the research methodology, which comprised the research paradigm used in the study, the methods, research design, population of the study, sampling, data collection and data analysis procedures. The paradigm of choice for this study was pragmatism, which falls within the post-positivist paradigm. Hence, mixed methods, which include both qualitative and qualitative methods were chosen for this study. Methods of ensuring the reliability and validity of the data collection instruments were discussed. Ethical considerations followed during the course of the study were thereafter presented.

Data analysis and presentation of results are covered in Chapter Five. Research data gathered from questionnaires, interviews, documents and bibliometric databases are evaluated, summarised and meaningfully presented, using the research questions of the study as a guide.

Chapter Six provided the discussion and interpretation of findings on IR developments, the role of the library, academics' perceptions and attitudes towards OA and the challenges that hindered them from adopting OA publishing. These findings were discussed and compared with related literature on OA, including studies that were informed by the UTAUT model.

Chapter Seven synthesised the findings in such a way that they answered the research questions of the study as presented in Chapter One. Conclusions and recommendations for the study, as well as directions for future research, were discussed. The originality and contributions of the study were also provided in the chapter.

7.3 Summary of findings

This section systematically presents a summary of the findings for the six research questions addressed in this study.

7.3.1 Developments made towards the growth of the UKZN repository

The first research question sought to establish the IR developments achieved since it was established in 2009. The findings revealed that the repository had grown in terms of contents; from 794 thesis and dissertations only, to over 13,732 items of different content types comprising journal articles, conference proceedings, book chapters, videos and more. The findings revealed that progress was made by the library in marketing and promoting the IR. Annual OA International Weeks were celebrated to support the OA movement. Presentations, meetings, workshops and trainings were conducted as efforts to create awareness on OA publishing and the institution's repository to the academic community. A notable achievement was the signing of the Berlin Declaration in 2012. This was an indication that the university was committing to support OA to scholarly communication and its practices. The year 2014 saw the appointment of the IR Librarian to manage and administer IR duties. Before the appointment, IR duties were done by the Subject Librarians when they had time, meaning the repository was not operating at full capacity. Findings also revealed that the library was in the process of adopting an OA policy that would see an improvement in the recruitment of content. At the time of this research, a draft policy was awaiting approval by the university senate. The latest development was the upgrade of the DSpace to version 5.2, aimed at resolving bug problems found in the previous versions.

Progress was also measured on the academics who were the main contributors to the repository. Findings revealed that, a majority of academics were now aware of the institutions repository and had a positive attitude towards OA publishing. Though many of them had not used the IR to disseminate their scholarly content, it was revealed that they were willing to be trained. Besides, a majority of them had developed good computer literate skills, possibly because scholarly communication is shifting towards the digital. These attributes are favourable to the development of the university's repository.

The results showed that adequate ICT infrastructures necessary for access and dissemination of scholarly information were available in the university. ICT infrastructure development is

important before one can even mention OA. Finally, the university had succeeded in generating scholarly contents that could be loaded on the IR. Findings revealed that UKZN had produced substantial research in recent years. Should academics' OA acceptance improve, the size of the repository will immensely increase because the content are available.

7.3.2 The role of the library in developing the IR

The second research question aimed at establishing what the library had done in support of the institution's repository. From the onset, reviewed documents revealed that it was the library that spearheaded OA by launching a repository in 2009. After the launch, the library engaged in a series of marketing campaigns to draw the attention of the academics and the university community. Results also revealed that the IR Librarian, with the support of the library, was responsible for: uploading theses and dissertations, training academics, marketing and promoting the IR and OA, creating metadata records for content loaded on the IR, requesting copyright permission on behalf of academics, assisting academics in uploading their work, checking and approving records loaded by academics and attending to all IR related queries. Although the results showed low levels of OA awareness amongst academics, it was revealed that the library was responsible for OA training and education. The results also confirmed that, the library, through the IR Librarian, tried in many different ways, to reach out to academics to discuss OA and self-archiving. To try and win the support of the academics, the library provided usage statistics using google analytics and downloaded counts from DSpace to prove that others were using the repository. It was also revealed that the library had developed a draft OA policy that was awaiting approval. While findings on academics' participation in self-archiving showed that it was low, and done voluntarily, it was believed that the implementation of a policy would boost usage of the repository.

7.3.3 To what extent are the academics using the university's IR

The third research question sought to establish factors that impacted on academics use of the IR. The extent of use was believed to be influenced by performance expectancy, effort expectancy, social influence and facilitating conditions. The purpose of incorporating these UTAUT constructs was to identify those variables that positively impacted on academics use of the IR so that these could be enhanced to improve adoption.

Regarding performance expectancy, results of the study were that a majority, 101 (61.2%), academics believed that using the IR would benefit them, their students and colleagues in their research and teaching activities. This belief can be shattered if academics lack adequate knowledge about the usefulness of OA to scholarly communication and their role in advancing the movement. Results confirmed that a majority of academics had little to no knowledge about OA and the university's IR. Thus, performance expectancy needs to be enhanced because academics perceived it to be important in aiding them attain their jobs.

The findings on effort expectancy confirmed that most academics would find it easy to use the repository. Ease of use is often defined by an individual's ability to manipulate a system. The findings showed that very few academics had used the IR to upload their content, implying that use of the IR was not easy for many. This is confirmed by the findings that a majority of academics had not received training on IR use and were willing to be trained. Attention on ensuring ease of use of the repository is therefore essential.

Social influence from high profile researchers in the field, fellow academics, the university and research funders were found to have a positive impact on academics use of the repository. Results of the study could not confirm the presence of these factors in influencing academic's use of the IR, yet academics felt such factors would encourage them to use the IR. As such, strategies of encompassing social factors need to be devised to encourage use.

ICT infrastructure, time, rewards, skills and assistance with self-archiving were factors considered as facilitating conditions that could positively influence academics' use of the repository. Findings on ICT infrastructures revealed that a majority of academics agreed that the university had adequate infrastructures necessary for uploading scholarly work on the IR. Regarding time, the analysis of results revealed that non-participation was not as a result of lack of time, but that self-archiving was not given high priority. On rewards, results confirmed that there was no system in place to reward academics. Finally, pertaining to the skills and knowledge of self-archiving, most academics were falling short as revealed by the results presented in section 5.5.

7.3.4 Academic's attitude towards OA and self-archiving

The fourth research question assessed academics attitude towards OA publishing and the use of the repository. Results revealed that a majority of academics were in favour of the repository and were willing to be trained, in order to obtain the knowledge and skills necessary to upload their works. In addition, a majority of academics showed the willingness to recommend students and their colleagues to make use of the repository for teaching and research purposes. Academics believed that students could consult the IR, explore relevant existing works in their subject areas and check acceptable writing standards. Besides, results presented in section 5.4.8 on rating the importance of the IR showed that 55% of academics believed that it was important to have a repository. Thus, the general finding was that academics had a positive attitude towards self-archiving and the IR.

7.3.5 Hindrances to IR use

The fifth research question sought to establish the challenges inhibiting academics from depositing their work on the IR. Responses to this question were mainly sought from the academics themselves. The findings confirmed that lack of participation was as a result of unawareness of the existence of the repository for some, and a lack of knowledge on how to upload the content for others. Some academics were not even aware that they had a part to play in the development of the repository. The results also revealed that a minority of the academics were not self-archiving because they did not have time. It was reported that academics were already overloaded with work and could not afford to spend time on activities that were not part of their KPAs. The findings also established that a few academics were not self-archiving because of unavailability of adequate infrastructure. This challenge was refuted in the interviews, where it was clarified that academics had personal computers. Thus, this could imply that these academics did not actually know the tools required to upload their content on the IR. Fear of plagiarism was raised as one of the obstacles discouraging academics from self-archiving. The belief was that because the repository gives full-text access to scholarly content, it would be easier for students and academics to plagiarise, as they can simply copy and paste other people's work into their own documents. The results also revealed that there were fears that uploading content on the repository will undermine their work. IRs recruit grey literature which normally does not go through rigorous peer review. Mixing their scholarly work with such content was believed to undermine the merit of their work. Finally, the findings disclosed that there were some academics who were already archiving their work in subject specific

repositories such as arXiv and on social media platforms like ResearchGate. The presence of these platforms hindered academics in that they were convinced that these platforms were more beneficial than the IR.

7.3.6 Strategies to improve adoption and use of the IR

The last research question focused on obtaining strategies that could assist in improving academics' use of the repository. The findings revealed that a majority of academics had little to no knowledge about OA publishing and the university's repository. It was therefore emphasised that the library conduct OA training sessions more often, and on an ongoing basis; coupled with marketing and promotion workshops; so that the news gets to the whole community, including those that are new to the university. The implementation of an OA policy was proposed as another strategy that could improve recruitment of content to the IR. This has worked for institutions that have put in place mandatory policies. Furthermore, rewarding academics that deposited their work was also recommended as a possible approach to an improved usage of the IR. Rewards would motivate those participating, and at the same time, attract the attention of those not self-archiving. The recruitment of more staff to help with IR duties was also proposed. Currently, one person is responsible for all IR duties. It was also revealed in the findings that academics felt that if they were assured of the integrity and preservation of their work, they would be more inclined to self-archive. They were not aware of the library's current state regarding these issues. Referring students and colleagues to the repository was suggested as a feasible way of enhancing IR use since it means more people will become aware of the existence of the repository. Finally, uploading content on behalf of the academics was identified as another strategy that could improve the growth of the IR. The library would not be dependent on academics, but would upload as, and when, content is available for archiving.

7.4 Conclusions

This study investigated the developments and extent of use of the repository by academics at the UKZN. In relation to the developments of the IR, the study concludes that UKZN has made significant progress in setting up an environment conducive for open access publishing through the IR. Efforts such as signing of the Berlin Declaration, employing of a full time IR Librarian and the OA draft policy are an indication of the university's commitment in ensuring that its research output is made visible. However, compared with other similar institutions, UKZN is

lagging behind particularly in adopting policies that support the growth of the IR. Successful repositories have been developed with the help of policies. The absence of a policy at UKZN has resulted in a majority of academics lacking interest and an awareness of the university's repository, and let alone, their role in developing the repository. As a result, content such as research articles, book chapters, conference proceeding and multimedia, is very limited as these are deposited by individual academics. This study also concludes that it has been too long since the OA policy has been awaiting approval from the university senate. This has been the case since the beginning of the study until it was complete and no reason was given, either by the DVC Research or Library Director, as to why it was taking this long. Such delays negatively impact on the progress of the IR and questions the seriousness of the university in committing to OA practices.

The study concludes that, despite the challenges of low rate of deposits by academics, the UKZN library performed its duties and invested a lot of effort in creating and maintaining the university's repository. From the on-set, the library organised marketing and promotion activities to publicise the repository, offered training and support services to encourage IR use by academics.

The general conclusion on academics use of the repository is that, although they indicated a positive attitude towards use of the IR, usage was low. Very few academics had self-archived even though most of them had scholarly content eligible for publishing on the IR. The infrastructure necessary to support OA publishing via the repository was available at UKZN, and so was the necessary support from the library. It was apparent from the findings that academics' interest in self-archiving was prevented by a lack of knowledge on open access and its benefits, and the necessary skills to self-archive. It is expected that, putting in place strategies such as mandating submissions and devising some of form a reward system, would improve use of the IR and ultimately its growth. In addition, if participating academics could encourage their colleagues and students to use the IR, this will help spread the knowledge about the IR and its benefits.

7.5 Recommendations

In view of the findings of the study, recommendations on improving the growth and use of the IR are presented in this section.

7.5.1 Strengthen OA education and training programmes

One of the greatest impediments to IR use established in this study is a general lack of knowledge about OA and self-archiving. Some academics were not even aware that UKZN has a repository, more so, that they were expected to contribute towards it. The library needs to be more proactive in trying to reach out to academics, especially by conducting regular scheduled training workshops. The schedule can be for the semester, to allow academics to plan and create time to attend. The workshops can be publicised via university email or via a library newsletter. Another strategy would be to partner with the research office and teaching and learning office so that when they conduct workshops and conferences, the library can be included in the programme. On such platforms, it is easier to get the attention of many academics at once, and possibly get constructive feedback. Even when UKZN schools or colleges have conferences, it is still relevant for the library to request to be included in the programme because academic libraries exist to support teaching and learning. It is even better at these levels because this would be an opportunity to reveal to the academics what they have contributed compared to other colleges or schools.

Another strategy would be for the library to design a brochure with information that often is not clear or not known to academics; for example: information about the benefits of self-archiving, issues of copyright, plagiarism, integrity of work, preservation of IR content, what content can be deposited and how the library can help in this whole process of self-archiving. Librarians, as advocates of OA, have more knowledge on the subject than academics, such that they often overlook sharing some of the basic information. A majority of academics at UKZN have good internet skills, so chances are they may know their way around self-archiving, but they may not know what they can gain from uploading their work. They may not necessarily need training, but knowledge. For them to discern the usefulness of the IR, adequate knowledge is a prerequisite. It boosts the confidence of those who are already uploading their work, and at the same time, draws the attention of those that are not yet participating.

7.5.2 Forge an OA mandate

The implementation of an OA mandate policy signifies that the institution consents to the usefulness of the repository, and this compels academics to participate in self-archiving. If a policy is not mandatory, it is a challenge because it has been proven that academics will simply not deposit (Tapfuma 2016). Most university repositories have theses and dissertations, which

are mandated to be submitted to the library for archiving, but libraries are struggling to recruit other content types. On the contrary, universities such as UP and Stellenbosch that have adopted policies for the mandatory submission of research papers, have yielded good results. Not only are their repositories big in terms of size, but they also have diversified content types. Findings from this study revealed that a draft policy was awaiting approval, but could not establish if this was a mandatory policy. UKZN already has a vast amount of research output which could be showcased in their IR should a mandatory policy be implemented.

7.5.3 Consider other OA services to boost the IR

Other than thesis and dissertations, archiving of content on the IR is, in most cases, done by the academics responsible for scholarly work. This means that recruitment is dependent upon the academic being under the employ of the institution. When they leave to join other institutions, which happens all the time, it poses a challenge for self-archiving. Uploading scholarly content on behalf of former UKZN academics becomes a mission, even those of prolific researchers who have made huge contributions, because they are supposed to have been uploading by themselves. In such instances, UKZN may want to consider, 1Science (https://www.1science.com/), an OA scholarly content recruitment solution offered on subscription by World Wide Information Services (WWIS). The service has two products called 1folder hub and 1folder data which are the only repository solutions available on the market that "seek and find the majority of green and gold open access papers published by your researchers in peer-reviewed journals, wherever on the Internet they are archived" (1Science: Products 2019). 1folder hub basically populates and updates the repository by pulling all peer-reviewed papers published by the university community, without breaching embargo periods or copyright permission. 1folder data provides the metadata, links to OA papers, and tools to download papers and upload data. The library may choose to subscribe for a limited period of time and thereafter, enforce the policy, considering that by then it would have been approved. This is a solution that can rapidly boost the repository without asking for input from academics. Even if a mediated service is to be considered, it is not possible that one person, the IR Librarian, can manage all processes. 1Science solution is more efficient.

7.5.4 Take advantage of social factors

Findings of this study revealed the significance of social factors in influencing academics use of the repository. Academics revealed that they will be motivated to use the IR if the university

and the research funders would look favourably on them for self-archiving. In addition, they felt that if leading researchers are using the IR, it would be easier for them to follow suit. Though it is beyond the control of the university, NRF should develop an OA policy mandating all research funded by them to be archived in IRs. This will help the development of many repositories in South African universities, considering that it is a major research funder in the country. On the other hand, the university should explore ways that will favour academics to deposit their work on the IR. Since it is not everyone who currently uploads, it is strategic to appreciate those that are participating. It does not always have to be monetary, which was raised as not feasible for the university. Acknowledging them in research reports and library newsletters, inviting them or sending them for OA workshops or conferences, giving them certain library privileges or promoting them to be OA pioneers in their departments are possible ways of rewarding them. Finally, for the library, the strategy would be to target influential academics, such as deans, heads of schools and departments, and convince them to influence academics who look up to them, for good standards and practice, to buy into OA and self-archiving.

