

**A study into the availability of and access to
electronic journals for teaching and
research by the academic staff at the
Faculty of Agriculture, University of
Zimbabwe.**

**A thesis submitted into the fulfilment of the
requirements for the Degree of Master of
Philosophy in Library and Information Studies.**

By Thembani Malapela

Library and Information Studies Centre

University of Cape Town, South Africa

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'Policies for science and technology must always be a mixture of realism and idealism'.

Chris Freeman (1921-2010)

Declaration

I, the undersigned, hereby declare that the work contained in this MPhil thesis entitled "A study into the availability of and access to electronic journals for teaching and research by the academic staff at the Faculty of Agriculture, University of Zimbabwe", is my own. This thesis contains no material that has been submitted previously, in whole or part, for the award of academic degree or diploma. All the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

Signed: **Themban Malapela**..... Date: ... **02.09.2014**....

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Umkhulu lomsebenzi!!!!

Abstract

Researchers have relied on journals as a source of current research information for more than 350 years. In sub-Saharan Africa, researchers and libraries complain about a lack of access to subscription electronic journals despite an increase in electronic journals access schemes for developing countries. Furthermore, African researchers lag behind in publishing their work when compared to their counterparts in the developed world. Research was carried out in the Faculty of Agriculture at the University of Zimbabwe, which sought to investigate electronic journal availability from the researchers' perspectives; to discover how electronic journals are used for teaching and research; and how faculty use journals in their publications.

To explore this multi-faceted objective, four key sub-objectives emanated from the main research objective. The first sub-objective was to determine to what extent the available electronic journal collections met faculty's electronic journal teaching and research needs. The second was to establish journal usage through analysing journals cited in faculty research papers and reading lists given to graduate students. The third was to understand the problems if any, encountered in accessing electronic journals – establishing the nature and frequency of these problems. The last was to explore if academic staff desire and publish their research and in the process, to understand the obstacles they face.

This study used methodological triangulation, and data was gathered through three main research methods. These were an electronic journal availability study, a 26 question-

survey, and a citation analysis. Each respective method addressed a respective sub-objective, with an overlap of methods for the fourth objective. The findings revealed that 85.5% of the required journals were available across the available electronic journals collections. Faculty members use electronic journals for their work; however, they need training to access and to be aware of what journal content is available. While faculty members aim to be published, evidence indicated that they use less recent journals in their published works. There was no evidence that suggested that access to electronic journals alone leads to increased publications.

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List of Abbreviations and Acronyms

ACU	Association for Commonwealth Universities
AGORA	Access to Global Research in Africa
AJOL	African Journals Online
APC	Author Processing Charge
ARDI	Access to Research for Development and Innovation
ARL	Association of Research Libraries
AVU	Africa Virtual University
CARA	Council for Assisting Refugee Academics
CGIAR	Consultative Group on International Agricultural Research
COUNTER	Counting Online Usage of Networked Electronic Resources
CTA	Technical Centre for Agricultural and Rural Cooperation
DOAJ	Directory of Open Access Journals
EIFL	Education Information for Libraries
HINARI	Health Internet Access to Research Initiative
ICT	Information Communication Technologies
IF	Impact Factor
INASP	International Network for the Availability of Scientific Publications
IPA	International Publishers Association
ISI	Institute for Scientific Information
ITOCA	Information Training and Outreach Centre for Africa
JCR	Thompson Reuters Journal Citation Reports
LCJS	Low Cost Journals Scheme
MMR	Mixed Methods in Research
OA	Open Access

OARE	Online Access to Research in the Environment
OpenDOAR	Directory of Open Access Repositories
OSI	Open Society Institute
PERII	Programme for the Enhancement of Research Information
PfD	Publishers for Development
PHD	Doctor of Philosophy Degree
PLoS	Public Library of Science
RAE	UK Research Assessment Exercise
SADC	Southern African Development Community
SCI	Science Citation Index
SNIPP	Source Normalisation Impact per Paper
SRKS	Strengthening Research and Knowledge Systems
TEEAL	The Essential Electronic Agricultural Library
UN	United Nations
UNEP	United Nations Environment Programme
UTLC	University Teaching and Learning Centre
UZ	University of Zimbabwe
UZP	University of Zimbabwe Publications
WHO	World Health Organisation
WIPO	World Intellectual Property Organisation
ZULC	Zimbabwe University Libraries Consortium

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Appendix 1: Questionnaire for this Study

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Chapter One

Introduction

1.0 Introduction

This chapter gives an overview of this study, which concerns the access to electronic journals and their use in teaching and publishing at the Faculty of Agriculture, University of Zimbabwe. The chapter gives the background which contextualises the study within the theoretical aspects of access to subscription journal content and issues related to accessing electronic journals, including measures to improve access to scholarly materials in the developing world. Thereafter, this chapter introduces issues related to researchers' publishing in international journals and their challenges related to journal access and scholarly publishing. The role of libraries in providing access to journal content and evaluating its use is explored throughout this study.

The objectives of the study and the research questions follow; stating the reasons for engaging in this study. A statement of purpose and perceived value of this study are presented and the key words that are used are defined. The chapter concludes with a section that explains how the thesis will unfold, briefly indicating the main topics that each of the remaining chapters will discuss.

1.1 Background to the Study

Researchers and academics have relied on work of others to build upon their own research and they endeavour to publish their findings for the benefit of other scholars and to further the growth of knowledge in their respective disciplines. Therefore, access to current research and publishing findings has been central to scholarly communication and research for many decades. Kristin (2005: 158) noted that this demanded quality assurance and hence built into this scholarly research system were standards for evaluating research by editorial boards of scholarly journals. This process of academic scrutiny in scholarship, initially pioneered by scholarly societies¹, attracted commercial publishers who saw an economic opportunity and thus the model of subscription journals came into being. In their analysis, McGuigan and Russell (2008) reported that the 1960s commercial publishers began to purchase top-quality journals previously published by non-profit academic societies.

The dominance of scholarly societies in the history of publishing has been referred to as “the bedrock of scholarly publishing” (OASIS, 2013). A variety of scholarly outputs such as books, journals, conference proceedings, research papers, reports, technical reports, and electronic formats such as electronic books, electronic journals, and many others developed in due course and formed a core body of peer-reviewed literature. The costs of producing these outputs have been met by the authors and consumers, with publishers owning or financing the means of production (for example, printing,

¹ The first scholarly journal, *Journal des Scavans*, was published as a new medium of communication in 1665, and was soon followed by the *Philosophical Transactions of the Royal Society* (Kronick, 1976:21)

distribution, marketing and licencing). Today there are many large commercial publishers as well as small publishing houses all over the world.

Commercial publishers tended to dominate traditional publishing houses (In the beginning of the 20th century it was mainly scholarly societies²) by establishing monopolies in the publishing industry and the journal prices continued to rise. Pinfield (2013) explained that gradually the prices of journal content continued to rise from the 90s to present date. He aptly stated that, “year-on-year price hikes for journal subscriptions far exceeded the consumer price inflation” (Pinfield, 2013:86). This increase in serial prices was termed “serials crisis” resulting in libraries not able to afford subscriptions to journals and other research outputs from commercial publishers (Panitch and Michalak, 2005). Some authorities (Thatcher, 1995, Guédon, 2001 and Willinsky, 2006) theorised that this crisis eventually led to alternative publishing models such as open access publishing.

This brief historical overview establishes the centrality of subscribed content to the scholarly outputs of academia. In the global context, these were the issues that academics were dealing with and of course these impacted on researchers and libraries in the developing world. Many libraries in sub-Saharan Africa struggle to maintain good and up to date collections in the face of falling budgets, rising purchase costs, and expanding student numbers (Economic Commission for Africa, 2007: 3). For example, Gitau et al., (2011:75) stated that

² For an elaborate historical description of this history see the online peer-review time line as described in the peer-review watch at <http://peerreviewwatch.wordpress.com/2014/03/23/history-of-peer-review-timeline/> [2014, January 18].

“...access to resources is one of the well-known challenges for African researchers, limiting their representation at conferences and their integration into global academic networks, and access to journals ...”

The UNESCO's *Knowledge Society Report* (United Nations Education Scientific and Cultural Organisation [UNESCO], 2005) noted that as a result, the poorest are further separated from sources of information when policy-makers fail to have an inclusive approach to development because they lack access to current research. This disparity in knowledge access has been termed the “North-South” divide (Karlsson, 2002), and measures were suggested to alleviate this. They included strengthening the data and science foundations of the South; strengthening the scientific community in the South; encouraging more research on the South among Northern scientists; and expanding the groups capable of generating scientific knowledge. In addition, the international community has provided programs of subsidised scholarly electronic journals access, which are donor funded schemes for accessing online resources by developing and emerging countries. These schemes have been defined as “knowledge-based aid” (King and McGath, 2004: 26).

Such major support and access programmes were enumerated by McCreadie (2013:26) and included Access to Global Research in Africa (AGORA), Access to Research for Development and Innovation (ARDI), Health Internet Access to Research Initiative (HINARI), Online Access to Research in the Environment (OARE) and The Essential Electronic Agricultural Library (TEEAL). These have been complemented by negotiated electronic journals schemes from the Electronic Information for Libraries (EIFL), the International Network for the Availability of Scientific Publications (INASP), and Publishers for Development (PfD). The collective results of these interventions enabled

researchers from participating institutions to access the same information as their peers in the developed nations, affording a possibility to everyone to contribute to the global body of research outputs and knowledge (Gedye, 2013).

Access to worldwide current research in electronic journals enables local researchers to improve their own research (Asamoah-Hasan and Frempong, 2008:13). Access to current scholarly and scientific literature is important for academics, as publishing academic output is part of academic life and important for the academic institutions, as most universities and research institutions now require their researchers to contribute to the growth of the institutional research output. To researchers, publication is necessary for promotion and to increase their status amongst peers and within their disciplines. Most universities “want publishing to support and further their mission to carry out research and teaching” (Pinfield, 2004:305). In South Africa, for example, publication output from universities also contributes towards the subsidy transfers of the Department of Education to universities (Ligthelm and Koekemoer, 2009:28). Academic outputs in terms of publications have become one of the important attributes in ranking universities (Pagell, 2009:34). Cruz (2008) emphasized that international surveys of universities, such as the *Times Higher Education Supplement* and *World University Rankings*, have taken publications citation data as crucial determinants of quality of faculties, universities and countries. The University of Zimbabwe seeks to be a leading university in the region and therefore places an emphasis on increased publication outputs from its academic staff. (University of Zimbabwe, 2011: 3) Against this background, this study will also investigate the problems and challenges faced by academics in publishing their work.

Meanwhile many studies (for example, Harle, 2010; Adams, et al., 2010) have shown that low income countries contribute fewer research outputs than developed countries. Langer et al., (2004) provided a number of reasons why research from developing countries failed to reach the international scene. The reasons included firstly, poor quality and quantity of research production as research is not continuously supported by local institutions. Secondly, poor preparation of manuscripts, as the submitted manuscripts are found wanting on account of inadequate presentation in language, scientific writing, and arguments. Thirdly, poor access to scientific literature, as “authors from developing countries are often not adequately prepared to participate in the international scientific debate, as they have limited access to the published literature” (Langer et al., 2004:802). This third reason will be interrogated more closely in this present study, see section 1.3 below. Fourthly, poor participation in publication-related decision-making processes, where reviewers for most international journals are from outside the least developed countries, and they have limited knowledge of local situations described in the submitted manuscripts. As a result, submitted manuscripts from developing countries are usually evaluated by experts who are “not knowledgeable about the constraints associated with conducting research” in settings in the developing countries and thereby depriving authors of informed guidance for publication (Langer et al., 2004:803). The fifth reason is that of the bias of international journals, towards researchers from prestigious centres in the developed world, and ignoring lesser-known entities and authors from the developing countries (Langer et al., 2004:803).

Measures were designed to address some of the issues related to publishing by African researchers (Harle, 2011b; McCreadie, 2013) and these interventions included supporting

research activities, strengthening research capacities of institutions in developing countries and supporting publishing activities. A joint project of the Association of Commonwealth Universities (ACU) and INASP, for example, supported publishing activities. This project, the Publishers for Development (PfD), aimed to engage both librarians and publishers in order to improve publishers' knowledge of the needs of developing countries, enabled publishers to share information about what they were already doing to help increase access, worked with developing country researchers and adapted their ICT to operate in a low-bandwidth environment, amongst other objectives (Publishers for Development, 2013).

The centrality of library services to academic and scholarly research is not in question. (RIN and RLUK, 2011). Libraries endeavour to support researchers to publish and to win grants and awards. In order to measure access and use of library resources, a number of methods have been used; including bibliometrics, benchmarking, citation and availability studies. (Nisonger, 2007: 23; Arivanathan, Ballantyne, and Pocari, 2010: 17; Prathap and Mittal, 2010: 273 and Crum, 2011: 3). An availability study was employed to establish if academics have access to electronic journals for teaching and research at the University of Zimbabwe.

This study was undertaken in the Faculty of Agriculture to find out the extent of electronic access to agricultural journals and their use by the academic staff in teaching and research. This was done firstly, by establishing whether academics had access to the electronic journals that they use in their teaching and research, and secondly, to study the journal usage by the faculty in their research output and also in their teaching by

analysing recommended reading lists given to graduate students. Thirdly, the study explored the nature and frequency of the problems encountered in accessing electronic journals by the faculty members. Finally, the study explored whether academic staff at the University of Zimbabwe published their research and what they regard as obstacles in publishing their work. In this way, the study put to test whether availability (or non-availability) of electronic journals affects usage and discusses issues around access to electronic scholarly content.

1.1.1 Context of the Study

The Faculty of Agriculture at the University of Zimbabwe was established in January 1980 as a separate faculty. The discipline had previously been included in the Faculty of Science. The Faculty's mission is to provide up-to-date, relevant and appropriate scientific knowledge for economically viable, environmentally friendly, diverse and sustainable food production, which should result in a satisfactory quality of life for all citizens and their communities. The Faculty of Agriculture is the centre for education, research and development in agricultural sciences and farming at the University of Zimbabwe and also in the country (University of Zimbabwe, 2011c). The Faculty of Agriculture has four academic teaching departments and they all have undergraduate and postgraduate programmes, offering both taught programmes, and research degrees at the Master and Doctor of Philosophy levels.

The informational needs of the Faculty of Agriculture are catered for by a separate agricultural collection housed in the main University of Zimbabwe library. Specialised animal science materials are separately housed in the Veterinary Science library. The

combined collections include books, periodicals, reference materials, animal and agro-related databases, CD-ROM databases and various electronic databases. The university library aims at offering the Faculty of Agriculture up-to-date information required for research, teaching and learning.

The university library took a strategic decision in 2007 to increase its electronic content (Mbambo-Thatha, 2007:36). This was as a result of successive efforts to increase digital content at the University of Zimbabwe library. In 1999, the University of Zimbabwe was the first library³ to purchase The Essential Electronic Agriculture Library (TEEAL) database called the “Library in a Box”- then with access to 130 electronic journals with 600,000 pages of articles, stored on 100 compact discs (Dauphiné, Ochs and Joos, 2003). TEEAL’s journals cover agricultural and environmental sciences, and the tool interface provides a searchable index that makes it easier to locate full-text articles. Since the launch of TEEAL database in 1999, technology has evolved and in 2005 TEEAL creators introduced a new system that could be operated on a local area network, this was known as LanTEEAL. Instead of storing electronic journals on CDs the new system allowed the entire database to be stored in an external drive and this facilitated multi-user access if plugged in to the network. The Technical Centre for Agriculture and Rural Cooperation (CTA) partnered with the TEEAL project at Cornell University to provide grants for the purchase of hard drives to institutions within the African, Caribbean and Pacific countries. Through this initiative, the library at the University of Zimbabwe still has access to the TEEAL database (a collection of more than 200 agriculture journals between 1993 and 2011) accessible to researchers through the University of Zimbabwe local area network.

³ According to the TEEAL Website. <http://www.teeal.org/about> [2013, November 18]

In early 2000, the university library became the site for the Africa Virtual University's electronic collection of about 2,000 electronic journals and e-books through the Net Library (Mbambo-Thatha, 2007:6). The Africa Virtual University is a pan-African educational network established in 1997 as a World Bank project to serve the countries of sub-Saharan Africa. The Digital libraries and learner support component of the Africa Virtual University, aimed to provide institutions in Africa with "a gateway to the world's virtual collections of scholarly information contained in vast databases of text and journals in French and English languages" (Dzvimbo, 2005:n.p).

In 2002, the University of Zimbabwe library became the founding member of the Zimbabwe University Libraries Consortium (ZULC) - a grouping of university libraries in Zimbabwe with an objective to participate in collective resource acquisition and sharing amongst members through cooperative collection development, electronic information services provision and related activities (Mbambo-Thatha, 2007:25). ZULC managed to participate in two joint purchase schemes that brought stable access to electronic journals to the university library for the past ten years. These programmes were the Programme for the Enhancement of Research Information (PERII) of INASP and EIFL, an initiative of the Open Society Institute (OSI). PERII⁴ formally ended in March 2013; however most of its aspects have now been continued in new programme called Strengthening Research and Knowledge Systems (SRKS).

The immediate impact of subscribing to the collections as explained above was that "availability thus increased from access to a single e-resource, EBSCOhost, in 1999 to more than 19,500 online journals by 2006" (Mbambo-Thatha, 2007:6). These

⁴ Through-out this Thesis, PERII is used to refer to the INASP's programme in its existence as either PERII or SRKS (Strengthening Research and Knowledge Systems).

organisations assist libraries and their users in obtaining access to electronic scholarly resources through negotiating licenses with publishers for electronic resources on behalf of its members. For example, EIFL in 2010, negotiated over 60 commercial electronic journal collections and databases from more than 20 suppliers, with an average discount of 75%. By the beginning of 2011, each institution could access thousands of electronic journals and over 50,000 electronic books with a single subscription (Electronic Information for Libraries [EIFL], 2012). In addition, the library still purchases through ZULC a number of databases and electronic content and these collections are made available through the library website.

In 2004, the Research4Life programme was launched and the university library has access to this initiative. Research4Life is a collective name for the four programmes led by United Nations agencies and their partners. Research4Life's goal is provide institutions in developing countries to academic and professional peer-reviewed scholarly online content either free or at low cost. The Research4Life programme provides access to peer-reviewed international scientific journals, books, and databases. Currently, the Research4Life programme includes collaboration between the Food and Agriculture Organization of the United Nations (FAO), United Nations Environment Programme (UNEP), The World Health Organisation (WHO) and the World Intellectual Property Organisation (WIPO) together with leading scientific publishers.

The collections now available at the University of Zimbabwe represent the efforts made by the donor community and the efforts of the university librarians through university's budgetary allocations. In order to ensure that these collections are beneficial and useful both to students and researchers, they have to be marketed and promoted (Creaser and

Spezi, 2012). In 2004, the University of Zimbabwe library started an information literacy programme which was meant to empower students to access library resources available in both print and electronic formats (Mlambo, 2010:1). Later in 2009, the information literacy programme was extended on a needs-basis to post-graduate degree programmes. In 2010, the library extended the programme to include newly appointed academic staff by partnering with the University Teaching and Learning Centre (UTLC) - a department within the University of Zimbabwe that orients and mentors newly appointed academic staff at the university. To cater for the academic staff members that were already employed by the university before 2010, the library, through a grant received from INASP, carried out a series of faculty based training sessions in accessing electronic journals (INASP, 2012).

In the Faculty of Agriculture, all staff training was held in April 2010. Additional training was organised on the 8th of October 2010 in conjunction with the Information Training and Outreach Centre for Africa (ITOCA) for selected faculty staff (University of Zimbabwe Library, 2010). E-resources training sessions still continue for newly appointed faculty staff via the UTLC, and the University of Zimbabwe library is ready to train any staff upon request. In the period January to June 2012, 347 academic staff had been trained by the library in accessing electronic journal content (Chikonzo, 2012).

Harle (2010) found that most Higher Education institutions in Sub-Saharan Africa had invested in e-resources through the INASP, EIFL and Research4Life programmes and had secured significant content, but this needed to be matched by associated investments in

ICT facilities and training. In that report, it was noted that money spent on journals risks being wasted if no investment in ICTs were equally prioritised.

Since 2011, the University of Zimbabwe has been making a significant investment in ICTs and the University Librarian was influential in pushing for investment in computing hardware through the University of Zimbabwe Computer Committee. Firstly, the university made a conscious effort to increase computers for all staff and students. Computers for each professor were sourced in the initial phase; the second phase was to equip all students' laboratories in the faculties and then sought to include all other staff members. Secondly, the number of computers in the university library was increased for students and staff access to electronic resources. Thirdly, the university made an investment to increase the network upgrade to allow for more computers to be connected on to the local area network. Finally, the university sought to have a stable Internet connection and additionally install campus-wide cloud connectivity that negated the limitations of the previous inconclusive cabling project started in early 2000. To complement these institutional developments, the library administration in 2012 established the Researchers Common Room (RCR). This common room is primarily for academics and research students' access to electronic journals and RCR had 100 computers at its launch. This new facility was located in the library's previous print periodicals section.

1.2 Statement of the Problem

In Africa, beyond South Africa, despite studies indicating an increase in the availability of electronic journals, it has been noted that researchers and lecturers still complain about

the lack of access to electronic content (Harle, 2010:12, Oronge, 2012). At the University of Zimbabwe, the Vice-Chancellor aptly summarised developments at a recent graduation ceremony,

“The University now has a wireless cloud which empowers both students and staff to enjoy increased Internet access from anywhere on campus. The Internet bandwidth has increased from 155Mbps to 239 Mbps, arguably one of the fastest speeds in the country... and the Main Library is now 99 percent digitalised and boasts of over 100 000 electronic journals, as well as more than 80 000 electronic books covering all disciplines.” (Nyagura, 2013)

However, researchers and academics still complain of lack of access to current research and external examiners are also noting a lack of citing of recent scholarly content by graduate students. For example, one examiner noted that students were citing outdated literature for a PHD's work. In that examiner's report the capacity of the library to support research activities at the university was questioned. The report stated that the university seemed not to have the resources to support doctoral study (Lietto, personal communication, 2012). The examination of the student bibliography indicated that resources were not consulted or lacking. This is despite the fact that the library had been reporting a gradual increase in its collection of electronic journals and other electronic content over the years. It is therefore, important to engage the researchers and find out at a micro-level what are the issues relating to access to electronic journal collections and to identify the nature and frequency of the problems encountered in accessing these journals.

Within an academic institution, the purpose of making online resources available is to support and stimulate teaching and research. Therefore, this study will explore research and publication outputs within this given case and locate them in a global context. At the University of Zimbabwe, a survey (University of Zimbabwe, 2011b: 1-11) revealed that,

between the year 2000 and 2011, the University of Zimbabwe produced 1,300 research outputs in peer-reviewed publications. The Faculty of Agriculture had 296 research items in that period. This study will explore the citation trends of the faculty in their research publications and will provide a better understanding of how electronic journals are used in research and in publishing. This study also considers the challenges encountered in electronic access to research resources. McCreddie (2013:8) contended that relatively low levels of scholarly research activity might partially explain low levels of online content and journal use. This study will subtly test the linkages, if any, between access, availability and use in teaching and research, with a view to understanding how electronic journals are used.

1.3 Objectives of the Study

The major objective of this study was to establish the extent of electronic access to agricultural journals and their utilisation in teaching and in publishing by the faculty members in the Faculty of Agriculture at the University of Zimbabwe. This study sought to explore whether available journal collections met the teaching and research needs of the Faculty of Agriculture, and analysed the usage of journals by faculty as expressed by their published works.

Therefore, the specific objectives of study were:-

- 1.3.1 To determine to what extent the available electronic journal collections met the local or the faculty's teaching and research needs.

- 1.3.2 To analyse the journal usage by the faculty through analysing the journals cited in their research papers collected in the University of Zimbabwe publication lists, and also in the reading lists given by academics to graduate students.
- 1.3.3 To understand whether there were problems encountered in accessing electronic journal collections and if so, what the nature and frequency of these problems were.
- 1.3.4 To explore whether academic staff at University of Zimbabwe published their research, in which journals they published and what they regard as obstacles to publishing their work.

1.4 Research Questions

The research questions for this study are stated as major and specific research question and they are presented below.

Major Research Question

Do the faculty members have access to electronic journals in agriculture for their teaching and research needs and how do they use these in their research publications?

Specific Research Questions

The following are the study's specific research questions,

- 1.4.1 To what extent do the available journal collections meet the needs of the faculty for teaching and research?
- 1.4.2 Does the University of Zimbabwe library provide access to the journal literature that academics cite in their published works and their reading lists?

1.4.3 Are there problems encountered in accessing electronic journal collections, and if so, what is the nature and frequency of these problems?

1.4.4 To what extent do faculty members publish their own research and what do they regard as the obstacles they face in attempting to do so?

1.5 Significance of the Study

The study will add to African literature on access and availability studies to electronic content, as there has been limited research on electronic availability of journal literature in Africa. In Zimbabwe and Sub-Saharan Africa, a few studies were conducted specifically on availability and use of electronic journals by researchers, and access to research in Africa from an African perspective. These studies included Steynberg and Rossouw (1993:873), Treptow and James (2011), and Alabi (2011) in South Africa, and Harle (2010) in Malawi, Kenya, Tanzania and Kenya. The present study will contribute to an understanding of electronic access to journals and their use by academics in the African context. In general, previous studies of electronic access to resources in Africa focused on the supply side (for example Harle, 2010) of the journal content, rather than on the user's perspectives of access, which this study explored. The results should offer a baseline for the University of Zimbabwe library to measure its service delivery to the university community. The study sought to find evidence that could support improved acquisition of and access to electronic information resources.

This research is important because of the following reasons:-

- It will suggest a standard methodology for measuring electronic journals availability in low resources countries.

- The research will lead to increased knowledge of how academics at the University of Zimbabwe access and use electronic information.
- It will show whether the electronic sources available at University of Zimbabwe library meet the needs of the research community.
- It will bring to light the challenges faced by academic staff in utilising e-resources.
- The study also has a potential to contribute to availability studies in electronic journals, a field that has been identified as a gap in literature by Nisonger (2007:36) and Crum (2011:291).

1.6 Scope of the Study

Agricultural research is widely respected as a discipline (Besemer et al., 2011:35) and also as a practice. To this end, agricultural information spans major subject fields such as animal science, nutrition, agricultural economics, crop science, agricultural engineering, environmental studies, biodiversity, and nutrition. Researchers and lecturers in agricultural subjects require up-to-date information; hence, a study of electronic journals availability is important. In recent years, there had been significant growth in open access publishing and a number of agricultural journals are also freely available. This study focused, however, on subscription electronic journals, the rationale being that these are the resources that academics cannot readily obtain by themselves and require institutional subscriptions.

As previously stated, the study sought to explore the usage of electronic journals by the faculty members in Faculty of Agriculture and the citation trends in their publications. Issues affecting access to journal literature and how electronic journal were used in

teaching and research was explored. This qualitative approach could be replicated in other faculties and similar institutions in sub-Saharan Africa in order to demonstrate to librarians that simply providing electronic access is not enough; libraries should recognise the importance of the user perspective and evaluate the level of support and services that they offer.

1.7 Definition of Terms

In this study a number of frequently used terms are defined as follows:

- Availability of electronic journals is defined “as whether or not one can get online access to the full text of a desired journal article by any method” (Squires, Moore and Keesee, n.d:4).
- Access – may be free or through some payment, such as pay by subscription, pay-per-use or pay-per-view, licensed for license rights (usually through institutional public Internet Protocol); or access might be through some negotiated or subsidised access, such as the Research4Life programme.
- Accessibility of an article (or journal title) refers to the convenience and ease of obtaining the full text online (Squires, Moore and Keesee, n.d:4). Accessibility can also be expressed as “can I put my hands on it?” – the need to make outputs as easy to find and share and as “open” as possible. Therefore, “accessibility implies that potential users can gain access to the electronic format of the research, in order to evaluate the work through a review or the abstract or through an engagement with the full text or content of the work” (Abrahams, et al., 2009:23).

- Electronic Journals or e-journals refer to journals that are accessed by electronic means, or the electronic version of a print journal.

1.8 Research Methodology

This study uses triangulation as an approach since it allows the usage of more than one research strategy in a single investigation. Triangulation was defined as “the combination of methodologies in the study of the same phenomenon” (Denzin, 1970:291) and it has been accepted that multiple viewpoints allow for greater accuracy. “Triangulation methodology is used in most cases by quantitative researchers to check and establish validity in their studies by analysing a research question from multiple perspectives” (Olsen, 2004: 1). There are five types of triangulation: data triangulation, investigator triangulation, theory triangulation, environmental triangulation and methodological triangulation (Olsen, 2004:2). This study employs methodological triangulation. Three reasons that are often cited to justify methodological triangulation are completeness, contingency and confirmation (Jack and Raturi, 2006:350). Due to the nature of the research questions in this study, methodological triangulation offered a matrix of research methods to address these questions. The research questions overlap and methods that test these multiple dimensions are an asset to this present study. The three methods used in this methodological triangulation are, the electronic journals availability study, a questionnaire and a citation study. How these were employed is discussed in section 3.4. The summary of each research method in relation to each of the research questions is presented below:-

1.8.1 Availability study

Research Question One: To what extent do the available journal collections meet the needs of the faculty for teaching and research and where else do faculty members obtain access to journal collections?

A core journal titles list was established, comprising of consolidated input from journal requests received from the faculty, journal titles quoted by the faculty from their publication lists (see explanation on section 1.8.2 below), and journals titles gleaned from students' core reading lists. The resultant core list of journals that were assumed to be required by members' of the Faculty of Agriculture, were retrieved from the library's collections to establish the journals availability rate – a measurement of the number of journals that can be retrieved from the library's digital holdings. The results were a measurement on the extent of availability of the journals in the core list from the library's electronic collections.

1.8.2 Questionnaire

Research Question Two: Are problems encountered in accessing electronic journal collections, and if so, what are the nature and frequency of these problems?

A questionnaire was distributed to 80 the lecturers and researchers in the Faculty of Agriculture; there was no need for sampling as the pool was manageable. This was distributed online and analysed using the *Survey Monkey* tool. The questionnaire had 26 questions, and these focused on the faculty access to electronic journal collections, their

use for teaching and research, and their impact on faculty members' own publication patterns. The survey was used to understand the challenges faced by the faculty in both publishing and accessing journal collections. This key instrument also interrogated the problems faced by faculty members in using library collections and their specific needs.

1.8.3 Citation Analysis

Research Question Three: Does the University of Zimbabwe library provide access to the journal literature that academics cite in their published works and their reading lists?

The lists of faculty research articles as published in the *University Of Zimbabwe List Of Publications*⁵, were analysed (University of Zimbabwe, 2011). This is a list of all published papers by the university staff from 2000 to 2011 and is categorised by faculties. The list was compiled by the University of Zimbabwe Publications (UZP) unit to establish the research output from the University of Zimbabwe. There are 296 cited articles emanating from the Faculty of Agriculture staff. Citations were culled from the papers listed under the Faculty of Agriculture references and these were analysed to understand faculty staff publishing patterns and also to establish if faculty members have access to the journals in which they publish. Chapter three provides further procedures for this analysis.

1.8.4 Combined methods (availability study, citations analysis and questionnaire)

Research Question Four: To what extent do faculty members publish their own research and what do they regard as the obstacles they face in attempting to do so?

⁵ Refers to the *University Of Zimbabwe List of Publications (2000-2010)* and its 2011 supplement, for the purposes of this study they shall be treated as a single document and referred throughout this thesis as *University Of Zimbabwe List of Publications*. These are available on request.

This question is cross cutting across the research methods and was mainly answered by the questionnaire; however citation analysis and availability study complemented these findings. The specific sub-questions and procedures for collecting data for this question are explained in Section 3.3.

1.9 Arrangement of the Chapters.

This thesis is arranged in two parts, the first part (chapters 1 to 3) outlines the key aspects of this study, starting with the literature reviewed, the research methodology and methods employed in this study. In the second part, the following chapters (4 to 6) provide the results of this study, with one chapter dedicated to the results of each method.

A brief summary of each chapter is presented below:-

- Chapter one is an introduction to the research project. It gives an overview and plan of the entire study.
- Chapter two presents a review of the literature on the concept of electronic access to electronic journals collections. The study research questions will be grounded in the current literature on electronic access to journal collections.
- Chapter three focuses on the research methodology applied in this study. It discusses the methodological triangulation, research methodology and the three core-data gathering methods employed and provides an overview of their strengths and weaknesses.