7.5.5 Cooperate to strengthen OA

The research funders, councils for higher education and the government, are stakeholders that have the potential to fast track the development of open access repositories. In the UK for example, open access started receiving serious attention from 2005 when funder mandates were beginning to emerge as these forced institutions and their researchers to comply and funders expected to see evidence of compliance (Daoutis and Rodriguez-Marquez 2018:2). The government's policy on the other hand, was launched in 2012 to support OA; and the Higher Education Funding Council for England (HEFCE), which is responsible for assessing the quality of research in institutions of higher education in UK, and from which funding emanates, required that authors submit their peer reviewed research on IRs since 2016 (Ayris and Ignat 2018:5). The UK's national movement towards OA has been a result of stakeholders coordinated efforts and is considered to be a case of good practice. Thus, in South Africa, the NRF, Universities South Africa (USAf) and the government can work together to improve OA adoption and use.

7.6 Contribution and originality of the study

This is the first study to assess OA and repository use by academics at UKZN. Besides, no literature was found addressing the behavioural aspect of technology acceptance in universities in South Africa. In addition, very few in depth studies have been conducted, specifically on the use of repositories in academic libraries in the country. This study fills this gap and adds to the growing literature of IR use in Africa. The findings of this study can guide academic libraries, particularly those in South Africa, to make informed decisions concerning the use of repositories by academics. For example, this study revealed what libraries can do to improve the effect of performance expectancy and effort expectancy. In addition, the findings can influence the development of OA policies in academic libraries in South Africa. Policies that mandate submission of research papers achieve growth and diversity in terms of content types compared with general OA policies. The case of UKZN has revealed that recruitment of content to the repository through voluntary submission will not produce significant results. Findings of the study may also guide policy makers in devising strategies on how to motivate academics and monitor compliance. The study outcomes are also expected to influence the government to make it a national agenda to cultivate an OA environment; and also research funders, to formulate policies that foster the development of OA for scholarly communication in South Africa. For academic libraries, the study will be of value as it reveals the responsibilities they should assume in order to develop successful IRs.

7.7 Suggestions for further research

The study recommends the following for future research:

1. One of the major findings of this study was that there was lack of awareness about OA and the IR amongst most academics. The repository has been in existence for almost 10 years, yet some academics still claim they were not aware that the university had a repository. This suggests there is a gap that the library staff, as advocates of OA, seem to be failing to fill. It was highlighted that OAIRs are no longer an option for academic institutions, libraries have to adjust and library staff have to assume new responsibilities associated with IRs. A study to evaluate the attitude of library staff towards OA would assist to establish their acceptance of OA, which, in turn, impacts on the service and commitment they give to academics about OA and the repository. Often, the assumption is that library staff are ready for OA and they are aware of what is expected of them in the new role. Little has been done to understand librarians' perception on

OA and to assess their needs for the new role. This is proven by a number of studies that have focused on academics' attitude and awareness of OA (Creaser et al. 2010; Dulle and Minishi-Majanja, 2011; Lwoga and Questier 2014; Zhu 2017). Such a study would broaden the literature on OA and repositories in developing countries.

2. A similar study is recommended that can widen the scope by including the past drivers of OA at UKZN, and national stakeholders who are taking initiatives in advancing open access in universities in South Africa.

3. A number of universities in South Africa have managed to develop viable repositories especially in terms of content recruitment. A benchmarking study can be conducted with other universities in South Africa as a strategy that can assist UKZN in establishing best practices capable of improving the growth of the IR and its use within the institution.

4. This study evaluated adoption and use of the repository by academics. There is need to study the use of the repository, in terms of 'access', by students, who constitute the potential population to use the repositories. The largest content type in most repositories is usually theses and dissertations which are often consulted by postgraduate students when writing their own theses. Their input and views about OA publishing are therefore important.

References

1Science. 2019. Available at: https://www.1science.com/ Accessed 17 January 2019.

Abdelrahman, O.H. 2017. Use of the University of Khartoum institutional repository by graduate students. *Desidoc. Journal of Library and Information Technology*, 37, 104-108.

Abdullah, A. 2009. The cautious faculty: their awareness and attitudes towards institutional repositories. *Malaysian Journal of Library and Information Science*, 14(2): 17-34. Available at: http://ejum.fsktm.um.edu.my/article/746.pdf Accessed 5 November 2018.

Abrahams, L., Burke, M., Gray, E. and Rens, A. 2008. Opening access to knowledge in Southern African universities. Southern African Regional Universities Association (SARUA). Available at: https://www.sarua.org/files/publications/OpeningAccess/Opening_Access_Knowledge_2008.pdf Accessed 28 October 2017.

Afarikumah, E. and Acheampong, A. 2010. Modelling computer usage intentions of tertiary students in a developing country through the technology acceptance model. *International Journal of Education and Development using Information and Communication Technology*, 6(1): 102-116.

Afshari, F. and Jones, R. 2007. Developing an integrated institutional repository at Imperial College London. *Program*, 41, 338-352. Available at: https://spiral.imperial.ac.uk/bitstream/10044/1/493/1/jones07rev-2.pdf Accessed 9 May 2017.

Agarwal, R. and Prasad, J. 1999. Are individual differences germane to the acceptance of new information technologies? *Decision Sciences,* 30(2): 361-391.

Aguillo, I., Ortega, J., Fernandez, M. and Utrilla, A. 2010. Indicators for a webometric ranking of open access repositories. *Scientometrics*, 82, 477-486.

Aina, L.O. 2002. General issues in research. In L.O. Aina, ed. *Research in information sciences: an African perspective*. Ibadan: Stirling-Horden Publishers, pp.185-20.

Ajzen, I. 1991. The theory of planned behaviour. *Organisational Behaviour and Human Decision Processes*, 50(2): 179-211.

Ajzen, I. and Driver, B.L. 1992. Application of the theory of planned behaviour to leisure choice. *Journal of Leisure Research*, 24: 207-224.

Akanni, O.T. and Adetimirin, A.E. 2017. Performance expectancy as a determinant of use of open access resources by lecturers in University of Ibadan, Nigeria. *International Journal of Academic Library and Information Science*, 5(2): 58-65.

Alam, I. 2014. Changing role of academic librarians in open access environment. *International Research: Journal of Library and Information Science*, 4(4): 449-457.

Al-Mamary, Y.H., Al-nashmi, M., Hassan, Y.A.G. and Sana'a, Y. 2016. A critical review of models and theories in field of individual acceptance of technology. *International Journal of Hybrid Information Technology*, 9(6): 143-158.

Alomary, A. and Woollard, J. 2015. How is technology accepted by users? A review of technology acceptance models and theories. Available at: https://eprints.soton.ac.uk/382037/1/110-14486008271-4.pdf Accessed 19 July 2017.

American Library Association. 1993. *World encyclopaedia of library and information services*. 3rd ed. Chicago: American Library Association.

Andersson, K. 2016. Developing a theory of open access: a grounded theory based literature review. *Unpublished Master's thesis,* University of Boras, Sweden. Available at: http://www.diva-portal.org/smash/get/diva2:1033071/FULLTEXT01.pdf Accessed 1 August 2017.

Anenene, E.E. and Oyewole, O. 2017. Factors contributing to the adoption of institutional repositories in Universities in South-West Nigeria: perspectives of library staff. Available at: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=4309andcontext=libphilprac Accessed 19 June 2017.

Ani, O. E. 2013. Accessibility and utilisation of electronic information resources for research and its effect on productivity of academic staff in selected Nigerian universities between 2005 and 2012. *Unpublished PhD thesis*, University of South Africa. Available at: http://uir.unisa.ac.za/bitstream/handle/10500/13057/thesis_.pdf?sequence=1 Accessed 26 November 2017.

Antelman, K. 2004. Do open-access articles have a greater research impact? *College and Research Libraries*, 65(5): 372-382.

Armitage, A. 2007. Mutual research designs: redefining mixed methods research design. Paper presented at the British Educational Research Association Annual Conference, Institute of Education held at University of London, 5-8 September. Available at: http://www.leeds.ac.uk/educol/documents/167799.htm Accessed 17 April 2016.

Armstrong, M. 2014. Institutional repository management models that support faculty research dissemination. *OCLC Systems and Services*, 30: 43-51.

Association of College and Research Libraries (ACRL). 2006. Principles and strategies for the reform of scholarly communication 1. Available at: http://www.ala.org/acrl/publications/whitepapers/principlesstrategies Accessed 11 June 2017.

Atkinson, M. and Kidd, C. 1997. Individual characteristics associated with world wide web use: an empirical study of playfulness and motivation. *The DATA BASE for Advances in Information Systems,* 28(2): 53-62.

Attuquayefio, S.N. and Addo, H. 2014. Using the UTAUT model to analyse students' ICT adoption. *International Journal of Education and Development using Information and Communication Technology*, 10(3):75-86.

Axelsson, F.H. 2012. In the event of a zombie apocalypse: An investigation into policies of long-term preservation of digital media in the modern world of Open Access institutional repositories. *Unpublished Master's thesis,* Uppsala University, Sweden. Available at: http://uu.diva-portal.org/smash/get/diva2:542709/FULLTEXT02.pdf Accessed 2 July 2017.

Ayris, P. and Ignat, T. 2018. Defining the role of libraries in the Open Science landscape: a reflection on current European practice. *Open Information Science,* 2(1): 1-22.

Babbie, E. 2007. *The basics of social research.* 4th ed. Belmont, CA: Wadsworth.

Babbie, E. 2013. *The practice of social research*. 13th ed. Belmont, CA: Wadsworth.

Bailey, C.W. 2005. The role of reference librarians in institutional repositories. *Reference Services Review*, 33: 259-267.

Bailey, C.W. 2007: What is open access? Available at: http://digital-scholarship.org/cwb/WhatIsOA.htm Accessed 17 August 2017.

Bailey, K.D. 1994. *Methods of social research*. 4th ed. New York: The Free Press.

Baker, E.W., Al-Gahtani, S.S. and Hubona, G.S. 2007. The effects of gender and age on new technology implementation in a developing country: testing the Theory of Planned Behaviour (TPB). *Information Technology and People*, 20(4): 352-375.

Bamigbola, A. and Adetimirin, A.E. 2017. Evaluating use of institutional repositories by lecturers in Nigerian universities. *Journal of Information and Knowledge Management*, 8: 83-102.

Bandura, A. 1986. *Social foundations of thought and action: a social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. 1991. Social cognitive theory of self-regulation. *Organisational Behaviour and Human Decision Processes,* 50(2): 248-287.

Bankier, J.G. and Perciali, I. 2008. The institutional repository rediscovered: what can a university do for open access publishing? *Serials Review*, 34: 21-26.

Barandiaran, D., Rozum, B. and Thoms, B. 2014. Focusing on student research in the institutional repository. *College and Research Libraries News,* 75: 546-549.

Baruch, Y. 1999. Response rate in academic studies: a comparative analysis. *Human Relations,* 52: 421-438.

Bellamy, C. 2012. Principle of methodology research design in social science. *Journal of Multidisciplinary Evaluation,* 8(18): 788-791.

Benbasat, I. and Zmud, R. 2003. The identity crisis within the IS discipline: defining and communicating the discipline's core properties. *MIS Quarterly*, 27(2): 183-194.

Bepress. 2018. Bepress. Available at: https://www.bepress.com/ Accessed 7 October 2018.

Berlin Declaration. 2003. Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities. Available at: https://openaccess.mpg.de/Berlin-Declaration Accessed 15 June 2017.

Berlin Declaration. 2018. Signatories. Available at: https://openaccess.mpg.de/319790/Signatories Accessed 19 November 2018

Bernius, S., Hanauske, M., Konig, W. and Dugall, B. 2009. Open access models and their implications for the players on the scientific publishing market. *Economic Analysis and Policy,* 39(1): 103-116.

Bezuidenhout, L. and Rappert, B. 2016. What hinders data sharing in African science? Paper presented at the Fourth CODESRIA Conference on electronic publishing held in Dakar, Senegal, March 30 to April 1. Available at: https://www.codesria.org/IMG/pdf/bezuidenhout_rappert.pdf Accessed 16 September 2017.

Billings, M.S. 2009. Exploring ways that institutional repositories facilitate new roles and partnerships for libraries and the academy. *CASLIN 2009: Institutional online repositories and open access, 16th International Seminar* (pp. 7–14). Tepla Monastery, Czech Republic, June 7–11, 2009.

Bjork, B.C., Laakso, M., Welling, P. and Paetau, P. 2014. Anatomy of green open access. *Journal of the Association for Information Science and Technology*, 65: 237-250.

Bloomberg, L. and Volpe, M. 2008. *Completing your qualitative dissertation: A roadmap from beginning to end.* California: Thousand Oaks.

Bloomberg, L. and Volpe, M. 2015. *Completing your qualitative dissertation: A roadmap from beginning to end*. 3rd ed. California: Thousand Oaks.

Bouwman, H. and van der Wijngaert, L. 2009. Coppers context, and conjoints: a reassessment of TAM. *Journal of Information Technology*, 24(2): 186-201.

Bowen, G.A. 2009. Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2): 27-40.

Brancheau, J.C. and Wetherbe, J.C. 1990. The adoption of spreadsheet software: Testing innovation diffusion theory in the context of end-user computing. *Information Systems Research,* 1: 115-143.

Brewerton, A. 2012. Re-skilling for research: investigating the needs of researchers and how library staff can best support them. *New Review of Academic Librarianship*, 18(1): 96-110.

Brink, H., van der Walt, C. and van Rensburg, G. 2006. *Fundamentals of research methodology for healthcare professionals.* Cape Town: Juta.

Budapest Open Access Initiative. 2002. BOAI15. Available at: https://www.budapestopenaccessinitiative.org/boai15-1 Accessed 6 June 2017.

Burns, R.B. 2000. *Introduction to research methods*. London: Sage.

Busha, C.H. and Harter, S.P. 1980. *Research methods in librarianship: techniques and interpretation*. San Diego: Academic Press.

Cargan, L. 2007. *Doing Social Research*. London: Rowman and Littlefield.

Carillo, K.D. 2010. Social Cognitive Theory in IS Research – Literature review, criticism, and research agenda. In: S.K. Prasad, S.K., H.M. Vin, S. Sahni, M.P. Jaiswal and B. Thipakorn, eds. *International Conference on Information Systems, Technology and Management.* Berlin, Heidelberg: Springer, pp. 20-31.

Carlson, J., Ramsey, A.E. and Kotterman, J.D. 2010. Using an institutional repository to address local-scale needs: a case study at Purdue University. *Library Hi Tech*, 28: 152-173.

Chalabi, L. and Dahmane, M. 2011. Open access in developing countries: African open archives. *Information Services and Use*, 31: 111-119.

Chan, L. 2004. Supporting and enhancing scholarship in the digital age: the role of open-access institutional repositories. *Canadian Journal of Communication*, 29: 277-300.

Chaputula, A.H. 2016. eReadiness of public university libraries in Malawi with special reference to the use of mobile phones in the provision of library and information services. *Unpublished PhD thesis,* University of KwaZulu-Natal. Available at: https://researchspace.ukzn.ac.za/xmlui/bitstream/handle/10413/14477/Chaputula_Aubrey_Harvey_2016.pdf?sequence=1andisAllowed=y Accessed 6 May 2017.

Cheng, D. Liu, G. and Qian, C. 2008. On determinants of user acceptance of internet banking: a theoretical framework and empirical study. Proceedings of the 2008 IEEE Advanced Management of Information for Globalized Enterprises, AMIGE. 28-29 September. Beijing, China. Available at: https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=andarnumber=4721462 Accessed 6 July 2018.

Cheng, D., Liu, G., Song, Y-F. and Qian, C. 2008. Adoption of internet banking: an integrated model. In: *Proceedings of the 4th International Conference on Wireless Communications, Networking and Mobile Computing*, Dalian, China, 12-14 Oct. Available at: https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=andarnumber=4680306 Accessed 12 July 2017.

Chilimo, W. 2016. Institutional repositories: awareness and self-archiving practices of academic researchers in selected public universities in Kenya. Paper presented at the Fourth CODESRIA Conference on electronic publishing held in Dakar, Senegal, March 30 to April 1. Available at: https://www.codesria.org/IMG/pdf/chilimo.pdf Accessed 17 January 2018.