- Chapter four details the results from the electronic availability study, measuring to what extent the available electronic journal collections meet the needs the faculty in teaching and research.
- Chapter five: The survey results of the faculty staff challenges in accessing electronic journal collections will be presented in this chapter.
- Chapter six: The citation analysis will be tabulated and presented in this chapter.
- Chapter seven: This chapter presents the findings of the study. It also suggests recommendations that can be implemented.

1.10 Summary

This chapter introduced the investigation. Researchers in both developed and developing countries rely on commercially published content (alongside other sources of scholarly material) to access current research and to publish their own findings. Access to journals has been an issue for libraries in the last ten years, as rising costs of journals outstripped library budgets. Especially in developing countries, library budgets have not been able to maintain up-to-date electronic journal collections. The international donor community, together with local librarians' efforts, responded to the challenge by investing and supporting interventions to provide researchers in African institutions with electronic journal content.

This chapter provided the context and an introduction to the research problem, expressed in four research questions. Methodological triangulation was used in this inquiry by using an availability study, a questionnaire and a citation analysis. The chapter noted the intended value of this study to the University of Zimbabwe library and also to

the library and information science discipline. The next chapter will discuss the literature on electronic access to journals and their use.

Chapter Two

Literature Review

2.0 Introduction

The previous chapter outlined the conceptual framework and the introduction to this present study. This chapter reviews the literature on availability and the use of electronic journals. The objectives and research questions as discussed in sections 1.3 and 1.4, respectively guided the selection of reviewed literature.

This chapter it is arranged in two parts. In the first part, the literature on the foundations of access to scholarly and scientific research (the evolution of the scholarly communication process), access to research by researchers and academics in the developing world, and acquisition will be explored. The section concludes with an overview of the access schemes available to developing countries, for which the University of Zimbabwe is eligible. The second part of this chapter reviews the literature on issues related to access to electronic journal content by researchers and other users, and their impact on teaching, research and publications. Issues related to access to electronic journal content, as well as the role of libraries and librarians in promoting the use and access to digital content were considered. The relationship between access and publishing is examined in literature and its effect, if any, on publishing trends explored.

Section A: Literature Review

2.1 Foundations of Access to Scholarly and Scientific Research Information.

Access to published research underpins the scientific enquiry and informs good policy and decision making (Nchinda, 2002:1700) as both scientists and policy makers tap into previous research findings. For more than 350 years, journal literature has been a medium for scholars in which to communicate their research findings. Finch (2012:4) indicated that access to published works played “a key role in the complex ecology of research, both for researchers themselves and society at large who have a stake or an interest in the results of their work”. Currently, scholarly publishing is made up of scholarly societies, professional associations, university presses, and independent companies. These publishing houses developed a traditionally simple model, that of a scholar writing a paper on his or her research (or findings of a research activity), and it was published on his or her behalf (by a publishing house) as a journal article or a book. In this way, the publishers became the custodians of the dissemination and printing of the research.

In this present study, one of the objectives is to see whether academics in the Faculty of Agriculture intend to publish, that is, do they produce work they need to share through publishing? Literature shows that the impetus initially rests on individual researchers to be motivated to share their output through the scholarly communication process. Suber (2012:7) agreed that “authors are scholars, and the works they customarily write and publish without payment” is for the interest of science. In a study to explore faculty values and the landscape of scholarly communication which was carried out in selected

institutions in America in the disciplines of archaeology, astrophysics, biology, economics, history, music and political science, common motivators were found for researchers participating in the scholarly communication process (Harley, et al., 2010:4).

The following were established as cutting-across disciplinary motivators for researchers to participate in the scholarly communication process: tenure and promotion, dissemination of research outputs, sharing of knowledge, collaboration, resource creation and consumption, and public engagement (Chavarro, Tang and Rafols, 2012).

The University of Zimbabwe requires that academic staff publish in order to be promoted and tenured. Within this survey it shall be established why faculty members intend to publish.

2.1.1 Impact of ICT on Scholarly Communication

Fyffe (2002: 14) noted that the increased adoption of market mechanisms and digital technologies by publishers led to increased new journal titles and a boom in scholarly journals, but threatened the affordability of these journals as subscription costs increased. Observing these developments in technologies within the scholarly publishing arena, Ali and Nisha (2011: 55) stated that scholarly journals have undergone many changes. New digital environments have resulted in the emergence of “digital scholarship” defined by Rumsey (2011: 2) as “the use of digital evidence and method, digital authoring, digital publishing, digital curation and preservation, and digital use and reuse of scholarship”. The following stakeholders were identified - reviewers, publishers, libraries, research institution administrators, and funders.

The roles of publishers in the digital scholarly communication process are embedded within the pursuit, distribution, preservation, access and use of discovered science and knowledge. These value addition functions include (International Association of STM publishers, 2008:4-9), certification and peer-review; investments in technology and expertise, dissemination and marketing, and facilitating access platforms. Cassella (2012:2) listed some changes that digitisation offered above traditional scholarly publishing. These changes included extensive hyperlinking within the text for other articles, sources and datasets; flexible formats, such as XML, Html and Pdf; a variety of models, for instance single access, journal bundles⁶, open access (see section 2.1.6 for discussion on open access); innovative layout and structure of articles; and faster dissemination.

2.1.2 Academic Journal Publishing and the Subscription Business Model

Academic journal publishing is a model that involves the authors who write articles and faculty members who provides editorial services .The role of the publishers is to act as the middle man by vetting publishing and distributing the scholarly content to various clients such as faculties, colleges and university libraries. This model was depicted in the Figure 1 by McGuigan (2008).

⁶ Journal bundles refers to the practice of collating all titles produced by a publisher into a single product which libraries purchase as a group (Nabe, 2001).

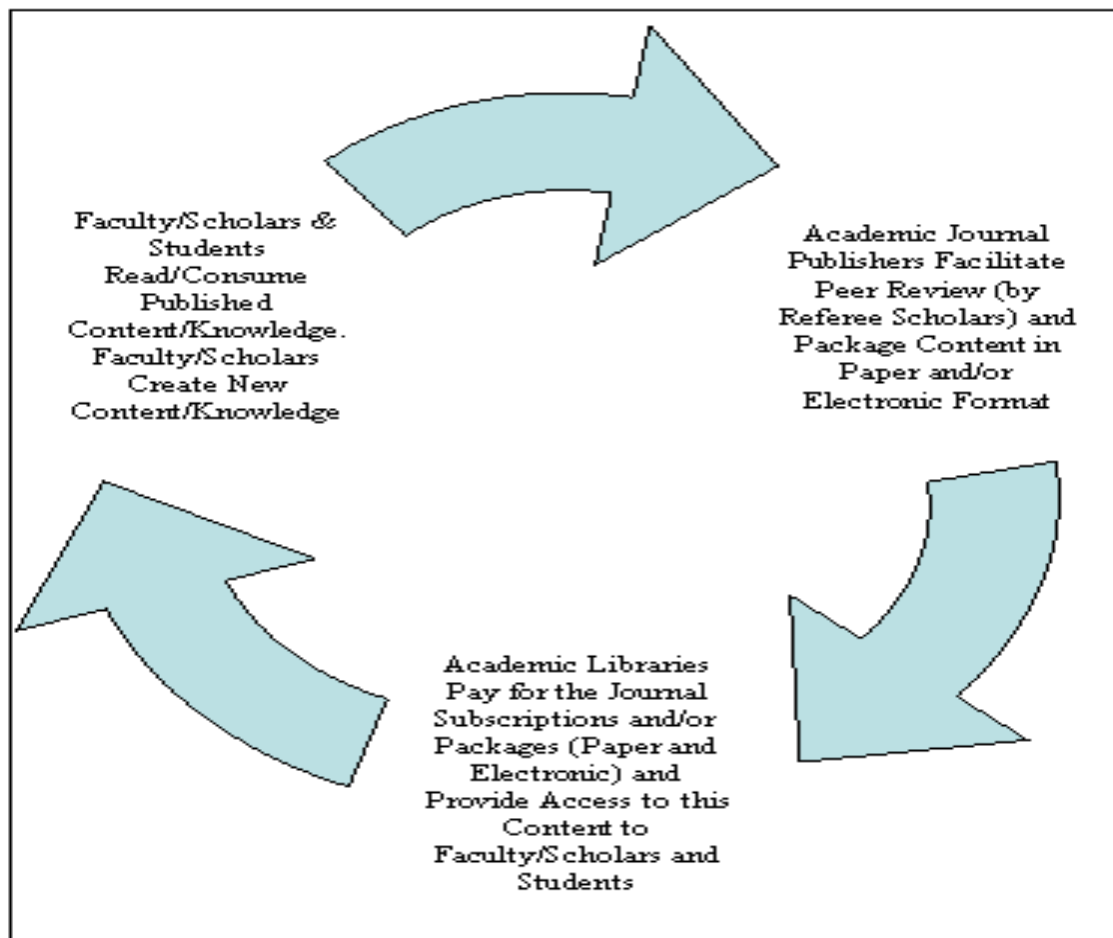


Figure 1: The Business Model of Academic Publishing (McGuigan and Russell, 2008)

The authors pay an article charge or page charge for their articles to be processed for publication; publishers provide the services of proofreading, copy editing, printing and distribution. Editorial boards are responsible for the peer-review of the submitted manuscripts. The contribution of editorial boards or reviewers is considered voluntary to the process. Apt phrased it this way, “most probably scientific publishing is the only branch of industry that relies on a massive voluntary work. This voluntary work is done by highly competent people, namely scientists” (Apt, 2001:25).

2.1.3 Peer-review Process

Authors participate in this process because they want to share their research outputs; they wish to publish in peer-reviewed journals and to use these publications for tenure and promotion. Chan (2004: 279) explained authors contribute freely to the academic publishing process without any expectation for any financial gain. This contribution he indicated include also peer reviewing. What attracts most authors to the academic publishing model is the peer-review process and publishing in journals with a high impact rate (to be discussed in the second part of this chapter). Peer-review is the process of the evaluation of manuscripts by persons of similar competence, who are considered knowledgeable on the subject of the manuscripts. It is a process of maintaining standards, quality, and proves credibility of the submitted works. (Kelty, Burrus, and Baraniuk, 2008:1001). However, peer-review has its limitations. One classical example is the rejection of an article, by the journal *Philosophical Transactions* in 1796, on the account of the first vaccination against small-pox which was discovered and written by Edward Jenner (Michaels, 2006: 187). Today Jenner's work is recognised as the foundation of immunology (Riedel, 2005:21) and is highly regarded within the medical fraternity.

In order to mitigate the anomalies in the peer review process, a number of interventions are needed. Hirst and Alman (2012) did a survey amongst peer reviewers from 116 health research journals to find if peer reviewers were encouraged to use reporting guidelines in assessing manuscripts. Their study discovered that only 41/116 journals (35%) provided online instructions. This indicated that journal publishers gave little guidance and

surveillance to pre-publication peer reviewers. Different publishers employed different methods of recruiting reviewers and also applied different styles of peer-review. These include double blind-review, anonymous review, open peer-review and post publication peer-review.

At the University of Zimbabwe, academics are encouraged to publish in peer-reviewed journals. In a study of published works discussed in Section 1.2, the University survey of published works 2000-2011, peer-review was stated as the first requirement for work, and articles reviewed for tenure and promotion are qualified based on peer-review. Therefore, the academics at the University of Zimbabwe endeavor to meet these standards by wishing to publish in peer-reviewed journals. The questionnaire used for this present study had a question on publishing in peer-reviewed journals.

2.1.4 Journal Impact Factors

In academic journals, the Impact Factor (IF) is a “measure reflecting the average number of citations to recent articles published in a journal” (International Society for Research Activity [ISRA], 2013). Impact Factors are used (as a standard) to establish the importance of a journal title within its discipline. There are two broad classes of metrics to measure journals – *un-weighted* implying that all citations treated equally and *weighted* indicating that some citations are worth more than others. In literature, Eugene Garfield, the founder of Institute for Scientific Information (ISI) is credited as the founder of the Impact Factor. Garfield (2006:90) explained that a journal impact factor was based on two factors, “the numerator which implies the number of citations in the current year to items published in the previous two years, and the denominator which the number of

reviews or articles published within the same period.” The Institute of Scientific information’s impact factors are published in the Science Citation Index (SCI).

Some authorities (Fanelli, 2010:2) have criticised this method of using impact factors in evaluating journals. Common reasons include that the target period is too short; differences in referencing behaviour and in database coverage between subjects; impact factors do not include most open access journals and; impact factors do not include all published literature (Zárate and Cerda, 2007:1475-8). Cardinal (2013:7-9) provided an elaborate call for the judicious use of journal impact factors in evaluating scholarly output in journals. He contended that impact factors have been used contrary to their intended original purpose by the publishers exploiting the “publish or perish” cliché. This cliché is used in academia to imply that one must publish their academic work in order to sustain one's immediate and future career (Fanelli, 2010:2). This latter point is reinforced by Willhite and Fong (2012:543), who noted that shrewd journal editors and publishers used multiple methods for intentionally increasing impact factors. They gave examples of soliciting and publishing more review papers on “hot topics”, requiring authors to cite papers from the host journal prior to accepting their work, asking authors to decrease the number of citations to competition journals, and publishing more multi-authored works. In the case of impact factors and open access, four foundation studies have been done in the past few years (McVeigh, 2004, Vanouplines and Beullens, 2008, Giglia, 2010 and Wouter, 2011).

As a result of these criticisms, a number of metrics to evaluate journals have emerged, and even this profusion of different metrics has not solved the shortcomings of ISI’s

Impact Factor. Craig (2010:3) enumerated the following metrics – h-index, immediacy index, audience factor, article influence, cited the half-life impact factor, g-index, “ERA-A*/A/B/C”, 5-year Impact Factor, AR index, SJR Indicator, Rank Normalised Impact Factor, Eigen Factor, Source Normalisation Impact Per Paper (SNIPP), and Author Superiority Index. This indicates the heterogeneous nature of the different types, approaches and formats for journal impact factors. Journal impact factors have also been used in ranking institutions and academics, and in turn institutions encouraged publishing in high impact journals. A classic study is one by Kalaitzidakis, Mamuneas and Stengos (2003) who used journal impact factors to rank major economics departments using their research outputs.

In the United Kingdom, the UK Research Assessment Exercise (RAE) used citation counting as a measure of quality of research, and as a basis to rank institutions. In 2014, British institutions of Higher Education intend to be evaluated in the Research Excellence Framework (REF), which will replace RAE, will disregard the journal impact factors in determining qualifying works. This is because of misapplication of impact factor by publishers across disciplines and the multiplicity of metrics used by different institutions. “The Impact factor is used to estimate the expected influence of individual papers which is rather dubious considering the known skewness observed for most journals” (Garfield,2006:5). However, individual institutions are still insisting that researchers will be evaluated using the journal impact factor as a means to determine scholarly output. In a similar exercise in Australia, the Excellence in Research in Australia (ERA) ranks Australian Universities and one of the key aspects is the use of journal rankings.

Academics are also questioning the use of journal metrics in determining the quality of research and academic output (Vanclay, 2011:267).

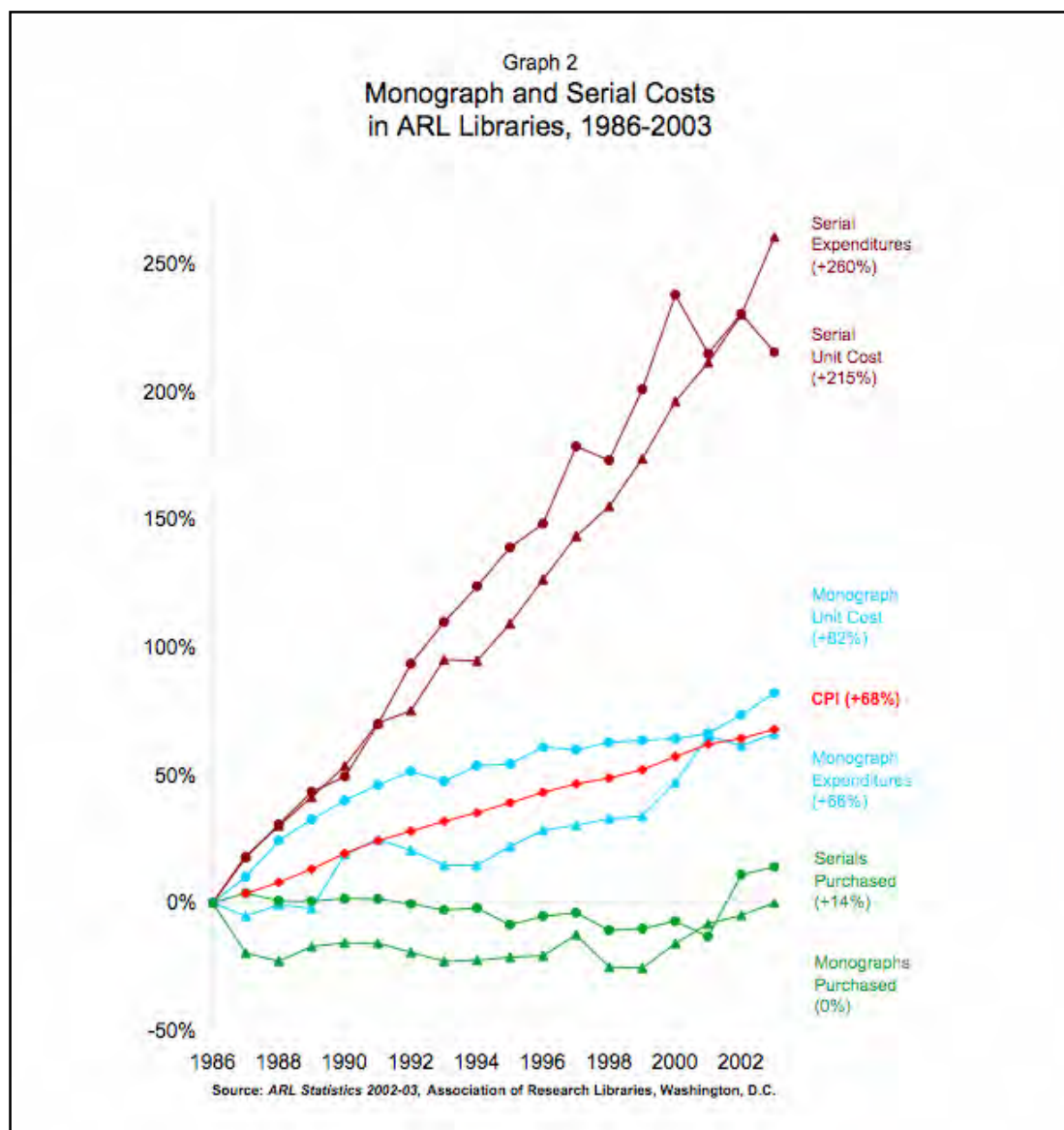
The University of Zimbabwe encourages its academics to publish in high impact journals as it strives to be a centre of excellence in teaching and research. Academics at the institution aim to publish in peer-reviewed and high impact factor journals. This study sought to assess researchers' access to electronic journal content and also how they use such content for teaching and research. In spite of the limitations of the impact factor, therefore, this study tried to establish the quality of access to journals provided by the university library and also to see whether the journals requested by faculty members are of high impact. The scope of this study is subscribed journal content as discussed in section 1.5, therefore, this study will employ the Journal Impact Factor from Thompson Reuters as a measure.

2.1.5 Serial Prices and Journal Subscription Prices

The rapid proliferation of web-based technologies has further revolutionised digital scholarly communication with the emergence of different models (Maron and Smith, 2008 and Newtown, 2013). These new forms of communication take a decentralised distribution where scholars can post their works on various platforms. The transition from print to electronic outputs was inevitable for scholarly communication publishing, but the transition did not reduce the cost of the electronic subscriptions. Within this digital scholarly communication system, academic publishers came to dominate scholarly publishing, and the prices of electronic books and journals continued to rise as library budgets were dwindling. Pinfield (2013) commented that the rise in journal prices was

termed (in 2005) the serials crisis and in their discussion of this crisis, Panitch and Mishakak (2005) reviewed the ten most expensive subscriptions and found that science journals were most costly. One comprehensive study of North American research libraries over a period between 1986 to 2004 revealed that journal expenditures increased by 273% between 1986 and 2004, and during the same period, the United States price index rose by 73%, which implied that the journal costs had outstripped the inflation by 4 times (University of Illinois, 2013). Their findings were summarised in Figure

2



**Figure 2: Monograph and Serial Costs in Association of Research Libraries (ARL), 1986-2005
(Young, 2009)**

In mid-2012, Harvard University reported that it could not afford journal prices, as Harvard University Library spent more than US \$3,5 million on journal subscriptions. In a published memo the university noted that:

“Some journals cost as much as \$40,000 per year, others in the tens of thousands. Prices for online content from two providers have increased by about 145% over the past six years, which far exceeds not only the consumer price index, but also the higher education and the library price indices” (Harvard University, 2012).

In a more recent study of periodical prices in 2013, Bosch and Henderson (2013) commented that library budgets were unlikely to support 2013 subscriptions in 2014, as the prices of journals were increasing against stagnated budgets. The authors used the ISI Indexes, and chose titles for which they searched for average prices for journals in different disciplines. In the Agriculture category which had 175 titles, the average cost of each title in 2011 was US\$1,277, in 2012 it was US\$1,343 and in 2013 it was US\$1,441, representing a 7% increase from 2012. While individual journal prices indicated an increase, Gantz (2012:3) noted that journals were now priced per license price and individual prices might not actually reflect a real increase. In comparison, there are few studies from African institutions that showed library funding in relation to expenditure in electronic journals costs (Kachoka and Hoskins, 2010; Hoskins and Stilwell, 2011; Ndlovu, 2011 and Mapulanga, 2012). In Africa, outside South Africa, institutional budgets allocated to libraries were in a poor state, in some cases with no funding for institutional electronic access except under consortial contributions (Ndlovu, 2011:3).

The rise of journal prices sparked reactions from both researchers and libraries – most libraries were obliged to cancel some subscriptions (Wysocki, 2004). Scholars and

researchers started to boycott publishing in major commercial publishers in protest against unfavourable pricing against libraries. Examples include the researchers from the University of California (UC) in San Francisco who called on their colleagues to boycott publishing in journals published by Cell Press (owned by Elsevier⁷). Cell Press had denied the UC libraries access to previously subscribed journals and required an additional levy of US\$90,000, above the subscription fees which had increased by 8% from the previous year (McCook, 2003). Another example was that the entire board of the *Journal of Algorithms* (published by Elsevier) resigned in protest to the publisher pricing policies, after which the board started to publish a competing journal, ACM Transactions in Algorithms (Van Orsdel and Kathleen, 2004).

The latest boycott was in January 2012, led by Timothy Gowers a Mathematician, who protested against Elsevier publishers, and launched a petition calling other scientists to shun publishing with any Elsevier journals citing the reason was that “they charge exorbitantly high prices for their journals” (Flood, 2012). More than 3,000 researchers and academics signed the online petition, which was later referred to as the “Academic Spring.” These developments triggered by serial prices, high subscription rates for journals and advances in internet technologies, were set to change the scholarly communication scene and models. It is noteworthy to mention that academics were early adopters of the internet and also were very passionate about access to journal content.

⁷ About Cell press. <http://www.cell.com/about>. [2014, March 28]

Despite the protest by one group of academics, another group was establishing parallel ways to share and distribute scholarly communication outputs. Two examples in this regard are that of arXiv and Public Library of Science (PLOS). In 1991, Paul Ginsparg a physicist from Cornell University, developed arXiv as a repository for pre-prints in physics where scientists would upload and share papers for worldwide access and review. Currently, the archive has more than 900,000 e-prints in mathematics, statistics, physics, computer science, quantitative biology, and quantitative finance. Preprint servers became one of the first choices for physicists and other researchers to find information on current topics, and to keep up with colleagues. Pre-prints allowed for a faster dissemination of results and allowed for comments from peers; however, the pre-print servers did not displace the need for publication, but offered an alternative for authors to share their work. Aman (2013:17) explained how Ginsparg coined the term “pre-print culture” to describe the way communication worked in high energy physics for decades before arXiv was established. In order to avoid double research and to avoid delays in the traditional publishing process, institutes printed their research results as pre-prints and distributed these copies amongst other researchers in the field while at the same time sending them to journal publishers. In this way, no delays in the journal publishing delayed the sharing and communicating with peers. Ginsparg took advantage of the improvement in technologies to set up an efficient way for researchers to share their outputs. To date, thousands of such pre-print repositories exist within research institutions. The University of Zimbabwe has an institutional repository where researchers can share their pre-prints. Faculty of Agriculture staff also have a community on that platform where they can share their pre-prints.

In the second example, the Public Library of Science (PLoS) was founded to realise the opportunities brought about by internet technologies. These technologies offered practicing scientists opportunities to expand and improve the ways of using the scientific literature. The possibility of making a treasury of scientific information available to a much wider audience, including millions of students, teachers, physicians, scientists, and other potential readers, who do not have access to a research library that can afford journal subscriptions, became very real. (Brown, Eisen and Varmus, 2003). The founding scientists (Patrick Brown, Michael Eisen, and Harold Varmus) were determined that the pay-per-access model was unsustainable due to unfair pricing, hence they stated “if we really want to change the publication of scientific research, we must do the publishing ourselves” (Brower, 2001:972). Therefore, a non-profit publishing model was established, originally funded by donations.

2.1.6 Open Access Scholarly Communication

The combined reasons of technological changes, the need for efficient systems to communicate research outputs, and the need to mitigate the problems related to traditional scholarly communication, led to the birth of the Open Access movement in early 2000. Open Access is a mode of scholarly communication where authors unmotivated by financial gain provide free access to their research outputs. Open Access literature is digital, free of charge, and free of most copyright and licensing restrictions (Suber, 2012:4). Open Access was defined by three declarations i) the Budapest Open Access initiative (2002), the Bethesda Statement on Open Access Publishing⁸, and the Berlin Declaration on Open Access to knowledge in the sciences and humanities. These

⁸ Bethesda Statement On Open Access Publishing. 2003. Available: <http://legacy.earlham.edu/~peters/fos/bethesda.htm> [2013, November 30].

three declarations are normally referred to as the 3Bs, emanating from the respective first letters of each declaration (Swan, 2012). The Berlin declaration captures the definition of open access this way:-

There are many degrees and kinds of wider and easier access to this literature. By 'open access' to this literature, we mean its free availability on the 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. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.

(Budapest Open Access Initiative, 2014)

Essentially the three definitions offered by the declaration emphasised the following key elements of open access- green OA⁹, gold OA¹⁰, “gratis” and “libre.” Gratis and libre refer to two scenarios, if price barriers alone are removed this implies gratis open access, and if permission barriers are removed, it is called libre open access (Suber, 2012). Furthermore, to achieve the goal of open access to scholarly literature, there are two complimentary strategies; Open Access Archiving and Open Access Publishing – Swan (2012) prefers Self Archiving and Open Access Journals, while Suber (2012:13) Open Access Repositories and Open Access Journals. In Open Access Publishing authors can publish in any open access journal, while in Open Access Archiving authors deposit their articles in an open access repository. These concepts tap from the foundations from the Public Library of Science (PLoS) and ArXiv, discussed in Section 2.1.4 of this chapter.

⁹ Green Open Access means researchers or authors self-archive their research outputs in subject-specific or institutional repositories. (These research outputs are published through traditional publishing channels (see Section 2.1).

¹⁰ Gold Open Access “involves publishing in an open access journal, which provides the dissemination and curation services of current proprietary publishers”. (Swan, Willmers and King, 2014:6).

The discussion in literature about Open Access (Barjok, 2012; Suber, 2012 and Swan, 2012) seemed to anchor around the four principles – unhindered (free) dissemination of scholarly materials, costs of production, two broad approaches (Gold Open Access and Green Open Access) and the effort to break financial, technical or legal barriers. Swan (2012) added the aspects of use of open access literature, for example that being able to read an article was inadequate, access and use should imply human use (essentially through reading and downloading) and computer use (for example text mining – Rodriguez-Esteban, 2009).

2.6.1.1 Open Access Archiving

Open Access Archiving entails authors depositing their works to open access repositories. Most of the repositories run on open source software and conform to the Open Archive Initiative and adhere to the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). The Open Archive Initiative is a community that developed and promoted interoperability standards that aim to facilitate the efficient dissemination of content (Swan and Brown, 2005). Most repositories contain pre-prints of journal articles and conference papers, but also other scholarly outputs are increasingly made available through this route. Barton and Waters (2004:8) summarised the reasons for institutional repositories as to create the visibility and citation impact of an institutional scholarly output; to provide unified access to an institutional scholarly output; and “to preserve the scholarly output of an institution”. For example, Swan and Brown (2005) summarised these issues in Table 1 below.

Advantages of institutional repositories	
Advantages to institution	Advantages to authors
Fulfils a university's mission to engender, encourage and disseminate scholarly work	Enables authors to provide open access to their work
An institution can mandate self-archiving across all subject areas	Provides a location for secure storage (of completed work and of work-in-progress)
Enables a university to compile a complete record of its intellectual effort	Provides a location for supporting data that are unpublished (large datasets, video files, etc)
Enables standardised online CVs for all researchers (e.g. RAE exercise)	Provides for one-input-many outputs (CVs, publications)
'Marketing' tool for universities	

Table 1: Advantages and Disadvantages of repositories (Swan and Brown, 2005)

To date there are more than 3,000 repositories registered with the Directory of Open Access Repositories (OpenDOAR) and as of December 2013 there were 112 in the Agriculture, Food and Veterinary science category. Subject repositories are also known as disciplinary repositories; they capture research in a given field while institutional repositories capture research from a given institution (Suber, 2012:57).

2.6.1.2 Open Access Publishing

The Open Access Publishing scene is made up of big and small publishers who are purely open access and also commercial publishers who have open access journals in their portfolios. Examples of big open access publishers include BioMedCentral, SciELO (Scientific Electronic Library Online), Public Library of Science (PLoS) and Hindawi¹¹ Publishing. The individual listing of open access journals and their publishers, the Directory of Open Access Journals (DOAJ) is a single reference point (Swan 2012). The

¹¹ Hindawi Publishing Corporation. <http://www.hindawi.com/> accessed 2013 December 23.

above examples are classed as ‘pure gold’ open access journals where all content is open access and licenced accordingly (Swan, 2012:23).

A study done by Björk and Solomon (2012), compared the impact factors of open access journals versus commercial journals. In that study the Directory of Open Access Journals¹² was used to identify open access journals. A total of 610 open access “journals were compared to 7,609 subscription journals using Web of Science citation data while an overlapping set of 1,327 open access journals were compared with 11,124 subscription journals using Scopus data” (Björk and Solomon, 2012:3). This study used key sources of citation data, Web of Science and Scopus - the Web of Science, is a product from Thompson Reuters and while Scopus is from Elsevier. In both cases, the average citation rates for the articles per journal were 30% higher for subscription journals than open access journals. It was also discovered that open access journals that adopt article processing charge (APCs) model cite more open access journals than other types of journals.

Another model, “hybrid” open access, offers authors to pay a publication fee have their article made open access in an otherwise subscription journal (Björk and Solomon, 2012). Barjok (2012:2) estimated that in 2011 over 4,300 such journals existed and the average article processing charge was US\$900.00 for open access journals using the APC model in comparison with subscription publishers who charge US\$3,000 per article. Villarroya et al., (2012) explained that author savings, external subsidies (for example, from author’s

¹² The Directory of Open Access Journals (DOAJ) is a registry and database that lists and provide access to open access journals and is maintained by Infrastructure Services for Open Access (IS4OA). The aim of DOAJ is to “increase the visibility and ease of use of open access scientific and scholarly journals thereby promoting their increased usage and impact.” (Stellenbosch University, 2014:n.p)

institutions), public funding, membership fees (society publishing) and funding agencies were sources of funding for open access journals.

A number of funding agencies have mandates to pay for the accessibility of research outputs. For example, BioMedCentral (2013) lists 34 funding agencies from which its authors have received funds to sustain the author publishing charge (APC). Abadal (2012: 130) listed additional strategies to support the purely open access business model through grants to parent organisations (for example, university presses), advertising and consortia. One such example is the Consortium of Open Access in Particle Physics Publishing (Abadal, 2012). In this present study, the University of Zimbabwe Publications (UZP) is fully funded by the university. As long academics are employed by the university, author fees are not levied. Although funding has been lacking for most of the journals published by the University of Zimbabwe, a few are still running see section 6.5 for a detailed discussion.