Chiware, E.R.T. 2007. Training Librarians for the digital age in African university libraries. Available at: http://library.nust.ac.zw/gsdl/collect/toolbox/archives/HASH90ce.dir/Training%20librarians%20for%20the%20digital%20age%20in%20African%20university%20libraries.pdf Accessed 27 March 2017.

Christian, G.E. 2008. Issues and challenges to the development of open access institutional repositories in academic and research institutions in Nigeria. A paper presented on the International Development Research Centre (IDRC) Ottawa, Canada. Available at: https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/36986/127792.pdf?sequence=1andisAllowed=y Accessed 17 January 2018.

Claassen, J. 2015. UCT's Institutional Repository: OpenUCT Available at: http://researchcommonsblog.uct.ac.za/wp-content/uploads/2015/04/Session-7-Research-Support-Services-Mrs-Claassen.pdf Accessed 24 April 2017.

Cohen, I., Manion, I. and Morrison, K. 2007. *Research methods in education*. 6th ed. New York: Routledge.

Cohen, J.F. Bancihon, J. and Jones. M. 2013. South African physicians of e-prescribing technology: an empirical test of a modified UTAUT model. *South Africa Computer Journal* 50 (1), 43-50.

Correia, A.M. and Teixeria, J.C. 2005. Reforming scholarly publishing and knowledge communication: from the advent of the scholarly journal to the challenges of open access. *Online information review*, 29(4): 349-364.

Creaser, C., Fry, J., Greenwood, H., Oppenheim, C., Probets, S., Spezi, V. and White, S. 2010. Authors' awareness and attitudes toward open access repositories. *New Review of Academic Librarianship,* 16: 145-161.

Creswell, J.W. 2007. *Qualitative inquiry and research design: choosing among five approaches*. 2nd ed. Thousand Oaks: Sage.

Creswell, J.W. 2014. *Research design qualitative, quantitative and mixed methods approaches*. 4th ed. Thousand Oaks: Sage.

Creswell, J.W. and Plano Clark, V.L. 2007. *Designing and conducting mixed methods research.* Thousand Oaks: Sage.

Creswell, J.W., Plano Clark, V.L., Gutmann, M.L. and Hanson, W.E. 2003. Advanced mixed methods research designs, In A. Tashakkori and C. Teddlie, eds*. Handbook of mixed methods in social and behavioral research*. Thousand Oaks: Sage, pp. 209-239.

Crissinger, S. 2017. Access to research and Sci-Hub: Creating opportunities for campus conversations on open access and ethics. *College and Research Libraries News*. Available at: https://crln.acrl.org/index.php/crlnews/article/view/9621/11030 Accessed 27 June 2018.

Crossan, F. 2003. Research philosophy: towards an understanding. *Nurse Researcher*, 11(1): 46-55.

Crow, R. 2002. The Case for Institutional Repositories: A SPARC Position Paper. *ARL Bimonthly Report* 223. Available at: http://www.sparc.arl.org/sites/default/files/media_files/instrepo.pdf Accessed 21 February 2017.

Cullen, R. and Chawner, B. 2011. Institutional repositories, open access, and scholarly communication: a study of conflicting paradigms. *The Journal of Academic Librarianship*, 37: 460-470.

Czaja, S.J. and Lee, C.C. 2007. The impact of aging on access to technology. *Universal Access in the Information Society*, 5: 341.

Czerniewicz, L. and Goodier, S. 2014. Open access in South Africa: a case study and reflections. *South African Journal of Science*, 110 (9/10): 1-9.

Daoutis, C. and Rodriguez-Marquez, M. 2018. Library-mediated deposit: a gift to researchers or a curse on open access: reflections from the Case of Surrey. *Publications*, 6: 20.

Darlington, Y. and Scott, D. 2002. *Qualitative research in practice: stories from the field*. 1st ed. Berkshire: Open University Press.

Davis, F.D., Bagozzi R.P. and Warshaw, P.R. 1989. User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, 35: 982-1003.

Davis, P.M. and Connolly, M.J. 2007. Institutional repositories: evaluating the reasons for non-use of Cornell University's installation of DSpace. *D-lib Magazine*, 13(3/4): 34-9. Available at: http://www.dlib.org/dlib/march07/davis/03davis.html Accessed 9 May 2017.

De Beer, J.A. 2005. Open Access scholarly communication in South Africa: current status, significance, and the role for National Information Policy in the National System of Innovation. *Unpublished Master's thesis,* University of Stellenbosch, South Africa. Available at: http://scholar.sun.ac.za/handle/10019.1/50409 Accessed 17 May 2016.

Denscombe, M. 2008. Communities of practice: a research paradigm for the mixed methods approach. *Journal of Mixed Methods Research*, 2: 270-283.

Denzin, N.K. 1970. *The research act*. New York: McGraw-Hill.

Deoghuria, S. and Roy, S. 2007. Open access: what scientists think? a survey of researcher's attitude towards open access. Available at: https://core.ac.uk/download/pdf/49286531.pdf Accessed 16 May 2018.

Diener, E. and Crandall, R. 1978. *Ethics in social and behavioural research*. Chicago: University Press.

Dillon, A. and Morris, M.G. 1996. User acceptance of new information technology: theories and models. In: Annual review of information science and technology: Medford, NJ: Information Today.

Directory of Open Access Repositories (OpenDOAR). 2017. Directory of Open Access Repositories. Available at: http://www.opendoar.org/ Accessed on 2 February 2017.

Directory of Open Access Repositories (OpenDOAR). 2018. Directory of Open Access Repositories. Available at: http://www.opendoar.org/ Accessed on 31 August 2018.

Dishaw, M.T and Strong, D.M. 1999. Extending the technology acceptance model with task-technology fit constructs. *Information and Management*, 36(1): 9-21.

Dulle, F.W. 2010. An analysis of open access scholarly communication in Tanzanian public universities. *Unpublished PhD thesis,* University of South Africa. Available at: http://uir.unisa.ac.za/index.php/SAJIM/article/viewFile/413/405 Accessed 6 December 2016.

Dulle, F.W. and Minishi-Majanja, M.K. 2011. The suitability of the Unified Theory of Acceptance and Use of Technology (UTAUT) model in open access adoption studies. *Information development*, 27(1): 32-45.

Du Toit, I.M. 2015. Towards a sustainable open access scholarly publishing model in the South African context. *Unpublished Master's thesis*, University of Pretoria. Available at: https://repository.up.ac.za/bitstream/handle/2263/49613/DuToit_Towards_2015.pdf?sequence=4andisAllowed=y Accessed 17 May 2017.

Eisenberg, E.M., Johnson, Z. and Pieterson, W. 2015. Leveraging social networks for strategic success. *International Journal of Business Communication,* 52(1):143-154.

Eisenhart, M. 1991. Conceptual frameworks for research circa 1991: ideas from a cultural anthropologist; implications for mathematics education researchers. Proceedings of the 13th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, Blacksburg. 1: 202-219.

Elen, J. and Verburgh, A. 2008. *Bologna in European research-intensive universities: implications for bachelor and master programs*. London: Garant Publishers.

Engeszer, R.J. and Sarli, C.C. 2014. Libraries and open access support: new roles in the digital publishing era. *Missouri medicine*, 111(5): 404-407.

Ennis, C.D. 1999. A theoretical framework: the central piece of a research plan. *Journal of Teaching in Physical Education,* 18(2): 129-140.

European Commission. 2018. H2020 online manual: open access and data management. Available at: http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/open-access_en.htm Accessed 12 December 2018.

Evans, N.D. 2014. Predicting user acceptance of electronic learning at the University of Zululand. *Unpublished PhD thesis,* University of Zululand.

Ezema, I.J. 2011. Building open access institutional repositories for global visibility of Nigerian scholarly publication. *Library Review*, 60: 473-485.

Ezema, I.J. 2013. Local contents and the development of open access institutional repositories in Nigeria: University libraries challenges, strategies and scholarly implications. *Library Hi Tech*, 31(2): 323-340.

Ezema, I.J. and Okafor, V.N. 2015. Open access institutional repositories in Nigeria academic libraries: advocacy and issues in scholarly communication. *Library Collections, Acquisitions, and Technical Services,* 39: 45-58.

Ezema, I.J. and Onyancha, O.B. 2016. Status of Africa in the global open access directories: Implications for global visibility of African scholarly research. Paper presented at the Fourth CODESRIA Conference on electronic publishing held in Dakar, Senegal, March 30 to April 1. Available at:
http://pro.ovh.net/~codesria/spip.php?article2564andlang=en   Accessed 18 February 2017.

Feilzer, M.Y. 2010. Doing mixed methods research pragmatically: implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4: 6-16.

Fidel, R. 2008. Are we there yet?: mixed methods research in library and information science. *Library and Information Science Research,* 30(4): 265-272.

Fielding, N.G. and Fielding, J.L. 1986. *Linking data*. Beverly Hills, CA: Sage.

Fishbein, M. and Ajzen, I. 1975. *Belief, attitude, intention, and behaviour: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Foster, N.F. and Gibbons, S. 2005. Understanding faculty to improve content recruitment for institutional repositories. *D-Lib Magazine* 11(1). Available at:
http://www.dlib.org/dlib/january05/foster/01foster.html Accessed 6 May 2017.

Fouka, G. and Mantzorou, M. 2011. What are the major ethical issues in conducting research? Is there a conflict between the research ethics and the nature of nursing? *Health Science Journal,* 5(1): 3-14.

Fox, M. and Hanlon, S.M. 2015. Barriers to open access uptake for researchers in Africa. *Online Information Review*, 39, 698-716.

Francke, H., Gamalielsson, J. and Lundell, B. 2017. Institutional repositories as infrastructures for long-term preservation. *Information Research: An International Electronic Journal*, 22. Available at: https://files.eric.ed.gov/fulltext/EJ1144764.pdf Accessed 9 September 2017.

Frankfort-Nachmias, C. and Nachmias, D. 1996. *Research methods in the social sciences*. 5th ed. London: Arnold.

Frass, W., Cross, J. and Gardner, V. 2014. Taylor and Francis open access survey. Available at:
https://www.tandf.co.uk//journals/explore/open-access-survey-june2014.pdf Accessed 8 May 2018.

Fullard, A. 2007. South African responses to open access publishing: a survey of the research community. *South African Journal of Libraries and Information Science*, 73: 40-50.

Gbolahan, O. 2014. Predictors of legislators' ICT acceptance and use in the performance of legislative functions at the Nigerian National Assembly. *Unpublished PhD thesis,* University of KwaZulu-Natal. Available at:
https://researchspace.ukzn.ac.za/bitstream/handle/10413/10812/Gbolahan_Olasina_2014.pdf?sequence=1&isAllowed=y Accessed 9 June 2017.

Ghosh, M. 2011. Advocacy for open access: a selected review of the literature and resource list. *Library Hi Tech News,* 28: 19-23.

Ghosh, S.B. and Kumar D.A. 2007. Open Access and Institutional Repositories - a developing country perspective: a case study of India. *IFLA Journal*, 33: 229-250.

Giglia, E. 2010. Open access to scientific research: where are we and where are we going? Facts and figures on the occasion of the 2010 Open Access Week (October 18-24). *European Journal of Physical and Rehabilitation Medicine*, 46: 461-469.

Glicken, M.D. 2003. *Social research: a simple guide*. Boston: Allyn and Bacon.

Goodwin, S. 1996. Management of resistance to change. *Unpublished Master's thesis,* University of South Africa.

Gray, D.E. 2009. *Doing research in the real world*. 2nd ed. London: Sage.

Gray, J.R., Grove, S.K. and Sutherland, S. 2016. *Burns and Grove's the practice of nursing research: appraisal, synthesis, and generation of evidence*. 8th ed. Amsterdam: Elsevier.

Hamutumwa, N. 2014. Electronic resources use by distance learners at University of Namibia. *Unpublished PhD thesis,* University of KwaZulu-Natal. Available at:
https://researchspace.ukzn.ac.za/xmlui/bitstream/handle/10413/12148/Hamutumwa_Meameno_Utuna_Nampa_2014.pdf?sequence=1andisAllowed=y Accessed 17 November 2017.

Harnad, S., Brody, T., Vallia Res, F.O., Carr, L., Hitchcock, S., Gingras, Y., Oppenheim, C., Stamerjohanns, H. and Hilf, E.R. 2004. The access/impact problem and the green and gold roads to open access. *Serials review*, 30: 310-314.

Hartman, M.S. and Wu, S.S. 2018. Open access in South Africa: A coherent strategy is needed. *South African Journal of Science*, 114: 1-2.

Hedlund, T. 2008. Researcher's attitudes towards open access and institutional repositories: A methodological study for developing a survey form directed to researchers in Business Schools. Paper presented at the Proceedings of the ELPUB 2008 Conference on Electronic Publishing held in Toronto, Canada. 25-27 June. Available at: https://www.researchgate.net/profile/Turid_Hedlund2/publication/253456130_Researcher%27s_Attitudes_Towards_Open_Access_and_Institutional_Repositories_A_Methodological_Study_for_Developing_a_Survey_Form_Directed_to_Researchers_in_Business_Schools/links/54083e030cf2c48563b9643d/Researchers-Attitudes-Towards-Open-Access-and-Institutional-Repositories-A-Methodological-Study-for-Developing-a-Survey-Form-Directed-to-Researchers-in-Business-Schools.pdf?origin=publication_detail Accessed 15 October 2017.

Heerink, M., Krose, B., Evers, V. and Wielinga, B. 2009. Measuring acceptance of an assistive social robot: A suggested toolkit. Available at: https://www.researchgate.net/profile/Bob_Wielinga/publication/224079222_Measuring_acceptance_of_an_assistive_social_robot_A_suggested_toolkit/links/02bfe50f53907cb487000000/Measuring-acceptance-of-an-assistive-social-robot-A-suggested-toolkit.pdf?origin=publication_detail Accessed 3 January 2019.

Heijden, H. 2004. User acceptance of hedonic information systems. *MIS Quarterly,* 695-704.

Henning, E., van Rensburg, W. and Smith, B. 2004. *Finding your way in qualitative research.* Pretoria: van Schaik Publishers.

Hess, D.R. 2004. How to write an effective discussion. *Respiratory Care*, 49: 1238-1241.

Hill, R. 1998. What sample size is enough in internet survey research? *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century,* 6(3/4): 1-10.

Holtz, B. and Krein, S. 2011. Understanding nurse perceptions of a newly implemented electronic medical record system. *Journal of Technology in Human Services*, 29(4): 247-262.

Horwood, L., Sullivan, S., Young, E. and Garner, J. 2004. OAI compliant institutional repositories and the role of library staff. *Library management*, 25: 170-176.

Hoskins, R. 2009. The effect of the crisis in scholarly communication on university libraries in South Africa. *Unpublished PhD thesis,* University of KwaZulu-Natal. Available at: https://researchspace.ukzn.ac.za/xmlui/bitstream/handle/10413/489/Ruth%20Hoskins%20phd%20thesis%20final.pdf?sequence=1andisAllowed=y Accessed 9 October 2016.

Hugentobler, M.K., Israel, B.A. and Schurman, S.J. 1992. An action research approach to workplace health: integrating methods. *Health Education Quarterly*, 19(1): 55-76.

Hughes, C.T. and Gibson, M.L. 1987. An attributional model of decision support systems usage. *Information and Management*, 13: 119-124.

Ibinaiye, D., Esew, M., Atukwase, T., Carte, S. and Lamptey, R. 2015. Open access institutional repositories: A requirement for academic libraries in the 21st century. a case study of four African universities. A paper presented on the Fourth International Conference on African Digital Libraries and Archives (ICADLA-4) held in Legon, Ghana. 28 – 29 May Available at: http://wiredspace.wits.ac.za/bitstream/handle/10539/18398/Ibinaiye_etal_Final.pdf?sequence=1andisAllowed=y Accessed 7 October 2017.

Igbaria, M. and Tan, M. 1997. The consequences of information technology acceptance on subsequent individual performance. *Information and management*, 32(3): 113-121.

Igbaria, M., Parasuraman, S. and Baroudi, J.J. 1996. A motivational model of microcomputer usage. *Journal of Management Information Systems*, 13(1): 127-143.