While hybrid journals also offer open access to articles, some journals have been accused (Swan, 2012:123) of following the principle of open access to the letter only, but not to the spirit. Swan (2012) calls this “double-dipping”. For example, the Wellcome Trust expressed concerns about some hybrid journals which were benefitting twice as they were receiving subscription charges as well as publication fees (Wellcome Trust, 2009). Many hybrid journals do not offer licences; they usually allow “human use” and restrict “computer use”, such as text mining. Jha (2012) noted that text mining was still forbidden by most publishers as “publishers’ still control text mining through expensive paywalls and policy restrictions”.

Piwowar¹³ explained how she managed to obtain Elsevier access to some of the open access journal data set for “computer use” (SPARC, 2013). These cases show the potential and challenge that academics face when accessing scholarly content from hybrid journals. Open Access Archiving and Open Access Publishing have therefore ushered new changes in to the scholarly communication process and these are documented in literature (Guédon, 2001; Hajjem, Harnard and Gingras, 2005; Suber, 2012; Swan 2012). The revolution in scholarly communication and access to research knowledge was reviewed by Houghton and Sheehan (2006).

Finch (2012: 5) summarised the current environment into three major interlocking channels for publishing, disseminating and gaining access to research findings. These were subscription-based journals, Open Access journals and Open Repositories. The different aspects of the last two has been reviewed in the first part of this chapter, the second part will predominantly focused on access to the subscription-based journals. The summary of these are depicted in Table 2:

¹³ Heather Piwowar interview with SPARC. <http://www.sparc.arl.org/news/sparc-interviews-heather-piwowar-pushing-frontier-text-mining> [2013, December 4].

Scholarly publishing models

Model	Example	Business model	Access model	Immediacy of access	Permanence	Peer review
'Traditional' print journals	Traditional scholarly journals	Toll-access (pay-to-read)	Restricted to subscribers	Delayed until print issue is published	Secure (traditional print archiving methods apply)	Yes
'Traditional' electronic journals	Traditional electronic journals	Toll-access (pay-to-read)	Restricted to subscribers	Mixed: sometimes delayed until whole issue is published, sometimes articles published as soon as they are ready	Initiatives underway	Yes
Open access journals	Public Library of Science (e.g. <i>PLoS Biology</i> , <i>PLoS Medicine</i>)	Open access (pay-to-publish)	Open to all	Immediate, online, when article is ready	Initiatives underway	Yes
Open access repositories	Institutional repositories in universities; arXiv	Open access (as a supplement to publishing in a traditional journal)	Open to all	Immediate, online, when author deposits (usually upon acceptance or at publication)	Institution's library or IT function takes responsibility	Yes

Table 2: Scholarly Communication Models (Swan & Brown, 2005)

2.2 Research Activity and Access to Research Information in Africa

While today's global economy is knowledge and information driven, developing countries seem to lack the means to access and generate information needed for their research and development (Hongladarom, 2007: 3). A literature search on access to current research or scholarly information in Africa tends to lead to authors who subscribe to the notion of the North-South Information divide as the cause of access gap between Africa and the rest of the world. Such scholars include Kirsop and Chan (2005), or (2006), Lor and Britz (2005), Hongladarom (2007), and most recently Raju, Smith and Gibson (2013).

A comprehensive report, the *UNESCO Science Report 2010*, (UNESCO, 2010:285) gave the status of world knowledge between 2005 and 2010. The report stated that in general there had been an increase in investments made in Research and Development globally and in emerging countries. India and the Republic of Korea were mentioned as having a marked increase. Sub-Saharan Africa produced 11,142 scientific articles in 2008, and South Africa produced almost half (46.4%) of that total, followed by Nigeria (11.4%) and Kenya (6.6%). These three countries combined produced two thirds of the sub-continent's scientific articles. Similar studies from pre-2010 corroborate this report and they show the small research output from African researchers in the corpus of world literature. Ritz, Adam and Laing (2010) did a PubMed search of publications on "access to medicines" in developing countries between 1999-2008. They found that there were few peer-reviewed articles on publication on access to medicines in developing countries, with only an average of 76 publications per year during the 10 year period. Ondari-Okemwa's (2007) analysis of research results from 48 countries in sub-Saharan Africa is noteworthy. He

extracted published articles between 1997 – 2007 from the Science Citation Index (SCI), Social Sciences Citation Index (SSCI) and the Arts and Humanities Citation Index (A&HCI).

The results of his analysis are shown in the Table 3 below,

Countries with 235 records or more between 1997 and 2007												
Note: Based on publication records in Thompson Scientific as of May 2007.												
Country	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
South Africa	4568	4613	4759	4609	4732	5049	4974	5395	5657	6305	1077	51738
Nigeria	877	838	864	884	746	854	855	926	1223	1269	204	9540
Kenya	582	579	617	578	597	666	694	662	684	843	159	6661
Tanzania	266	221	230	253	235	271	316	322	370	473	80	3037
Ethiopia	239	207	261	244	216	275	300	312	302	333	58	2747
Cameroon	188	193	187	209	216	263	292	332	344	425	69	2718
Zimbabwe	258	263	258	263	256	269	251	216	242	234	44	2554
Uganda	136	167	191	191	203	188	244	310	304	382	119	2435
Ghana	173	158	190	198	194	208	206	239	261	305	53	2185
Senegal	168	205	224	202	182	176	239	209	247	224	40	2116
Eritrea	112	159	146	142	147	155	146	153	148	156	38	1499
Benin	112	118	117	134	110	135	126	156	168	216	38	1430
Botswana	96	105	114	129	128	156	135	143	148	186	29	1369
Malawi	101	87	107	132	124	132	132	143	148	167	30	1303
Sudan	92	123	119	90	81	110	112	126	135	135	25	1148
Burkina Faso	68	90	82	78	95	108	135	138	127	175	31	1127
Zambia	99	97	83	78	99	89	98	86	121	152	29	1031
The Gambia	81	54	67	69	82	77	82	86	78	113	14	803
Mali	53	56	34	47	53	65	70	82	88	140	12	700
Gabon	53	64	64	52	64	63	69	69	81	97	11	687
Niger	78	69	53	50	51	62	61	45	86	85	15	655
Madagascar	14	21	14	19	21	33	115	91	123	150	27	628
Namibia	38	56	47	33	64	53	61	56	95	88	8	599
Mauritius	27	41	40	42	51	61	40	51	57	69	11	490
Mozambique	28	36	44	38	46	36	42	57	63	81	17	488
Togo	28	46	54	62	37	32	45	53	48	59	8	472
Swaziland	60	21	17	24	43	29	30	37	26	30	5	322
DR Congo	46	22	21	29	11	13	21	17	28	18	9	235

Table 3: Top 30 publications from Sub-Saharan African countries from 1997-2007 (Ondari-Okemwa, 2007)

In this ranking, Zimbabwe was ranked number 7 from the top 30 countries and South Africa, Nigeria and Kenya were the top three.. He further grouped outputs by the continental sub-regions – East, Central, Southern and Western Africa and the Islands.

The southern African situation within universities was analysed in detail by Abrahams et al., (2009) whose study was based on 2 key reports – *The State of Public Science in the*

SADC Region, and *Opening Access to Knowledge in Southern African Universities*. Their interest was to find the productivity, visibility and accessibility of university based research and scholarly outputs from the region. They conducted a bibliometric analysis on papers published and indexed by the Web of Science (ISI), Medline and African Journals Online (AJOL) from 1990 to 2007. Their study discovered that the total output from the 14 SADC countries for the period was 95,711 papers. Their findings were similar to the results of Mouton et al. (2008); both studies concluded that South Africa accounts for 79% of the total articles from the regional universities, while 21% is shared amongst the 13 other SADC countries. Zimbabwe was reported to be in the third position. The study concluded that research infrastructure in SADC universities should be strengthened and that SADC universities should adopt open access to knowledge as a strategic thrust and therefore strengthen their open access publishing and open access archiving institutional capacities.

The studies reviewed so far indicated low research activity in Sub-Saharan Africa when compared to the rest of the world. South Africa, Nigeria and Kenya dominated the research output in Sub-Saharan Africa. However, post UNESCO 2012, studies (Schemn, 2013, Gedye, 2013, and in exception Gaible et al., 2011) suggested a positive change. For example, Schemn (2013: 11) noted an increase in the number of papers published in scientific journals with at least one African author, to have quadrupled from about 12,000 in 2010 to over 52,000 in 2012. She noted that the world share of articles from African authors rose from 1, 2% to 2,3% between 1996 and 2012. The study seemed to attribute the increase in publications to the increase in access to resources; this element of this study will be reviewed in section 2.9 of this chapter. This present study will also seek to study

the Faculty of Agriculture's publications and determine from it the nature of access and also whether faculty members publish. The period of publications for this study is year 2000 to 2011 as collected in the *University Of Zimbabwe List Of Publications*, and this will be discussed in Chapter 6 of this present study.

2.2.1 Challenges related to Access to Research in Africa

Most authorities agree that there are challenges inhibiting access to scientific research information and specifically journal content in most institutions in sub-Saharan Africa. Dessie and Mesfin (2013:70) pointed to global political problems affecting access to research, such as reliance by countries on education systems and literature from their colonial masters; military governance which gave less priority to research and development, and African countries' strategy of "massification" of higher education. UNESCO (2010), Britz, et al., (n.d), Harle (2009), Adams, King and Hook (2010) are some of the studies that have enumerated the challenges related to access to electronic journals and other online scholarly content in Africa. Their findings can be grouped into the following themes, internet connectivity and bandwidth, lack of computers and computer networks, support infrastructure, weak library systems (Harle, 2009) and lack of awareness. Most studies from Nigeria raise the issue of support infrastructure, such as electricity and power cuts pertinent to the access to electronic journals (Achonna, 2008; Chingbu, 2012). In this section, literature on internet connectivity and bandwidth is reviewed as it is raised in most cases by Southern African authors (outside South Africa) (for example, Shibanda, 2006; Mapulanga, 2009; Harle, 2009; Harle, 2010; Bhukuvhani, Chiparausha and Zuvalinyanga, 2012) in access to online electronic resources.

2.2.2 Internet Connectivity and Bandwidth

In his study on challenges to access to scientific literature in four African universities Harle (2010: 34) noted that internet connectivity to sub-Saharan Africa was improving due to undersea cables connecting Africa to the rest of the world. As of January 2014, the status of connectivity is shown in the map below (Figure 3), which illustrates an increase in the level of cables coming from the rest of the world.

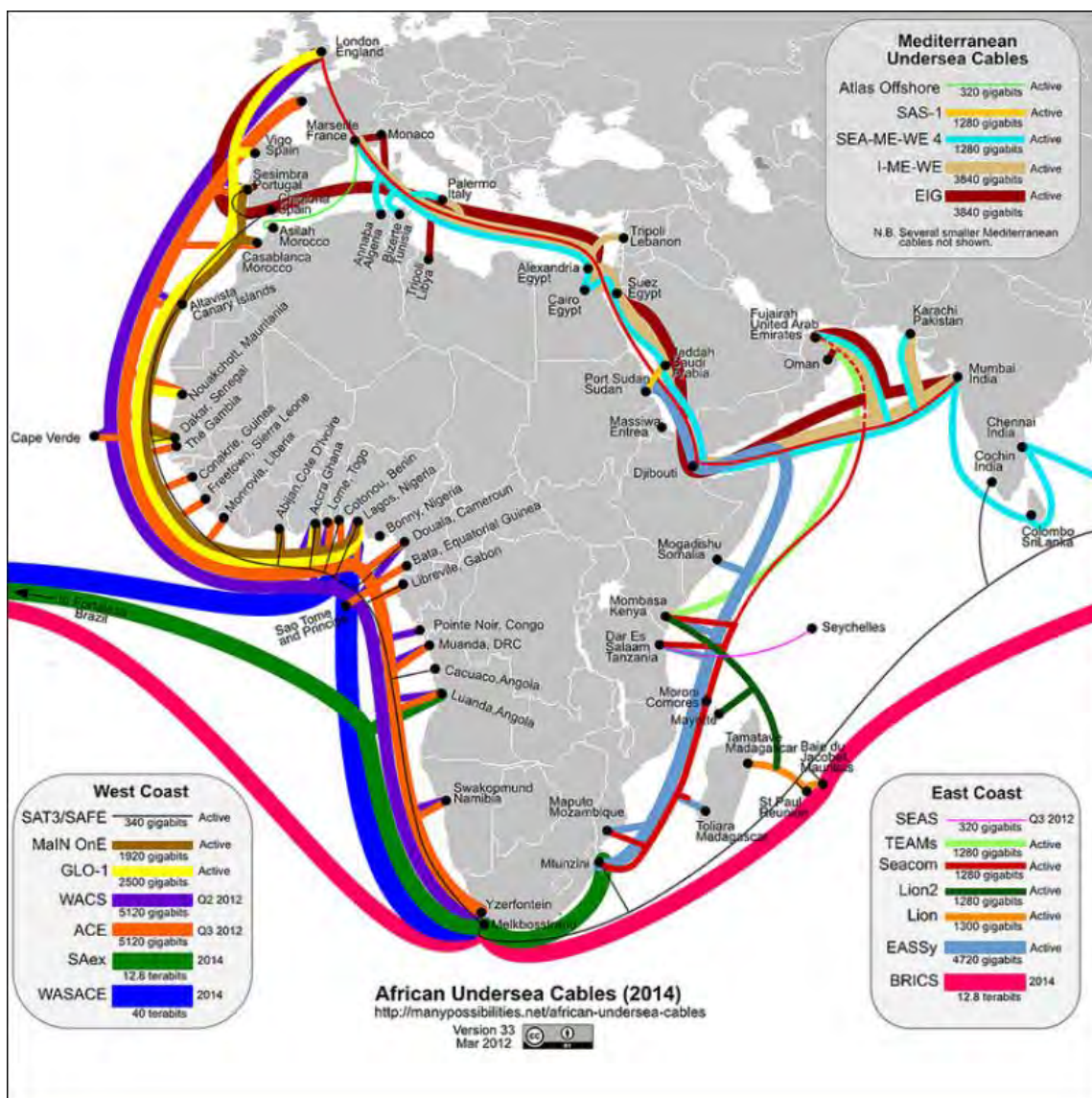


Figure 3: Africa undersea cables -Jan 2014 (© Song, 2014)

The above diagram shows less connectivity to landlocked countries in the southern Africa, with South Africa having better connectivity than the other countries in the region. The countries in Western Africa are more connected than the rest of the sub-region. Despite the increase in connectivity to Sub-Saharan Africa, a recent report (International Telecommunications Union, 2013:3) acknowledged that the cost of internet is still the highest in the world here and also that internet penetration in the region still remained low. In a related report (Analysis Mason,2013), it was acknowledged that investments were made in the region in the last 5 years by internet service providers, but since these were private investments, internet costs had not gone down. The report provided the cost of Internet per Gigabyte in selected African countries, expressed in the Figure 4 below,

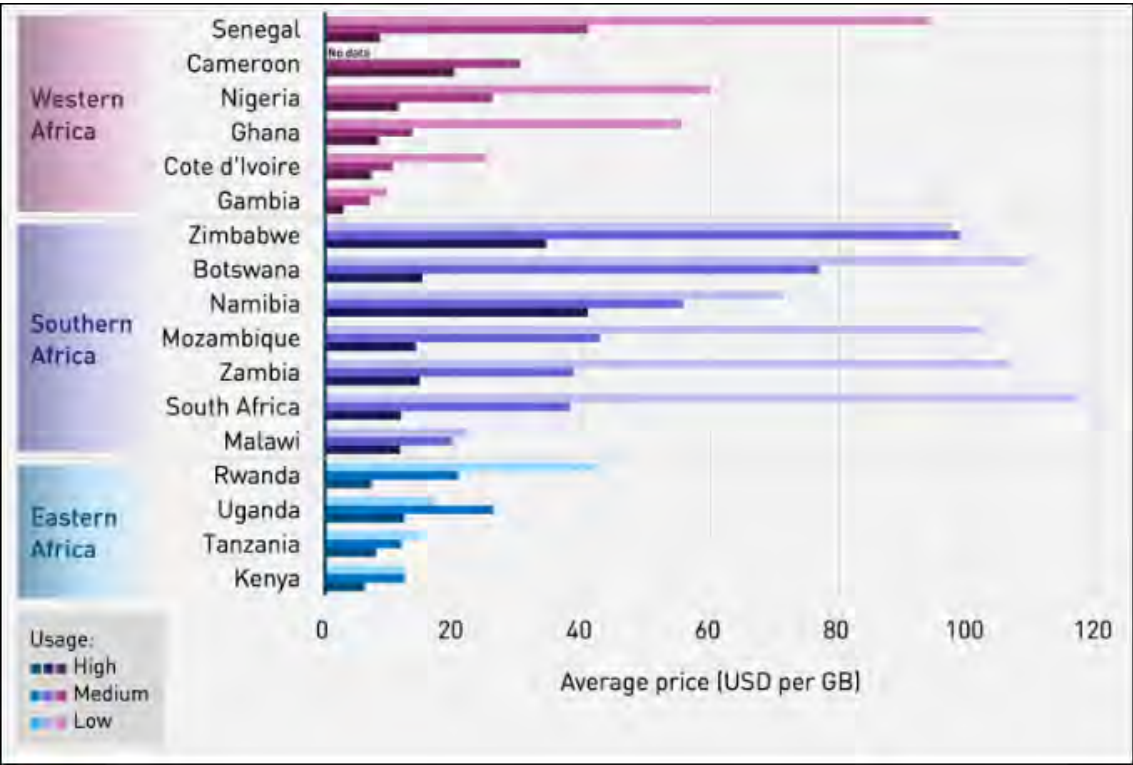


Figure 4: Average price per GB of traffic for low-, medium- and high-usage Internet access bundles, selected African countries - Analysis Mason, 2013.

Figure 4 shows that in Southern Africa, Zimbabwe has high cost of internet usage per GB of traffic. The impact of the cost of internet affects educational institutions more, since they depend on state funding in most sub-Saharan countries. Chinama, Makaza and Madzima (2008:8) surveyed internet connectivity and bandwidth from four universities in Zimbabwe, and their findings are summarised below,

Network Service	University of Zimbabwe	Midlands State University	Chinhoyi University of Technology	National University of Science and Technology
No. of Network Points	3000	1000	350	4000
No. of Users	12 000	10 000	1 560	6 000
Size of Bandwidth	2Mbps	1 Mbps	2 Mbps	2 Mbps
Cost of Bandwidth per Month	(Z\$)140 million	(Z\$)120 million	(Z\$)130 million	(Z\$)10 million
Type of Internet Link	Leased line	Leased line/ Fiber Optics	Leased line	Radio Link Dial-Up

Table 4: Networking Infrastructure in 4 Universities in Zimbabwe (Chinama, Makaza and Madzima, 2008:8)

Table 4 illustrates the network infrastructure that existed in 2008 at the 4 state universities, and the number of users utilising the resources. The University of Zimbabwe then had 12,000 users with only 3,000 network points and used a leased line type of internet connection. The study showed that the bandwidth use was very low. In 2013 however, the University of Zimbabwe reported a 239 Mbps increase in their internet connectivity (Nyagura, 2013). In Malawi, one study revealed that access to a fibre optic cable positively affected library operations and reduced internet costs:

“The fibre optic network has increased bandwidth from a maximum of 1,024 in Kbps around 2006 to between 4 and 8 Mbps per month. Bandwidth costs have been reduced from an average of \$US3,000/Mbps in 2006 to around US\$1,700/Mbps per month in 2012. The number of articles downloaded has increased from 6,075 in 2006 to 50,860 in 2011, representing a 737 per cent increase” (Mapulanga, 2012:224)

2.2.3 Access initiatives to subscription scholarly content in Africa

The challenges of access to electronic journals are an international issue as seen in section 2.2.1. However, African researchers are in a more difficult situation as they experience other ancillary challenges as reviewed in section 2.2.1. Harle (2009:3) indicated that the new opportunities for digital information led to a number of access initiatives for obtaining scholarly content in Sub-Saharan Africa. The current access initiatives programme established in the literature can be grouped into three broad groups, the Research4Life programmes, negotiated access schemes and individual publisher arrangements. A recent report from the Association of Commonwealth Universities (ACU) suggests that around 80% of some the top-ranking journals are actually available in the current collections of many African university libraries (Harle, 2010).

2.2.3.1 Research4Life Programme

Research4Life comprises of four programmes operating online portals that provide low income countries with free or low cost access schemes to scientific and technical information otherwise only accessible through subscriptions. Research4Life is a public-private partnership (Gaible et al., 2011) of the World Health Organisation (WHO), the Food and Agriculture Organisation of the United Nations (FAO), the United Nations Environment Program (UNEP), World Intellectual Property Organisation (WIPO), Cornell and Yale Universities and the International Association of Scientific and Medical Publishers. In each of the four portals in the Research4Life programme, each subscribing institution can search publisher's databases, view abstracts of publications, and download complete texts of the articles and publications. Once each institutions is

registered, all its members – students, researchers, lecturers, teaching and administrative staff – and visitors on site are eligible to access these resources using the institutional password. While licences vary according to each portal, there is a limitation of downloads as whole journals or books cannot be downloaded; download is limited to articles or book chapters for one journal issue provided they do not exceed 15% of its contents.

Collectively, the Research4Life programme provides eligible libraries and institutions with over 30,000 peer-reviewed international scientific journals, books and databases in several languages. Training materials are available on each respective portal and Information Training and Outreach Centre for Africa (ITOCA) has a partnership with the Research4Life programme to provide training in the use of these resources. Gullingham (2013) also stated that other training partners were engaged such as “librarians without borders” or the International Network for the Availability of Scientific Publications (INASP), which offered electronic journals usage training grants. UN agencies also support such training initiatives.

The first Research4Life portal is the Health Internet Access to Research Initiative (HINARI) which was launched in 2002 and is led by the World Health Organisation (WHO) in collaboration with Yale University. HINARI, as of December 31, 2013, provided access to over 11,400 journals in 30 different languages, 18,500 eBooks and 70 other information resources. The journals are also searchable through a special version of PubMed. (The platform can be accessed at <http://www.who.int/hinari/en/>)

The impact of HINARI in improving people's lives has been documented in a number of case studies which are summarised by Swartz (2013). Limitations of HINARI access have also been raised in literature, for example countries with a Gross National Income (GNI) per capita exceeding \$4,700 are not eligible. Chinnock (2011) noted that these restrictions have affected India, which, according to the multi-dimensional poverty index, is classed poor, is not covered by the HINARI access. Another example is Cuba, which lost its access to HINARI in January 2013 when the country was reported to have a positive GNI level and a positive position in the Human Development Index (HDI) (Urria, 2013). Publishers participating in the HINARI portal temporarily withdrew their collections for Bangladesh's institutions, alleging a breach in access conditions, but after an outcry full access was restored (The PLoS Medicine Editors, 2011). These few studies raise questions of sustainability of HINARI and related access models to African institutions. The current access commitment of Research4Life runs until 2015; it remains to be seen what the future of these programmes will be.

Essen, et al. (2012) reported a survey in Rwanda to assess the effectiveness and usefulness of HINARI to medical school curricula focusing on the e-Book collection. Their study discovered that after categorising and reviewing the medically relevant e-books on HINARI, they found that e-Books were as inadequate to meet the needs of medical schools in Rwanda, as in the United Kingdom and the United States. While this present study does not seek to evaluate any journal provider, Essen's et al., (2012) provided an approach which was used in this study to study access of resources from the user's needs or perspectives (see discussion on Section 1,5 above).

The second portal is the Access to Global Online Research in Agriculture (AGORA) which was launched in 2003 and is led by the Food and Agriculture Organisation of the United Nations (FAO) in partnership with Cornell library. AGORA provides access to over 3,400 journals in agriculture, fisheries, food, nutrition, veterinary studies, and other life sciences. The journals are also searchable through the CABI¹⁴ abstracts. (The AGORA platform can be accessed at <http://www.aginternetwork.org/en/>). The impact of AGORA access has been reviewed by Vent (2005: 226) and Research4Life (2013a). The later report (Research4Life, 2013b) indicated that “AGORA enabled local researchers, scholars and scientists at a Malawi agricultural college to produce quality and well-researched project reports, scientific papers, theses and dissertations”. The AGORA portal is used mostly by the Faculty of Agriculture academic staff at the University of Zimbabwe. The availability study, detailed on chapter 4 of this study will seek to establish also how the electronic journal collections meet the needs of the faculty.

The third portal is the Online Access to Research in Environment (OARE <http://www.oaresciences.org/about/en/>) and is led by the United Nations Environment Programme (UNEP) and provides access to more than 4,150 electronic journals, and up to 8,300 e-Books on environment, pollution, botany, ecology, geology, oceanography and other related disciplines. The fourth portal is the Access to Research for Development and Innovation (ARDI <http://www.wipo.int/ardi/en/>) which is led by the World Intellectual Property Organization. The portal has access to 10,000 electronic journals, books and reference works from diverse fields of science and technology. Takagi and Czajkowski (2012:35) stated, “WIPO’s program is to tackle information challenges by offering a broad

¹⁴ CABI Abstracts is an abstracting and indexing database that gives researchers access to over 7.3 million records from over 7,500 journals, books and conference proceedings.

range of diversity of programs catering for the needs in developing countries skills, absorbing capacity and adding value to information for using it as knowledge. The ultimate goal is to provide information that stimulates innovation and creativity in the world". This showed that the interest of ARDI goes further than information access, but ensured that the least developed and developing countries become more innovative and use information for productivity.

2.2.3.2 Negotiated Access Schemes

There are two schemes, one by INASP, the Programme for the Enhancement of Research Information (PERII) and the EIFL licence negotiating scheme provided by EIFL (Education information for libraries). The model of these two schemes is to negotiate with vendors on behalf of library consortia and libraries in partner countries to do what?. Farrow (2011) indicated that the INASP model was developed over the years to enable access to research and scholarly information via electronic information resources and online journals. The EIFL licence negotiating scheme reported in 2012 that it similarly enabled partner libraries to save an estimated US\$215 million in subscription fees, and achieved an average discount of over 97% (EIFL, 2013).

2.2.3.3 Publisher led initiatives

The JSTOR African Access Initiative is an online journals archive established by the Mellon Foundation, to make its collections (in arts, humanities and social sciences) freely available to African universities. The Archives contain over 2,000 academic journals, as well as select monographs and other materials. Contents are full-text searchable and the

archive begins with the first issue of each journal and runs to a moving wall of 3-5 years (the most recent issues of journals are thus not included). The database can be accessed at <http://www.jstor.org/>. This African access is made possible through a combination of donor support and the subscriptions and fees paid by libraries in other countries around the world, and also publishers' willingness to support this initiative.

The Up-to-Date Database Global Health Delivery Project. The Up-To-Date® International Grant Subscription Program on GHDonline provides one-year complimentary subscriptions to Up-To-Date®, an evidence-based and peer-reviewed clinical information resource, to clinicians, doctors and institutions offering medical care or related services to developing countries.

The Low Cost Journals Scheme. In 2002, the Association of Commonwealth Universities launched the Low Cost Journals Scheme (also known as Protecting the African Library Scheme within Africa). The purpose of LCJS is to assist member universities in developing countries within the commonwealth to secure access to print journals at an affordable price, at a discount of 75-80% of the cover price.

The Essential Electronic Agricultural Library (TEEAL) is an initiative by Cornell University's R. Mann Library in cooperation with over 50 major scientific publishers to provide full-text agricultural journals to universities, agricultural research organizations, and government ministries in eligible low-income countries. This programme was explained in section 1.1 above. As noted before, the Technical Centre for Agriculture and Rural Cooperation (CTA) of Netherlands had since July 2009 been providing small grants to support the purchase

of TEEAL sets by universities and research institutions to acquire TEEAL. Chimalizeni et al., (2010) provided some statistics of the usage of the TEEAL database by eleven African countries, the results of their survey are displayed in Table 5 below.

Institution	Country	No of times accessed in 2010
University of Zimbabwe	Zimbabwe	606
Ahmadu Bello University	Nigeria	376
Forestry Research Institute -Ghana	Ghana	65
National University of Science and Technology	Zimbabwe	47
CSIR -Ghana	Ghana	14
Africa Rice Centre	Benin	13
University of Ghana	Ghana	9
Egerton University Kenya	Kenya	6
Uganda Martyrs University	Uganda	5
AGRIS Centre	Sudan	1
Sokoine University of Agriculture	Kenya	1

Table 5: Survey of TEEAL Usage by institutions in Africa (adapted from Chimalizeni, et al., 2010)

The results in Table 5 show that TEEAL is not heavily used¹⁵ by the institutions in Africa, however, it shows a higher usage of TEEAL at the University of Zimbabwe than elsewhere. Three other studies (Oduwule and Sowole, 2006; Akobi,2007 and Salaam and Aderibigbe, 2010) evaluated the TEEAL programme in Nigeria. Their findings showed the appreciation of the TEEAL resources by the faculty staff and students in the respective institutions under study. More than 50% of respondents in the Salaam and Aderibigbe's (2010: 13) study were of the opinion that access to TEEAL helped them improve their own research and that TEEAL had the requisite information they needed. Despite the TEEAL sets available to both institutions, both studies noted challenges beyond TEEAL as a

¹⁵ Usage was based on downloads.

reason for non-access (for example lack of electricity and computers), as indicated in 2.2.1 above.

Section A of this literature review has shown the developments within the scholarly communication process, and provided a view of the issues involved. The literature indicated that problems of access in the international scene were sparked by budgetary issues as a result of price increases that caused a serial crisis. Academics have however always been searching for alternative ways to share their outputs, and combined with the developments in technology, open access was born. In Sub-Saharan Africa (outside South Africa), issues in accessing current journal literature were affected by broader macro-issues such as weak governance, lack of investments in research and development, infrastructural issues, internet costs and lack of necessary technologies. However, an increased access to electronic journals could also be shown, with the suggestion that around 80% of top-ranking journals are actually available in the current collections in most African institutions. Three modes of access schemes – Research4Life programmes, negotiated access schemes and individual publisher efforts – have contributed to increased accessibility of electronic journals.

Section B: Literature Review

This section presents a brief summary of the electronic journals in libraries and then reviews literature on issues related to availability and use of electronic journals by researchers and their impact on teaching, research and publications.

2.3 Electronic Journals Use and Adoption in Libraries

The two sections that follow will focus on issues related to electronic journals and their acquisitions in libraries. How electronic journals are acquired will be considered, as this has an impact on their availability.

2.3.1 Electronic Journals

The proliferation of electronic resources and digital collections has had an impact on librarians, budgets and also on library users. In recent years, academic users have become more dependent on article databases and electronic journals to obtain information pertinent to their needs (Sasireka, 2011:223). These journals can be available via onsite server or via the Internet. A number of studies have addressed the reasons for acquiring electronic journals in academic libraries. Chu (2000) surveyed 95 major academic libraries in the United States to examine how librarians were responding to electronic journals. The author reported that the top five reasons cited reasons for acquiring electronic journals as the ability to provide remote access; simultaneous use by more than one user; timely access; searching capabilities not found with print journals and accommodation of such unique features as links to related items. From this study, it is obvious that libraries benefit from electronic journals. The study revealed also that electronic journals provide users with faster, more convenient 24-hour desktop access from home or campus. Electronic journals are preferred over print journals for a number of reasons:-

- *Speed* (Wells, 2011): Articles can be online as soon as the editorial process is completed, without having to wait for months for a space in the journal issue. For example the American Chemical Society places articles on their website “as soon

as publishable” which can be up to a few weeks before print. Information could therefore be much more current than can be achieved by paper journals.

- *Easily Searchable*: “Searchability” is one of the advantages of a digital format, and concepts can be searched at sentence, paragraph and article levels (Wells, 2011). Most journal publishers are acquiring high powered search engines that ensure that articles are available online to create visibility. Article abstracts and other bibliographic information can be shared with indexing and abstracting services and made available on *Google Scholar* in real time after publication and in most cases even before the journal issue publication.
- *Interactive*: Online publishing offers the journals community a chance to comment on articles as they are posted. Networks and communities are established as articles are read and there is much feedback received, emails and social media tools such as ‘Facebook’ and ‘Twitter’ are increasingly used as feedback collection tools (Wells , 2011).
- *Accessible*: Immediate access to information is provided by electronic journals. Users can access articles within minutes and do not need to travel to retrieve information, which is a phenomenon of print journals. Hitchcock, Carr and Hall (1998) agreed that availability from a desktop means a significant increase in accessibility especially for those far away from the library building. Wells (2011) noted that different layers of access can be given to different people, for instance subscribed users have full text access and the general public have abstract level access only.
- *Links*- Electronic publishing exploits linking in hypertext where papers can link to those they have cited and also can be linked to those that cite them. The growth

of knowledge can be watched and also a reader can manager to follow references by clicking on then and opening snippet views of these while on their main articles.

The emergence of electronic scholarly information has also brought new challenges to their management and access, which libraries did not have in print (Swan and Brown, 2005:4). Some of the issues include, firstly the ownership of the content and secondly perpetual access of previously subscribed to resources. Regarding perpetual access, Stemper and Barriebeau (2006:104) conducted an extensive study on perpetual access to electronic journals by university libraries and their sample included 40 publishers of electronic journals, including commercial, society and university press publishers. Their study showed that 64% of the publishers could grant perpetual access, albeit not automatically upon subscription. They found that if libraries accepted licenses from publishers in their generic form and sign them without negotiating, libraries and their patrons risked losing access in the future should the online subscriptions be cancelled. Their study also showed that those librarians who negotiated perpetual access in their licensing, had increased subscription costs, and they were encouraged to budget for perpetual access.

In a related study, Zhang and Eschenfelder (2012) considered 72 electronic journals licenses in terms of perpetual access clauses among commercial publishers, society publishers and university presses. Their study focused on differences in perpetual access between consortia and site licenses. Their findings showed that the licenses from commercial publishers were more likely to provide perpetual access than licenses from society publishers and university presses. Consortia licenses depended on a third-party to

obtain perpetual access. A comprehensive investigation of perpetual access and archiving of electronic content was done by Beagrie (2010:1-177) and provided an analysis of how this can be achieved. These studies indicated that subscription is not synonymous with purchase in the electronic environment. The University of Zimbabwe subscriptions to electronic journals are mainly through the Zimbabwe University Library Consortium (ZULC) whose negotiations for journals is done by EIFL (license negotiating scheme) and INASP (PERII). In most cases these two entities negotiate perpetual access for ZULC members, although publisher policies vary. A sample of listed resources on INASP and EIFL assures perpetual access. Browse (2013: 36) indicated that “INASP requests that publishers commit to a long-term programme of affordable access and activity which reflects the pace at which change might realistically occur”. The other issues related to electronic journals or in general electronic scholarly resources are presented in the Table 6 below,

Electronic scholarly resources: the advantages	
Access	At any time, from any workstation, in any location
Speed	More rapid publication and speedier retrieval of information
Dissemination	Libraries can more easily share their collections with users around the world if copyright and licensing conditions permit
New content	Additional types of content can be included, such as video and audio files, large datasets, large graphics files and so on
Linking	Documents can be connected from references, text notes, and supplementary material
Access	Permit open access models of dissemination
Electronic scholarly resources: issues of concern	
Ownership	Most electronic journals and books have been licensed to libraries rather than being owned outright and access to the material is usually only for the lifetime of the licence. Universities are now starting to add clauses to their licensing agreements with publishers that cover current use, archiving and perpetual access to licensed content
Archiving and storage	While no complete answer to the issue of longterm storage of digital resources has been found, various initiatives are underway in Europe and the US. Some university libraries are also taking steps to secure a print 'copy of record' of each article
Peer review	Electronic journals are no different to printed journals with respect to peer review: in other words, the vast majority operate the same sort of peer review procedures to ensure consistency and level of quality. Preprints (electronic versions of articles prior to peer review) are common currency in some disciplines, notably physics and computer science; scholars deposit preprints to establish their claim on a piece of research and to generate discussion within the peer community. Preprints should not be confused with postprints, which are peer reviewed articles in electronic form.
Reproduction quality	In some disciplines, digital dissemination is not always considered adequate: an example is fine art illustrations, which a scholar may need to view in high-quality printed form

Table 6: Electronic Scholarly Resources -Advantages and Disadvantages (Swan and Brown, 2005)

There are economic and technological barriers to the use of electronic journals. The networks, computer hardware and software needed to access electronic journals are expensive to acquire, frequently need replacing, have heavy maintenance costs associated and, therefore, beyond the reach of many users. Adams, King and Hook (2010:23) noted that the academic community was divided into two groups; the “haves” and “have nots” in terms of access to needed equipment and networks. The issue of having to download and print articles may prove to be too costly to users. Some libraries may not afford to have full connection to the Internet and have all the facilities to access, download and preserve the electronic journals. The speed and bandwidth of networks can be affected, thereby, slowing down the downloading speed and might end up frustrating users.

2.3.2 Acquisition and Subscription Models for Electronic Journals

Academic libraries and journal vendors have worked out a number of electronic journals acquisition and subscription models. In most cases, individual journals titles are purchased in a database suite such as *EBSCOhost* or *Taylor and Francis*. In order to facilitate libraries using these databases, most vendors and/or publishers draw up contracts, “access policies” that define the usage and also specify who could view the content and how it should be distributed to users. These licenses break down access into two camps of either continued or perpetual access which is “the right to permanently access the licensed materials paid for during the period of the license agreement; or archival access which is defined as “the right to permanently retain an electronic copy of the licensed materials” (Jewell, et al., 2004:2). Thanuskodi (2011:5) outlined a number of subscription models for electronic journals which included, individual site access on – pay

by subscription, pay-per-use or pay-per-view, institutional access (usually through institutional public Internet Protocol) , the consortia access model, and the big deal model. These and other journal acquisition models have been discussed in literature and are summarised below:-

The traditional Subscription Model: This model was also used in the print environment where users paid a standard rate over a designated period and had full access to journal volumes during the year (Wells, 2011). In the electronic environment this is referred to as “site licensing” for an institution and a username and password for an individual. This option is more expensive for academic libraries, as they pay for title subscription rather than database access.

The Pay-per-view (PPV) Model: This model charges a download fee per article, and usually the articles cost on average about 30USD\$ per download. This is useful for downloading at article level when full access to the whole journal is not required. Schell, Ginanni and Heet, (2010:87) found the following potential benefits of this model: users can access thousands more articles than previously available through traditional library subscriptions; cost-per-use for on-demand articles was found to be cheaper than seldom used subscriptions; and that evaluation by usage statistics is more precise. However, some concerns were raised, for example, that the accounting log was regularly inaccurate, and the cost per article was higher than advertised. This model was suitable for very specific unique requests which were not covered by other subscription models.

Mac Alpine (2010) analysed the use of this method in 70 academic libraries and discovered that it was used in only 18 of the libraries surveyed. This method was found useful for highly priced journals, as the library will pay only for the articles that it downloaded. Carr and Collins (2009) examined the appropriateness of this method during economic depression times and found it useful in the face of falling budgets. However, in their survey the method was not sustainable in the long run, as they also found that the cost-per-use of PPV is oftentimes significantly higher than it was for a subscription. Debate of the cost effectiveness of PPV when compared to subscriptions was discussed extensively by a number of authorities. (Harwood and Prior, 2008; Chamberlain and Mac Alpine, 2008; and Carr, 2009). The University of Zimbabwe library has not been utilizing this method, but other small research libraries are finding it cost effective.

The Institutional Model: This can be either or both of the two models described above. The institutional model is based on access to a package of electronic journals titles in a database rather than individual titles.

Consortia Models: This is by far the most common model preferred by academic libraries. Library consortia have evolved from just cooperating amongst similar libraries to become powerful negotiating forces in academic libraries. Examples of known consortia in academic libraries include: CAUL (Council of Australian University Libraries); CALIS (China Academic Libraries and Information Systems); Washington Library Consortia; eiFL – Education information for Libraries (UK); ICOLC –International Coalition of Library Consortia.

In the consortia model of acquiring electronic journals, participating libraries negotiate with publishers and share the costs. Park (2007) outlined two options for such arrangements, the first is a national academic library licence scheme (national academic site licensing model) and the other is the cooperation purchasing (co-purchasing) model. In both instances a committee is established to look at individual institutions' needs and publishers policies. In the Korean Education and Research Services (KERIS) the following parameters were set for the selection of electronic journals national academic licensing model (Park, 2007):-

1. Online journals in heavy demand for research.
2. Online journals of high quality
3. Online journals with precedence among various subjects
4. Online journals with balanced subjects coverage
5. Online journals with good pricing after negotiation,
6. Online resources offering a national academic licensing model.

The Zimbabwe University Library Consortium (ZULC) adopted the cooperating purchasing scheme of resources (including e-journals) and each participating university library chose its access modality and negotiates directly with the respective subscription agent (EIFL or INASP).

The University of Zimbabwe Library obtains its electronic resources from ZULC. While the existence of library consortia in Sub-Saharan Africa is evident in literature, for example, in Ethiopia (Bajpai, 2013), Kenya (Shibanda, 2006), Malawi (Mapulanga, 2013), Zimbabwe (Bhukuvhani, Chiparausha and Zuvalinyenga, 2012), Nigeria (Olorunsola and Adeleke, 2010), South Africa (Thomas and Fourie, 2006), a few studies focus on electronic journals acquisitions and subscription models. Olorunsola and Adeleke (2010:589) reviewed the

status of electronic journals acquisitions within 30 Nigerian university libraries and focused on the role of consortia in subscription to electronic journals.

A recent study by Mapulanga (2013) in Malawi sought to find out how libraries are accessing electronic resources and showed that the Malawi Library and Information Consortium (MALICO) was instrumental in libraries' access to electronic journals through the EIFL and INASP schemes. The study noted that while the electronic resources are heavily discounted, libraries are failing to contribute their portion towards e-resources due to inadequate budgets. Bhuvhukani, Chiparausha, and Zuvalinyenga (2012) concur to that in Zimbabwe, consortial access is the main method of accessing electronic journals for university libraries in Zimbabwe. Although successful consortia acquisitions have been evident in the Sub-African and Indian contexts, Roth (2013:207) raised concerns that individual library specific needs are not supported in the collective process; that smaller libraries pay more subscriptions if subscriptions are divided equally. Three advantages however make consortia the future of electronic journals access methods – economies of scale, sharing of resources and easier availability.

The Library enabled programs model: Developing countries lack the capacity to acquire all the electronic journals subscriptions that they need due to a number of reasons. Developmental organisations have provided assistance in access to electronic resources through what Hunter and Bruning (2010) refer to as “library enabled programs”. In this model, libraries in developing countries (classed as such according to their Gross Domestic Income) are given subsidised rates (or paid fully on their behalf) to access journals databases, the ‘Research4Life’ programme is one such example. The HINARI

Portal gives access to more than 13,000¹⁶ electronic journals in medicine and biomedical sciences. Masinde and Rahim (2011) noted that due to this model, there has been a significant increase in the number of African institutions accessing electronic journals.

However, the sustainability of this model cannot be guaranteed, as Koehlmoos and Smith (2011) reported that the HINARI program was being withdrawn in Bangladesh and leaving a lot of institutions with no access to much needed journals. It is interesting to note that not all developing countries have access to these programs, for example HINARI is not available in India, Brazil, and Indonesia, because “they represent potentially large revenue streams for publishers” (Houghton and Oppenheim, 2010:4). Academic libraries in these countries need to have a matrix of acquisition policies to enable perpetual access to electronic journals and other e-resources.

Open Access: While open access is not a subscription model, it has grown to be a scholarly communication model where libraries can access unrestricted content. Open access has been reviewed above in Section 2.1

2.3.2.1 “Big Deals”

This term was coined in 2001 by Kenneth Frazier to describe multiyear contracts in which a library purchased all or most of a commercial publisher’s journals at a price based on the library’s current subscription costs and paid annual price increases that were fixed at the outset of the contract (Frazier, 2001). Glassier (2013:263) gave the following example of the meaning of the “Big Deal” to a library, “for example, if the library spent \$10,000 on 50

¹⁶ As of December 2013.

print titles, it could acquire the publisher's Big Deal package (sometimes all of the publisher's titles, sometimes a large portion, but not all) for, say, 5% more than the \$10,000 it already spent plus a small access fee." Other than coining the term "Big Deal", Frazier also doubted the success of this model and predicted that it was unsustainable and that libraries should not acquire these Big Deal packages. The downside of this model was that libraries were neither able to reduce their number of subscriptions nor lower their electronic journal costs (Bivens-Tatum, 2013). The cost always grew by a fixed amount each year (for example 4%), notwithstanding the library budget. Most libraries in western countries were exposed to the negative effects of this scheme when library budgets were cut either due to economic crises or other reasons. The Big Deal model was criticised (Peters, 2001) for three reasons with respect to collection development and management in academic library collections: librarians are no longer focusing on the needs of community of users; no selection is done at individual title level; and the Big Deal activities risk to homogenise core collections. In Sub-Saharan Africa outside South Africa, the most common method of journal subscription in African university libraries, is the consortium model, and the influence of the INASP and PERII resources is seen in most consortia in Sub-Saharan African countries. This verified the findings from the study by Harle (2010) that in Sub-Saharan Africa journal collections had increased and issues of electronic journals acquisition had been addressed over time.

2.3.2.2 Electronic Journal Access platforms

The various subscription models and schemes have increased the number of online electronic resources that are available to most libraries. Librarians face the challenging decision of making this content available to users on and off-site. According to Oberg

(2009:235), how an electronic journal is accessed is very important and libraries today exist in 'post-catalog-centric era' where it is generally recognised that there must be a multitude of options ways users can access electronic journal content. This study contended that seamlessly linking online and off-line library content in user searches was of prime importance. Sadeh and Ellingsen (2005) reviewed methods and systems that libraries employed to expose their content and their work traced the complexity and tools that could be used to manage electronic content. Their work reviewed the various facets of electronic resources management systems (ERMs), noting that these could be commercial or developed in-house.

Yu and Breivold (2008:356) offered advantages and disadvantages of commercial versus local systems, and they noted that the issue of compatibility with vendors in both cases was an issue of concern. They listed the following features of a good electronic resource management system - supporting acquisition and management of licensed e-resources; "tracking electronic resources from point of order through licensing and final access; providing information about the data providers, consortia arrangements, access platforms" (Chaurasia,2010), and supporting retrieval and usage statistics (Feather, 2007).

These systems most often employ some kind of federated search functionality. Craven (2007:2) defined federated search as "searching aggregates multiple channels of information into a single point", and it is also known as parallel searching, meta-searching, and broadcast searching. Dialog, LexisNexis, Ovid, SFX are some of the database providers who provide cross database searching within their collections.

However, “in no way can the federated search compete with Google in Google Strengths: speed, simplicity, ease of use, and convenience” (Weddle and Grogg, 2008:237). Google Scholar has a library support program¹⁷ that works with publishers’ link resolvers to facilitate access to commercial databases. Google is compatible with most OpenURL- link resolvers. (Examples such as SFX from Ex Libris, 360 Link from Serials Solutions, LinkSource from EBSCO, or WebBridge from Innovative Interfaces).

The University of Pretoria found that utilising Open Urls had an increase in usage statistics registered, articles download statistics rose from 42,200 in April to 155,583 September 2007 (Pienaar and Smith, 2007). The other common modes of facilitating access to electronic journal collections include link resolvers and OpenUrls, A to Z listing of titles and providing links to the platforms (Crum, 2011; Weddle and Grogg, 2008 and De Groot, 2013). The screen shot below shows how the search results in a link resolver enabled Google Scholar appears, (notice arrows)

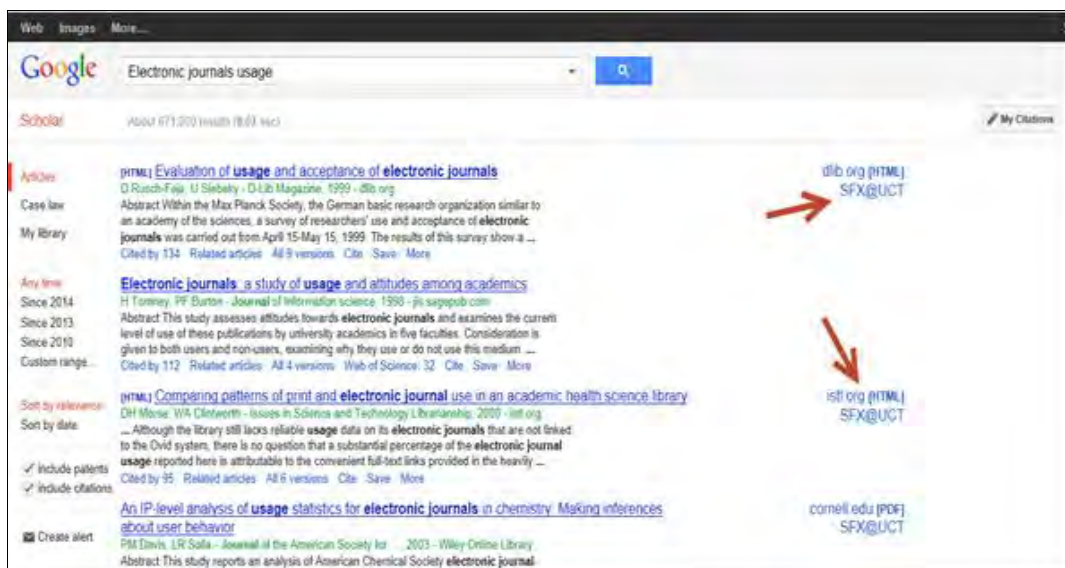


Figure 5: Search Results of OpenUrl link at the University of Cape Town Google access

¹⁷ Google Scholar Library Program <http://www.google.com/intl/en/scholar/libraries.html> [2013 November,14]

There is very little literature published on the electronic journals platforms used in libraries in Africa (outside South Africa) such as link resolver software and Google Scholar discussed above, A study by Harle (2010:32) in four university libraries showed that one of the challenges for access of journal literature in Africa was that library websites and portals were under-developed. The report noted that 34% of the surveyed users use library websites in comparison to the 70% that used Google.

In a survey commissioned by INASP on selected library websites, it was found that for many students and researchers, the first port of call for information is a search engine rather than the library website or online catalogue and only 29% of catalogues were providing links to electronic journals (Burnett and Kyle, 2012). The results further showed that some libraries had static pages with no active links to electronic journals. McCreadie (2013) in a recent study of library value in developing countries discovered that librarians needed to create more visibility of electronic resources through building accessible and usable websites

At the University of Zimbabwe, the library uses the Millennium Innovative library software, a commercial integrated library system, and the library used to have a Web Bridge (link resolver software package from the integrated library management system) which offered a possibility of accessing electronic journals. Currently¹⁸ the library uses its web page which offers links to specific journal databases, through A-Z listing of databases subscribed to and links to Research4Life portals. The impact of this access will be

¹⁸ As of December 2013.

examined in the availability study and the survey to be discussed in chapters 4 and 5 respectively.

2.4 Evolution of Electronic Journals Use and Their Impact to Researchers and Academics.

Some studies have been conducted on electronic journals usage. This section presents literature in these studies in trying to establish the emerging concepts emanating from these studies.

2.4.1 Approaches to studying use of electronic journals

Studies of the use of scientific literature and electronic journals revealed two methodological approaches. The first group of studies used surveys or interviews to examine respondents' views and opinions of electronic journals. The second group relied on bibliometric evidence, based on investigations of what users downloaded, read, and cited. Davis and Walters (2011:209) referred to the studies based on bibliometric approaches as “unobtrusive methods” which also include download statistics. This present study is unique in that it employs both methods and therefore sought to offset the imbalances of each approach by the strengths of the other – this is discussed more in the next chapter. Download statistics have been criticised for varying especially if different user interfaces were used and also downloads do not necessarily mean that an article was read (Davis and Price, 2006:1245). In the present study it was impossible to get statistics from all the platforms; especially the Research4Life statistics were very difficult to obtain as platforms are hosted by the respective United Nations agencies and they are never made public.

Literature reviews on the usage of electronic journals were undertaken, by Tenopir and King (2002), Rowlands (2007) and by Tripathi and Jeevan (2013). Tenopir and King (2002) surveyed the literature from over 200 studies on the use of electronic resources published in libraries between 1995 and 2001. The results showed that, in general, electronic journals were rapidly adopted in the academic spheres, with academic staff reading on average 120-130 papers per year per person. The review further indicated that the number of personal subscriptions to journals was going down as researchers preferred institutional or library subscriptions. Scientists were reported to be reading more articles than engineers, yet all readers regarded electronic journals to be of high value. One striking finding from that literature review was that faculty seemed not to be aware of pre-prints and post prints resources available to them.

The second study by Rowlands (2007) generally regarded as the “post-Tenopir” review, focused on electronic journals articles published from 2004 to 2006/7. The review established four groups of themes emanating from the literature, firstly – a change in scholarly methods of knowledge production and use. For example researchers were reading electronic journals from wider sources and this was facilitated by end user search tools. Tools like Web of Knowledge or Scopus were very popular amongst researchers. Secondly – digital transition: electronic journals had replaced print journals at a much faster rate than initially anticipated, and also that mediated library services were disappearing faster in preference to self-services. Thirdly –subject domain and information use: it was found that domains were useful in determining journals use. Fourthly - on user behaviour: this study established that researchers were not technically

proficient at searching and were employing secondary means such as Google to obtain needed articles. The full findings are detailed in the Table 7 below.

1. Changing contexts for scholarly production and use

- Researchers appear to be reading more primary journal materials from a wider range of sources than ever before. The key drivers appear to be the availability of end-user search tools and changing working practices as researchers engage more in Mode II knowledge production.
- Specialist secondary services remain strong only in a few areas with strong Mode I characteristics. Generic services like the Web of Knowledge and Scopus are very much up and coming.
- Researchers spend less time per article reading. They “see” an increasingly narrow view of their own discipline as a result of the accelerating growth in the literature.
- Despite many problems with the current publishing system, there is little consensus on the best way forward. Positions are entrenched both in terms of stakeholder tribe and adherence to economic, technological, or behavioural determinist positions.

2. The digital transition

- Where implemented, electronic versions of journals have displaced print use dramatically and at a much faster rate than many anticipated.
- Introducing electronic journal platforms has a strong negative impact on print-only titles. The convenience and consumer acceptance of the new medium raise big issues for the continuing value of the print legacy.
- In bald contradiction, an isolated study suggests that introducing e-platforms actually increases print use by raising the profile of journals as an information source. This merits further investigation.
- There has been a major shift from a focus on the journal to a focus on separates, with brand management implications for publishers.
- Convenience and digital visibility are critical factors in the new information landscape.
- There is a strong correlation between print and electronic journal use in that the more popular titles tend to be used relatively more heavily in both formats.
- Mediated library services are declining rapidly in favor of user self-service. In some cases, mediated services are nearing the point of extinction.
- Much of the current thinking about the digital transition lacks sensitivity to some deep-rooted domain differences. It is not tenable that all disciplines are moving towards the common end point emblemized by the physics community.

3. Subject domains and information use

- Specialties or disciplines are a more useful, more natural unit of analysis for studies of scholarly communication than studies at the institution or journal level. This observation should be taken much more seriously at the research design stage.
- Greater sensitivity to disciplinary variation is needed in the design of user behaviour studies.
- A theoretical perspective (“domain analysis”) which begins to explain some of the scholarly communication preferences of different user groups is beginning to emerge. However, it remains a high-level concept. It is difficult to operationalize effectively in practice, either in terms of designing research studies or digital libraries.

4. Changing user behaviour

- The introduction of databases of electronic journals signals a major shift from browsing to search behaviours.

Table 7: Findings from electronic journal and user behaviour review by Rowlands (2007:389-390)

Tripathi and Jeevan (2013) recently did another literature review on electronic resources usage in academic libraries. Their study sought to highlight the importance of quantitative and qualitative analysis of usage of electronic resources, and also described various studies on user behaviour and attitudes towards electronic journals.

2.5 Use of Electronic Journals in Developed Nations

Davis and Walters (2011) reviewed surveys and interviews on information seeking and reading behaviour of scientists in the United States and established three trends, first that scientists were reading more articles while spending less time on searching and retrieving them, secondly, scientists now read from a broader group of journals and could read older literature, and thirdly that scientists are more reliant on institutional access. These findings were similar to the Rowlands (2007) findings enumerated above. King et al., (2009) surveyed five university faculties in the United States to find information seeking and reading patterns. They found that faculty used a variety of means to find articles, including browsing and searching, the latter particularly for research purposes, and to locate older articles. The study found that faculty members who published more, or who have won awards, read more articles on average than their less productive or successful colleagues. The same conclusion was reached by Tenopir et al., (2010) who compared e-reading patterns from academics in Australia, Finland and the United States. Their study discovered that the readings from electronic journals and articles provided by libraries were more often for research than were readings from other sources. Academics noted that such research reading stimulated new ideas and their study confirmed that academics who published more also read more.

In the United Kingdom, the Research Information Network (2011) commissioned a study to understand how electronic journals were being used within the universities in the country. Their research established that users spend less time on the journal platforms since they use gateways such as Google, Google Scholar, Web of Knowledge and PubMed in order to download the articles they want. These gateways were found to be useful because they offered a single interface to access electronic journals, rather than visiting each journal publisher's platform and that they were easy to use. This study also found that researchers use less advanced searching techniques due to the complicated nature of search syntax and it was found that researchers from the sciences judged articles from title information. The study noted that "downloads of journal articles are rising faster than the worldwide growth in the number of articles published each year" (Research Information Network, 2011:9).

It was concluded that electronic journals were in demand for teaching and for research and thus researchers valued enhancements to access. This study also confirmed what other studies in the developed world showed, that researchers' information seeking happened outside libraries, mostly in their offices, at home or on the move. The study found that fewer than 14% of researchers, mostly in the humanities, still walked into the library to read a hard copy of a journal or book. This study also analysed the referencing behaviour over a period of time, and found that over a period from 1997 to 2007; access to electronic journals had an impact on the research behaviour of researchers in UK. For example, it was found that researchers were producing articles with more references from a wider range of resources than they used to a decade ago. The study also

established that universities with high number of research students had an increased usage of electronic journals.

In Spain, two comprehensive studies (Borrego, et al., 2007; Olle and Borrego, 2010) focused on the use of electronic journals at eight Catalan Universities and the impact of electronic journals on the scholarly information behaviour, respectively. Borrego et al., (2007) established that there was a high usage of electronic journals by academic staff, and that knowledge of electronic journals was high w (95.3% respondents). The main reason identified by younger researchers for using electronic journals was for research, while the older researchers used them for both research and teaching and a significant percentage only for teaching. Electronic journals were used mostly in Biomedicine, Exact and Natural Sciences and Engineering. In a continuing study three years later, Olle and Borrego (2010) showed that academic researchers now read more, and more widely. It was discovered that their reading was becoming more superficial. The electronic accessibility of journals meant that researchers make few visits to the library.

2.5.1 Project COUNTER

Using quantitative methods to measure the usage of electronic resources has not been straightforward. Luther (2001: 3-6) listed possible issues that arise, and these are there is lack of reliable and comparable electronic resources usage data. Secondly, if data is available it lacks context and cannot be generalised, and thirdly, incomplete data and sometimes incoherent from different vendors and service providers. In order to standardise data collection for the purpose of evaluating electronic information, the COUNTER project was developed. COUNTER (Counting Online Usage of Networked

Electronic Resources) “is an international initiative serving librarians, publishers and intermediaries by setting standards that facilitate the recording and reporting of online usage statistics in a consistent, credible and compatible way” (COUNTER, 2013).

The COUNTER project was launched in 2002, and it offers Codes of Practice on recording and usage reporting that covers online journals and other networked databases. COUNTER works with various stakeholders in the publishing industry to develop and implement usage-related reporting and services. COUNTER has grown to be used as an industry standard in managing statistics to guide collection decisions (Innovative Interfaces, 2007). COUNTER ensures that publishers provide COUNTER-Compliant reporting to help librarians collect standardised reports to inform better decision making. COUNTER-Compliant statistics are easy to compare across vendors. Sugarman, Krueger & Kelly (2011:84) noted that while COUNTER was useful in providing guidance for electronic journals and database usage, it failed to provide guidelines for multi-media statistics usage.

2.5.2 Other quantitative studies

Meanwhile, studies using quantitative data, report an increase the download numbers for electronic journals. (Nicholas, et al, 2010; Tenopir, Maysa and Wua, 2011; Research Information Network, 2011). The study by Nicholas, et al, (2010) examined the raw logs for Science Direct obtained for the period January to April 2007 (for ten institutions in the UK) and these were subjected to deep log techniques and where using the Software Package for Social Science (SPSS) analysed. The results showed an increase in the number of article accesses and the study showed that gateways such as PubMed were highly

used to locate and retrieve journals by 56% of the institutions under study. The study also showed that keyword searching was the most popular search method amongst scholars. Other than surveys, transaction logs and downloads; citation analysis has been traditionally used to measure electronic journal usage. Each of these methods has its weaknesses and has been discussed extensively in literature (Nicholas, Huntington, and Watkinson, 2005; Davis and Walters, 2011). Citation analysis studies of electronic journals come in two ways. The first group of studies focused on bibliometric studies of citations in journals. Ni, et al., (2013:802) stated that “bibliometricians usually study authors and keywords associated with journal articles, as well as the collections of articles that form journals. The journal thus becomes an essential component in many bibliometric analyses”.

The second group of studies focused on the impact of scholarly journals on citation behaviour. In the present study, the first type of citation method will be reviewed in Chapter 6. Regarding the second group there are some disputes over whether increased access has broadened the scope of cited materials. Commenting about this argument, Evans (2008) reported that commercial access to literature through large online collections had led to a reduction in the scope of articles that were likely to be cited. This claim was refuted by Jacobs (2006) who said that citations to scientific literature are becoming more dispersed over time, was a flawed claim. Davis and Walters (2011) concluded after reviewing literature, that there was little evidence that improved access has an independent effect on citation counts. However, all these studies agreed to an increased access to electronic journals and a significant increase in publications, but disagreed whether the one lead to the other.

2.5.3 Citation analysis and its use in measuring library resources

Citations analysis may be used to provide data and tangible means to investigate and ascertain the use of local collection materials, both electronic and print (Bierman, 2012: 412). Citation analysis is taken to represent the analysis of bibliographic references to discover through these resources a number of factors such as articles consulted, impact factors, average number of citations (Jacobs, 2006) and to measure collaborations. Citation analysis was first reported in 1927, when Gross and Gross (1927) used the method to study references to a journal for a Faculty of Chemistry at Pomona College.

Hoffman and Doucette (2012) reviewed 34 studies of citation analyses focusing on “user study” articles which informed collection development. Their study noted that common investigations focused on students’ and faculty’s research outputs in either theses or journal articles. Three core areas of investigation were defined: selecting a target group of users; defining types of publications; and defining the date range of publications. Three approaches were used in citation analysis and these were, firstly, use of the Web of Science index to establish author affiliation and also to discover their publications; secondly, in some studies alternative databases such as PubMed were used. Lastly, some studies focused on student theses or dissertations and these were gathered from libraries or document delivery services such as ProQuest. A few studies employed random sampling and searching on various databases and the internet. In this present study, the challenges of identifying the articles highlighted by Hoffmann and Doucette (2012), were avoided by using the *University Of Zimbabwe List Of Publications*, which provided the needed references. Also studies indicated that using the Web of Science had tended to

miss published works from African journals as they are not indexed by these aggregators (Harle, 2010; Ondari-Okemwa,2007) and exclude most open access (outside those offered by commercial publishers) journals.

Edewor (2013: 2) noted that, various studies were conducted in Africa in library and information science to understand and evaluate journal usage. Factors such as numbers of articles, characteristics of authors, impact factors, average numbers of citations, citation age, consumption factor, popularity factor and h-index were taken into account (Jacobs, 2006; Ocholla and Ocholla, 2007; Onyanchara,2008 and Onyanchara, 2009). A few studies of electronic journal usage and availability using a citation analysis were conducted in in Sub-Saharan Africa. Edewor (2013) used citation analysis in evaluating the journal, *Information Impact: Journal of Information and Knowledge Management-ISSN: 2141-4297* in order to establish its performance according to an importance index, influence weight and popularity index. In a related study, Onyanchara (2009) also used citation analysis to assess 14 journals in library and information science/studies (LIS) journals published in sub-Saharan African countries. Google Scholar was used to measure these journals according to the following variables - number of publications; average number of records; number of citations; citations per year; citations per article, amongst many others. These studies focused on electronic journals and not on authors, while the present study sought to use citation analysis to understand author reading trends and to establish whether they use electronic journals available in the university library.