International Open Access Week - SPARC. 2017. UKZN International Open Access Week Celebration 2017. Available at: http://www.openaccessweek.org/events/ukzn-international-open-access-week-celabration Accessed 18 November 2017.

Islam, A., Akter, R. 2013. Institutional repositories and open access initiatives in Bangladesh: a new paradigm of scholarly communication. *Liber*, 23: 3-24.

Iton, I. and Iton, A. 2016. Open access and the Caribbean academic: an exploratory investigation of the adoption of this medium for publishing among science faculty of the University of the West Indies. *IFLA Journal*, 42: 25-35.

Jain, P. 2011. New trends and future applications/directions of institutional repositories in academic institutions. *Library Review* 60(2):125-141.

Jain, P. 2012. Promoting open access to research in academic libraries. *Library Philosophy and Practice.* Available at: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1811andcontext=libphilprac Accessed November 2017.

Jairak, R., Praneetpolgrang, P. and Mekhabunchakij, K. 2009. An investigation of trust in e-learning for instructors and students in private and public universities. In *Proceedings of the 6th eLearning for Knowledge-Based Society Conference, Thailand*. pp. 17-18. Available at: http://www.ijcim.th.org/SpecialEditions/v17nSP3/21_Full_Rath%20Jairak.pdf Accessed 1 March 2017.

Jantz, R.C. and Wilson, M.C. 2008. Institutional repositories: faculty deposits, marketing, and the reform of scholarly communication. *The Journal of Academic Librarianship*, 34: 186-195.

Jen, W., Lu, T. and Liu, P.T. 2009. An integrated analysis of technology acceptance behaviour models: comparison of three major models. *MIS Review*, 15(1): 89-121.

Jick, T.D. 1979. Mixing qualitative and quantitative methods: triangulation in action. *Administrative Science Quarterly*, 24(4): 602-611.

John-Okeke, R. 2008. Developing institutional repositories: considering copyright issues. *Journal of Applied Information Science and Technology*, 1(2): 11-18.

Johnson, R.B. and Onwuegbuzie, A.J. 2004. Mixed methods research: a research paradigm whose time has come. *Educational Researcher*, 33: 14-26.

Johnson, R., Fosci, M., Chiarelli, A., Pinfield, S. and Jubb, M. 2017. Towards a competitive and sustainable open access publishing market in Europe: a study of the open access market and policy environment. Available at: https://blogs.openaire.eu/wp-content/uploads/2017/03/OA-market-report-28Final-13-March-201729-1.pdf Accessed 9 October 2017.

Jones, R., Andrew, T. and MacColl, J. 2006. *The institutional repository*. Oxford: Chandos Publishing.

Kalichman, S.C., Ajzen, I., Albarracin, D. and Hornik, R. 2007. *Prediction and change of health behaviour: applying the reasoned action approach*. New York: Psychology Press.

Kallet, R.H. 2004. How to write the methods section of a research paper. *Respiratory Care*, 49: 1229-1232.

Kamanzi, A. and Damen, J. 2016. The role of African academic institutions in promoting open access in Africa: obstacles and opportunities. Paper presented at the Fourth CODESRIA Conference on electronic publishing held in Dakar, Senegal, March 30 to April 1. Available at: https://www.codesria.org/IMG/pdf/kamanzi_damen.pdf?4788/fca114dfbfa5adb265e17821cf5 2d604fedeb849 Accessed 17 January 2018.

Kamraninia, K. and Abrizah, A. 2010. Librarians' role in the institutional repository phenomenon: a case of Malaysian academic libraries. *Malaysian Journal of Library and Information Science*, 15(3): 121-133.

Karahanna, E., Straub, D.W. and Chervany, N.L. 1999. Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly*, 23(2): 183-213.

Karna, D. and Ko, I. 2013. Collaboration orientation, peer support and the mediating effect of use of e-collaboration on research performance and satisfaction. *Asia Pacific Journal of Information Systems,* 23(4): 151-175.

Karsten, R. 2002. An analysis of IS professional and end user causal attributions for user-system outcomes. *Journal of Organizational and End User Computing (JOEUC)*, 14(4): 51-73.

Kassahun, K. and Nsala, C. 2015. The awareness of academic librarians towards open access resources to support reference services: A case of private institutions of higher learning in Gaborone, Botswana. A paper presented at the International Federation of Library Associations World Library and Information Congress held in Cape Town, South Africa, 15-21 August 2015. Available at:
https://www.ifla.org/files/assets/reference-and-information-services/publications/5-kassahun-en-doc.pdf Accessed 8 December 2017.

Kelley, H.H. 1967. Attribution theory in social psychology. In: Nebraska symposium on motivation. Nebraska: University Press.

Kelley, H.H. and Michela, J.L. 1980. Attribution theory and research. *Annual Review of Psychology*, 31: 457-501.

Kemoni, H.N. 2008. Theoretical framework and literature review in graduate records management research. *African Journal of Library Archives and Information Science*, 18(2): 103-117.

Kennan, M.A. 2007. Academic authors, scholarly publishing, and open access in Australia. *Learned publishing,* 20: 138-146.

Khasawneh, M.M. and Ibrahim, H.B.H. 2008. Toward an information and communication technology development in developing countries. Communications of the IBIMA, 4(17): 135-140.

Kijsanayotin, B., Pannarunothai, S. and Speedie, S.M. 2009. Factors influencing health information technology adoption in Thailand's community health centers: applying the UTAUT model. *International Journal of Medical Informatics*, 78(6): 404-416.

Kim, J. 2010. Faculty self-archiving: motivations and barriers. *Journal of the American society for Information Science and Technology*, 61(9):1909–1922.

Kim, J.S. 2000. Students' attitudes and perceptions toward technology. *Unpublished PhD thesis,* Iowa State University. Available at: https://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=14908andcontext=rtd Accessed 19 April 2016.

Kim, J.S. 2011. Motivation of faculty self-archiving in institutional repositories. *Journal of Academic Librarianship,* 37(1): 246–254.

Kim, Y. and Crowston, K. 2011. Technology adoption and use theory review for studying scientists' continued use of cyber-infrastructure. *Proceedings of the American Society for Information Science and Technology*, 48(1): 1-10.

Kimengsi, J.N., Oben, E.E.E., Molombe, J.M. and Mojoko, F.M. 2016. Repositioning Africa's open access movement on the global stage: challenges and prospects for African universities and research institutions. Paper presented at the Fourth CODESRIA Conference on electronic publishing held in Dakar, Senegal, March 30 to April 1. Available at: http://www.codesria.org/spip.php?article2564andlang=en Accessed 7 September 2016.

Konkiel, S. and Scherer, D. 2013. New opportunities for repositories in the age of altmetrics. *Bulletin of the American Society for Information Science and Technology*, 39: 22-26.

Kothari, C.R. 2004. *Research methodology: methods and techniques*. 2nd ed. New Delhi: New Age International Publishers.

Koundouri, P., Davila, G., Giannouli, A., Kourogenis, N., Xepapadeas, A., Xepapadeas, A. P. and Souliotis, I. 2014. OpenAIRE Feasibility/Business model report. Available at: https://cordis.europa.eu/docs/projects/cnect/5/283595/080/deliverables/001-D357BusinessModelv8.pdf Accessed 7 May 2018.

Krejcie, R.V. and Morgan, D.W. 1970. Determining sample size for research activities. *Educational and Psychological Measurement,* 30: 607-610.

Kripanont, N. 2007. Examining a technology acceptance model of internet usage by academics within Thai business schools. *Unpublished PhD thesis,* Victoria University, Melbourne. Available at: http://www.vuir.vu.edu.au/1512/1/Kripanont.pdf Accessed 6 January 2016.

Kuhn, T.S. 1962. *The structure of scientific revolutions*. Chicago: University Press.

Kuhn, T.S. 1970. *The structure of scientific revolutions*. 2nd ed. Chicago: University Press.

Kumar, R. 2005. *Research methodology: a step by step guide for beginners.* 2nd ed. London: Sage.

Kumar, R.B., Chandra, B.S. and Parthasarathi, M. 2016. Status of open access institutional digital repositories in agricultural sciences: a case study of Asia. *Library Philosophy and Practice* (e-journal). Paper 1329. Available at: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=3615andcontext=libphilprac Accessed 10 July 2017.

Kuzmanic, M. 2009. Validity in qualitative research: interview and the appearance of truth through dialogue. *Horizons of Psychology*, 18: 39-50.

Lagzian, F., Abrizah, A. and Wee, M.C. 2015. Critical success factors for institutional repositories implementation. *The Electronic Library*, 33: 196-209.

Lai, C., Wang, Q. and Lei, J. 2012. What factors predict undergraduate students' use of technology for learning? A case from Hong Kong. *Computers and Education*, 59(2): 569-579.

Lamb, R. and Kling, R. 2003. Reconceptualising users as social actors in information systems research. *MIS quarterly*, 197-236.

Lawson, E.H. and Bertucci, M.L. 1996. *Encyclopedia of Human Rights.* 2nd ed. Washington: Taylor and Francis.

Leedy, P.D. and Omrod, J.E. 2010. *Practical research: planning and design*. 9th ed. Upper Saddle River, NJ: Pearson Education.

Lee, M.K.O., Cheung, C.M.K. and Chen, Z. 2005. Acceptance of internet-based learning medium: the role of extrinsic and intrinsic motivation. *Information and Management*, 42: 1095–1104.

Leng, C.B., Ali, K.M. and Hoo, C.N.E. 2016. Open access repositories on open educational resources: feasibility of adopting the Japanese model for academic libraries. *Asian Association of Open Universities Journal,* 11: 35-49.

Leonard, B. 2012. Technology acceptance within organisations: improving understanding of failing technology projects using social network analysis and the technology acceptance model. *Unpublished PhD thesis,* University of South Australia. Available at: http://search.ror.unisa.edu.au/media/researcharchive/open/9915952111901831/5311191338000183 Accessed 15 May 2017.

Lercher, A. 2007. A survey of attitudes about digital repositories among faculty at Louisiana State University at Baton Rouge. *The Journal of Academic Librarianship*, 34: 408-415.

Library and Information Association of South Africa (LIASA). 2018. *LIASA in-touch.* Johannesburg: LIASA.

Locke, L.F., Silverman, S.J. and Spirduso, W.W. 2010. *Reading and understanding research.* 3rd ed. Los Angeles: Sage.

Lor, P.J. and Britz, J.J. 2007. Challenges of the approaching knowledge society: major international issues facing LIS professionals. *Libri*, 57(3): 111-122.

Lupton, D. 2014. Feeling better connected: academics' use of social media. Canberra: News and Media Research Centre, University of Canberra. Available at: https://www.canberra.edu.au/about-uc/faculties/arts-design/attachments2/pdf/n-and-mrc/Feeling-Better-Connected-report-final.pdf Accessed 25 November 2017.

Lwoga, E.T. and Questier, F. 2014. Faculty adoption and usage behaviour of open access scholarly communication in health science universities. *New World Library*, 115(3/4): 1-22.

Lynch, C.A. 2003. Institutional repositories: essential infrastructure for scholarship in the digital age. *Libraries and the Academy*, 3, 327-336.

Lynch, C.A. and Lippincott, J.K. 2005. Institutional repository deployment in the United States as of early 2005. *D-Lib Magazine*, 11(9): 1-11. Available at: http://www.dlib.org/dlib/september05/lynch/09lynch.html Accessed 3 January 2017.

Macha, A. and De Jager, K. 2011. A comparative overview of the development of the institutional repositories at the University of Cape Town and at the University of Pretoria. Proceedings of the 14th International Symposium on Electronic Theses and Dissertations, Cape Town, South Africa, 13-17 September. Available at: http://dl.cs.uct.ac.za/conferences/etd2011/papers/etd2011_macha.pdf Accessed 9 March 2017.

Macha, A.S. 2012. Towards the establishment and implementation of an institutional repository at the University of Cape Town a case study. *Unpublished Master's thesis,* University of Cape Town. Available at: https://open.uct.ac.za/handle/11427/12077 Accessed 9 May 2016.

Machimbidza, T. 2016. The adoption and use of peer reviewed electronic journals by academics at selected Zimbabwean state universities. *Unpublished PhD thesis*, University of KwaZulu -Natal. Available at: https://researchspace.ukzn.ac.za/bitstream/handle/10413/12120/Machimbidza_Takawira_2014.pdf?sequence=1andisAllowed=y Accessed 14 November 2017.

Madalli, D.P. 2015. *Concepts of openness and open access.* Paris: UNESCO. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000232207 Accessed 16 October 2016.

Magal, S.R. and Snead, K.C. 1993. The role of causal attributions in explaining the link between user participation and information system success. *Information Resources Management Journal (IRMJ)*, 6(3): 8-20.

Majyambere, M. 2014. Information seeking behaviour of humanities/arts international postgraduate students in public universities in KwaZulu-Natal province, South Africa. *Unpublished PhD thesis,* University of KwaZulu-Natal. Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.921.4599andrep=rep1andtype=pdf Accessed 21 July 2017.

Maldonado, U.P.T., Khan, G.F., Moon, J. and Rho, J.J. 2009. E-learning motivation, students' acceptance/use of educational portal in developing countries: a case study of Peru. In *2009 Fourth International Conference on Computer Sciences and Convergence Information Technology,* pp. 1431-1441.

Malhotra, Y. and Galletta, D. F. 1999. Extending the technology acceptance model to account for social influence: Theoretical bases and empirical validation. Paper presented at the Systems sciences, 1999. HICSS-32. Proceedings of the 32nd annual Hawaii international conference. Available at: https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=772658 Accessed 19 June 2016.

Marakas, G.M., Johnson, R.D. and Palmer, J.W. 2000. A theoretical model of differential social attributions toward computing technology: when the metaphor becomes the model. *International Journal of Human-Computer Studies*, 52(4): 719-750.

Marangunic, N. and Granic, A. 2015. Technology acceptance model: a literature review from 1986 to 2013. *Universal Access in the Information Society*, 14(1), 81-95.

Marsh, R.M. 2015. The role of institutional repositories in developing the communication of scholarly research. *International digital library perspectives*, 31: 163-195.

Martinko, M.J., Henry, J.W. and Zmud, R.W. 1996. An attributional explanation of individual resistance to the introduction of information technologies in the workplace. *Behaviour and Information Technology,* 15: 313-330.

Mashroofa, M.M. and Seneviratne, W. 2016. Open access initiatives and institutional repositories Sri Lankan scenario. *Annals of Library and Information Studies*, 63: 182-193.

Matizirofa, L. and Zaaiman, R. 2011. UJ's Open Access policy development and implementation. Berlin 10 Open Access Conference. 6-8 November. Stellenbosch, South Africa. Available at: http://hdl.handle.net/10210/10471 Accessed 24 April 2017.

Mercer, H. 2011. Almost halfway there: an analysis of the open access behaviours of academic librarians. *College and Research Libraries*, 72: 443-453.

Mertens, D.M. 1998. *Research methods in education and psychology: Integrating diversity with quantitative and qualitative approaches*. London: Sage.

Mohammed, A. 2013. Institutional digital repository: an option for scholarly communication in Nigeria. *International Journal of Education and Research*, 1(6): 1-10.

Moodley, T. and Govender, I. 2016. Factors influencing academic use of internet banking services: an empirical study. *African Journal of Science, Technology, Innovation and Development,* 8: 43-51.

Moore, C. 1998. Academic motivation and performance as a function of cognitive factors. *Unpublished Master's thesis,* University of South Africa. Available at: https://core.ac.uk/download/pdf/43174904.pdf Accessed 25 November 2016.

Moore, G.C. and Benbasat, I. 1991. Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, 2(3): 192-222.

Morris, T. 2006. *Social work research methods: four alternative paradigms*. Thousand Oaks, Sage.

Morrison, H. and Waller, A. 2008. Open access and evolving scholarly communication: an overview of library advocacy and commitment, institutional repositories, and publishing in Canada. *College and Research Libraries News*, 69(8): 486-490.

Mouton, J. 2001. *Understanding social research*. Pretoria: van Schaik.