Davis (2011) used a citation study to understand if discounted journal access programmes helped researchers increase their publications in Sub-Saharan Africa. The study used three

bibliometric indicators of scholarship: article production; reference length and the number of references made – within journals included in the TEEAL package (see Section 1.1.1 of this study for the discussion of the TEEAL programme and also section 2.2.2.3). Two sets of institutions were used in the study; one with a TEEAL access and one with no TEEAL access. The resultant dataset had 19,753 article publications and 497,437 references from 70 institutions in 11 African countries between 1988 to 2009. The study established that ownership of TEEAL did not result in higher article production, although it did lead to longer reference lists. This was established after both institutions, the one with and the other without TEEAL access, had increased publications in the same period. A similar conclusion was reached by Ross (2008: 115) who found less research output when she studied publication from developing countries using the Web of Science index and compared these to the HINARI and AGORA platforms.

2.6 Use of electronic journals in Sub-Saharan Africa

Most studies from Sub-Saharan Africa used surveys in to study issues related to electronic journals, rather than deep logs, transaction data or web visits. There were more studies of electronic journals emanating from Nigeria than from the other parts of the continent. South Africa, Nigeria and Kenya are the top three producers of scholarly works in Africa (Ondari-Okemwa's, 2007; Abrahams,et al., 2009 and UNESCO, 2010). Achonna (2008:26) investigated the status of awareness, access and usage of electronic journals in Lagos, Nigeria. The study revealed that the level of electronic journal usage was low amongst students and that they lacked skills to access electronic resources. However, Chingbu (2012) who studied electronic journals usage amongst academics at the University of

Nigeria, showed that 93% of the respondents were aware of electronic journals. While academics reportedly found the Research4Life portals and EBSCOHost databases as avenues for locating articles (44%), Google Scholar was most highly used (50%) for retrieving articles. Most (92%) academics in this study accessed these resources from their offices and 82 % used commercial cyber cafes. Less than 50% used university libraries to access electronic journals. The reasons for using electronic journals were 98% for current awareness, 96% for literature searches, and 90% to upgrade lecture notes. Academics also indicated (59%) they would contribute papers to an electronic journal, showing a willingness to publish.

Outside Nigeria, the following relevant studies were located, Shibanda (2006), Treptow and James (2011), and Bhukuvhani, Chiparausha and Zuvalinyenga (2012). Treptow and James (2011) reviewed the studies in electronic journals from a global focus; they zeroed in on the usage patterns of electronic journals by prominent researchers in South Africa and the study focused on the way journal articles were retrieved and also took into account disciplinary differences. In their literature review, they established that electronic journals were considered very important by South African researchers across all scientific disciplines. Regarding the methods of locating electronic journal articles, Google Scholar was preferred by 72% of the respondents from all scientific fields, followed by Google at 69%. This result resonated with previous studies and confirmed the popularity of Google and Google Scholar in retrieving articles from databases. The bibliographic databases ISI Web of Knowledge and Scopus were reportedly underutilised in retrieving articles at 24% and 17% respectively. This study found that some disciplines still preferred print, for example arts and humanities. This concurred with the finding in the United Kingdom that

most humanities researchers still requested print copies of journal articles (Research Information Network, 2011).

The study by Bhukuvhani, Chiparausha and Zuvalinyenga (2012) came from Zimbabwe, they looked at the effects of electronic resource training on the usage of electronic journals by academic staff and its impact on pedagogical practices and research productivity. It was found that lecturers who attended the electronic resources training (Electronic Information Resource Training –EIRT) had used more than one electronic information resource for their teaching (Bhukuvhani, Chiparausha and Zuvalinyenga, 2012:24).

Dimension of work	Considerably	To some extent	Not at all	Don't know
	f(%)	f(%)	f(%)	f(%)
Easier to find material	8 (26.7)	20 (66.7)	1 (3.33)	1 (3.33)
Easier to get hold of material	8 (26.7)	18 (60.0)	2 (0.67)	2 (6.67)
Extended the range of material	8 (26.7)	17 (56.7)	2 (6.67)	3 (10.0)
Easier to keep up to date	8 (26.7)	20 (66.7)	0 (0.00)	2 (6.67)
Improved the quality of work	7 (23.3)	19 (63.3)	2 (6.67)	2 (6.67)
Inspired new ideas	8 (26.7)	21 (70.0)	0 (0.00)	1 (3.33)
Saved working time	6 (20.0)	18 (60.0)	3 (10.0)	3 (10.0)
Reduced browsing in libraries	6 (20.0)	19 (63.3)	3 (10.0)	2 (6.67)

Table 8: Effect of Electronic Resources on Lecturers' work (Bhukuvhani, Chiparausha and Zuvalinyenga, 2012:25)

The attributes shown in Table 8 that measured 'dimension of work' seemed to reflect general retrieval concerns of any user who is not a lecturer. The results further show that lecturers relied more on Internet resources (83%) than on electronic resources (10%) provided by the library.

2.7 Availability Studies in Libraries: Theoretical Foundations

Of the many studies of the concept availability, Mansbridge (1986), Nisonger (2000) and Nisonger (2007) provided review articles. Mansbridge reviewed availability studies published up to 1984, while Nisonger reviewed those published after that time to 2005. Chandler (1998:2) explained that “availability studies” could be compared to systems analyses within the library context and established how a library system provided required documents to its clients. Most availability studies, however, were done outside Africa with a few studies from South Africa were noted, Zondi (1996:108) focused on book availability studies, and a more recent study was by Alabi (2011: 454) which also focused on book availability. A variety of research designs in print availability studies used Kantor’s branching method to show specific reasons why known items were not available or could not be found by patrons (Kantor, 1976:312). Nisonger (2007) surveyed the use of Kantor’s branching method and found that the method had been implemented in United States, Europe, Africa, Asia, the Middle East and Australia, signifying its international acceptance. Availability studies have also been used in the print environment to assess both book and journal collections, for example, Shaw-Kokot and De La Varre (2001:21) used a journal availability study as method to improve access to journal collections.

2.7.1 Electronic journal availability

There is limited literature on electronic journal availability studies, although there is a steady growth in interest in this area. Initial attempts to measure electronic availability

were reported by Kaske (1994:317) where he proposed to extend Kantor's method in searches via electronic catalogues, where librarians would search their own library or search multiple libraries and establish electronic availability via the computer catalogue. In that study Kaske proposed that web-based electronic availability studies should attempt to measure the extent to which the full-text of electronic documents could be retrieved. This study was not limited to electronic journals, but provided a baseline for electronic availability studies. Nisonger (2009:427) enlarged Kaske's study of electronic availability by applying it to electronic journals and measuring their access through the university library page.

A 500+ item sample of article citations was collected from scholarly journals in five disciplines: Area Studies, Humanities, Sciences and Social Science, with a hundred citations per category. These emulated the needs of the researchers at Indiana University in Bloomington. It was found that an average of 65.4% of the items were electronically available through the library web page. However, the specific field availability rates were Area Studies - 51%, Humanities - 45%, Professional fields - 81%, Sciences - 79% and Social Sciences - 71%. The reasons for non-availability were ranked per discipline. In general it was found that the following reasons explained non-availability:-

1. Titles were not subscribed to
2. No electronic archival access (citations were earlier than available collections)
3. Titles available but abstract only
4. Incorrect Citation

Squires, Moore and Keese (n.d) conducted an electronic journal availability study at the University of North Carolina (UNC) Chapel Hill to establish what percentage of articles

were readily available online, and also sought to explain the reasons for non-availability. A sample of 400 citations was collected from course reserves, reading lists and articles authored by persons affiliated to UNC Chapel Hill. The list was considered a simulation of the needs of the faculty and students. It was found that 78% of the 400 articles were available online. The reasons for non-availability were that the library did not have subscriptions to unavailable journals and that the institution did not have an electronic archival access.

Brazzeal and Powers (2007:155-160) examined the electronic journal availability of agronomy journals at eight Association of College and Research Libraries (ACRL) member institutions with a doctoral program in Agronomy. In this study the sample list of agronomy journals was harvested from 2005 Journal Citation Reports (JCR) published by Thompson Reuters. This core list comprised of 47 titles. This list was searched for library holdings of the identified eight institutions with PHD programmes in Agronomy. On average it was found that the electronic availability rate was 62.7% of the agronomy journals with an average of 45.3% available full text. The major reason for non-availability was no subscription and also different access platforms requiring different passwords.

The above studies were carried out outside the African context. In 2009 Arcadia commissioned the Association of Commonwealth Universities (ACU) to study the challenges faced by African researchers in accessing journal collections and other electronic resources (Harle, 2010:8). This study focused on four African institutions – the University of Malawi Chancellor College, the University of Nairobi in Kenya, the National University in Rwanda, and the University of Dar es Salaam in Tanzania. This study involved

240 postgraduate students, 23 librarians and ICT staff in the stated institutions. Four disciplines – Arts, Humanities, Sciences and Social Sciences were studied. In studying availability, samples of 20 journals were identified from the Thompson Reuters JCR and were searched against current subscriptions in each institution and the “potential availability” was established through a number of access schemes. The results were then benchmarked against two European universities for comparative analysis. The study established that together the four universities had an average electronic availability rate of 79% (for the top 20 titles in four disciplines) and this compared to the European counterparts who were at 95%. Interestingly, the study showed that the availability rate increased when potential alternative access was available from AGORA, HINARI and OARE, to a potential electronic availability rate of 83% for the top 20 titles. The study did not focus on the reasons for non-availability directly, but inferred that the 21% non-availability could be that the institutions had insufficient access to electronic collections.

2.8 Access to Journal Content and Publishing Trends.

This chapter has reviewed access schemes available to African researchers (2.2.2), and a number of open access schemes now available, were discussed (2.1.4). The challenges experienced by accessing online scholarly literature as well as the publishing output in the global context as compared to Sub-Saharan Africa were considered. Schemn (2013) noted that Africa’s research was reported to be on the increase. She based her study on the results released by the Research4Life programme. In a recent report, the Research4Life programme reported an increase in publications up to 194% in countries that received access the Research4Life programme. Dr Plume, Elsevier’s Associate Director of Scientometrics and Market Analysis, used “a database sourced from Thomson Reuters to

count the appearance of each country in the author affiliations of indexed journal articles, and then grouped these countries by their Research4Life eligibility” (Research4Life, 2013b:2). While noting an increase in publications, Schemn (2013) quoted Richard Gedye, the Research4Life publishers’ representative, who stated that demonstrating real research output impact is not a straightforward matter. He noted that stronger bibliometric analysis remained a challenge as there was a lack of basic information about institutions participating in the Research4Life programmes and similar access programmes. Hence, he proposed a comprehensive survey in 2014 to establish a methodology to measure Research4Life’s impact on stakeholders and publications (Gedye, 2013).

A recent literature review on scientist productivity (IVA, 2012) focused on the age of scientists, access to resources (necessary for publishing, finance and grants support), and research group level, and attempted to find out the actual factors causing scientists to publish. The review showed that there were many factors determining the causes of scientists publishing and noted that these differ from institution to institution and from country to country. However, below is a summary of the findings,

“Many studies have shown that the productivity of publications at individual levels tends to increase within the hierarchy of academic positions, where professors are the most prolific personnel. The average production of publication increases with age and reaches a peak at some point during the career and then declines. Female scientists tend to publish generally between 20–40 per cent fewer publications than their male colleagues. Scientists who have many PhD students/master students/technicians will be more productive in publishing than others, this is because they will be able to co-author with their students” (IVA, 2012:4).

In southern African Universities, it was noted that research systems needed to be strengthened for research outputs to increase. It was noted that the combined efforts from INASP, EIFL and Research4Life had increased most universities’ access to electronic

journal content (Abrahams, et al, 2009:24). It was noted that local authors were tended not to publish in international journals, despite efforts from INASP and Publishers for Development to help local authors to publish in reputable journals. Another factor noted was that most local journals were not indexed by international abstracting services such as Thompson Reuters and Scopus and hence such data had a gap from Sub-Saharan African Authors. There was no study that focused on the productivity of academic staff at the University of Zimbabwe, nor of their use of electronic resources. A study by Chireshe (2011) focused on students' viewpoint of lecturers and used a questionnaire in the Faculty of Arts and Faculty of Social Studies. The present study did not ask students about course references to literature, during classes or in assignments.

Abrahams, et al., (2009) noted that in Southern Africa Universities, publications by academics can increase if research support systems are in place and budgetary support is extend to academic papers. They noted that most academics in these universities write a lot of research for consultancy and other project work which became invisible as it was not shared beyond the framework of the projects. Halevi (2013) suggested that for publications in third world countries which have been affected by migration of academics (UNESCO, 2010), collaboration was the key to boosting publication. In a recent article, Adams et al, (2014) examined international collaboration clusters in African countries and the rest of the world. In their study they found that collaborations between African researchers and the world exhibited layers of internal clusters and external links that are explained not by monotypic global influences but by regional geography and, perhaps even more strongly, by history, culture and language. They also discovered that the percentage of Africa's publications that were substantive research papers (that is to say,

articles or reviews) declined from 88% to 82.6% (in the period 2011 to 2013), which reflected an increasing number of proceedings papers and other contributions authored within Africa. These results corroborated that most African researchers engage in consultancy and project work and therefore have fewer publications (Abrahams, et al., 2009). They summarised collaboration in the six biggest African research countries in Figure 6 below,

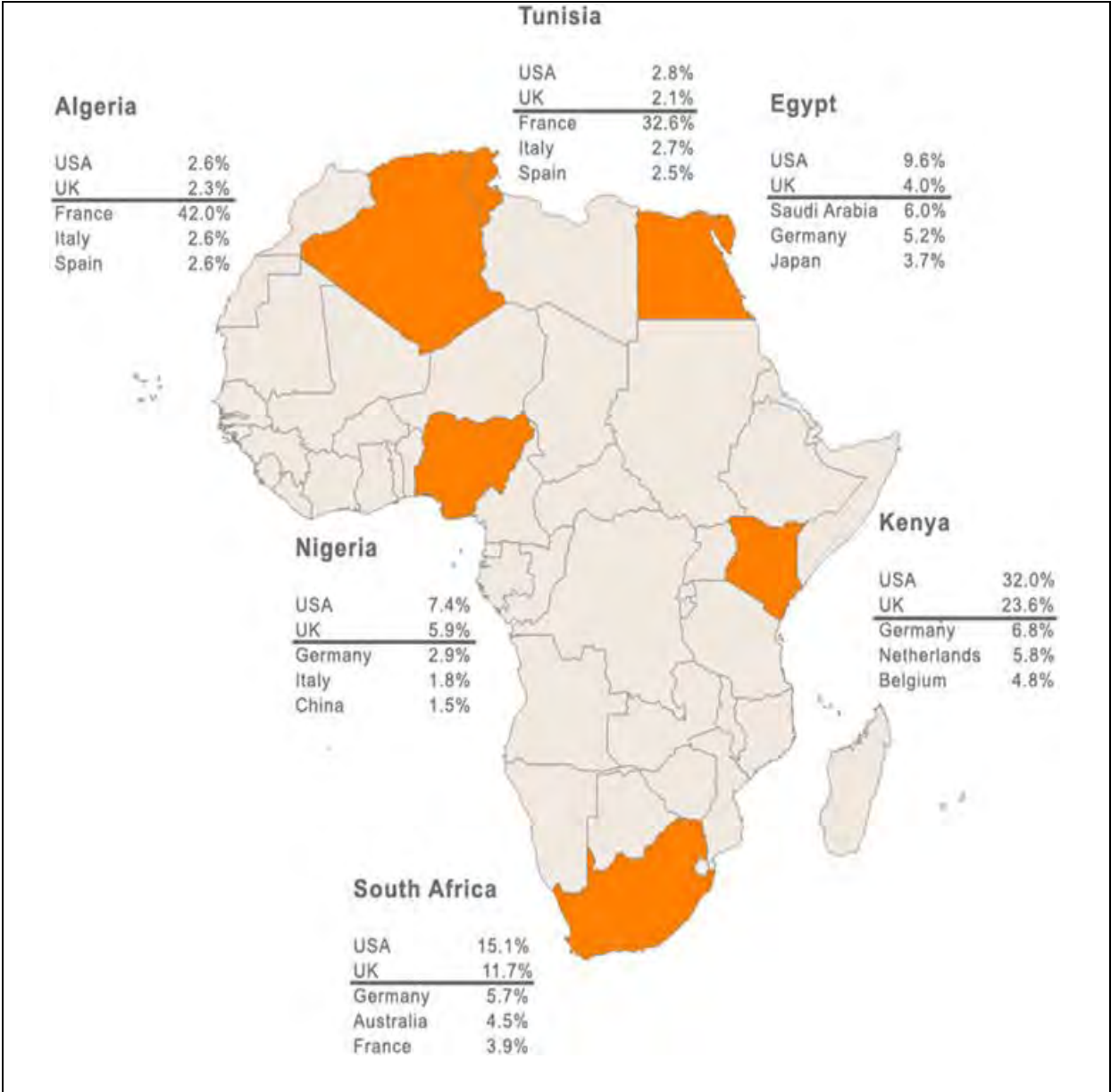


Figure 6: Most frequent intercontinental research collaborations for six key African research economies (Adams et al., 2014)

2.9 Emerging Issues and further Research

Section A and Section B of this chapter reviewed the literature essential to this study. It was shown that electronic journal prices had been rising for the last decade and there had been concerns from academics and librarians about the future accessibility and the current model of subscription journals. The adoption of Open Access publishing was noted to help African authors in publishing (Abrahams, et al., 2009; UNESCO, 2010; and Davis and Walters, 2011). The awareness of Open Access amongst African researchers was established to be very low in the last 9 or 10 years (Ouya and Smart, 2007?; Dulle and Minishi-Majanga,2009). There was a gap for literature on academics' awareness of open access publishing and their views on that publishing model.

In section 2.6.1 literature on electronic journals in Sub-Saharan Africa was reviewed. In Zimbabwe, there was only one study (Bhukuvhani, Chiparausha and Zuvakinyenga (2012) that looked at the subject of electronic resources. A number of studies lamented the low research outputs from African academics (Harle, 2009; Abrahams, et al., 2009, UNESCO, 2010; Onyacha and Maluleka, 2011 ; Bhukuvhani, Chiparausha and Zuvakinyenga, 2012; and Adams et al, 2014). There is a need to study why researchers in Sub-Saharan Africa seem to be publishing less than their peers. ,

2.10 Conclusion

This chapter began by contextualising electronic journals within the scholarly communication process and considered issues related to electronic journals, such as peer-review, the role of the publishers, the rise of alternative methods and also the growth of

open access electronic journals. The study also contextualised itself within the electronic journals and library roles of acquisition and use. Most importantly the literature focused on the electronic journals within the context of Sub-Saharan Africa and explored the various access schemes noted in literature. The challenges faced by in accessing electronic journals were explored.

The literature review then focused on electronic journal access within libraries and considered user behaviour. Two main methods have been used to study electronic journals: quantitative and qualitative, and both methods have their advantages and disadvantages. Teaching and publishing challenges faced by academics were also explored. These issues are discussed in the second part of the literature review. The chapter concluded by enumerating the gaps that exists in literature that could be further exploited by this researcher or other readers of this work.

Chapter Three

Research Methodology

3.0 Introduction

The purpose of this chapter is, firstly to describe the research methodology of this study, secondly to explain the procedures used for the specific methods of data collection, and thirdly to provide an explanation on how the methods were used to address the research questions of the study.

3.1 Research Design

This study required the collection of data to address the research questions. The methodological approach known as triangulation was adopted, which was defined as “the combination of different methodologies in the study of the same phenomenon” (Denzin, 1970:291) and allows multiple viewpoints, which reduce researcher bias. In the previous chapter it was noted that both quantitative and qualitative approaches may be used to study the usage of electronic journals. Quantitative methods include access log statistics and article download statistics (normally provided by the publishers and their agents), while qualitative studies use surveys and interviews. The advantages and disadvantages of each of these approaches with respect to user studies were reviewed in the previous chapter in section 2.5.

Many different types of bias are described in literature (Hartman et al., 2002). Kennedy discussed three common types of bias which any chosen research methodology should seek to minimise (Kennedy, 2009). Although some early researchers argued that triangulation was impossible, recent theorists have regarded triangulation as a legitimate research strategy (Bryman, 2004). The purpose of triangulation in the context of this study is to facilitate a mix of data gathering methods to address the research questions, assuming that weaknesses inherent in one approach will be counterbalanced via the strengths in another. This method has been used by most qualitative researchers to check and establish validity by analysing a research question from multiple perspectives.

3.1.1 Why Triangulation?

Three common reasons that are advanced to justify methodological triangulation are completeness, contingency and confirmation. Completeness implies that any single research method has inherent flaws and these tend to limit conclusions that can be drawn from the study. In order to assure completeness, three methods are used in this study; an availability study, a questionnaire, and a citation study. These methods complemented each other and provided detail that would not be available from one method alone. Related to completeness was a sub-principle known as “abductive inspiration” defined as the logical process by which a researcher arrives at a new explanation for a phenomenon where one method is used to generate ideas that are tested by another method (Jack and Raturi, 2006: 346).

Contingency provides insight into how and why a particular method is chosen (Jack and Raturi, 2006: 346). Accordingly, the choice of the method is defined by the study’s

research questions. While three methods were chosen in this study to address the core research questions, they had the capacity to overlap, which enhanced the validity of this study.

The third reason is that of Confirmation which sought to affirm that “triangulation should improve the ability of researchers to draw conclusions from their studies” (Knafi and Breitmayer, 1989: 228). In general, researchers use the research results to accept or reject a study’s hypothesis, claim or proposition. Quantitative methods rely on measurements of the results in confirming a proposition, while qualitative approaches provide an array of evidence such as meaning, beliefs, intentions or values in approving or disproving a proposition. Therefore, in a methodological triangulation, both quantitative and qualitative elements support theories with different logical structures (for example deductive and inductive reasoning in quantitative and qualitative approaches, respectively).

3.1.2 Approaches and use cases for the Triangulation Methodology

Jack and Raturi (2006) provided five issues to consider when using methodological triangulation, “develop a strategy for triangulation; choose methods with complementary strengths and non-overlapping weaknesses; carefully consider validity when selecting the underlying research methods; recognise that methodological issues can limit the “generalizability” of the results; and build rich theories by leveraging types of inferences from triangulation” (Jack and Rauri, 2006:350). These steps were taken into account in designing the methodology for this study, and the results of the literature study helped in the refinement of the procedures for each method employed. This study

focused on the use of electronic journals in teaching and also in publication by academic staff. The use of triangulation allowed for various methods to test the research questions and underlying assumptions.

3.2 Research Questions

This study sought to explore whether available journal collections met the teaching and research needs of the Faculty of Agriculture and to analyse the usage of journals by faculty in teaching and in research. In the process, the challenges faced by the faculty members in accessing electronic content were explored. Based on this objective and also the review of related literature presented in the previous chapter, the four main research questions and sub-questions were constructed as follows:-

3.2.1 Research Question 1

To what extent do the available journal collections meet the needs of the faculty for teaching and research and where else do faculty members obtain access to journal collections?

This question sought to measure whether journal collections required by faculty members were available from the university library. The sub-questions for the first research question that arose were:

- i. Did faculty members have access to journal collections from outside University of Zimbabwe
- ii. Were journals required by academics accessible at the University of Zimbabwe?

- iii. What was the overall availability rate of the faculty's identified citations?
- iv. What was the impact factor of the journals in the faculty core journal list when compared to the *Thomson Reuters Journal Citation Index*?

3.2.2 Research Question 2

Are there problems encountered in accessing electronic journal collections, and if so, what is the nature and frequency of these problems?

This research question was addressed by findings from the questionnaire, addressed to the academic staff. The guiding sub-questions for the third research question were: -

- i. Were there problems faced by the faculty in accessing electronic collections and if so, what were these problems?
- ii. How did faculty members obtain access to agricultural electronic journals?
- iii. Were faculty members satisfied with the electronic journal collections?

3.2.3 Research Question 3

Does the University of Zimbabwe library provide access to the journal literature that academics cite in their published works and their reading lists?

This question explored the usage of electronic journals by the academic staff and also showed which journals were or were not available in the library's holdings. In addressing this question, the citation study revealed which were the most cited journals in the Faculty of Agriculture. The guiding sub-questions for the second research question were:

- i. Were the journals available in the library cited by the faculty in their research publications or their recommended class reading lists?
- ii. How many journal titles that were not available at University of Zimbabwe, were cited by the academics?

3.2.4 Research Question 4

To what extent do faculty members publish their own research and what do they regard as the obstacles they face in attempting to do so?

This question was answered mainly by the questionnaire, and other research methods, and the following guiding sub-questions for fourth research question were:-

- i. Were academics in the Faculty of Agriculture publishing their own research? If so, to what extent? And if not, Why not?
- ii. What were the problems encountered by the faculty in trying to publish?
- iii. Did access to electronic journals have an impact on the faculty members' publication output?
- iv. Are faculty members motivated to publish or are they aiming to publish? What other issues inhibit the publication process?

3.3 Research Methods

In 3.2 above, triangulation was identified as the methodological approach for this study. The table below shows the research methods used to address the four main research questions identified above. Two methods, the availability study and the citations analysis, were carried out concurrently as they overlapped, and the data generated also needed to be verified by the questionnaire, which was the third approach. Each of these methods as

used in this study are discussed in the sub-sections that follow. The Table 9 below sets out how each research question will be addressed by the study's respective methods.

Research Questions	Research Methods
1. To what extent do the available journal collections meet the needs of the faculty for teaching and research?	1. Availability Study
2. Do problems exist and if so, what is the nature and frequency of the problems encountered in accessing electronic journal collections?	2. Questionnaire
3. Does the University of Zimbabwe library provide access to the journal literature that academics cite in their published works and their reading lists	3. Citation Analysis
4. To what extent do faculty members publish their own research and what do they regard as the obstacles they face in attempting to do so?	4. Availability Study, Citation analysis, and Questionnaire

Table 9: Research Methods for this study

Methodological triangulation allows for the use of multiple qualitative and quantitative methods in a single study. Golafshani (2003; 599) noted that methodological triangulation assures validity by accommodating surveys, focus groups, and interviews and results could be compared to see if they reach a common conclusion. Whichever methods are chosen for the triangulation, Todd (1979) urged the researcher to strive to achieve a convergence of the chosen methods to ensure reliability of research results. In this present study three methods were chosen the availability study, questionnaire and citation analysis. The choice of methods in a research approach has been discussed at

length by Coll and Chapman (2000) who stated also that the final decision of methods employed is best resolved fundamentally by the research design. They stated that “some research questions will be readily answered using the qualitative means, others quantitative, and some will be addressed using a combination of the two” (Coll and Chapman, 2000:4). The distribution of research methods viz-a-viz the research questions in this present study is depicted in Table 9 above. In the paragraphs below each method is discussed in detail and also the rationale for each choice and application.

3.3.1 Availability study

Electronic journal availability studies have involved the compilation of a list of journal citations or journal titles (Brazzeal and Powers, 2007) and using this list to simulate a search to record access to the resources. The numbers of accessible journals are expressed as a percentage of the entire sample to establish the “availability rate”. Using availability as a data collecting methodology was influenced by literature as reviewed in section 2.7. In order to establish what the faculty needed, previous studies had simulated use requests. In Crum’s study (2010) users’ requests were harvested from the link resolver and the Innovative Library Electronic Resources Management (ERM) module. The University of Zimbabwe library uses the same library software, but did not subscribe to the ERM module, and the information technology division was unable to harvest logs by IP ranges, as electronic resources access were institutional and not faculty based.

In essence the following key works postulate the concept of electronic journals availability study, these are Squires, Moore & Keese (n.d), Brazzeal & Powers (2007), Nisonger (2009) and Harle (2010). In these studies an underlying pattern of conducting an

electronic availability study emerge, which includes simulating the needed journals by researchers, searching these journals in the library's collections, establish the percentage of available journals and offer reasons of availability and non-availability. In Nisonger (2009) the needs of researchers was collected from a 500+ item sample of citations ; in Squires, Moore and Keesee (n.d) the sample was collected from course reserves, reading lists and articles authored by researchers ; in Brazzeal and Powers (2007) and also in Harle (2010) the sample was harvested from the Thompson Reuters' Journal Citation Reports (JCR). In a related study by Crum (2011) the sample was analysed from log files from electronic journals access application software; the gleaned and cleaned files represented the actual user demand for electronic articles. In each respective study, these simulated users' needs where searched in the local collections to establish an overall availability rate and reasons of availability and non-availability. The following availability rates were established in these studies, Nisonger -65.4%; Squires, Moore and Keesee – 78%, Brazzeal and Powers - 62.7%, Harle -79% and Crum - 68%. Harle (2010) focused on four African institutions – the University of Malawi Chancellor College, the University of Nairobi in Kenya, the University of Rwanda, and the University of Dar es Salaam in Tanzania. Harle's study employed benchmarking where results were further compared with two European universities. Benchmarking has also been found useful in examining access to research outputs by Arivanathan et al (2010) and Gitanjali et al (2012).

Availability study procedures used in this study

A group of journals representing the faculty needs (the faculty core journals list) was compiled from the following sources;

i) Purchase Requests:

The list of journals needed for purchase by the faculty (requests list). This list is a collection of journal subscriptions requested by the faculty for purchase by the library.

ii) Reading lists:

These were collected from course reading lists recommended to postgraduate students by faculty staff. There are more than 48 core postgraduate courses taught in the Faculty of Agriculture. Individual course reading lists were obtained and journal titles recommended to students were collected.

iii) Top cited journals:

Journal titles which faculty members quoted in their publications as recorded in the *University Of Zimbabwe List Of Publications* were collected. In 2010, the University of Zimbabwe collected all research work published by academics in the last 10 years and published a report listing each researcher's bibliography of publications. In early 2011, a supplement was published with research works missing in the initial study. An analysis of the agriculture section established a list of various research outputs of which 200 journal titles were from academics affiliated with the Faculty of Agriculture.

The Faculty core journals list was searched by title, author and ISSN from the library's collections to determine the electronic availability rate of the journals in the list. The search result for each title was recorded and where possible the collection(s) where each title was found, was recorded; otherwise reasons for non-availability were noted. An Excel spreadsheet was used. The results were collated to establish the total number of

journal titles available electronically and these are presented in Chapter 4. The individual journal titles in this list were searched in the 2011 Thompson Reuters Journal Citation Reports, to establish the impact factor of the titles in the faculty core journals list. This benchmarking approach was used to validate the list (and findings), as was used in similar studies by Harle (2010), Brazzeal and Powers (2007) and Arrivanathan et al., (2010).

3.3.2 Questionnaire

The third method used in this study was a questionnaire, which was distributed to the faculty staff. A questionnaire is a self-report form designed to elicit information that can be obtained through written responses of the subjects (Brace, 2008:37). A questionnaire can either be structured or unstructured, yet questionnaires should have a definite purpose and be related to the research objectives (McBurney and White, 2009:246). McBurney and White (2009) further provide guidelines for the design of the questionnaire, which included determining the goals of the study; avoiding bias; making alternative choices clear and logical arrangements of questions.

Questionnaires have been regarded (Anderson 2004: 208) to be the most widely used data gathering methods, however they have both advantages and disadvantages. Saunders, Lewis and Thornhill (2009), McBurney and White (2009), Gillham (2007), and Anderson (2004) amongst the many authors were consulted to study the advantages and disadvantages of questionnaires. The following emerged, that questionnaires can contact a large number of people at a relatively low cost, can reach easily the respondents, respondents can complete the questions at their pace, and confidentiality is guaranteed with anonymous questionnaires. The disadvantages that emerged included they might be

time consuming, if not well prepared respondents might provide wrong answers, opportunities to verify questions at the point of completion is non-existent , low response rate and incomplete answers. These issues were considered in the design of this instrument and in this present study the questionnaire was designed and tested in the piloting phase in order to address the any bias or issues for the tool in the real study.

The Faculty of Agriculture has four departments; Agricultural Economics, Animal Science, Crop Science, Soil Science and closely works with the Faculty of Engineering and Faculty of Veterinary Sciences. Besides their teaching roles, the faculty members conduct research, have a number of laboratories on campus and also oversee the operation of the university's farm. The faculty student population is estimated at 600 students. The e-mail list of academic staff from the faculty office had about 80 staff members across departments and a further 20 from inter-faculty collaborative research and teaching from the Faculties of Veterinary Sciences and Engineering. The semi-structured questionnaire had 26 questions, both closed and open ended, focusing on:

- Access to electronic journals collections (for example, access platforms and problems related to accessing the collections)
- The use of electronic journals for teaching and research (for example, electronic journals databases used reasons for use)
- Impact of access on publishing and other issues affecting publishing by academics.

Since the number of academic staff was fewer than 100, this was considered manageable, and therefore there was no need for sampling. The *SurveyMonkey* tool facilitated easy

distribution of the questionnaire, both for the pilot and the main study. An example of the questionnaire is available in Appendix 2 of this study.

Piloting the Questionnaire

The questionnaire was piloted in order to assess the stability of the questions and improve their structure. The pilot was carried out in September and October 2012, and twenty faculty members in the Faculty of Veterinary Science participated in the study. The Veterinary Science faculty was chosen because of the similarity of the discipline with the Faculty of Agriculture, and both faculties (the one for the pilot and the other for the main study) are in the same institution. The pilot showed that 89.5% of the faculty members used electronic journals, of whom 86.7% accessed these from their offices (33.3% from home and only 8.3% in the library). The common difficulties experienced in accessing electronic journals were: no passwords at 57.1% and 50% indicated campus restricted access.

3.3.3 Citation Analysis

The third method used in this study was citation analysis. There is a significant debate on the use of Citation Analysis amongst scholars, for example Moed (2005) stated that Eugene Garfield discovered that journal citation analysis could be used to study scholarly communication impact. Since that time, a number of studies have been conducted in Journal Impact factors and research metrics (Adams, 2014; Zupanc, 2014).Section 2.1.4 of this study discussed in depth the evolution of citation analysis and current debate on Journal Impact factors.

However, the citation analysis employed in this present study has a foundation in Hoffman and Doucette (2012) and the literary framework reviewed in section 2.6. In summary it emerges from literature that citation analysis has been used for three reasons. First, to find out the impact a particular article has had by showing which other authors based some work upon it or cited it as an example within their own papers. Second, to find out more about a field or topic of study, and finally to determine how much impact an author has had by looking at his/her total number of citations (University of Michigan, 2014). Citation analysis adopted in this study focused on understanding researcher's publication output and evaluating their references in order to understand their reading trends in turn establish whether they use electronic journals available in the university library (for similar application see Kumar and Dora, 2011 and Brazzeal and Powers, 2007). Elsewhere, citation analysis has also been applied in social media and tweets during scientific conferences (Weller, Droge and Puschmann, 2011).

Since the early 80s, citation analysis has also been used as a method of collection development and evaluation. The method entails counting and ranking the frequency of documents that are referred to in bibliographies, footnotes and references. Over the years, these citations were studied and results applied to a variety of library scenarios. De Groot, (2010: 307) found citation analysis useful in assessing the adequacy of library collections, to inform collection practices and to evaluate the strengths of the collections. Citation analysis in the present study was done with the objective to establish the faculty's access to electronic journals. This application of citation analysis was similarly applied by Kumar and Dora (2011). Data harvested from the reference section was compiled and analysed to determine the frequently cited journals, fields and subject

coverage, currency of information sources amongst many other variables. In a related study, also in the agricultural domain, Brazzeal and Powers (2007) examined the electronic availability of agronomy journals in eight institutions with doctoral programmes in order to examine the use and access of agronomy journals, similar to the present study.

Citation Analysis procedures employed in this study

Hoffman and Doucette (2012) pointed out that there was a gap in the literature regarding the standard or consolidated guidelines for applying citation analysis in research. They noted that “while there is a considerable body of literature that presents the results of such studies, most researchers do not provide enough detail in their methodology to reproduce the study...” (Hoffman and Doucette, 2012: 322). In this present study there was an effort to provide methodological details of each data gathering method. The *University Of Zimbabwe List Of Publications* and its supplement were used as the bibliographic sources of faculty’s publications. The total numbers of research items were 296 papers for all the faculty staff from the four departments (Department of Soil Sciences, Department of Animal Sciences, and Department of Agricultural Engineering and Agricultural economics). Each paper of the identified agricultural papers had their bibliographic citations to journals extracted and entered into an Excel spreadsheet to compile a database of citations. The total number of citations harvested was 5,633 references and each of these was entered in a row with columns indicating the title of the journal or resource. These were analysed to establish the titles of the cited journals, their

availability in local collections, and also the most frequently used journals. The citation analysis is presented in chapter 5 of this study.

The intention was to yield insights into journal citation trends, and also the availability of these citations in the library's collection. The citation study provided insight into:

- the usage of the collections by the faculty members
- their most cited journals, compared to their availability in the library's collection
- the extent to which the electronic journal collections met the needs of agricultural researchers.

The output of this method also contributed to the faculty core journal list, used in the availability study. The most frequently cited journals were added to the core journals list. From the ten such titles that are presented in section 6.1.3, two titles were not included in the core journals list.

Throughout this study, an effort was made to ensure the quality of data. Approaches that were employed included:

- The questionnaire was pre-tested using sample of respondents to ensure that all aspects of the research questions in terms of content and detail were addressed and understood.
- The responses were collected through an online survey and respondents were not asked to provide their names in order to encourage freedom of expression and to allow a true picture of the situation.

3.4 Data Analysis Procedures

Gray (2004) stated two approaches for analysing qualitative data which are Grounded Theory and Content Analysis. Content analysis attempts to identify specific categories and criteria for selection before the analysis process starts. Grounded Theory is a systematic way of discovering theory through the analysis of data (Faggiolani, 2011). Strauss and Corbin (1998) stated that the grounded theory technique involves three stages : *Open Coding*, in which data is categorised into units; *Axial Coding*, in which the relationships between categories are identified and lastly *Selective Coding*, where the core categories are supposed to produce a theory. Another important method to analyse data is the constant comparative method. According to Glaser and Strauss (1967) it involves a series of steps – collect the data from the field ; identify key issues that will be a focus of categories; documenting the categories to describe existing issues and also

constantly looking for new incidents; and working with data to capture a social processes and relationships.

In this study, the data that was obtained was analysed by using the constant comparative method which yielded from the grounded theory approach. As noted in the specific employment of the respective research methods detailed in section 3.3 above; each method has distinctive was of collecting data and data obtained was constantly compared with similar trends emerging from the other methods. This approach is possible due to the Methodological Triangulation and the impact of this can be seen for example in Chapter 7, in the presentation of results. The analysis stated with transcribing, coding, categorising the data into different sets and then comparing them at each respective method. For example with regards to the questionnaire and coding, this was done for the free text questions and an example can be seen in Section 5.8.5. Afterwards, I critically analysed the similarities and differences of formed categories with the aim of finding the actual meaning of data. These themes were guided by the research questions and sub questions discussed in Section 1.4 of this study.

3.5 Conclusion

The purpose of this chapter was to describe the research methodology of this study, to describe the procedures used in designing the instruments and collecting data, and to provide an insight into procedures used to analyse the data. The chapter discussed the research methods, which were an availability study, a questionnaire and a citation analysis. The result of this study is presented in the three following chapters: chapter four

details the availability study, chapter five presents the questionnaire and chapter six presents the results from the citation analysis.

Chapter Four

Electronic Journals Availability Study

4.0 Introduction

The purpose of this chapter is to present the results of the electronic journals availability study, the first of the three instruments in this study. The list of journals required by faculty was established through culling journal titles from the faculty's recommended reading lists, from course outlines given to graduate students, by obtaining from the *University Of Zimbabwe List Of Publications* journal titles in which faculty members publish, and purchase requests submitted to the library. The combined collection of these titles was used as a simulation of faculty's needs, and is referred to as the *faculty core journals list*. This list was then searched from the electronic journal collections subscribed to by the University of Zimbabwe library and accessible to faculty members. The procedures that were employed for the availability study were explained in section 3.3.1 and the purpose of this chapter is to present the results of this method.

A list of 200 journal titles represented the faculty core journals list, for a complete list of these journals see Appendix 2. In carrying out this electronic availability study, the following sub-questions acted as a guide to the process:-

- i. Did faculty members have access to journal collections from outside University of Zimbabwe

- ii. Were journals required by academics accessible at University of Zimbabwe?
- iii. What was the overall availability rate of the faculty's identified citations?
- iv. What was s the impact factor of the journals in the faculty core journal list when compared to the *Thomson Reuters Journal Citation Index*?

4.1 Overview of Electronic Journal Access

As stated in section 2.1, access to electronic journals collections for agriculture at the University of Zimbabwe, is available via three sources;

- i. the university library's homepage¹⁹ (on-campus and off-campus access);
- ii. through the local area network for offline agriculture databases. This access is facilitated by TEEAL access, which is a hard drive with pre-loaded journals. These journals are accessed by each individual computer in the Faculty of Agriculture and students' computers in the main library mapped to the hard drive;
- iii. the Research4Life programmes. To access the Research4Life platforms²⁰, each user should have the institutional username and password for each respective platform. Access to the following platforms - AGORA, HINARI, OARE and ARDI- is through the internet, and each respective platform has an individual web address (for example HINARI platform²¹).

For the purposes of this study, the faculty core journals list was searched on all these platforms and the results are shown in Section 4.4.

¹⁹ As of 2013, December 31

²⁰ As of 2013, December 31

²¹ HINARI access platform. <http://www.who.int/hinari/en/> [2013, December 31]

Agricultural journals accessible on these platforms are available through the following subscription arrangements,

- I. The Research4Life programmes, which involve the following databases:
 - a. Access to Global Online Research for Agriculture (AGORA)
 - b. Access to Research for Development and Innovation (ARDI)
 - c. Online Access to Research in the Environment (OARE)
 - d. Access to Research in Health Programme (HINARI)
- II. The Essential Electronic Agricultural Library (TEEAL)
- III. The University of Zimbabwe Library subscriptions through INASP and EIFL.

In section 2.2.2 these schemes were reviewed, and it was explained how they work. Electronic journals access schemes available to academic libraries were discussed in section 2.3.2.

4.2 Overview of e-resources Subscriptions at the University of Zimbabwe Library

In carrying out the electronic journal availability study, it was found that accessing electronic journal collections subscribed by the university library was not a simple exercise. The different subscription types require different approaches to accessing and retrieving electronic journals. The researcher or student should be aware of these access platforms and respective technicalities in order to retrieve these electronic journals. The Table 10 below provides a summary of the subscription types and access modes for each collection relevant to agriculture.

Electronic journals resource collections at the University of Zimbabwe	Subscription Types	Collections	Access mode	Notes
	University of Zimbabwe subscriptions	INASP PERii Resources	Web Access Management (WAM) through library OPAC	On-Campus Access
				Off-Campus Access
		EiFL resources	Web Access Management (WAM) through library OPAC	On-Campus Access
				Off-campus Access
	TEEAL	TEEAL Database	Local Area Network Access in the faculty of agriculture	Local client machine should be mapped to the database server
	Research4Life Access	HINARI database	Password access to HINARI website	1 password shared by all in the institution
		AGORA database	Password access to AGORA website	1 password shared by all in the institution
		OARE database	Password access to OARE website	1 password shared by all in the institution
ARDI database		Password access to OARE website	1 password shared by all in the institution	

Table 10: Overview of subscription types and access modes

Table 10 shows that users need to employ at least 6 different access modes to retrieve electronic journals available through the University of Zimbabwe library. In the first two collections, the INASP and EIFL resources, one simply needs to be a registered library user to access these collections. Section 2.3.2.1 discusses different access schemes for electronic journals and reviews the University of Zimbabwe library access against stated examples in literature. Off-campus access is also possible, through offsite log in using

University of Zimbabwe staff or student ID barcode. When on campus, the IP address authentication system enables users to access seamlessly these resources via the library's website. Yet, for the TEEAL database, faculty members should have software loaded on their office machines in order to access the TEEAL server. This access only works to machines confined to the local area network and also mapped by library IT staff to the TEEAL server.

The Research4Life programme offers a standard access regime for its four portals- HINARI, AGORA, OARE, and ARDI. The user should have an institutional username and password and this is used on the relevant online platform. The challenge is that the four databases have four different passwords and separate access platforms, although they all have a similar interface. Users have to be aware of which password corresponds to which database. Once logged in, a user can access journals in each platform through the A-Z listing, subject categories or through abstracting services (for example AGORA uses CABI abstracts). There is currently no mechanism to do a federated search across platforms. The publishers participating in the Research4Life programmes are strict about terms and conditions of access. In Section 2.2.1 the case of Bangladesh was mentioned, when institutions in that country temporarily lost access to some publishers' content within the HINARI envelope (PLoS Medicine Editors, 2011).

4.3 Distribution of the Sources of the Faculty Core Journals List

In order to carry out the availability study, a representative list of journals had to be obtained. The faculty core journals list had 200 journal titles, of which 51 titles were obtained from the purchase requests sent in to the library by the faculty; 19 titles were

obtained from course outlines and reading lists and 130 titles were obtained from the journals cited by faculty staff. The frequently cited journal titles are journal titles cited more than four times each as shown by the Citation Study. There were 23 journal titles that appeared on more than one list; eight titles from the purchase requests, four from the course outlines, and 11 from the bibliography of faculty's citations. Duplicates were removed from the list. The sources of journal titles from the resultant faculty core journals list are shown in Figure 7, below.

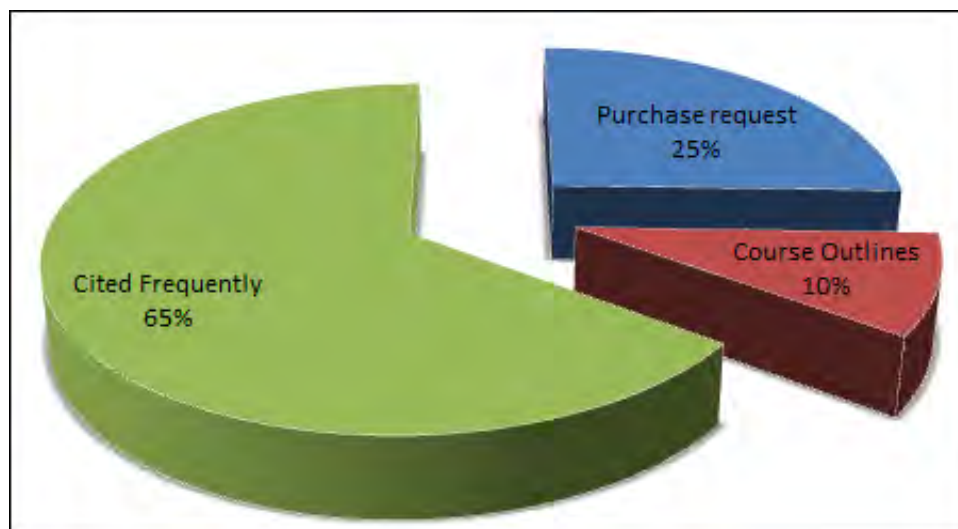


Figure 7: The faculty core journals list sources

It was found that only 10% of titles in the faculty core journals list came from the graduate course outlines. During this availability study it was discovered that most course outlines did not have journals cited in the reading list. Question 10 of the Survey probed this finding as the question enquired, “Do you cite journals that you find electronically in your research or in your course notes or outlines?”. This is discussed in section 5.5 of this thesis.

4.4 Electronic Availability Rate for the Journals

The faculty core journals list titles were searched in the available collections and the average availability rate of the journals across the collections was found to be 85.5%. The faculty core journals list was searched in each respective collection and the available journals were recorded. The results revealed that the AGORA database had 63% of the journals in the core list, followed by OARE which had 53.5%. Only 1% of the core journals were Open Access. Figure 8 below illustrates the access to the core journals in each collection.

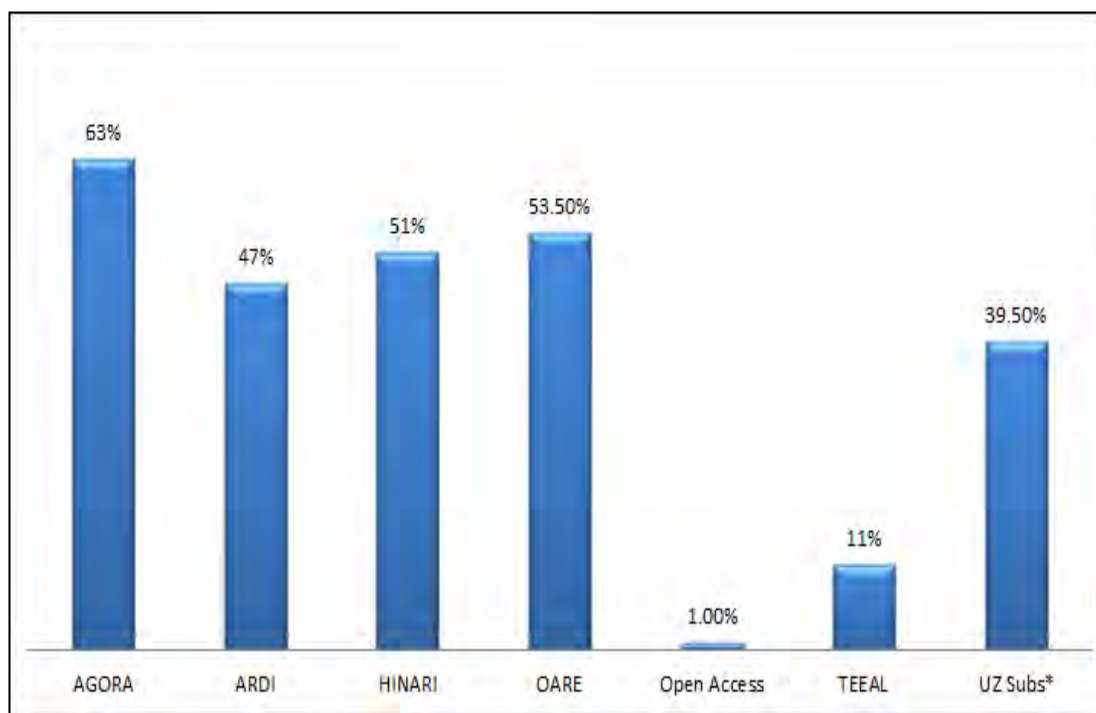


Figure 8: Availability of the core journals in each access platform

In searching for these journals in the different collections, the results showed the following availability rates, AGORA had 37% of the titles not available, while ARDI, HINARI and OARE had 53%, 49% and 46.5% respectively. The subscriptions by the university through ZULC could not meet 40.5% of the faculty's needs.

Some duplication in title access was noted, as some journals titles were available in more than one of the six platforms. Journals that were available on one platform were 46 titles, on two platforms there were eleven titles, on three platforms there were nine titles. On four platforms there were 60 titles, on five platforms were 36 titles and finally on all six platforms, only two titles. Therefore, in real terms, the actual availability – the exact number of journals that could be retrieved irrespective of the platform, was 170 titles representing 85% real electronic availability rate. The negotiated access schemes (or donated journal schemes), which include AGORA, ARDI, HINARI, and OARE, provided 63%, 47%, 51% and 53.5% access respectively. These schemes available under the Research4Life umbrella offer collectively more than 50,000 journals²² to the University of Zimbabwe and in agriculture is estimated to provide more than 10,000²³ journal titles across all Research4Life platforms.

4.5 Journal Access and Impact Factors.

The *2011 Journal Citation Report*²⁴ was used to establish the impact factors of the individual journals in the faculty core journals list. This validation and benchmarking tool was used in electronic availability studies by Brazzeal and Powers (2007), Harle (2010) and Tandon, et al. (2012). In Harle's study (2010), the top 20 ISI ranked journals were used as a standard in comparing the electronic availability of journals in African universities with western universities to determine local electronic journal availability. Section 2.7

²² A numerical figure as they are duplication of titles across Research4Life programme.

²³ As of 31 December 2013, AGORA had 3400 journals for Agricultural Sciences.

²⁴ This study was done in 2012 and that time this edition of *The Journal Citation Report* was the current one.

discussed electronic availability studies while Section 2.1.4 reviewed the limitations of impact factors. In this study of electronic journals availability and their use by faculty staff, impact factors are an important metric to evaluate the quality of journals accessed by the faculty, since the university encourages publishing in high impact journals. Therefore, the results of this study revealed that 84% of the journals in the list were available in the 2011 *Journal Citation Report*. The range of journals impact factors and their numbers are shown Figure 9 below,

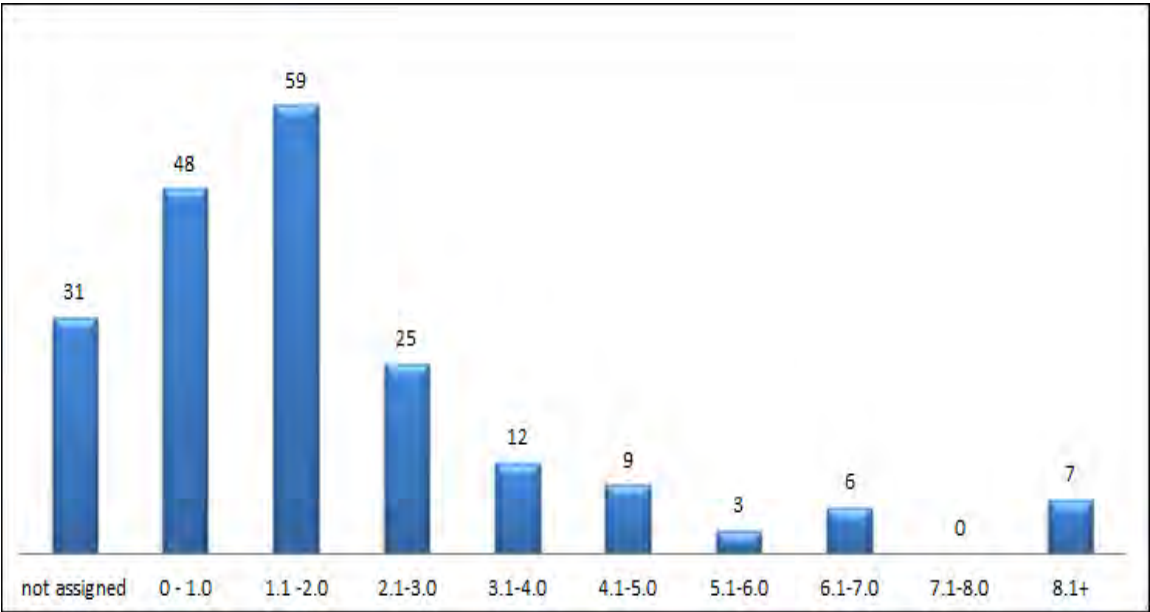


Figure 9: Distribution of core journal titles by impact factor

This graph above indicates that only 31 journals were not listed in the 2011 *Journal Citation Report*, representing 16% of the journals in the faculty core journals list. The remaining 169 journals appear in the *Journal Citation Report* indicating 84% presence. Most of these journals, a total of 153 titles, rank between 0.1 to 5.0, with a peak of 59 journal titles with an impact factor of between 1.1 and 2.0 in the *Journal Citation Index*. There are eight journals that registered an impact factor above 8.0 in the *journal citation index*.

Top ten journals with high impact factor

The top high impact journals from the core journals list that are used by the faculty are shown in the Table 11 below,

	Journal Title	Publisher	Research4Life				LanTEE AL	UZ Library Subscriptions (PERii & EIFL)	JSC Citation Index	Overall access
			AGORA	ARDI	HINA RI	OARE				
1.	Science	Ame. Ass. Adv.Sci.	✓				X	31,201	Y	
2.	Trends in Ecology and Evolution	Elsevier	✓	✓	✓	✓	X	15,748	Y	
3.	Nature	Nature Publishing Group	✓	✓	✓	✓	✓	36.280	Y	
4.	Annul Rev. Plant Biology	Annual Reviews	✓		✓	✓	✓	25.962	Y	
5.	Animal Review of Entomology	Annual Reviews		✓	✓	✓	✓	11.6	Y	
6.	Biotechnology Advances	Elsevier	✓	✓	✓	✓	X	9.646	Y	
7.	Frontiers of Ecology Environment	Elsevier	✓	✓	✓	✓	X	9.113	Y	
8.	Nuclei Acid Research	Oxford	✓	✓	✓	✓	✓	8.026	Y	
9.	Acta Agriculture Scandinavia	Taylor & Francis	✓	✓	✓	✓	✓	6.9	Y	
10.	Global Environment Change	Elsevier	✓	✓	✓	✓	X	6.868	Y	

Table 11: Top ten high impact journals

The above table indicates that the faculty staff have access to all the top ten high impact journals that they require, including the famous journals, *Science*, *Nature*, and *Trends in Ecology and Evolution*. These three have the highest impact factors at 31.201, 36.280 and 15,748 respectively. The ten listed titles are all accessible on more than four platforms, with most of them duplicated in the Research4Life programme.

4.6 Access by Database or Publisher

The study showed that most of the journals published by scholarly societies which were not included in journal aggregators were not available through the university collections either. The most popular commercial databases such as Elsevier, Springer, Oxford,

Cambridge and John, Wiley and Sons, are accessible via the library collections. The results indicate that commercial publisher databases are readily available across different journal collections (HINARI, AGORA, OARE, ARDI, EIFL and PERII), followed by university presses and lastly the scholarly society platforms are less accessible. The list shows very few African journals databases, except African Journals Online. This indicates that the university prefers to acquire journals through commercial databases, and to exclude most scholarly society publishers, because most of these journals are not included in the commercial journal databases. Crow (2006: 2) stated that society publishers face strong competition from scholarly publishers and some of them still have journal titles in print, which no longer represent a viable business model. Davidson (2008:38) confirmed that big deals negatively affected society publishers in reaching library markets.

4.7 Nature of Access to the Electronic Journals

All the platforms for the journals discussed in section 4.2 are available full text online, up to the current issue, except the TEEAL collection which provides electronic back issues of selected agricultural journals titles from 2003 to 2010. This access is electronic via through a local area network connection, and does not contain current issues, but is updated once every year. TEEAL collection statistics for the University of Zimbabwe in 2010 compared to 11 other African countries was provided and reviewed by Chimalizeni et al, (2010). This study confirmed that the limited journal titles in the TEEAL programme do not attract higher usage. The study also indicated a low usage of TEEAL electronic journal collections in most of the institutions participating in the TEEAL programme.

4.8 Conclusion

In this chapter, it was found that the overall average electronic access to agricultural journals required by the Faculty of Agriculture is 85.5%, so that 14.5% of the journals for which researchers have expressed need, are not available on any of the database platforms provided by the library. The negotiated access schemes (or donated journal schemes), which include AGORA, ARDI, HINARI, and OARE provide 63%, 47%, 51% and 53.5% access respectively. Without these donated access schemes, the electronic availability rate for the University of Zimbabwe falls from an average of 85.5% to 39.5%. This clearly shows the contribution of these databases to an increased availability rate of electronic journals for the University of Zimbabwe. The electronic availability study revealed that there is considerable duplication of journal titles, especially amongst the Research4Life programmes. Journals available to faculty members were rated by the Journal Citation Reports, and it was found that 84% of the titles from the list had impact factors. The next chapter will discuss the second instrument in this study and will consider the results from the survey.

Chapter Five

Survey Results

5.0 Introduction

The previous chapter presented the results of the electronic availability study. This chapter presents the results of the survey and focuses on the presentation of the data collected. In this survey, faculty members in the Faculty of Agriculture completed an online questionnaire and the SurveyMonkey™ tool was used to collect, tabulate and present the data. The questionnaire had 26 questions that focused on the faculty access to electronic journal collections; their use for teaching and research, and their impact on faculty members in publishing their work. (The questionnaire used in this survey is available in Appendix 2)

The purpose of this questionnaire was to provide an insight to the third major research question of this study: Are there problems encountered in accessing electronic journal collections, and if so, what are the nature and frequency of these problems?

The guiding sub-objectives of this study were: -

- i. Were there problems faced by the faculty in accessing electronic collections and if so, what were these problems?
- ii. How did faculty members obtain access to agricultural electronic journals?
- iii. Were faculty members satisfied with the electronic journal collections?

This chapter presents the data obtained in this survey and data will be categorised following the format of the questionnaire.

5.1 Description of Participants

The questionnaire was distributed to all the faculty members using staff email addresses. In the final collection, 65 (72.2%) staff members participated in this study. However, not all respondents completed all the questions; the question by question analysis²⁵ presented below will provide the extent of participation in each question.

5.1.1 Categories of participants and their description

Out of the 65 respondents 62 (95.3%) replied to the first question(Question 1). There were 46 (74.1%) respondents who considered themselves lecturers, ten (16.1%) were researchers while three (4.8%) indicated they were either professors or tutors. These responses showed that most participants in this study were lecturers. This is important since one of the objectives of this study is to establish the availability and use of electronic journals in both teaching and research. The “other” option was chosen by three respondents, and two of these were a librarian, the third a graduate teaching assistant. Since the question allowed ticking more than one box, two respondents considered themselves both researchers and lecturers while one respondent indicated professor-researcher and lecturer. In summary, most respondents considered themselves either lecturers or researchers.

²⁵ Unless indicated, please note that percentages presented in each respective question are worked out based on the responses in that particular question.

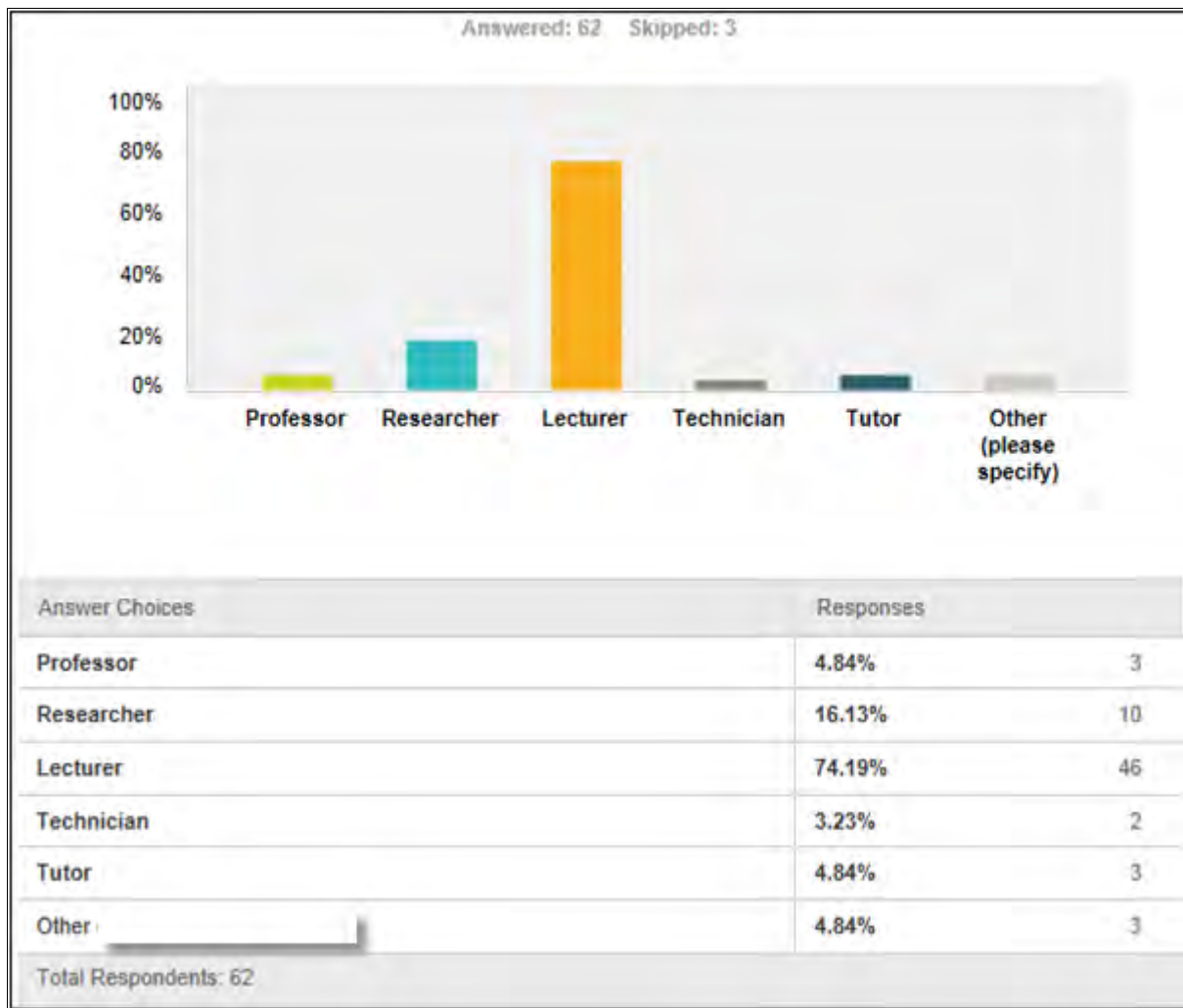


Figure 10: Description of participants

5.1.2 Participants field or main area of research

In Question two, 62 (95.3%) respondents indicated their field of study or interests. The Faculty of Agriculture offers courses in the departments of animal science, agricultural economics, crop science and soil science. The following were the responses: Animal Science 14 responses (22.5%), Agricultural Economics 12 (19.3%), Crop Science 12 (19.5%), Soil Sciences 12 (19.3%) and Veterinary Sciences 14 (22.5%). These responses are illustrated in Figure 11 below.