Mubuke, F., Masaba, A.K., Ogenmungu, C. and Kituyi, G.M. 2017. Examining the effect of facilitating conditions as an imperative input in enhancing the intention to use mobile learning systems in universities. *Global Journal of Computers and Technology,* 6(1). Available at: https://www.researchgate.net/profile/Faisal_Mubuke/publication/315487099_Examining_the_Effect_of_Facilitating_Conditions_as_an_imperative_input_in_enhancing_the_intention_to_use_Mobile_Learning_systems_in_Universities/links/58d217a4a6fdcc3fe7852d32/Examining-the-Effect-of-Facilitating-Conditions-as-an-imperative-input-in-enhancing-the-intention-to-use-Mobile-Learning-systems-in-Universities.pdf?origin=publication_detail Accessed 29 December 2016.

Muchaonyerwa, N. 2016. Knowledge sharing strategies in university libraries in KwaZulu-Natal Province of South Africa. *Unpublished PhD thesis,* University of KwaZulu-Natal. Available at:
https://researchspace.ukzn.ac.za/xmlui/bitstream/handle/10413/13085/Muchaonyerwa_Ndakasharwa_2015.pdf?sequence=1andisAllowed=y Accessed 17 October 2017.

Mugwisi, T. 2013. The information needs and challenges of agricultural researchers and extension workers in Zimbabwe. *Unpublished PhD thesis,* University of Zululand.

Munge, E., Kimile, N. and Nasieku, P. 2012. Developing an institutional repository at Moi University library: challenges and opportunities. *Journal of Gender, Information and Development in Africa (JGIDA)*, 1: 75-93. Available at:
https://journals.co.za/docserver/fulltext/aa_jgida/1/1/aa_jgida_v1_n1_a6.pdf?expires=1548750093andid=idandaccname=58014andchecksum=DB087E29F41E75F09C53250D0816FFD3 Accessed 17 June 2017.

Mutsvunguma, G. 2013. Predictors of users' preferences for digital Information at the Oceanographic Research Institute (ORI) library, Durban. *Unpublished Master's thesis,* University of KwaZulu-Natal. Available at:
https://researchspace.ukzn.ac.za/xmlui/bitstream/handle/10413/10560/Mutsvunguma_Grace_2013.pdf?sequence=1andisAllowed=y Accessed 6 September 2016.

Mutwiri, C. 2014. Challenges facing academic staff in adopting open access outlets for disseminating research findings in selected university libraries in Kenya. *Unpublished PhD thesis,* Kenyatta University. Available at:
http://ir-library.ku.ac.ke/bitstream/handle/123456789/11893/Challenges%20facing%20academic%20staff%20in%20adopting%20open%20access%20outlets%20for%20disseminating%20research%20findings%20in%20selected%20university%20libraries%20in%20kenya.pdf?sequence=1andisAllowed=y Accessed 5 April 2016.

Nagra, K.A. 2013. Building institutional repositories in the academic libraries. *Medical Reference Services Quarterly*, 36: 280-291.

Nandez, G. and Borrego, A. 2013. Use of social networks for academic purposes: a case study. *The Electronic Library*, 31: 781-791.

Narayan, B. and Luca, E. 2017. Issues and challenges in researchers' adoption of open access and institutional repositories: a contextual study of a university repository. *Information Research,* 22. Available at:
http://www.informationr.net/ir/22-4/rails/rails1608.html Accessed 27 November 2018.

Nassuora, A.B., 2012. Students acceptance of mobile learning for higher education in Saudi Arabia. *American Academic and Scholarly Research Journal*, 4(2): 1. Available at: http://www.naturalspublishing.com/files/published/57755yw5wvd3xw.pdf Accessed 23 September 2016.

National Research Foundation (NRF). 2015. Available at: https://www.nrf.ac.za/ Accessed 24 April 2017.

Neuman, W.L. 2000. *Social research methods: qualitative and quantitative approaches*. 4th ed. Boston: Allyn and Bacon.

Neuman, W.L. 2006. *Social research methods: qualitative and quantitative approaches*. 6th ed. Boston: Pearson.

Neuman, W.L. 2011. *Social research methods: qualitative and quantitative approaches*. 7th ed. Boston: Pearson.

Ngulube, P. 2010. Mapping mixed methods research in library and information science journals in Sub-Saharan Africa 2004-2008. *The International Information and Library Review,* 42: 252-261.

Ngulube, P., Mathipa, E.R. and Gumbo, M.T. 2015. Theoretical and conceptual framework in the social sciences. In E.R. Mathipa and M.T. Gumbo, eds. *Addressing research challenges: making headway in developing researchers.* Johannesburg: Mosala-MASEDI Publishers. pp. 43-66.

Nguyen, M.N., Potvin, L. and Otis, J. 1997. Regular exercise in 30- to 60-year-old men: Combining the stages-of-change model and the theory of planned behaviour to identify determinants for targeting heart health interventions. *Journal of Community Health*, 22: 233-246.

Nilsen, P. 2015. Making sense of implementation theories, models and frameworks. *Implementation Science*, 10(53). Available at: https://implementationscience.biomedcentral.com/track/pdf/10.1186/s13012-015-0242-0 Accessed 17 November 2017.

Nolan, A., Macfarlane, K. and Cartmel, J. 2013. *Research in early childhood*. Thousand Oaks: Sage.

Nuq, A. and Aubert, B. 2013. Towards a better understanding of the intention to use ehealth services by medical professionals. the case of developing countries. *International Journal of Health Care Management,* 6(4): 1-12.

Obuh, A.O. and Bozimo, D.O. 2012. Awareness and use of open access scholarly publications by LIS lecturers in Southern Nigeria. *International journal of library science*, 1: 54-60.

Okemwa, O. 2016. Open Access, Scholarly Publishing and Knowledge Production in Sub-Saharan Africa: Opportunities and Challenges. Paper presented at the Fourth CODESRIA Conference on electronic publishing held in Dakar, Senegal, March 30 to April 1. Available at: http://www.codesria.org/spip.php?article2564 Accessed 3 February 2017.

Okendo, E.O. and Mligite, E.E.E. 2014. Assessment of levels of open access awareness and its usage in relation to scholarly communication in Tanzanian universities. *International Journal of Community and Cooperative Studies*, 1. Available at: http://www.eajournals.org/wp-content/uploads/Assessment-of-Levels-of-Open-Access-Awareness-and-Its-Usage-In-Relation-To-Scholarly-Communication-in-Tanzanian-Universities.pdf Accessed 19 September 2017.

Okhakhu, O.D. 2015. Librarians' Perception of Lecturers' Awareness as a Factor Influencing the Development of Institutional Repository in Public Universities in South-West Nigeria. Available at: http://dx.doi.org/10.2139/ssrn.2659199 Accessed 2 May 2017.

Onyancha, O.B. 2016. Open research data in Sub-Saharan Africa: a bibliometric study using the data citation index. Paper presented at the Fourth CODESRIA Conference on electronic publishing held in Dakar, Senegal, March 30 to April 1. Available at: http://www.codesria.org/spip.php?article2564 Accessed 7 February 2017.

Onwuegbuzie, A.J. and Combs, J.P. 2011. Data analysis in mixed research: a primer. *International Journal of Education*, 3(1): 13.

Ooko, M.A. 2016. The adoption of technology to support teaching and learning in a distance learning programme at Africa Nazarene university. *Unpublished PhD thesis*, University of South Africa. Available at: http://uir.unisa.ac.za/bitstream/handle/10500/20687/thesis_ooko_ma.pdf?sequence=1&isAllowed=y Accessed 19 October 2016.

Open Access 2020. 2017. OA2020: mission. Available at: https://oa2020.org/ Accessed 16 September 2017.

Owolabi, K.A. 2016. Access and use of clinical informatics among medical doctors in selected teaching hospitals in Nigeria and South Africa. *Unpublished PhD thesis*, University of Zululand.

Oye, N.D., Iahad, N.A. and Rahim, N.A., 2014. The history of UTAUT model and its impact on ICT acceptance and usage by academicians. *Education and Information Technologies*, 19(1): 251-270.

Palmer L.A. 2014. Cultivating scholarship: the role of institutional repositories in health sciences libraries. *Against the Grain,* 26(2): 24-28.

Pansiri, J. 2005. Pragmatism: a methodological approach to researching strategic alliances in tourism. *Tourism and Hospitality Planning and Development*, 2: 191-206.

Parliament of South Africa. 2000. Promotion of Access to Information Act ("PAIA"), No 2. Available at: http://www.justice.gov.za/legislation/acts/2000-002.pdf Accessed 2 May 2017.

Pearce, D.G. 2012. *Frameworks for tourism research*. Wallingford, Oxfordshire: CAB International.

Peters, D.A. 2011. Open access to scientific data: why researchers are reluctant to share. Paper presented at the UKZN Open Access week, 24 - 28 October. Available at: http://researchspace.ukzn.ac.za/handle/10413/7307 Accessed 19 July 2016.

Picarra, M. and Swan, A. 2015. Monitoring compliance with open access policies. Briefing paper. Available at: http://pasteur4oa.eu/sites/pasteur4oa/files/resource/Brief_Monitoring%20compliance%20with%20OA%20policies_0.pdf. Accessed 12 November 2018.

Pickard, A. J. 2007. *Research methods in information*. London: Facet Publishing.

Pinfield, S., Salter, J., Bath, P.A., Hubbard, B., Millington, P., Anders, J. and Hussain, A. 2014. Open-access repositories worldwide, 2005–2012: past growth, current characteristics, and future possibilities. *Journal of the Association for Information Science and Technology*, 65: 2404-242.

Polit, D.F. and Beck, C.T. 2004. *Nursing research: principles and methods*. Philadelphia: Lippincott Williams and Wilkins.

Polit, D.F. and Hungler, B.P. 1999. *Nursing research: principles and methods*. 6th ed. Philadelphia: Lippincott.

Ponterotto, J.G. 2005. Qualitative research in counseling psychology: a primer on research paradigms and philosophy of science. *Journal of Counseling Psychology*, 52: 126-136.

Pyrounakis, G. and Nikolaidou, M. 2009. Comparing open source digital library software. In Y-L. Theng, S. Foo, D. Goh and J-C. Na, eds. *Handbook of research on digital libraries: Design, development, and impact.* Hershey, Pennsylvania: IGI Global. pp. 51-60.

Rahman, A.L.A., Jamaludin, A. and Mahmud, Z. 2011. Intention to use digital library based on modified UTAUT model: Perspectives of Malaysian postgraduate students. *International Journal of Social, Behavioural, Educational, Economic, Business and Industrial Engineering*, 5(3): 270-276.

Raju, R., Raju, J. and Claassen, J. 2015. Open scholarship practices reshaping South Africa's scholarly publishing roadmap. *Publications,* 3: 263-284.

Raju, R., Smith, I., Gibson, H. and Talliard, P., 2012. Open access: are we there yet? The case of Stellenbosch University, South Africa. *South African journal of libraries and information science*, *80*(2).

Ramsey, E. 2014. Increasing faculty awareness of open access in 5 minutes or less. Available at: http://libra.virginia.edu/catalog/libra-oa:7360 Accessed 12 August 2017.

Ranking of Web Universities. 2017. Ranking of Web Universities. Available at: http://webometrics.info/en/Africa/South%20Africa Accessed 22 May 2017

Ranking Web of Repositories. 2017. Ranking Web of Repositories. Available at: http://repositories.webometrics.info/en/Africa/South%20Africa Accessed 9 March 2017

Rashotte, L. 2010. Social influence. In G. Ritzer and J.M. Ryan, eds. *The Concise Encyclopaedia of Sociology*. Hoboken, New Jersey: Wiley. pp. 1-2.

Ratanya, F.C. 2017. Institutional repository: access and use by academic staff at Egerton University, Kenya. *Library Management,* 38: 276-284.

Rawstorne, P., Jayasuriya, R. and Caputi, P. 2000. Issues in predicting and explaining usage behaviours with the technology acceptance model and the theory of planned behaviour when usage is mandatory. Paper presented at the twenty first International Conference on Information Systems in Brisbane, Queensland, Australia. 10 - 13 December. Available at: https://aisel.aisnet.org/cgi/viewcontent.cgi?referer=http://www.google.co.za/url?sa=tandrct=j andq=andesrc=sandsource=webandcd=2andved=2ahUKEwjL3vWWgPPfAhXQdN8KHQx3 BokQFjABegQIARABandurl=http%3A%2F%2Faisel.aisnet.org%2Fcgi%2Fviewcontent.cgi %3Farticle%3D1098%26context%3Dicis2000andusg=AOvVaw136PHfwsDTGkjUrIhX5ka mandhttpsredir=1andarticle=1098andcontext=icis2000 Accessed 29 December 2017.

Reeves, B. and Nass, C. 1996. *The media equation: how people treat computers, television, and mew media like real people and places*. Cambridge: University Press.

Registry of Open Access Repository Mandates and Policies (ROARMAP). 2018. Registry of Open Access Repository Mandates and Policies. Available at: http://roarmap.eprints.org/ Accessed 8 November 2018

Rocker, C. 2010. Why traditional technology acceptance models won't work for future information technologies. *World Academy of Science, Engineering and Technology*, 65, 237-243.

Rockinson-Szapkiw, A.J. and Spaulding, L.S. 2014. *Navigating the doctoral journey: a handbook of strategies for success*. Lanham, MD: Rowman and Littlefield Publishers.

Rodriguez, A. 2017. Collaboration in scholarly communication: opportunities to normalize open access. *College and Research Libraries News,* 78: 270-273.

Rogers, E.M. 1995. *Diffusion of innovations*. 4th ed. New York: Free Press.

Rowlands, I. and Nicholas, D. 2005. Scholarly communication in the digital environment: the 2005 survey of journal author behaviour and attitudes. *Aslib proceedings: New information perspectives,* 57(6): 481-497.

Rugut, V.C. 2015. Adoption of open access initiatives in dissemination of scholarly research by academic staff at selected universities in Kenya. *Unpublished Master's thesis*, University of Nairobi, Kenya. Available at: http://erepository.uonbi.ac.ke/bitstream/handle/11295/94709/Rugut_Adoption%20of%20open%20access%20initiatives%20in%20dissemination%20of%20scholarly%20research%20by%20academic%20staff%20at%20selected%20universities%20in%20Kenya%20.pdf?sequence=1 Accessed 2 September 2016.

Salo, D. 2008. Innkeeper at the Roach Motel. *Library Trends*, 57. Available at: https://minds.wisconsin.edu/bitstream/handle/1793/22088/Salo_Final.pdf?sequence=6 Accessed 7 August 2018.

Samaradiwakara, G. and Gunawardena, C. 2014. Comparison of existing technology acceptance theories and models to suggest a well improved theory/model. *International Technical Sciences Journal*, 1(1): 21-36.

Saravanavel, P. 1991. *Research methodology*. 3rd ed. New Delhi: Kitab Mahal.

Saunders, M., Lewis, P. and Thornhill, A. 2000. *Research methods for business students*. Harlow: Prentice Hall.

Scholarly Publishing and Academic Resources Coalition (SPARC). 2016. Access Reuse Addendum. Available at: https://sparcopen.org/wp-content/uploads/2016/01/Access-Reuse_Addendum.pdf Accessed 8 May 2017.

Scholarly Publishing and Academic Resources Coalition (SPARC). 2017. International Open Access Week 2017. Available at: https://sparcopen.org/news/2017/theme-2017-international-open-access-week-open-order/ Accessed 16 August 2017.

Scholarly Publishing and Academic Resources Coalition (SPARC). 2017. EU Statement on making all research open by 2020. Available at: https://sparcopen.org/ Accessed 7 December 2017.

Schöpfel, J. 2015. Open access – the rise and fall of a community-driven model of scientific communication. *Learned Publishing*, 28: 321-325.

Sejane, F. 2017. Access to and use of electronic information resources in the academic libraries of the Lesotho Library Consortium. *Unpublished PhD thesis*, University of KwaZulu-Natal. Available at:
https://researchspace.ukzn.ac.za/xmlui/bitstream/handle/10413/14345/Sejane_Lefuma_2017.pdf?sequence=1andisAllowed=y Accessed 29 March 2017.

Sekaran, U. 2000. *Research methods for business: a skill-building approach*. New York: Wiley.

Serrano-Vicente, R., Melero, R. and Abadal, E. 2016. Open access awareness and perceptions in an institutional landscape. *Journal of Academic Librarianship*, 42: 595-603.