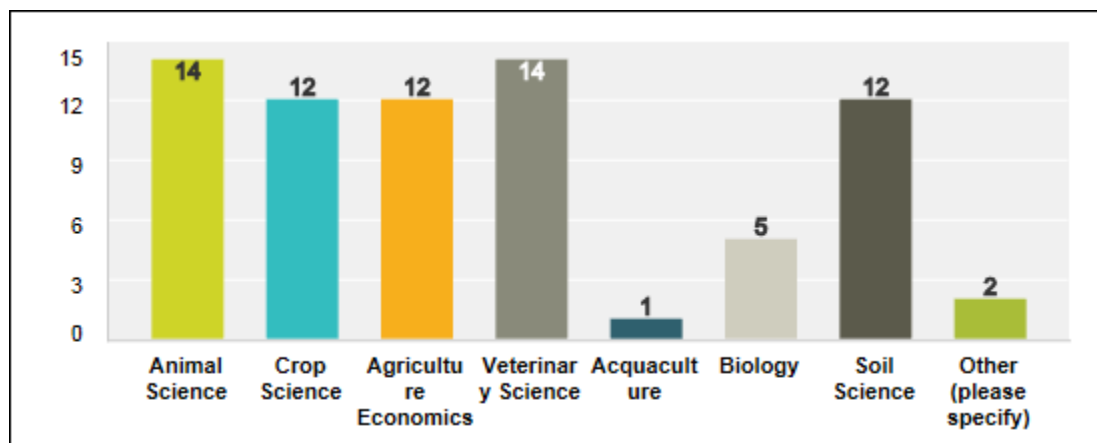


Figure 11: Participants field or main area of research.

There were two respondents who chose the “other” option, and they indicated that they were interested in agricultural engineering. In general, the responses to this question confirmed that most respondents in this survey were interested in the core areas of agriculture, which were agricultural economics, animal science, crop science, soil science and veterinary science. As noted in chapter one, the Faculty of Agriculture has four teaching departments, which are Animal Science, Crop Science, Agricultural Economics, and Agricultural Engineering²⁶.

5.2 Access to Electronic Journals by Faculty Members

One core objective of this study was to find the extent of access and use of electronic journals by faculty members. In this regard, the third question sought to establish whether the respondents used electronic journals for study and research.

5.2.1 Use of electronic journals for study and research purposes

Question 3 had two options; YES and NO. If NO was chosen the survey automatically directed the respondents to the section on teaching roles, access to current literature

²⁶ The Agricultural Engineering was erroneously missed in the listed options of this question, however the respective responses could be entered in the open ended ‘Other’ option.

content and publishing (Question 13). If YES was chosen, the survey allowed the respondent to continue with the rest of the questions in the survey. In total, 63 (96%) respondents answered this question. The YES choice received 55 (87.3%) responses and the NO had eight (12.7%) responses. This implied that eight respondents were automatically directed to Section B of the questionnaire, which will be discussed later. Most of the respondents affirmed that they were using electronic journals, the focus of this study. There is consensus in literature that electronic journals are an important source for scholarly works by researchers (Achoona, 2008; IVA, 2012; Abrahams, et al., 2009; Olle and Borrego, 2010; Rowlands, 2007).

5.2.2 Frequency of accessing

Question 4 sought to provide insight into where and also how frequently faculty members accessed the electronic journals they needed. The university has various electronic journal access mechanisms as discussed in Section 4.2, which facilitate both access from office machines on campus (on-campus access) and also access wherever there is an internet connection (off-campus access). Question 4 therefore requested respondents to rank their preferred locations “often”, “sometimes” or “never”, and 53 (81.5 %) respondents answered this question. below, shows the tabulation of the responses indicating from where electronic journals were being accessed most frequently.

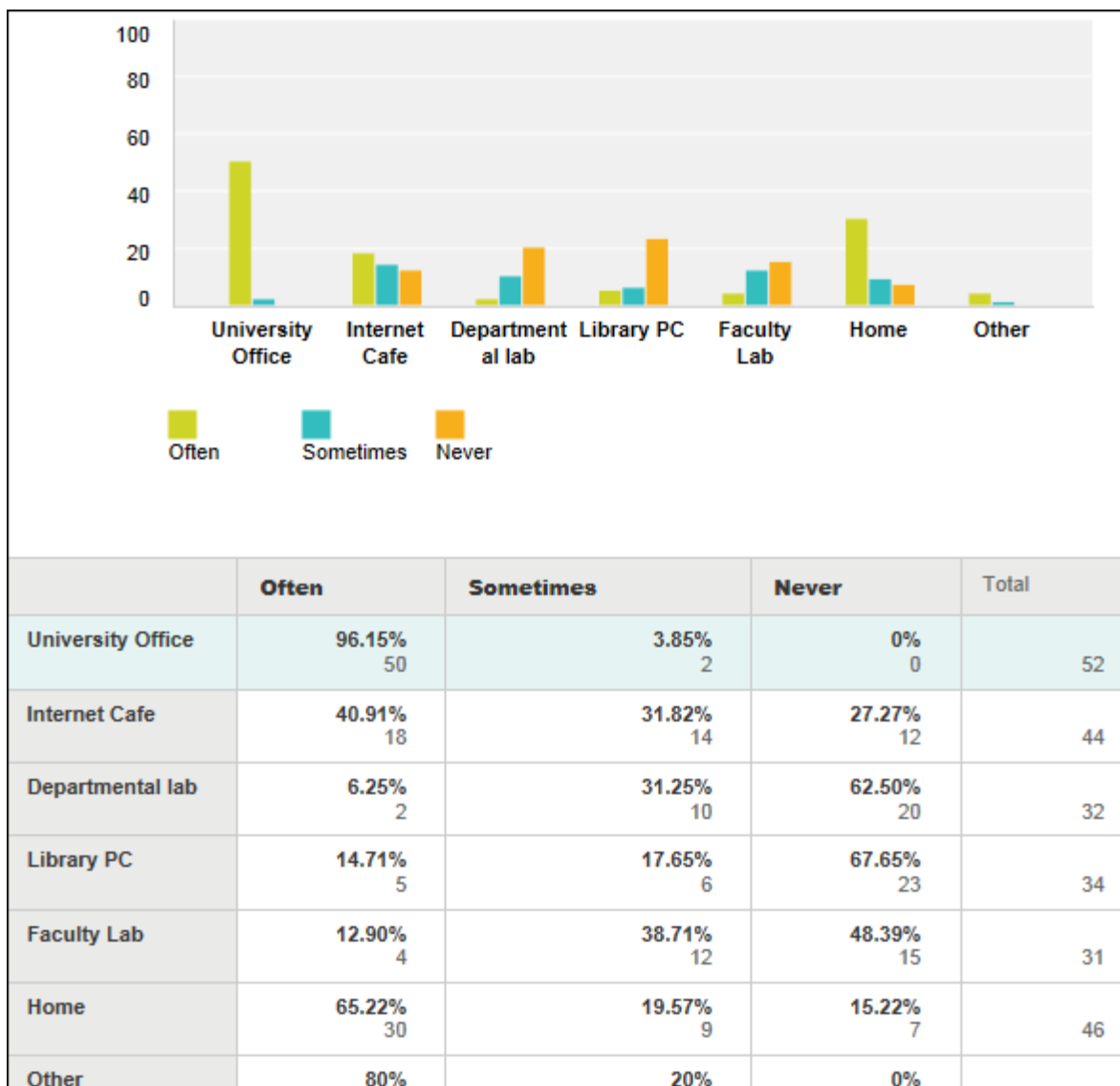


Figure 12: Location of accessing electronic journals

A total of 50 respondents (96.1%) often accessed electronic collections in their University Office, followed by 30 respondents (65.2%) who accessed them from home, and 18 respondents (40.9%) accessed these from an Internet café, suggesting that many of the faculty members invested in additional private Internet connections to access electronic journals from outside campus. In comparison, other university facilities such as the library²⁷ or the departmental computer laboratories were not preferred locations for accessing electronic journals. The library was never used by 23 (67.6%) respondents, and

²⁷ A few months after the survey was conducted, the university library commissioned a ‘researchers common room’ in order to increase library support to researchers.

similarly, 20 (62.5%) respondents never used departmental laboratories. These results showed that access to electronic journals by faculty staff is primarily from their offices, followed by an Internet café or when they were at home. This presents an opportunity for librarians to promote library facilities to faculty staff as specific areas to access electronic journals. The “other” option received a total of five responses, two of which indicated that they access electronic journals from their iPads and three specified laptops. Although the figure is low at present, accessing resources with handheld devices (such as iPads or mobile phones) could be explored to establish whether journal access systems and library web page interfaces could be re-designed or adapted to accommodate users accessing library resources from mobile devices. Researchers including Kaur and Verma (2009), Kaur (2012), and Tenipor et al., (2010) found that researchers are increasingly accessing electronic journals through mobile devices.

5.2.3 Barriers to accessing electronic journals

This survey sought to establish the nature of problems experienced by faculty members in accessing electronic journals. Therefore, Question 5 required the respondents to rank difficulties experienced in accessing electronic journals in the options on a three tier scale of a) Often, b) Sometimes, and c) Never. The problems encountered were: no password at 33 (66%) responses, access restricted to campus only 21 (45.6%) responses and university not subscribed to the journal 20 (41.6%) responses. The 41.6% response that the university was not subscribed to required journals showed that some journals were erroneously perceived by academic staff not to be in the university collection. The previous chapter established through the electronic availability study that the overall

average electronic access to agricultural journals required by the Faculty of Agriculture was 85.5%.

Occasional challenges expressed in the “Sometimes” category were that back issues were not available at 21 (65.6%) responses, or that access was restricted to the campus only, at 24 (52.1%) responses. This data indicates that access passwords to many databases were not known by the faculty staff, or alternatively they did not know the access path to these resources. The previous chapter in section 4.2 discussed the various access platforms for these journals, noting that some required passwords while others required authentication through an IP address. These heterogeneous access mechanisms could be the source of the high access failure rates depicted in Table 10. In the other options, respondents indicated that they often received timed-out error messages. This could either imply a poor internet connection or a loss of communication with the journal publishers’ servers. Literature reviewed revealed that Internet connectivity and lack of computers were general and common problems in higher educational institutions in Sub-Saharan Africa, outside South Africa (Achoona, 2008; Adams, King and Hook, 2010; Harle, 2010; Mapuranga, 2012:223 and Chingbu, 2012). However, at the University of Zimbabwe, internet connectivity had been improved (Nyagura, 2013) and the allocation of computers to senior lecturers was increased, but the results of this present question indicated that there were still technical problems inhibiting access to electronic journal content. Figure 15 below illustrates the results.

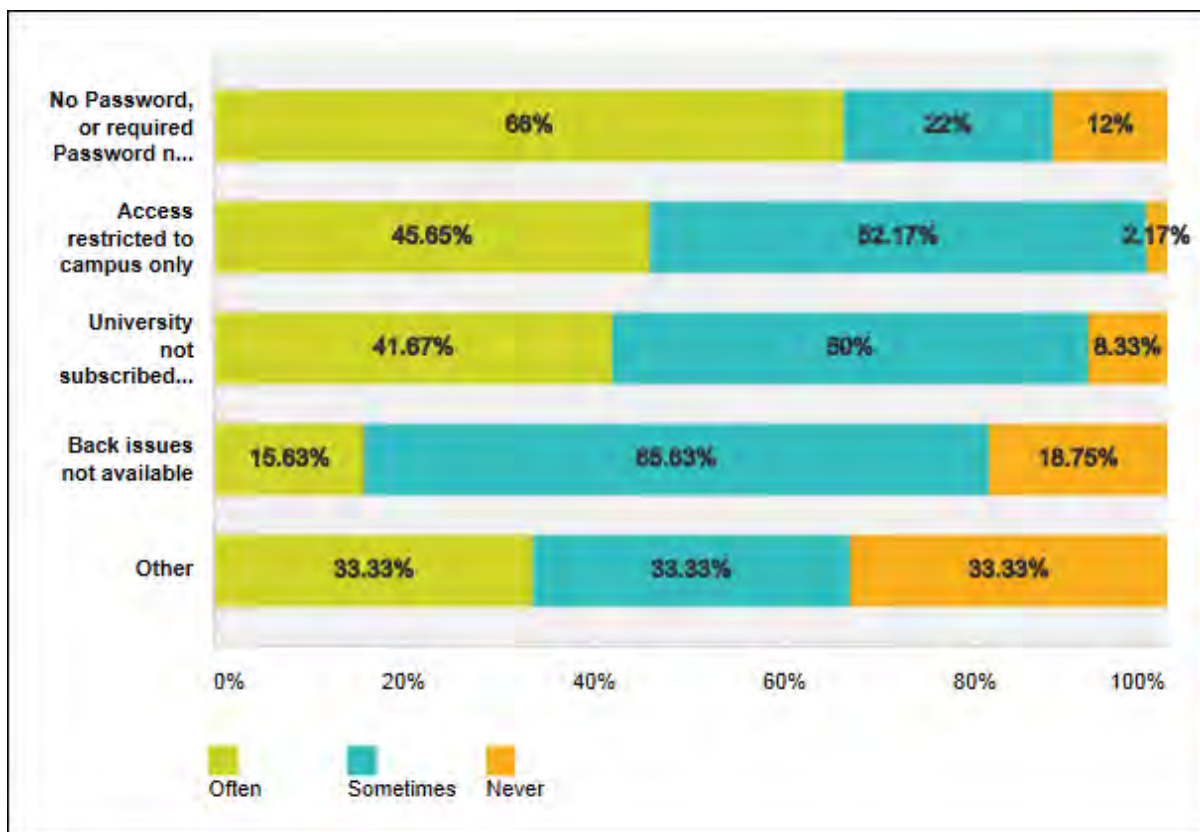


Figure 13: Difficulties in accessing electronic journals

5.3 Journal Titles Required for Teaching and Research

Questions 8 to 12 focused on the journal titles required for teaching and research, the access mode to available journal titles, and the various approaches used by academic staff in accessing electronic journals. The electronic journal availability study (discussed in chapter 4) sought to measure the journals required by the faculty’s staff. This was a top down approach to establish faculty needs from external sources. Inversely, in this present survey, faculty staff were given an open ended question where they could provide a list of titles they needed for teaching and for research. This would be a bottom-up approach in looking at the same point of electronic journal availability through the feedback from the survey participants themselves and to validate the findings of the two studies. In the previous chapter it was seen that most of the electronic journal titles

required for teaching and research were available across the university's subscribed resources on different platforms. In this present study, faculty staff were required to state which journals they personally needed and these were also searched collectively in the subscribed resources to establish and test their availability, thereby finding out if the university's collections satisfy the needs of the researchers. Questions 6 and 7 below provided these results.

5.3.1 Journals required for teaching and research

In Question 6, respondents were asked to list journal titles required for teaching and research and the question was answered by 40 (72.7 %) respondents, and a total of 47 journal titles were listed by the participants and which cumulated to 43 distinct titles. The following titles were noted more than once:

- *Animal Conservation* (2 times),
- *Journal of Agronomy* (3 times), and
- *Tropical Animal health and Production* (3 times)

The titles identified by faculty were searched again in the library collections to establish whether these were available. It was found that 30 titles were available, representing an availability rate 69.7% of the titles specifically noted by the respondents in the questionnaire. Of the three journals listed above, two titles were available in the faculty core journals list, and these were *Animal Conservation* and *Tropical Animal Health and Production*. Chapter 4 provided the results of the electronic availability study, and in that methodology an overall availability rate of 85.5% was noted.

5.3.2 Accessing electronic journals via the University library website.

Question 7 sought to find out whether faculty members thought they had access through the University of Zimbabwe library website, to the journals they listed. Responses indicated that from the 53 who attempted this question, 38 (71.7%) indicated NO and 15 (28.3%) indicated YES. This result contradicts the availability studies and also the analysis of the journal titles given in Question 6 above. For instance, in the availability study discussed in chapter 4, the overall availability rate was 85.5% and the sample in Question 6 indicates a 69.7% availability rate. The results of this question supports the availability study results presented in the previous chapter, which indicated that the University of Zimbabwe electronic journal subscriptions available on the website had a lower availability rate of 39.5% when compared with availability rates provided through HINARI (51%), OARE (53.5%), and AGORA (63%). Thus if academic staff are only searching subscribed journals available through the library website and are not searching the Research4Life programmes as well, then perhaps that could be a reason for the reduced availability of 28.3%. This too, presents a training opportunity for the library.

Question 7 went further by asking the “NO” respondents to explain what they used instead of the library website, and out of the 38 (71.7%) respondents, 23 specified their sources. Firstly, eight said they obtained journals from friends – with five indicating friends outside the country, in South Africa, Australia and the United Kingdom. Secondly, HINARI and AGORA were specified by five respondents, and this further corroborates that at least some of the faculty staff seemed to be aware of the donated collections such as AGORA and HINARI in addition to the local subscriptions. Thirdly, the internet was

specified by four respondents, while another four indicated that they had personal subscriptions. Lastly, one user indicated going to the medical library, another branch library of the University of Zimbabwe libraries located off campus, to retrieve electronic journals. These responses show that there are more informal sources beyond the access mechanisms provided by the university library that are used by academics to obtain journals needed for their work. This indicates either a lack of availability of the needed journals, a lack of awareness of which journals are available, or poor searching skills on the part of the requesting local users.

The studies by Harle (2010: 23) in four African universities indicated that these universities had far better access than their counterparts in the developed world through the Research4Life programmes. However, it seems that researchers and academic staff either do not know that journals collections available in their institutions might be equal or better than in northern universities, or they do not know how to obtain access to journals that are available on their campuses.

5.3.3 Journals suggested to the library

Respondents were asked in question 8 if they ever suggested new journals to the library and there were 53 responses to this question; 38 (71.7%) said NO and 15 (8.3%) said YES. Those that chose YES were asked to provide titles of the suggested journals and 11 titles were suggested;-

- *Acta Planta*
- *Acta Tropica*
- *African Crop Science Journal*(2 suggestions)

- *Agricultural Systems*
- *Biological Conservation*
- *Crop Protection*
- *Journal of Animal Sciences*
- *Journal of Heredity*
- *Plant Pathology*
- *Small Ruminants Research*

These titles were searched on the available collections and most of them were already available except for *Acta Planta* which was not available across the databases. Table 12 below provides a summary of the search results.

Journal Title	Research4Life Programmes				UZ Subs (PERII and EIFL)
	AGORA	ARDI	HINARI	OARE	
<i>Acta Planta</i>	-	-	-	-	-
<i>Acta Tropica</i>	X		X	X	X
<i>African Crop Science Journal</i>	X	X	X		X
<i>Biological Conservation</i>	X	X		X	X
<i>Crop Protection</i>	X	X	X		X
<i>Journal of Animal Sciences</i>	X		X		
<i>Journal of Heredity</i>	X	X		X	X
<i>Plant Pathology</i>	X			X	X
<i>Small Ruminants Research</i>	X	X	X	X	X

Table 12: Availability of Suggested Journal Titles

5.4 Databases and Approaches used to retrieve Electronic Journals

The second part of the questionnaire sought to find which databases were used and how sources were retrieved. Choices included the various databases subscribed to by the University such as Elsevier, Taylor and Francis and Science Direct amongst many others. The donated Research4Life programmes come as a portal with a collection of these databases in one access platform. Against this background, the respondents were asked to indicate which databases they use to obtain electronic journals.

5.4.1 Databases used to obtain journal articles for teaching and research

Question 9 provided respondents with a list of databases (and journal collections) available in the university's library collection, and there was an "other" option where respondents could add any not listed. The respondents were expected to tick the databases they use and then rank their choices on a daily, weekly, fortnightly, monthly or never scale. There were 52 respondents who completed this part of the questionnaire. The results indicated that AGORA was the most frequently used database with 50 respondents using it; 14 (26.9%) on a daily basis, 24 (46.15%) respondents weekly, eight (15.3%) respondents using it fortnightly, and four (7.6%) respondents using it on a monthly basis.

The second most used database was the TEEAL database with 39 (75%) respondents. The frequency of the TEEAL database use was 15 (34%) daily, 12 (27.2%) weekly and four (9%) fortnightly. The HINARI database was the third most used with a total of 37 respondents (71%), at an average of 10% daily, weekly, and fortnightly respectively. OARE database was the fourth used by 26 (50%) of the respondents, and was used monthly by 11 (32.3%) respondents. The other commercial databases that had high usage were Springer with 21 (40%) respondents and were used daily by seven (21%) respondents, fortnightly by six (18%) respondents and monthly by six respondents. JSTOR, Science Direct, and Wiley Blackwell were used less frequently. Table 13 below provides a view of the individually listed databases.

	Daily	Weekly	Fortnightly	Monthly	Never	Total
AGORA	26.92% (14)	46.15% (24)	15.38% (8)	7.69% (4)	3.85% (2)	50
TEEAL Database	34.09% (15)	27.27% (12)	9.09% (4)	15.91% (7)	13.63% (6)	39
HINARI	10.64% (5)	10.64% (5)	10.64% (5)	46.81% (22)	21.28% (10)	37
African Journals Online	8.33% (3)	22.22% (8)	22.22% (8)	30.56% (11)	16.67% (6)	30
Springer	21.21% (7)	6.06% (2)	18.18% (6)	18.18% (6)	36.36% (12)	21
CABI Abstracts	0% (0)	13.89% (5)	13.89% (5)	25% (9)	47.22% (17)	19
OARE	5.88% (2)	2.94% (1)	5.88% (2)	32.35% (11)	52.94% (18)	16
JSTOR	3.45% (1)	20.69% (6)	10.34% (3)	20.69% (6)	44.83% (13)	16
Science Direct	11.54% (3)	7.69% (2)	23.08% (6)	15.38% (4)	42.31% (11)	15
Wiley-Blackwell	14.29% (4)	7.14% (2)	14.29% (4)	14.29% (4)	50% (14)	14
Taylor and Francis	15.38% (4)	19.23% (5)	7.69% (2)	3.85% (1)	53.85% (14)	12
EBSCO Host	3.85% (1)	3.85% (1)	11.54% (3)	3.85% (1)	76.92% (20)	6
Emerald	3.85% (1)	7.69% (2)	3.85% (1)	3.85% (1)	80.77% (21)	5
Gale Thompson	4.55% (1)	0% (0)	9.09% (2)	0% (0)	86.36% (19)	4
Academic Search Premier	4.55% (1)	4.55% (1)	9.09% (2)	0% (0)	81.82% (18)	4
Sage	6.25% (1)	6.25% (1)	12.50% (2)	0% (0)	75% (12)	4
Beech Tree Publishing	0% (0)	0% (0)	0% (0)	9.09% (2)	95.65% (22)	1
Other	0% (0)	0% (0)	20% (1)	0% (0)	80% (4)	1

Table 13: Library- subscribed databases used in accessing electronic journals

The trend is that the donated programmes (AGORA, HINARI and TEEAL) are more heavily used than the university subscribed databases. This could be that Research4Life programmes' access mode is much simpler than the university collection, since the access platform uses the same interface across the AGORA, HINARI and OARE resources.

5.4.2 Approaches used to locate electronic journals.

Question 10 sought to establish the approaches that the faculty members use to retrieve electronic journal citations. The question also required the respondents to rank their choice(s) in three categories – Often, Sometimes and Never. This question was answered

by 49 respondents and Google and other search engines were the most preferred avenues of accessing journal content and all respondents to this question ticked this option. These 49 respondents were distributed as follows: 45 (91.84%) use search engines often and four (8.6%) chose sometimes. Google scholar is the second most used approach to locate electronic journals. Out of the total of 47 (95%) respondents, 43 (91.9%) indicated that they use Google Scholar often and four (8, 5%) indicated sometimes. These results are in line with similar studies that show that Google and Google Scholar are popular mechanisms in retrieving electronic journals (Singh and Bebi, 2012; Research Information Network, 2011; King et al., 2009; Onyanacha, 2009 and Treptow and James, 2011).

The third most used approach is asking a friend from abroad, with 34 (69%) respondents, of which 19 (52.7%) use this approach often and 15 (41.6%) use the approach sometimes. This result, when read with responses to Question 7, where respondents indicated obtaining journal titles through friends from abroad, implied that faculty members were not able to find these journals locally and hence requested them from colleagues elsewhere. In comparison, therefore, in the present question 69% indicated that they ask a friend from abroad, and in question 7, respondents also stated the countries from where they accessed their journals. This indicated that this was a common access mode, but with the high availability rate of electronic journals from both the university collections and donated collections, there should be no need for requesting articles from abroad.

The fourth most common method was to ask a colleague, which registered a total of 25 (51%) responses. Of these 15 (45%) asked colleagues often and 20 (80%) respondents did so sometimes. The citation database and publisher’s websites were not used often but were sometimes used at 76.4% and 85% respectively. The other responses such as using the university library’s homepage, and asking librarians, each received less than 15%. These results indicate that the role of librarians and other finding tools should be promoted and the technical platform for retrieving electronic journals be improved. About 39.47% of the respondents indicated they would ask a colleague, suggesting that users needed help in retrieving and locating electronic journals and librarians have apparently not yet responded to such needs.

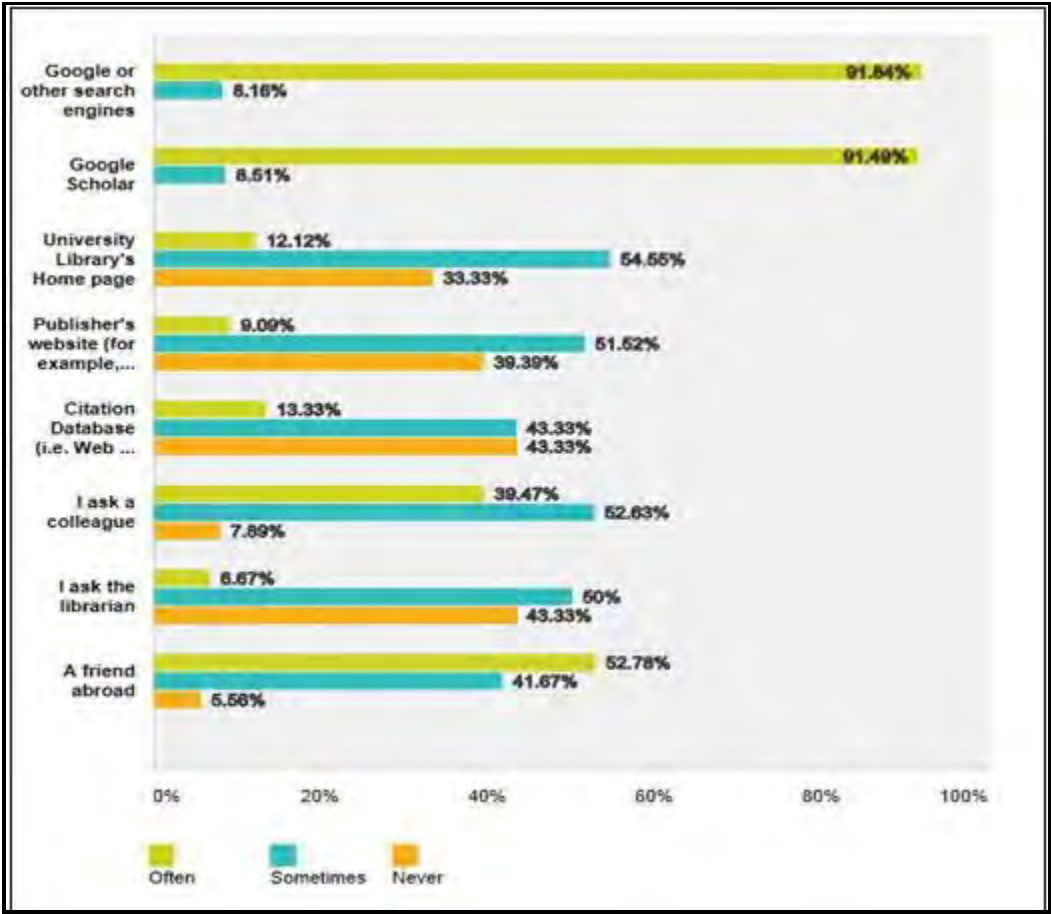


Figure 14: Approaches to locate electronic journals

5.5 Electronic Journals Use and Teaching.

This section of the survey sought to establish the purposes for which electronic journals are used and also how they are used in teaching and in research.

5.5.1 Purposes for which electronic journals are used

Question 11 asked respondents to state the purposes they use electronic journals for. This question was answered by 48 respondents and their choices ranked from highest to lowest are, research 48 responses (100%), teaching 46 responses (95.8%), student supervision 12 responses (25%), consultancy eight responses (16.6%), and two (4%) responses indicated other purposes. In the other option, the three following comments were offered - running farming operations, project activities, and writing up scientific publications. In summary, faculty members seemed to be engaged in research and used electronic resources to support their research and teaching. Section 5.8 will further explore whether such research culminated into increased publications. The answers to question 11 are presented in Figure 15.

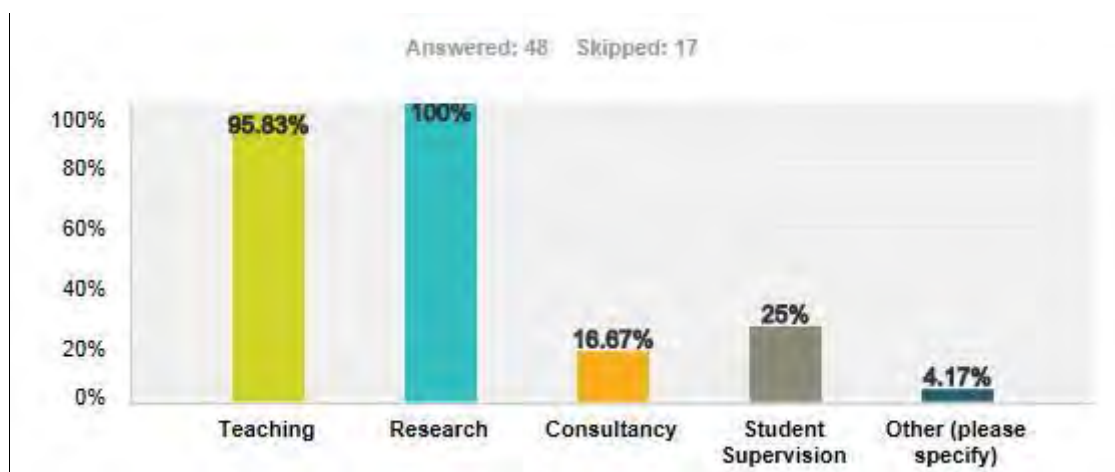


Figure 15: Purposes for which electronic journals are used

5.5.2 Citation of electronic journals in research

In order to obtain opinion of respondents for the citation of electronic journals in their research Question 12 asked directly if they cited electronic journals in their notes or course outlines. A total of 48 (96%) respondents indicated that they do cite their work compared to two (4%) who did not. This response contradicted with the availability study which discovered²⁸ that a few electronic journals were cited in course outlines

5.6 Teaching responsibilities

As noted above, question 3 had asked respondents to answer YES or NO whether they used electronic journals for study or for research. Respondents who chose NO were directed to Question 13 and automatically skipped Questions 4 to 12. The Survey Monkey™ tool recorded that these NO responses were counted as having skipped the questions from 4 - 12. The above analysis of these questions took this into account. The questions below focused on teaching responsibilities and whether faculty staff encouraged students to use electronic journals.