Sevilla, C.G. 1992. *Research Methods*. Manilla: Rex Book Store.

Sharifian, R. Asakarian, F, Nematolahi, M. and Farhadi, P. 2014. Factors influencing nurses' acceptance of hospital information in Iran: application of the unified theory of acceptance and use of technology. *Health Information Management Journal,* 43(2): 23-28.

Sharma, R. and Mishra, R. 2015. A review of evolution of theories and models of technology adoption. *Indore Management Journal*, 6(2): 17-29.

Shearer, K. 2004. Institutional repositories: towards the identification of critical success factors. Available at:
https://prism.ucalgary.ca/bitstream/handle/1880/43357/CAIS-IR.pdf?sequence=6andisAllowed=y Accessed 15 May 2017.

Shearer, K. 2015. Promoting open knowledge and open science: report of the current state of repositories. Available at:
 https://www.coar-repositories.org/files/COAR-State-of-Repositories-May-2015-final.pdf
Accessed 8 September 2017.

Shearer, K., Haigh, S. and Whitehead, M. 2015. Supporting Canadian innovation through shared expertise and stewardship of research data. Paper presented on the 81st IFLA General Conference and Assembly held in Cape Town, South Africa, 15-21 August 2015. Available at: http://library.ifla.org/1263/1/198-shearer-en.pdf Accessed 2 January 2017.

Sheeran, P. and Orbell, S. 1999. Augmenting the predictive validity of the theory of planned behaviour: a field experiment. *British Journal of Social Psychology*, 37: 111-128.

Sheeran, P., Conner, M. and Norman, P. 2001. Can the theory of planned behaviour explain patterns of health behaviour change? *Health Psychology*, 20(1): 12.

SHERPA/RoMEO. 2018. Publisher copyright policies and self-archiving. Available at: http://www.sherpa.ac.uk/romeo/statistics.php Accessed 17 November 2018.

Shroff, R.H., Deneen, C.C. and Ng, E.M.W. 2011. Analysis of the technology acceptance model in examining students' behavioural intention to use an e-portfolio system. *Australian Journal of Educational Technology*, 24(4): 600-618.

Silva, P.M. and Dias, G.A. 2007. Theories about technology acceptance: why the users accept or reject the information technology? *Brazilian Journal of Information Science*, 1(2): 69-86.

Singeh, F.W., Abrizah, A. and Karim, N.H.A. 2013. What inhibits authors to self-archive in open access repositories?: a Malaysian case. *Information Development*, 29(1): 24-35.

Snead, K.C., Magal, S.R., Christensen, L.F. and Ndede-Amadi, A.A. 2015. Attribution theory: a theoretical framework for understanding information systems success. *Systemic Practice and Action Research*, 28(3): 273-288.

Snow, C.C. and Thomas, J.B. 1994. Field research methods in strategic management: contributions to theory building and testing. *Journal of Management Studies*, 31(4): 457-480.

Srite, M. and Karahanna, E. 2006. The role of espoused national cultural values in technology acceptance. *MIS Quarterly*, 30(3): 679-704.

Standing, C., Guilfoyle, A., Lin, C. and Love, P. 2006. The attribution of success and failure in IT projects. *Industrial Management and Data Systems*, *106*(8): 1148-1165.

Steckler, A., McLeroy, K.R., Goodman, R.M., Bird, S.T. and McCormick, L. 1992. Toward integrating qualitative and quantitative methods: an introduction. *Health Education Quarterly*, 19(1): 1-8.

Stellenbosch University. 2010. Policy in respect of the commercial exploitation of intellectual property. Available at: http://www.innovus.co.za/media/forms2010/101205%20Final%20IP%20Policy.pdf Accessed 27 November 2018.

Stellenbosch University. 2018. SUNscholar Research repository. Available at: https://scholar.sun.ac.za/browse?type=type Accessed 13 November 2018.

Sterman, L. 2014. Institutional repositories: an analysis of trends and a proposed collaborative future. *College and Undergraduate Libraries*, 21: 360-376.

Stilwell, C. 2000. Venturing into academic journal publishing: some issues and guidelines. *African Journal of Library, Archives and Information Science*, 10(2): 167-175.

Street, A.F. 1992. *Inside nursing: a critical ethnography of clinical nursing practice*. New York: University Press.

Stufflebeam, D., Madaus, G. and Kellaghan, T. 2000. *Evaluation models*. 2nd ed. Boston: Kluwer Academic.

Suber, P. 2003. Bethesda Statement on Open Access Publishing. Available at: https://legacy.earlham.edu/~peters/fos/bethesda.htm Accessed 8 July 2017.

Suber, P. 2008. Science Dissemination using Open Access: A compendium of selected literature on Open Access. Available at: http://eprints.rclis.org/13650/1/SciDissOpenAccess.pdf Accessed 13 May 2017.

Suber, P. 2009. Timeline of the Open Access Movement. Available at: https://legacy.earlham.edu/~peters/fos/timeline.htm Accessed on 28 July 2017.

Suber, P. 2012. *Open access*. Cambridge: MIT Press. Available at: http://www.academia.edu/8535597/Suber_Peter_OPEN_ACCESS_2012_ Accessed 11 October 2017.

Sumak, B. Polancic, G. and Hericko, M. 2010. An empirical study of virtual learning environment adoption using UTAUT. In *Proceedings of 2010 Second International Conference on Mobile, Hybrid, and On-Line Learning.* Available at: https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=5430017 Accessed 9 July 2018.

Sun, H. and Zhang, P. 2006. The role of moderating factors in user technology acceptance. *International Journal of Human Computer Studies*, 64(2): 53–78.

Suryaningrum, D.H. 2012. Assessing individual performance on information technology adoption: A new model. *Global Journal of Business Research,* 6(4): 111.

Swan, A. and Brown, S. 2005. Open access self-archiving: an author study. Available at: http://www.keyperspectives.co.uk/OpenAccessArchive/2005_Open_Access_Report.pdf Accessed 16 November 2016.

Swan, A., Willmers, M. and King, T. 2014. Opening access to Southern African research: recommendations for university managers. *Scholarly Communication in Africa Programme (SCAP) brief 4*. Available at: https://open.uct.ac.za/bitstream/handle/11427/2313/SCAP_Swan_OpeningAccess_2014.pdf?sequence=1 Accessed 30 April 2017.

Sykes, T.A., Venkatesh, V. and Gosain, S. 2009. Model of acceptance with peer support: A social network perspective to understand employees' system use. *MIS Quarterly*, 33(2): 371-393.

Taiwo, A.A. and Downe, A.G. 2013. The theory of User Acceptance and Use of Technology (UTAUT): A Meta-Analytic Review of Empirical Findings. *Journal of Theoretical and Applied Information Technology*. (49:1): 48-58.

Tan, M. and Teo, T.S. 2000. Factors influencing the adoption of Internet banking. *Journal of the Association for information Systems*, 1(1): 5.

Tan, P. 2013. Applying the UTAUT to understand factors affecting the use of English e-learning websites in Taiwan. SAGE Open. Available at: https://journals.sagepub.com/doi/pdf/10.1177/2158244013503837 Accessed 9 May 2018.

Tapfuma. M.M. 2016. Utilisation of open access institutional repositories in Zimbabwe's public universities. *Unpublished PhD thesis,* University of KwaZulu-Natal. Available at: https://researchspace.ukzn.ac.za/bitstream/handle/10413/14893/Tapfuma_Mass_Masona_2016.pdf?sequence=1andisAllowed=y Accessed 3 February 2017.

Tashakkori, A. and Teddlie, C. 1998. *Mixed methodology: combining qualitative and quantitative approaches.* Thousand Oaks: Sage.

Tashakkori, A. and Teddlie, C. 2003. *Handbook of mixed methods in social and behavioural research.* Thousand Oaks: Sage.

Tate, D. 2015. Open access and research assessment: dealing with UK open access requirements in practice. In B.S.A.M. Dobreva, ed. *New Avenues for Electronic Publishing in the Age of Infinite Collections and Citizen Science*. Available at: https://pdfs.semanticscholar.org/2301/77ecdff15364390f955f8443fd7a8a39f236.pdf Accessed 8 August 2018.

Taylor, S. and Todd, P.A. 1995. Understanding information technology usage: a test of competing models. *Information Systems Research*, 6: 144-176.

Teddlie, C. and Tashakkori, A. 2009. *Foundations of mixed methods research: integrating quantitative and qualitative approaches in the social and behavioral sciences*. Thousand Oaks: Sage.

Ten Kate, S., Haverkamp, S., Mahmood, F. and Feldberg, F. 2010. Social network influences on technology acceptance: a matter of tie strength, centrality and density. In: *Bled eConference* p. 40. Available at:
https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1001andcontext=bled2010 Accessed 27 November 2018.

Thatcher, J., Zimmer, J., Gundlach, M. and McKnight, D. 2008. Internal and external dimensions of computer self-efficacy: an empirical examination. *IEEE Transactions on Engineering Management*, *55*(4): 628-644.

Thomas, P.Y. 2010. Towards developing a web-based blended learning environment at the University of Botswana. *Unpublished PhD thesis,* University of South Africa. Available at: http://uir.unisa.ac.za/handle/10500/4245 Accessed 3 February 2018.

Thomas, T.D., Singh, L. and Gaffar, K. 2013. The utility of the UTAUT model in explaining mobile learning adoption in higher education in Guyana. *International Journal of Education and Development using Information and Communication Technology*, 9(3): 71.

Thompson, R.L., Higgins, C.A. and Howell, J.M. 1991. Personal Computing: toward a conceptual model of utilisation. *MIS Quarterly*, 15(1): 125-143.

Tibenderana, P.K. and Ogao, P.J. 2008. Acceptance and use of electronic library services in Ugandan Universities". In *Proceedings of the 8th ACM/IEEE-CS joint conference on Digital libraries, Pittsburgh*, pp. 323-332.

Tkacikova, D. 2009. Open access institutional repository and the role of academic library staff: reconsidering the position of the academic library in preserving and disseminating university's scholarly output. Paper presented on the 16th International Seminar on Institutional Online Repositories and Open Access held in Tepla Monastery, Czech Republic, 7-11 June. Available at:
https://knihovna.zcu.cz/export/sites/knihovna/open-access/dokumenty/Caslin09.pdf
Accessed 8 July 2016.

Tramboo, S., Humma, T., Shafi, S.M. and Gul, S. 2012. A study on the open source digital library software's: special reference to DSpace, EPrints and Greenstone. *International Journal of Computer Applications*, 59. Available at:
https://arxiv.org/ftp/arxiv/papers/1212/1212.4935.pdf Accessed 17 June 2017.

Ubogu, F. 2009. IR and OA initiatives in Africa. A paper presented at the First International Conference on African Digital Libraries and Archives (ICADLA 1) held in Addis Ababa, Ethiopia. 1 – 3 July 2009. Available at:
http://wiredspace.wits.ac.za/bitstream/handle/10539/8949/34%20Ubogu%20%5bslide%20show%5d.pdf?sequence=1andisAllowed=y
Accessed 7 March 2017.

Ukwoma, S.C. and Okafor, V.N. 2017. Institutional repository in Nigerian universities: trends and development. *Library Collections Acquisitions and Technical Services*, 40, 46-57.

Umar, K. and Das, A.K. 2015. Introduction to Open Access 1. United Nations Educational, Scientific and Cultural Organization. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000231920 Accessed 13 July 2017.

United Nations. 1967. World Intellectual Property Organization (WIPO). Available at: https://www.wipo.int/portal/en/index.html Accessed 25 November 2017.

University of KwaZulu-Natal. 2007. Library Newsletter (8). Available at: http://library.ukzn.ac.za/pdfs/8%20Aug2007.pdf   Accessed 17 February 2017.

University of KwaZulu-Natal. 2008. Library Newsletter (10). Available at: http://library.ukzn.ac.za/pdfs/June2008.pdf   Accessed 17 February 2017.

University of KwaZulu-Natal. 2009. Annual Research Report. Available at: https://www.ukzn.ac.za/wp-content/miscFiles/publications/ResearchReport2008-2009.pdf Accessed 6 May 2017.

University of KwaZulu-Natal. 2009. Library Annual Review. Available at: http://library.ukzn.ac.za/Libraries/Annual_Reports/Annual_review_2009.sflb.ashx Accessed 18 March 2017.

University of KwaZulu-Natal. 2010. Annual Research Report. Available at: http://library.ukzn.ac.za/libraries/annual_reports/annual_review_2011.sflb.ashxUniversity of Accessed 9 April 2017.

University of KwaZulu-Natal. 2010. Intellectual Property Policy. Available at: http://research.ukzn.ac.za/IntellectualPropertyTechnologyTransfer.aspx Accessed 18 October 2018.

University of KwaZulu-Natal. 2010. Library Annual Review. Available at: http://library.ukzn.ac.za/Libraries/Annual_Reports/Annual_Review_2010.sflb.ashx Accessed 18 March 2017.

University of KwaZulu-Natal. 2010. News: ResearchSpace goes to senate. Available at: http://library.ukzn.ac.za/news/10-11-09/ResearchSpace_goes_to_Senate.aspx   Accessed 19 May 2017.

University of KwaZulu-Natal. 2011. Annual Research Report. Available at: http://library.ukzn.ac.za/libraries/annual_reports/annual_review_2011.sflb.ashx Accessed 9 April 2017.

University of KwaZulu-Natal. 2011. Library Annual Review. Available at:
http://library.ukzn.ac.za/libraries/annual_reports/annual_review_2011.sflb.ashx
Accessed 16 March 2017.

University of KwaZulu-Natal. 2011. Library News: new digital manager. Available at:
http://library.ukzn.ac.za/news/11-10-06/New_Digital_Manager.aspx Accessed 9 April 2017.

University of KwaZulu-Natal. 2011. Library News: UKZN receives certificate at Berlin10
Open Access Conference 2012. Available at:
http://library.ukzn.ac.za/news/12-11-
22/UKZN_receives_certificate_at_Berlin10_Open_Access_Conference.aspx
Accessed 10 April 2017.

University of KwaZulu-Natal. 2011. Library News: Where has ResearchSpace gone? Available
at: http://library.ukzn.ac.za/news/11-06-01/Where_has_ResearchSpace_gone.aspx
Accessed 9 April 2017.

University of KwaZulu-Natal. 2012. Library Annual Review. Available at:
http://library.ukzn.ac.za/Libraries/Annual_Reports/Annual_Review_2012.sflb.ashx
Accessed 18 March 2017.

University of KwaZulu-Natal. 2013. Library Annual Review. Available at:
http://library.ukzn.ac.za/Libraries/Annual_Reports/Annual_review_2013.sflb.ashx
Accessed 18 March 2017.

University of KwaZulu-Natal. 2015. Annual Research Report. Available at:
https://www.ukzn.ac.za/wp-content/miscFiles/publications/AnnualReport2015.pdf
Accessed 6 May 2017.

University of KwaZulu-Natal. 2016. Annual Research Report. Available at:
https://www.ukzn.ac.za/wp-content/uploads/2017/12/ResearchRep2016.pdf
Accessed 6 May 2017.

University of KwaZulu-Natal. 2018. College handbooks. Available at:
http://saa.ukzn.ac.za/Forms_proce/Handbooks.aspx Accessed 17 July 2018.

University of KwaZulu-Natal. 2018. ResearchSpace. Available at:
https://researchspace.ukzn.ac.za/ Accessed 12 September 2018.

University of Pretoria. 2011. Intellectual Property Policy. Available at:
https://www.up.ac.za/media/shared/538/ZP_Files/up-policy-on-intellectual-
property.zp68649.pdf Accessed 27 November 2018.

University of Pretoria. 2009. Open access mandate. Available at: http://www.library.up.ac.za/openup/docs/UPmandateAfrica.pdf Accessed 14 October 2018.

University of Pretoria. 2018. UPSpace Institutional Repository. Available at: https://repository.up.ac.za/browse?type=type Accessed 13 October 2018

van der Graaf, M. 2009. *The European repository landscape 2008: Inventory of digital repositories for research output*. Amsterdam: University Press.

van der Westhuizen, A. 2012. UNISA Institutional Repository: sharing knowledge to advance research. Available at: http://uir.unisa.ac.za/handle/10500/18728?show=full Accessed 24 April 2017.

van Westrienen, G. and Lynch, C.A. 2005. Academic institutional repositories deployment status in 13 nations as of mid-2005. *D-Lib Magazine*, 11: 1-14. Available at: http://www.dlib.org/dlib/september05/westrienen/09westrienen.html Accessed 16 February 2016.

Van Wyk, B. and Mostert, J. 2014. African institutional repositories as contributors to global information: a South African case study. *Mousaion*, 32(1): 98-114.

Venkatesh, V. and Davis, F. D. 2000. A theoretical extension of technology acceptance model: four longitudinal field studies. *Management Science*, 46: 186-204.

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. 2003. User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3): 425-478.

Venkatesh, V., Speier, C. and Morris, M.G. 2002. User acceptance enablers in individual decision making about technology: toward an integrated model. *Decision Sciences,* 33(2): 297-316.

Vincent-Lamarre, P., Boivin, J., Gargouri, Y., Lariviere, V. and Harnad, S., 2016. Estimating open access mandate effectiveness: the MELIBEA score. *Journal of the Association for Information Science and Technology,* 67(11): 2815-2828.

Vos, A. 2015. Creating an institutional repository (IR) in Greece: need for information systems strategy. *Unpublished Master's thesis,* Linnaeus University, Sweden. Available at: http://www.diva-portal.org/smash/get/diva2:882177/FULLTEXT01.pdf Accessed 30 October 2017.

Vosloo, J.J. 2014. A sport management programme for educator training in accordance with the diverse needs of South African schools. *Unpublished PhD thesis,* North West University. Available at: https://repository.nwu.ac.za/handle/10394/12269 Accessed 16 March 2018.

Wang, W. and Benbasat, I. 2008. Attributions of trust in decision support technologies: a study of recommendation agents for e-commerce. *Journal of Management Information Systems*, 24(4): 249-273.

Ward, R. 2013. The application of technology acceptance and diffusion of innovation models in healthcare informatics. *Health Policy and Technology*, 2(4): 222-228.

Ware, M. and Mabe, M. 2015. *The STM Report: An overview of scientific and scholarly journal publishing*. 4th ed. The Hague: International Association of Scientific, Technical and Medical Publishers. Available at: https://www.stm-assoc.org/2015_02_20_STM_Report_2015.pdf Accessed 15 September 2017.

Web of Science. 2018. Web of Sceince. Available at: http://apps.webofknowledge.com/WOS_GeneralSearch_input.do?product=WOSandsearch_mode=GeneralSearchandSID=F3MkcfTwoA2bb71DRnNandpreferencesSaved= Accessed on 9 May 2018.

Weber, R.P. 1990. *Basic content analysis*. 2nd ed. Thousand Oaks: Sage.

Welman, C., Kruger, F. and Mitchel, B. 2005. *Research methodology*. 3rd ed. Cape Town: Oxford University Press.

Westell, M. 2006. Institutional repositories: proposed indicators of success. *Library Hi Tech*, 24: 211-226.

Williams, M.D., Rana, N.P. and Dwivedi, K.Y. 2015. The unified theory of acceptance and use of technology (UTAUT): a literature review. *Journal of Enterprise Information Management,* 28(3): 443 - 488.

Willinsky, J. 2006. *The access principle: the case for open access to research and scholarship*. Cambridge, Mass.: MIT Press.

Wisker, G. 2008. *The postgraduate research handbook*. 2nd ed. Bassingstoke, Hampshire: Palgrave Macmillan.

Wu, Y., Tao, Y. and Yang, P. 2000. Using UTAUT to explore the behavior of 3G mobile communication users. In *Proceedings of the International Conference on Industrial Engineering and Engineering Management (IEEM)*. Available at: https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=andarnumber=4419179 Accessed 12 May 2018.

Xia, J. 2013. The open access divide. *Publications*, 1: 113-139.

Xu, H. 2015. Factors affecting faculty use of learning object repositories. *The Electronic Library*, 33: 1065-1078.

Yang, Z. and Li, Y. 2015. University faculty awareness and attitudes towards open access publishing and the institutional repository: a case study. *Journal of Librarianship and Scholarly Communication*, 3. Available at: https://jlsc-pub.org/articles/abstract/10.7710/2162-3309.1210/ Accessed 9 August 2017.

Yeates, R. 2003. Institutional repositories. *Vine*, 33(2): 96-101.

Yin, R.K. 2003. *Case study research: design and methods*. 1st ed. Thousand Oaks: Sage.

Yin, R.K. 2014. *Case study research: design and methods*. Thousand Oaks: Sage.

Zhang, H., Boock, M. and Wirth, A. 2015. It takes more than a mandate: factors that contribute to increased rates of article deposit to an institutional repository. *Journal of Librarianship and Scholarly Communication*, 3: 1-30.

Zhong, J. and Jiang, S.Y. 2016. Institutional repositories in Chinese open access development: status, progress, and challenges. *Journal of Academic Librarianship*, 42: 739-744.

Zhu, Y.M. 2017. Who support open access publishing? gender, discipline, seniority and other factors associated with academics' OA practice. *Scientometrics*, 111: 557-579.

Zuiderwijk, A., Janssen, M. and Dwivedi, Y.K. 2015. Acceptance and use predictors of open data technologies: Drawing upon the unified theory of acceptance and use of technology. *Government information quarterly*, 32(4): 429-440.

Title of the study: Institutional repositories as platforms for open access in South African universities: the case of University of KwaZulu-Natal.

Universities across the globe are investing in the development of open access institutional repositories where published and unpublished research literature produced by academics and students of an institution is archived online as full-text documents. These documents are accessible to anyone anywhere as long they have internet connections. Through IRs, research literature has become more visible to the global community. Access to scholarship has been a challenge under the business publishing and subscription models, especially for universities in developing countries like South Africa. While IRs have shown to improve access to scholarship, acceptance by academics in universities in South Africa has been slow. This study seeks to evaluate the development, adoption and of use of the UKZN's IR. The aim is to examine the current state so that strategies can be proposed that can improve adoption and use of the university's IR.

Instructions: Please respond to the following questions to the best of your ability and as honestly as possible. Tick appropriate boxes/brackets and give details were spaces are provided. Further instructions are given in some questions.

A. Demographic data

1. Gender: Female ( )   Male ( )

2. Age group: 20-30 ( )   31-40 ( )   41-50 ( )   51-60 ( )   61+ ( )

3. Academic qualifications: Masters ( )   PhD ( )   Other (*Please specify*) _____

4. What is your academic rank?
    Senior Professor ( )   Professor ( )   Associate Professor ( )   Senior lecturer ( )

    Lecturer   ( )   Other (*Please specify*) _____

5. What is your discipline? *Please Specify School*
    - College of Agriculture, Engineering and Science
      School..
    - College of Humanities
      School..
    - College of Health Sciences
      School..
    - College of Law and Management Studies
      School..

6. For how long have you been employed as an academic at the UKZN?
    0-5yrs ( )   6-10yrs ( )   11-15yrs ( )   16-20yrs ( )   20+yrs ( )

7. How would you rate yourself regarding Internet usage skills in terms of:-

   7a: Searching and retrieving scholarly information Very good ( ) Good ( ) Average ( )

   Poor ( )

   7b: Disseminating your own scholarly information Very good ( ) Good ( ) Average ( )

   Poor ( )

B. Developments of the institutional repository: Awareness
An institutional repository is an online archive which collects, disseminates and preserves a university's scholarly content, making it available free of charge to anyone as full-text documents. Theses and dissertations, teaching material, peer-reviewed articles, pre-prints, conference papers, monographs, datasets and grey literature is content that can be published on a university's repository.

8. UKZN has an institutional repository. Were you aware of this before this survey?
   YES ( )   NO ( )   (If your answer is NO, go to #11)

9. If Yes, how did you get to know about the IR? (*Tick **ALL** that apply to you*)
   Through social media (e.g. ResearchGate, Academia)   ( )
   Heard about it from my colleague   ( )   From the library   ( )
   Heard about it from publishers'   ( )   Library newsletter   ( )
   During work meetings   ( )   Internet   ( )
   Other *(Please specify)*
   …………………………………………………………………………………………
   ..…………………………………………………………………………………………

10. For what purposes have you used the institutional repository?
    • 11a. deposit your own research?   YES ( )   NO ( )

    • 11b. search for information?   YES ( )   NO ( )

11. Do you have valuable research that has not been published anywhere? Yes ( )   No ( )

12. Have you ever supervised Masters and/or PhD students?   Yes ( )   No ( )

13. What type of content are you willing to share via the university's institutional repository?
    (*Tick **ALL** that apply to you*)
    Research articles   ( )   Book chapters ( )
    Teaching materials   ( )   Reports   ( )
    Conference/workshop papers   ( )   Theses/dissertations   ( )
    Other *(Please specify)*
    ……………………………………..…………………………………………………………
    …………………………………………………………………………………………

14. What type of information would you search for on the institutional repository
    (*Tick **ALL** that apply to you*)
    Research articles   ( )   Book chapters ( )
    Teaching materials   ( )   Reports   ( )

Conference/workshop papers   ( )   Theses/dissertations   ( )
Others (*Please specify*):
……………………………………………………………….......................................
....

15. How do you rate the importance of the university's institutional repository for archiving and

   wider dissemination of research output? (*Tick **ONE** that apply to you*)
   Very important ( )   Important ( )   Unimportant ( )   Least important ( )

16. Would you recommend your students or colleagues to use the institutional repository?
   Yes ( )   (No ( )
   Please explain why…………………………………………………………………
   ………………………………………………………………………………………….

17. What conditions are put in place by the university to ensure that your work is available on the university's institutional repository? (e.g. policies, mandates, etc.)
   Please specify ....……………………………………………………
   ………………………………………………………………………………………..

C. Role of the library
18. Does the library offer any training to bring an awareness to open access publishing and the university's institutional repository? YES ( )   NO ( )

19. If your answer was NO to Question 18, would you be interested in receiving training?
   YES ( )   NO ( )
   Please explain why………….……………………………………………………….
      …………………………………………………………………………………………

20. What sort of help would you expect to receive from the library with regards to archiving of your research in the IR?
   Deposit for me ( )   Inform me about copyright issues   ( )
   Advise me about open access ( )   Inform me when l can self-archive   ( )
   Other. *Please Specify*………………………………………………………………….
   …………………………………………………………………………………………..

21. Do you think the library is the most appropriate department to administer the university's institutional repository? YES ( )   NO   ( )
   Please explain why…..………………………………………………………………………
   …………………………………………………………………………………………………

D. Factors perceived to influence IR use

22. To what extent do you agree or disagree with the following statements about the anticipated outcomes of the institutional repository *(Tick **ONE** box against each statement* – Key: 1 = Strongly Agree; 2 = Agree; 3 = Neutral; 4 = Disagree; 5 = Strongly disagree)

Performance expectancy	1	2	3	4	5
The institutional repository enables academics to publish more quickly (turnaround time from submission to publishing is short)					
Publishing in the university's repository will increase usage of my work					
The institutional repository allows for global access to scholarly literature					
Open access repositories enable researchers to access literature more easily					
Uploading information on the institutional repository will increase visibility of my work					
The repository will enable me to conduct my research more quickly.					

23. To what extent do you agree or disagree with the following statements about the anticipated effort needed to publish in the institutional repository. *(Tick **ONE** box against each statement* – Key: 1 = Strongly Agree; 2 = Agree; 3 = Neutral; 4 = Disagree; 5 = Strongly disagree)

Effort Expectancy	1	2	3	4	5
It will be easy for me to use the IR					
Using the repository will not be difficult for me to learn.					
I would not find using the IR difficult to understand					
It will be simple for me to become good at using the repository					
I would not find navigating the repository needing advanced internet skills					

24. How important are the following factors or conditions in influencing your decision to use the institutional repository? (*Tick **ONE** box against each statement* - Key: 1 = Strongly Agree; 2 = Agree; 3 = Neutral; 4 = Disagree; 5 = Strongly disagree)

Social influence	1	2	3	4	5
I will be motivated if leading researchers in my field are disseminating scholarly information through the institutional repository					
I will be motivated to use the repository if my colleagues are also using it					
I will feel encouraged if l receive help in publishing content on the institutional repository					
I will be motivated to publish in the institutional repository if the university is supportive					

25. To what extent do you agree or disagree with the following statements about the anticipated value of facilitating conditions in developing the institutional repository. (*Tick **ONE** box against each statement* - Key: 1 = Strongly Agree; 2 = Agree; 3 = Neutral; 4 = Disagree; 5 = Strongly disagree)

Facilitating conditions	1	2	3	4	5
I have adequate infrastructure (e.g. computer, internet, power supply) to publish content on the institutional repository					
I have enough time to load content on the repository					
I have enough knowledge to publish content on the repository					
The university rewards me for publishing on the repository					
The library trains us on how to deposit and access information on the repository					
The library is available to deposit my research work on my behalf					
I have adequate knowledge about open access publishing					

E. Attitude towards use of the IR

26. Please indicate the extent to which you agree or disagree with the following statements about your attitudes towards accessing and disseminating scholarly information using the institutional repository. (*Tick **ONE** box against each statement* – Key: 1 = Strongly Agree; 2 = Agree; 3 = Neutral; 4 = Disagree; 5 = Strongly disagree)

Attitude	1	2	3	4	5
Using the institutional repository is a good idea					
It is wise to decide on using the IR					
Using the IR is favourable for me					
Use of the open access institutional repository is easy for me					
It is beneficial for me to use the institutional repository					
I am positive towards using the IR					

F. Challenges of using the IR

27. To what extent do you agree or disagree with the following statements relating to the challenges regarding publishing research on the IR? *(Tick **ONE** box against each statement –* Key: 1 = Strongly Agree; 2 = Agree; 3 = Neutral; 4 = Disagree; 5 = Strongly disagree)

Statement	1	2	3	4	5
I do not have adequate knowledge on OA publishing					
IRs will expose more research to plagiarism					
I publish my work on other online platforms (e.g. personal websites, Subject repositories, ResearchGate, Academia.edu etc.)					
IRs risk reducing the value of peer review process					
Depositing to the IR adds extra workload					
Lack of peer review will undermine my work					

28. Any other challenges? *Please specify*
……………………………………………………………………………………………
……………………………………………………………………………………………

G. Strategies to improve IR use

29. What would motivate you to publish your research work in the institutional repository?
   *(Tick **ALL** that apply to you)*
   If the integrity of my work is upheld ( )
   If I can still publish in journals ( )

241

Protection from plagiarism   ( )
Assurance of long term preservation ( )
Full understanding of open access publishing ( )
If the university incentivise ( )
Other (Please specify)
……………………………….…………………………………………………………………….

30. What would you suggest be done to improve the growth of the university's IR?
    30a. By the university:
……………………………...………………………………………………………………
…………………………………………………………………………………………………

    30b. By the library:
……………………………………………………………………………......................................
....

    30c. By the academics:
……………………………………………………………………………….………………....
....

THANK YOU

For any questions, please feel free to contact me at:
Email: gracemutsvunguma@gmail.com OR
Cell no.: 0845533490

Title of the study: Institutional repositories as platforms for open access in South African universities: the case of University of KwaZulu-Natal.

Institutional repositories (IRs) have presented an opportunity to increase visibility of scholarship and have created a platform for universities to showcase their research output and improve access to scholarly literature. Irrespective of the benefits that the movement has presented, acceptance by academics in universities in South Africa has been slow. This study seeks to evaluate the development, adoption and of use of the UKZN's IR. The aim is to examine the current state so that strategies can be proposed that can improve adoption and use of the university's IR.

Instructions: *Please respond to the following questions to the best of your ability and as honestly as possible.*

Development of the IR

1. What is your general opinion about open access publishing, and particularly self-archiving of scholarly content?
……………………………………………………………………………………………
……………………………………………………………………………………………

2. How do you rate the importance of an IR for complementing library collections and also for wider dissemination of research output?
……………………………………………………………………………………………
…………………………………………………………………………………………….

3. The university's IR was established in 2009. In the last few years, what has the library done to promote the development of the repository, ResearchSpace?
……………………………………………………………………………………………
……………………………………………………………………………………………

4. What material is recommended by the university for publishing in the repository?
……………………………………………………………………………………………
…………………………………………………………………………………………….

5. The visibility of a university's research output on the web is one of the key indicators used to rank universities today. UKZN has produced substantial research and most of it is not available on the online IR. What is your comment on this status?
……………………………………………………………………………………………
…………………………………………………………………………………………….

6. In 2015, the NRF mandated all research funded by them to be deposited in the IR, has this improved deposits on the UKZN IR?
……………………………………………………………………………………………
…………………………………………………………………………………………….

7. Are there university policies or mandates developed to promote open access publishing? If not, how does the library ensure that all qualifying research output is made available for publishing on the IR in good time?

....

....

8. The success of an IR is a result of collective efforts from different university stakeholders (Library, research office, ICT and academics). How would you describe these relationships within the university?

……

……

Role of the library

9. What IR responsibilities are fulfilled by your staff?

……

…….

10. Does the library have adequate resources to support its IR functions?

……

……

11. Has the library staff responsible for IR received training on open access and/or administering of the IR? Explain the nature of training they received.

……

…….

12. How does the library promote open access and self-archiving to academics (ie. educating on OA to bring awareness, copyright issues, conducting OA workshops, putting up OA displays, uploading for academics, celebrating International OA week, etc.)

……

…….

13. How does the library reach out to academics? (ie meetings, workshops, offices, etc)

……

……

Usage by academics

14. What is the responsibility of the academics in self-archiving in the IR?

……

……

15. What is the attitude of the academics towards self-archiving?

……

……

16. As far as you are aware, to what extent are the academics using the university's IR? You can refer to IR usage reports, enquiries about the IR, complains, etc.

……

……………………………………………………………………………………………………

17. What can you suggest be done to motivate academics to self-archive?

…………………………………………………………………………………………….

…………………………………………………………………………………………….

Challenges faced by the library in IR development

18. Are there any system-related problems you face?

……………………………………………………………………………………………

…………………………………………………………………………………………….

19. What problems or complaints have been raised regarding the repository? Either by
library staff or academics.

……………………………………………………………………………………………

……………………………………………………………………………………………

20. Any other challenges?

……………………………………………………………………………………………

…………………………………………………………………………………………….

Strategies to improve the IR

21. What support would you require from the university to improve the IR and promote open
access publishing (e.g. skilled staff, infrastructure, financial resources etc.)?

……………………………………………………………………………………………

…………………………………………………………………………………………….

21. What plans do you have of improving the IR at the UKZN?

 ……………………………………………………………………………………………

……………………………………………………………………………………………

22. What do your staff require to perform their IR functions better?

…………………………………………………………………………………………..

…………………………………………………………………………………………..

23. What can be done to improve academic's acceptance to open access and the university's
IR?

……………………………………………………………………………............................

…………………………………………………………………………………………..

24. Any other comments or information you may want to share?

 ……………………………………………………………………………………………

 ………………………………………………………………………………………….

THANK YOU

Appendix 3: Interview schedule: IR Librarian

Title of the study: Institutional repositories as platforms for open access in South African universities: the case of University of KwaZulu-Natal.

Institutional repositories (IRs) have presented an opportunity to increase visibility of scholarship and have created a platform for universities to showcase their research output and improve access to scholarly literature. Irrespective of the benefits that the movement has presented, acceptance by academics in universities in South Africa has been slow. This study seeks to evaluate the development, adoption and of use of the UKZN's IR. The aim is to examine the current state so that strategies can be proposed that can improve adoption and use of the university's IR.

Instructions: *Please respond to the following questions to the best of your ability and as honestly as possible.*

A. Development of the IR
1. What are your responsibilities regarding the institutions IR?
   …………………………………………………………………………………………
   …………………………………………………………………………………………

2. What content is recruited in the IR and how is this done?
   …………………………………………………………………………………………
   …………………………………………………………………………………………

3. How do you ensure that all qualifying content is deposited in good time?
   ....
   ....

4. Do you keep records tracking usage statistics, particularly deposits of the IR?
   …………………………………………………………………………………………
   …………………………………………………………………………………………

5. Would you say you have adequate knowledge and experience in conducting your duties as the IR administrator?
   …………………………………………………………………………………………
   …………………………………………………………………………………………

6. Did you receive any training on IR maintenance, content recruitment, etc.?
   Yes ( )   No ( )

7. If "yes" describe the training you received
   …………………………………………………………………………………………
   …………………………………………………………………………………………

8. Do you attend any workshops on open access to enhance your knowledge and skills in managing the university's IR?

………………………………………………………………………………………………
…………………………………………………………………………………………….

9. Do you get the support that you require from the university stakeholders (academics, research office and library management) in performing your duties and enhancing the success of the IR?
………………………………………………………………………………………………
………………………………………………………………………………………………

10. Basing on your experience and the knowledge you have gained from other institutions in administering and managing the university's IR, would you say you have adequate infrastructure to support your roles? Such infrastructure could include ICT infrastructure, policies and mandates that enforce deposits, financial resources, training for skills development, human resources etc.
………………………………………………………………………………………………
………………………………………………………………………………………………

11. Do you think institutional repositories are important alternative platforms for accessing information in a library?
………………………………………………………………………………………………
………………………………………………………………………………………………

B. Role of the library
12.What activities do you or other library staff engage in to promote open access? These could include conducting workshops on open access and or participating in activities promoting the open access movement.
………………………………………………………………………………………………
………………………………………………………………………………………………

13. What strategies are you or other library staff members using to bring an awareness to the academic community about open access and the IR?
………………………………………………………………………………………………
………………………………………………………………………………………………

14. How do you reach out to academics? (ie meetings, workshops, offices etc)
………………………………………………………………………………………………
………………………………………………………………………………………………

15. Do you support that academic libraries should educate academics about open access and institutional repositories?
………………………………………………………………………………………………
………………………………………………………………………………………………

C. Usage by academics

16. Do you think academics are taking their part in developing the university's IR?

………………………………………………………………………………………………

………………………………………………………………………………………………

D. Academic's attitude towards open access

17. From your observation, what is the attitude of academics towards self-archiving?

………………………………………………………………………………………………

………………………………………………………………………………………………

E. Challenges faced by the library in IR development

18. What problems do you face in conducting your duties as the IR administrator?

………………………………………………………………………………………………

………………………………………………………………………………………………

19. What challenges does the library have which hinder the growth of the IR?

………………………………………………………………………………………………

………………………………………………………………………………………………

F. Strategies to improve the IR

20. What would you require to help you conduct your IR duties better?

………………………………………………………………………………………………

………………………………………………………………………………………………

21. Any other comments

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

THANK YOU

Title of the study: Institutional repositories as platforms for open access in South African universities: the case of University of KwaZulu-Natal.

Institutional repositories (IRs) have presented an opportunity to increase visibility of scholarship and have created a platform for universities to showcase their research output and improve access to scholarly literature. Irrespective of the benefits that the movement has presented, acceptance by academics in universities in South Africa has been slow. This study seeks to evaluate the development, adoption and of use of the UKZN's IR. The aim is to examine the current state so that strategies can be proposed that can improve adoption and use of the university's IR.

Instructions: *Please respond to the following questions to the best of your ability and as honestly as possible*.

A: Developments of the institutional repository
1. What is your general opinion about open access publishing, and particularly self-archiving of scholarly content?
    ……………………………………………………………………………………
    ……………………………………………………………………………………

2. The university's IR was established in 2009. What has the university done to support the development of the institutional repository is then?
    ……………………………………………………………………………………
    ……………………………………………………………………………………

3. The UKZN has produced substantial research and much of it is not available through the institutional repository. What is your comment on this status?
     ………………………………………………………………………….................
     ……………………………………………………………………………………

4.   In 2015, the NRF mandated all research funded by them to de deposited in the university IR. How has the university responded to this call?
……………………………………………………………………………………
……………………………………………………………………………………

5. The success of an IR is a result of collective efforts from different university stakeholders (e.g. Library, academics etc.). How would you describe these relationships within the university?
 ………………………………………………………………………………………….
 ………………………………………………………………………………………….

6. What conditions have been put in place by the university to encourage the use of the institutional repository? Such conditions may include policies, financial resources, human resource capacity building, or ICT infrastructure.
……………………………………………………………………………………
……………………………………………………………………………………

7. How do you rate the importance the IR for archiving and disseminating of research output at the UKZN as a research intensive university?

……………………………………………………………………………………………………
……………………………………………………………………………………………………

8. As far as you are aware, to what extent has open access been adopted by universities in South Africa?

……………………………………………………………………………………………………
……………………………………………………………………………………………………

B: Roles of the library

9. What are the responsibilities of the library in the development of the IR?

……………………………………………………………………………………………………
……………………………………………………………………………………………………

10. As far as you are aware, is the library conducting its duties fairly?

……………………………………………………………………………………………………
……………………………………………………………………………………………………

C: Usage of IR by academics

11. Academics play a pivotal role in open access institutional repositories in terms of its usage, particularly in disseminating scholarly content. What has been put in place to encourage academics to self-archive their research on the repository (e.g. Bonuses, rewards, etc.)

……………………………………………………………………………………………………
……………………………………………………………………………………………………

12. Should conditions improve, do you think academics will be motivated to self-archive?

……………………………………………………………………………………………………
……………………………………………………………………………………………………

D. Attitude of academics

13. As far as you are aware, what is the attitude of academics towards self-archiving?

……………………………………………………………………………………………………
……………………………………………………………………………………………………

E. Challenges in IR adoption

14. Are there any challenges hindering IR growth at the university?

……………………………………………………………………………………………………
……………………………………………………………………………………………………

F. Strategies to improve IR

15. What approaches would you propose to improve use of the repository by the academics?

……………………………………………………………………………………………………
……………………………………………………………………………………………………

16. Any other comments or information that you may want to share?

……………………………………………………………………………………………………
……………………………………………………………………………………………………

THANK YOU

Appendix 5: Document checklist

1. University policies (UKZN and other universities)

2. UKZN Library Newsletters

3. UKZN Library Annual Reports

4. UKZN Annual Research Reports

5. OpenDOAR

6. ROARMAP

7. ResearchSpace (UKZN repository)

8. Repositories of other South African universities

25 June 2018

Dear Respondent,

<u>Informed consent letter</u>

My name is Grace Mutsvunguma (212562280), a PhD student in Information Studies in the School of Social Sciences, College of Humanities at the University of KwaZulu-Natal, Pietermaritzburg. I kindly invite you to participate in my research project entitled ***"Institutional repositories as platforms for open access in South African universities: the case of University of KwaZulu-Natal"***. I am conducting this study as part of the requirements of the Doctoral degree programme.

The aim of this study is to evaluate the development of the UKZN's institutional repository which was launched in 2009. Institutional repositories allow universities to populate scholarly communication (for example, papers published in journals, theses and dissertations) produced by its academic community so that it can be accessible online for free. Academics are set to benefit as their research becomes accessible and visible globally. The study also aims at assessing the adoption and use of the institutional repository by academics as they are responsible for availing or populating the research output on the institutional repository. Acceptance and use of the institutional repository will be evaluated for purposes of making informed decisions when developing strategies for improvements for the university's repository.

Results of the study will be disseminated through conferences, workshops and publications. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Please note that your name will not be included in the report and your confidentiality will be maintained throughout the study. There will be no monetary gain from participating in this research project. The information that you will provide will be used for academic purposes only and not otherwise.

Your participation in answering the questions is completely voluntary. You have the right to withdraw at any time during the study. I appreciate the time and effort you will take in participating in this study.

The questionnaire will take about 30 to 45 minutes to complete.

Yours sincerely,

Grace Mutsvunguma
Institution: University of KwaZulu-Natal
Telephone number: +27 (0) 845533 490
Private email address: gracemutsvunguma@gmail.com
University email address: 212562280@stu.ukzn.ac.za

Supervisor: Prof. Ruth Hoskins
Institution: University of KwaZulu-Natal
Telephone number: + 27 (0) 33 260 5093
Email address: HoskinsR@ukzn.ac.za

HSSREC Research Office: Ms P. Ximba
Institution: University of KwaZulu-Natal
Telephone number: +27 (0) 31 260 3587
Email address: Ximbap@ukzn.ac.za

Please complete this form

Title of study: "*Institutional repositories as platforms for open access in South African universities: the case of University of KwaZulu-Natal*"

I.., hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participate in the research project as outlined in the document about the study.

I acknowledge that I have been informed of the purpose of this survey. I am aware that participation in the study is voluntary and I understand that I am at liberty to withdraw from the project at any time, should I so desire.

Participant

Signature ………………....................................

Date: ....

Email: ………………………………….…..…….

Researcher

Signature … ………………

Date: …25 June 2018 …………..

Appendix 7: Request for permission to undertake research

University of KwaZulu-Natal
Pietermaritzburg
Pte Bag X01,
Scottsville, 3209

15 April 2017.

The Registrar
Mr S. Mukwena
University of KwaZulu-Natal
Pte Bag X3630
Durban

Dear Sir,

RE: REQUEST FOR PERMISSION TO UNDERTAKE RESEARCH

My name is Grace Mutsvunguma (208524104), a PhD student in Information Studies in the School of Social Sciences, College of Humanities at the University of KwaZulu-Natal, Pietermaritzburg.

As part of my doctoral studies I am undertaking research on the, "Institutional repositories as platforms for open access in South African universities: the case of University of KwaZulu-Natal'. My study would require to review UKZN documents, distribute questionnaires to academics and interview the Deputy Vice Chancellor Research, Library Director and the institutional repository Librarian. The outcomes of this study will be beneficial to the university by providing strategies that can be employed to improve adoption and use of the repository by the university community.

The purpose of this letter is to request permission to conduct these interviews, distribute the questionnaires and have access to the relevant documents, and to request any other information that could assist this research. I intend to collect data from July-September 2018. The data collected will be treated with confidentiality and anonymity.

I shall be very grateful for your assistance and I appreciate your cooperation in advance.

Yours sincerely,

Grace Mutsvunguma
E-mail: gracemutsvunguma@gmail.com or 212562280@stu.ukzn.ac.za

Appendix 8: Gatekeeper's letter

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

8 May 2017

Mrs Grace Mutsvunguma(212562280)
School of Social Sciences
College of Humanities
Pietermaritzburg Campus
UKZN
Email: 212562280@stu.ukzn.ac.za   gracemutsvunguma@gmail.com

Dear Mrs Mutsvunguma

RE: PERMISSION TO CONDUCT RESEARCH

Gatekeeper's permission is hereby granted for you to conduct research at the University of KwaZulu-Natal (UKZN), towards your postgraduate degree, provided Ethical clearance has been obtained. We note the title of your research project is:

"Institutional repositories as platforms for open access in South African universities: the case of University of KwaZulu-Natal".

It is noted that you will be constituting your sample by handing out questionnaires, and/or conducting interviews with the academics and Deputy Vice Chancellor of Research and Library Director and institutional repository Librarian on all five campuses.

Please ensure that the following appears on your notice/questionnaire:
* Ethical clearance number;
* Research title and details of the research, the researcher and the supervisor;
* Consent form is attached to the notice/questionnaire and to be signed by user before he/she fills in questionnaire;
* gatekeepers approval by the Registrar.

You are not authorized to contact staff and students using 'Microsoft Outlook' address book. Data collected must be treated with due confidentiality and anonymity.

Yours sincerely

MR SS MOKOENA
REGISTRAR

Appendix 9: Ethical clearance letter

UNIVERSITY OF ™
KWAZULU-NATAL

INYUVESI
YAKWAZULU-NATALI

01 November 2017

Mrs Grace Mutsvunguma 212562280
School of Social Sciences
Pietermaritzburg Campus

Dear Mrs Mutsvunguma

Protocol reference number: HSS/1739/017D
Project title: Institutional repositories as platforms for open access in South African Universities: the case of the University of KwaZulu-Natal.

Expedited Approval

In response to your application dated 19 September 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

Please note: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of **3** years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

_____
Dr Shamila Naidoo (Deputy Chair)

/ox

cc Supervisor: Prof Ruth Haskins
cc Academic Leader Research: Prof M Naidu
cc School Administrator: Ms Nancy Mudau