5.6.1 Faculty members teaching responsibilities

A total of 60 respondents answered Question 14 which asked about teaching responsibilities, and from these 55 respondents (91.6%) had teaching roles while five (8.3%) had no teaching roles.

²⁸ See section 4.3 above.

5.6.1.1 Classes taught per year

Those that had teaching roles were asked to state the number of classes they teach in a year. “Class” means the group of students a lecturer takes per given teaching session (maybe 2 hour lecture/tutorial) during the academic year, and with big groups these can be split into a number of classes. Their choices are shown in Figure 16, below. In these three categories, 1-3 per year, 3-5 per year, and 6 or more per year, the following results were registered: 40 (75.4%) responses, 11 (20.7%) responses and 3 (3.7%) responses, respectively. It therefore seems that most faculty members have teaching responsibilities and teach a minimum of between one and three classes per year, with only about 24% (20.7% plus 3.7 %) teaching more than three classes per year.

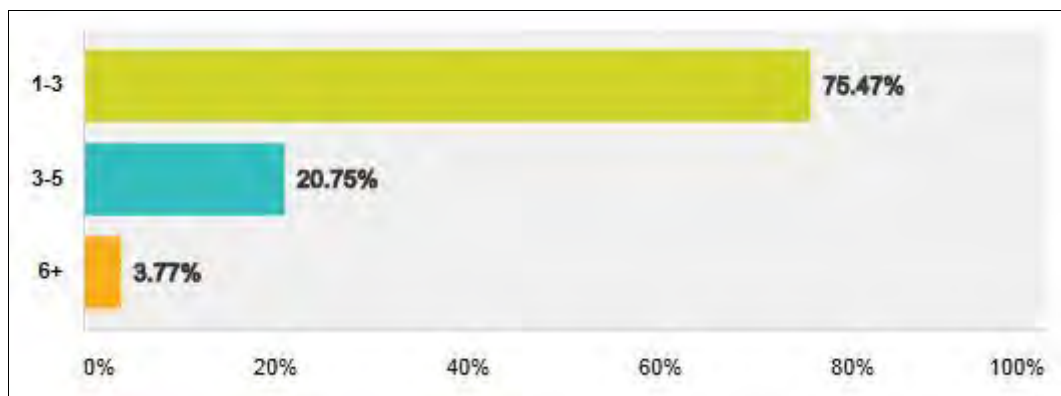


Figure 16: Number of classes taught per year

One evaluation criterion of the use of electronic journals by faculty members is to establish whether they encouraged students use to electronic journals and what strategies they employed to encourage the use of these resources.

5.6.2 Promoting electronic journals use to students

Question 16 sought to ask if respondents had specific training needs in the use of electronic journals. The question was answered by 54 respondents representing 83% of

the total study response to this question. Faculty members who indicated they encouraged the use of electronic journals were 52 (96.3%), and two (3.7%) did not. Question 15 gave the option of a free-text explanation: “If YES, elaborate on how you acknowledge or reward the student’s effort to use electronic journals?” This sub-question was answered by 31 respondents and six staff members noted that they would award marks for journal citations, while six respondents said they would check the references to establish the currency of literature cited. These remarks indicated that the lecturing staff made an effort to ensure that literature is cited, but did not explicitly request students to use electronic journals or journal literature.

5.7 Issues around Electronic Journals Use

The introduction of electronic content in libraries has called for additional resources such as more computers, increased bandwidth, training, marketing, and other support services. In this present study, respondents were asked to indicate specific items that they needed to improve or enhance their access to electronic journals.

5.7.1 Areas of training in the use of electronic journals

In order to establish training needs in the use of electronic journals, faculty members were asked in question 16 to indicate specific areas where they required training. This question was answered by 58 (89%) respondents and accessing the library’s electronic collections and retrieving e-journal references were most frequently chosen by 39 (67.2%) respondents, followed secondly by managing electronic journal references with 37 responses (63.8%), thirdly locating full-text articles for specific e-journal references at 36%

(62%). These results show that respondents had difficulties in accessing and retrieving electronic journal content from the library’s collections. This corroborates the responses obtained in Question 10 where respondents indicated that they ask a colleague to locate electronic journals. Coupled with the current findings in the present question, librarians should take up this challenge of additional training for staff. Figure 19 below provides a tabulation of these responses.

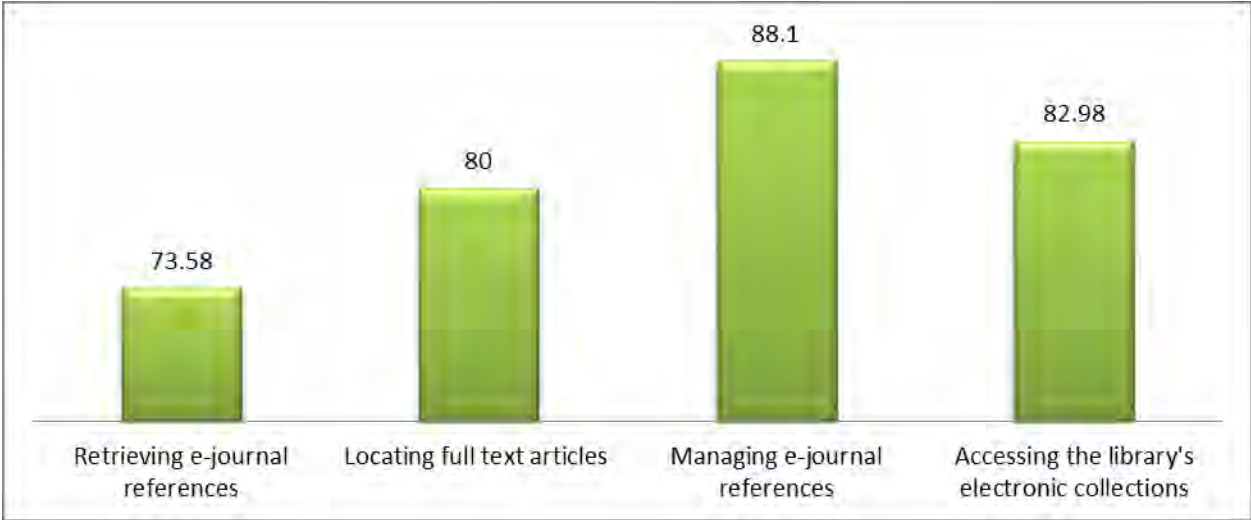


Figure 17: Electronic journal training needs

5.7.2 Improvement and enhancement to access to current research information

There were 58 participants (89%) who responded to Question 17 that sought respondents’ views on areas of improvement and enhancement to access current research information. Respondents were expected to choose from five options and then qualify each choice with a YES or NO response. Specific YES responses were to improve Internet bandwidth 42 (93.3%) responses, more computers 34 (87.1%) responses, increased training 37 (97.3%) responses, increased subscriptions 50 (98.%) responses and improvement of the e-journal platform for the University of Zimbabwe library at 39 (90.7%) responses. Very few respondents noted that these elements were not important. Five respondents (12.8%) indicated that additional computers were not required to

improve access to current research information available online, suggesting that a shortage of computers was not a problem.

Despite the improved collections and access to journal collections at the university as established in the availability study in the previous chapter, 50 (98%) respondents were of the opinion that more subscriptions to journals were needed. This might imply faculty's lack of awareness of what is available and also an opportunity for the library to market the e-resources to the academic staff. These results indicate a potential also for training opportunities and improved university library electronic journals online platforms. The results of the responses in question 17 are depicted in Figure 20 below.



Figure 18: Possible areas of improvement to enhance access to electronic journals

5.7.3 Issues important for academics in the use electronic resources

Question 18 sought to uncover which additional issues, other than the training and infrastructural issues were pertinent to the faculty members in accessing electronic journals. A variety of answers were given by the 33 respondents to this question. The responses were grouped under themes, the most important of which was research

funding. A total of seven members thought that it was important to have funding that encourages research and for researchers to use electronic resources. Responses were phrased in free text and included:

- Research grants or funding
- Funding for research projects
- Funding for publications
- Foster research through provision of research funds especially to young researchers.

The second largest group of comments concerned the culture of publishing. Some members stated that the university should stimulate a publishing culture among the staff. Ease of access to existing collections and improved subscriptions were mentioned a number of times. The relationship of funding to publication will be fully discussed in questions 19 and 20 in this chapter and comments from this question will also be incorporated into that discussion. The other issues raised by the comments were access to the resources off campus (two responses), continuous power supply, and good salaries (two comments). These final comments seemed to be related to conditions under which academics work and not relevant to the present study.

5.8 Electronic Journals Access and Publishing

The final section of the questionnaire focused on the usage of electronic journals for research and whether access to journals had a bearing on staff members publishing in journals themselves. These issues were designed to address part of the major research question for the study as presented in the introduction to this chapter:

- i. What are the problems encountered by the faculty in trying to publish?
- ii. Are faculty members motivated or aiming to publish?

iii. What are the issues that inhibit publication?

In the questionnaire of this survey (see Appendix 1), the last section was designed to gather the academic staff views regarding these questions (Questions 19 - 22). The final research methodology, citation analysis, discussed in the next chapter, will further explore this area of this study.

5.8.1 Faculty members publishing trends

There were 59 responses to Question 19 that asked if faculty have published or co-published in peer-reviewed journals since 2010 . The year 2010 was chosen to capture the publications that were not covered by *The University Of Zimbabwe List Of Publications*. There were 31 (52.5%) faculty members who had published after 2010 and 28 (47.4%) respondents had not published any work after 2010. Respondents who answered YES were asked for the number of their publications. Only 25 of the 31 respondents stated the number of their publications, and a total of 45 publications were recorded. The highest number of publications per person was five, followed by three people who indicated four and the rest had one publication each. The total numbers of publications given in this question are fewer than the number of respondents that participated in this survey – with 65 respondents; the publication to respondent ratio to publications is 0.63 to 1. Answers to this question indicated that at least 31 (52.5%) of staff are actively engaged in publication. This result showed that there was some attempt by staff members to publish, although research funding was mentioned as a negative factor by respondents to Question 18. To explore the 28 NO responses (47.4%), about faculty who had not published a paper in a research journal, the question below was asked.

5.8.2 Reasons for not being published

Question 20 was a follow up question that sought reasons for not publishing. There were three options provided, firstly “I have submitted a paper for publication but have had it rejected”; secondly “I am working on a paper, but it is not yet complete” and “I am not currently working on a research project”. This question was answered by less than half (26 respondents ; 40%) of the survey participants, 13 respondents (50%) indicated that they were working on a paper; 9 responses (34.6%) indicated that they had submitted a paper for publication but that it had been rejected. Lastly, 4 respondents (15.3%) stated that they were not currently working on a research project. Despite the low response rate, these responses do show that there was an attempt by the faculty members to publish, as signified by 13 respondents (50%) who were working on a paper. If those working on a paper and those that have submitted a paper were combined, a total of 22 responses (84.6%) of respondents were working towards publication. However, a cause for concern is that nine respondents (34.6%) had had their efforts rejected, thus indicating a potential area for further research into the reasons for a relatively high article rejection rate for faculty submissions. The “other” option provided for in this question was not attempted and no other reasons were stated.

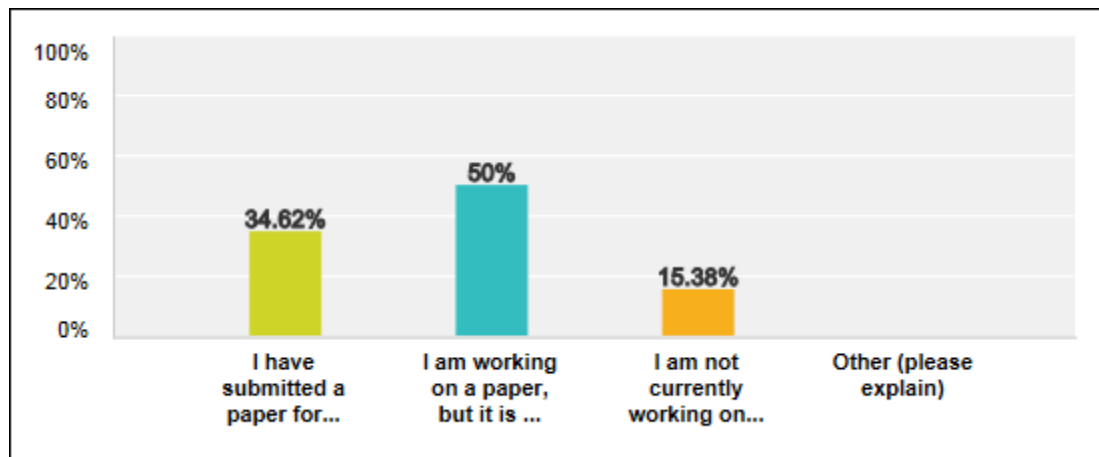


Figure 19: Reasons for not being published

5.8.3 Access to journals and publishing trends

Question 21 was an open-ended question that sought to establish whether respondents perceived a direct relationship between access to journals and increased publishing. Ondari-Okemwa (2007:3) had listed the lack of access to electronic journals by academic staff in sub-Saharan Africa as one of the challenges for academics in attempting to publish. That author contended that improved accessibility would decrease the knowledge divide or the disparities in people's capacities to do research and publish. This present study sought to test Ondari-Okemwa's (2007) assumption. The question was answered by 59 respondents (90.7%) and 20 (33.9%) agreed that access had improved their publishing rates, while 39 respondents (66.1%) disagreed. The results therefore seem to suggest that access to electronic journals had not made much difference to the publishing rates of the academic staff. Question 22 sought to establish issues that prevented the faculty from publishing.

5.8.4 Challenges in publishing in Peer-reviewed journals

A total of 57 respondents (87.6%) attempted this question 22 which asked about reasons preventing faculty from publishing in peer reviewed journals. The most frequently stated reason preventing faculty members from publishing was identified as the high cost of publishing²⁹ by 43 respondents (75.4%). Secondly, a lack of time due to teaching roles was noted by 33 respondents (57.8%); thirdly lack of local incentive to publish was noted by 28 respondents (49.1%), and finally writing skills were noted by ten respondents (17.5%). With regard to lack of time due to teaching roles, 33 respondents (57.8%) agreed with this statement and this result can be compared to responses given in Question 14, which established that most faculty members had a minimum of 1 – 3 classes per year, with 24% having had more than three classes per year, so there was evidence for some staff members having heavy teaching responsibilities. The third highest chosen response, No local incentive to publish had 28 respondents (49.1%), suggesting that academic staff might want to publish but that there were inadequate support mechanisms and therefore no local incentives to publish.

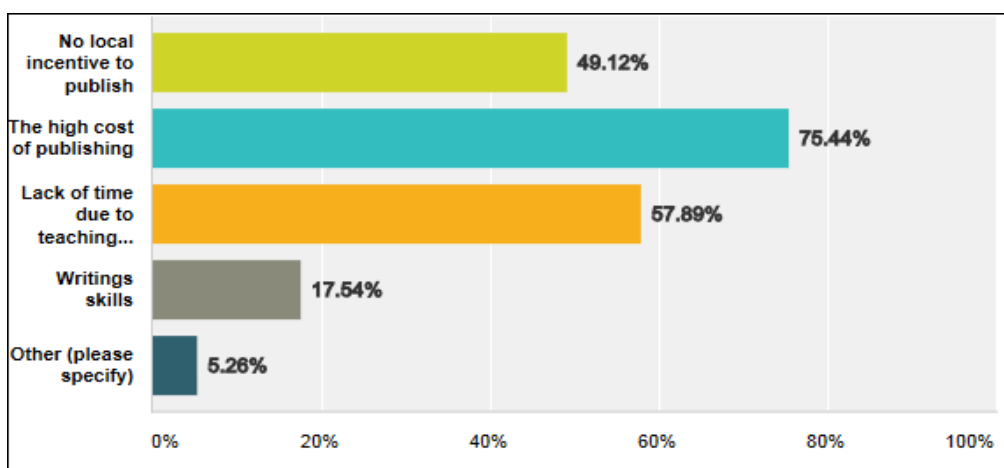


Figure 20: Reasons for not publishing.

²⁹ The option 'High Cost of Publishing' indicates the Author Article Charge which was discussed in section 2.1.5. This is normally one common reason given by African researchers for not publishing and Ondari-Okemwa (2007) refers to it as an economic barrier. See discussion in section 2.1.6.

Three respondents chose the “other” option and their reasons were either that they had no funding to carry out research, too many administrative responsibilities, or that research work required a lot of funding and currently the university did not provide such funds. These results might indicate some willingness on the part of the faculty members to attempt to publish, but that they needed more institutional support.

5.8.5 Improving access to current research

Question 23 was an open ended question gave respondents an opportunity to provide answers and comments freely to areas that could be addressed to improve access to current research in their field. This question was answered by 32 (49.2%) respondents.

The comments seemed to be clustered around 5 areas –

- Improved subscriptions (13 comments)
- Infrastructural issues such as computers, and bandwidth (5 comments)
- Awareness of electronic journals (4 comments)
- More national content and statistical data (3 comments)
- Training (2 comments)
- Other (5 comments)

Responses seemed to indicate that there was a need for more local journal resources, from sub-Saharan Africa, and from other developing countries in Asia and Latin America.

The journal collections to which the library subscribes, and the donated collections, are mainly from the developed countries, with journals from developing countries not well represented. Perhaps an investment in journals from other regions would balance the scholarship and research at the University of Zimbabwe. These comments about subscriptions echo some comments in Question 8 (increased subscriptions); Question 16 (training needs) and elsewhere throughout this survey. This observation corroborates the

finding in section 4.6 which noted that access is mainly provided to commercially provided databases rather than journals published by learned societies and African journals.

5.9 Impact of Electronic Journals Access.

Question 24 enquired about the impact of electronic journals on respondents' work and 31 (47.6%) attempted this question. Thirteen respondents acknowledged that access to electronic journals enabled access to more literature sources and widened their scope of knowledge in their specific fields. Ten respondents acknowledged that it was relatively easy to locate references and saved them time in literature searching. One respondent acknowledged that the quality of his work had improved as a result of increased access of literature in his (her) field. At the time of the survey, the university library still had a collection of print journals and these were located in the periodicals section in the library.

Question 25 of the survey asked whether faculty members would prefer electronic journals to the print collections, and the question was answered by a total of 54 respondents (83 % of the survey). More than three quarters, 41 (75%) respondents, said they preferred electronic journals to print journals. This showed the acceptance of electronic journals by the faculty. Conversely, 13 respondents (24%) said they preferred print journals and these responses indicate that the library should still consider methods to satisfy the 24.07% who still prefer print journals.

The last question of the survey (question 26) was an open ended question which is phrased this way:- ‘ Are there any other issues relating to access to current scholarly and scientific literature that you would like to mention?’ Question 26 was not attempted by many of the survey participants, only 21 out of 65 participants responded. Those who answered this question reiterated previously raised comments - that increased subscriptions, an awareness of the collections, and funding for research were required to improve access to scholarly and scientific literature. There were a few additional comments:

- Prices from Google search are very high,
- University should acquire these on behalf of researchers,
- Access mechanisms should be relatively easy
- Finding Journals through Google is easier but the problem of paying and,
- The most relevant articles and review papers always inevitably show up a ‘\$’ sign.

These responses indicate that they use Google to locate these resources but are asked to pay for actual access. There is a need to improve the platform mechanism and ensure that collections subscribed to by the library are found and accessed relatively easily.

5.10 Conclusion

This chapter has presented the data from the survey according to the categories of access to electronic journals by academic staff, usage of electronic journals for teaching and research, and issues surrounding the use of electronic journals and finally access to electronic content and publishing by the faculty members. The results indicate that 55 staff members (87.3%) use electronic journals and they cite these in their research works. The result also indicated that university facilities such as the library and the computer laboratories are not fully utilised to access electronic journal content. The survey showed

that search engines (at 91.84%) such as Google are preferred by faculty to locate journal content. The library website, the librarians and other finding aids are less used in locating the electronic journals. Faculty members use electronic journals for teaching and research; however access to electronic journals has not led to increased publications. Respondents indicated willingness to publish and stated the reasons why they do not publish.

The survey sought to answer the key questions as phrased in the introduction of this chapter in section 5.1. The paragraphs above discussed the responses to the 26 questions. The answers addressed the major research questions which this survey intended to explore. The questions that focused on publishing were not answered by all the respondents, but on average more than 50% responded to the questions dealing with issues surrounding publishing and access to journal content (sections 5.7 and 5.8). Issues dealing with publishing will also be discussed in the next chapter, which will present the third research method of this study, the citation analysis of the publications by the academic staff in the Faculty of Agriculture.

Chapter Six

Citation Analysis

6.0 Introduction

This chapter presents the results of the third research method - citation analysis - employed in this study. The previous chapter presented the results of the survey which focused on the faculty's access to electronic journal collections, their use of journals for teaching and research, and the impact of electronic journals on faculty members in publishing. The citation analysis complements the findings from the other two methods. Citation analysis addresses the third and fourth research questions for this present study which were discussed in section 3.3.2.

University Of Zimbabwe List Of Publications was the source of the faculty's journal publication references used in this study. An analysis into the faculty citations retrieved from their research papers revealed their publication choices, and also indicated the information sources they consulted for research purposes. The *University Of Zimbabwe List Of Publications* had a total of 296 references. A two-part approach was used to examine the citations in this study. In the first place, the 296 references were analysed to establish the preferred journal titles in which faculty members published. Secondly, the 5,633 citations culled from the 296 references were analysed.

6.1 Analysis of List References from the University Of Zimbabwe List Of Publications

The references were analysed to explore the publications trends, authorship patterns, preferred journals and availability of preferred journals.

6.1.1 Publications Trends

Figure 21 below shows the numbers of published articles by the faculty staff between year 2000 and 2010. The graph shows an erratic publication rate, with a peak of 42 publications in 2004. The average figure between 2000 – 2010 was 26 publications per year. From the year 2007, there was a gradual drop in the number of publications from a high of 33 publications per year to 12 publications in 2008. An anomaly is noted during the period while access to journals was reported to be increasing, publications were decreasing.

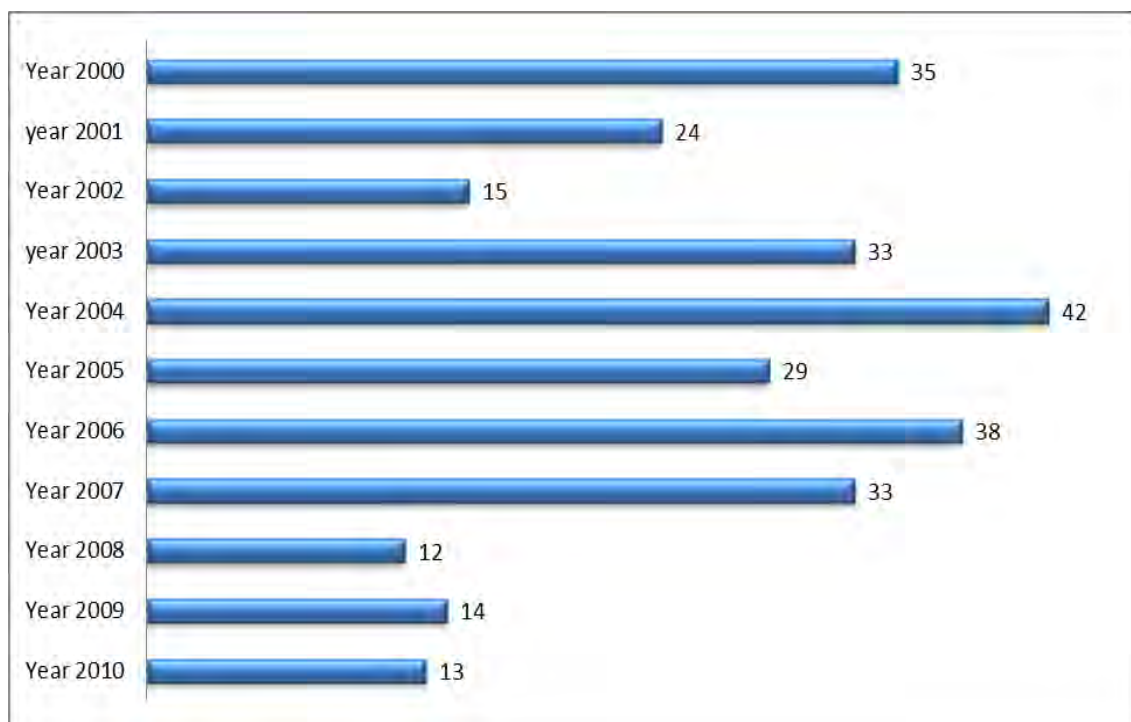


Figure 21: Publications by years

6.1.2 Authorship Patterns

This study continued to explore the authorship patterns of the listed authors in the publications list, focusing on internal and external collaborations. There were very few articles of single authorship; in most cases there were collaborations amongst colleagues in the same departments. Table 14, below presents the summary of these collaboration and co-authorship arrangements and this information is presented per department. This table shows that in the Faculty of Agriculture there were more co-authorship arrangements than single authorship for articles. Only 6% (19) were single authored articles, compared to 13% (39) for two authors, 20% (59) for three authors, and 28.6% (84) for four authors.

Lee and Bozeman (2005:3) studied different approaches to collaborative research within researchers of the same institutions and across institutions and they established that collaborations were a significant drive to boost scientific productivity. The ratio of multi-authored papers to total number of authored papers was 0.91, which according to Subramanyam is an index of strong collaboration among faculty staff members (1983:4). A closer examination of the list across all the departments shows that faculty members publish in common groups and in similar journal titles. Co-publishing has been recognised as one of the ways to mentor young researchers (Thein and Beach, 2010). There was also a high number of papers with five authors or more, and looking at the nature of these papers, it was apparent that the articles resulted from some common projects within the departments. Evidence of sponsored research and a collaborative approach in publishing was noticed as well.

	One Author	Two Authors	Three Authors	Four Authors	Five Authors
Department of Animal Science	3	4	17	31	39
Department of Crop Sciences	11	8	14	12	23
Department of Soil Sciences	2	18	17	21	18
Department of Agricultural Engineering	3	9	11	20	12
Totals	19	39	59	84	92

Table 14: Authorship patterns in the Faculty of Agriculture

There was some evidence of external collaboration with co-authors outside the university. There were ten external collaborations in the department of Animal Sciences, of which seven published in European journals and three in American Journals. In the department of Soil Sciences and Agricultural Engineering, there were 17 external collaborations, 13 from European journals and five from South African journals. In the Crop Science department there were 18 external collaborations; 15 published in Europe and three published in America. In all these situations, collaboration apparently resulted in publishing in international journals. It is suggested that inter-institutional collaboration presents an opportunity that the faculty can exploit as a measure of boosting publications.

6.1.3 Preferred Journals

The list showed that faculty members published in 109 different journals, of which 53% (58) are from Africa, 29% (32) from America, 8% (9) are European and the remaining 7% (7) are Asian and 3% (3) Australian journals. The results also indicate that the majority (60%)

of the faculty members publish in African journals and the rest publish in American and European journals. The survey results supported that they wanted to publish in international journals, but were deterred by the difficulty of publishing in these journals. In reviewing the publication patterns and the journal titles, *Tropical Animal Health Production* (11 Citations) was found to be the most preferred and popular journal, followed by *Agroforestry Systems* and *Tropical and Sub-Tropical Agro ecosystems* that had ten citations each. The top ten preferred journals as indicated by the number of times they were cited, are shown in the Table 15 below,

Journal title	No of Citations
<i>Tropical Animal Health and Production</i>	11
<i>Agroforestry Systems</i>	10
<i>Tropical and Subtropical Agro ecosystems</i>	10
<i>South African Journal of Education, Science and Technology</i>	7
<i>African Journal of Range and Forage Science</i>	5
<i>Experimental Agriculture</i>	5
<i>Field Crop Research</i>	5
<i>Livestock Research for Rural Development</i>	5
<i>Crop Research Journal</i>	4
<i>Journal of Applied Sciences in Southern Africa</i>	4

Table 15: Top Preferred Journals

The University of Zimbabwe also has journals in which academics can publish; some are managed by the university's publication unit while others are run separately by departments within the university. The following journals are managed by the University of Zimbabwe Publications: *Journal of Applied Science in South Africa* (JSSA), ZAMBEZIA, *Zimbabwe Journal of Education Research* (ZJER), *Zimbabwe Law Review* (ZLR), and *Central*

Journal Africa of Medicine (JAM). The *Zimbabwe Veterinary Journal* is managed by the Faculty of Veterinary Sciences.

Faculty members attempt to publish in local journals. Results show that faculty members published in the following journals, *Journal of Applied Science in South Africa (JSSA)* (four articles) and *ZAMBEZIA* (three articles), and two other non-University of Zimbabwe journals - *Zimbabwe Science News* (one article) and *Zimbabwe Veterinary Journal* (two articles). These results show that faculty also publish in local journals. However, the University of Zimbabwe journals are not current and as a result in the list the latest is 2004. The University of Zimbabwe Press has been failing to publish journals timeously, for example the *Central African Journal of Medicine's* latest copy is Vol. 58, No 9-12 (2012) and *ZAMBEZIA*, Vol. 32, No 1 (2005).

In order to establish whether faculty members publish in Open Access journals, the titles from *University Of Zimbabwe List Of Publications* were searched in the Directory of Open Access Journals (DOAJ). This is a directory that attempts to list all recommended quality open access journals. Only one journal title was established to be open access. *Tropical and Subtropical Agro Ecosystems* is the only open access journal that was listed as a journal in which they publish. This corroborates the results that were obtained in the availability study which indicated in section 4.1 that there were many opportunities for faculty members to publish in open access journals, for example the DOAJ alone lists more than 492 journals in agriculture.

6.1.4 Availability of the Preferred Journals

The availability study, the first of the three methods of this study, explored the availability of the Faculty of Agriculture core journals. Section 4.3 showed that the Faculty had over 80% access to the electronic journals they required. This study also relied on the core faculty journal list which was discussed in section 4.3 to measure how many of those journals were listed in their references. The results of this process is shown in Table 16 below, which indicates that of the top ten journals, nine are available in the university's collections. This shows that faculty members have access to nearly all the journal titles in which they publish, and this is corroborated by the results given by the two other methods of used in this study.

Journal title	No. of Citations	Availability on local collections			JSC Impact factor
		Research4Life	UZ Subs	Other	
<i>Tropical Animal Health and Production</i>	11	HINARI/ AGORA/ OARE	Available	TEEAL	1.115
<i>Agroforestry Systems</i>	10	AGORA/ OARE/ ARDI	Available		1.378
<i>Tropical and Subtropical Agro ecosystems</i>	10			Open Access	0.16
<i>South African Journal of Education, Science and Technology</i>	7		Available (AJOL)	Not available	
<i>African Journal of Range and Forage Science</i>	5	ARDI/HINARI	Available		0.6
<i>Experimental Agriculture</i>	5	HINARI /AGORA/OARE	Available	TEEAL	1.06
<i>Field Crop Research</i>	5	AGORA/OARE	Available	TEEAL	2.474
<i>Livestock Research for Rural Development</i>	5		Not available	TEEAL	0.03
<i>Crop Research Journal</i>	4	Not available	Not available	Not Available	
<i>Journal of Applied Sciences in Southern Africa</i>	4	Not available	Not available	Available only in print.	

Table 16: Availability of the preferred journals titles

Table 16 above shows that titles in which faculty members publish are generally available in the library collections. From the top ten journals, two were not available and these were the two titles *Crop Research Journal* and *Journal of Applied Sciences in Southern Africa (JASSA)*. The *Journal of Applied Sciences in Southern Africa (JASSA)* is not available in electronic format, but is in print, while the two other journals are not available because they are not included in the University of Zimbabwe purchase scheme. The challenges of publishers and journals not available in bundles were discussed in section 4.5. As noted in section 4.2.1, the electronic journal access at the University of Zimbabwe is heterogeneous, in that there three main access approaches – through the Research4Life (HINARI, AGORA, OARE and ARDI Databases) collections, the TEEAL offline electronic journals and the University Subscriptions. The different access platforms and access mechanisms in each respective electronic journals collection present a challenge to faculty staff in retrieving these journals. This point was confirmed by faculty members in the survey, specifically in section 5.7 where it was noted that 90.7% members raised the issue of the different electronic journal platforms, as one area that needs to be addressed.

Faculty members generally endeavour to publish in high impact factor journals, and the University of Zimbabwe staff members also aim to publish in these journals as there is a culture of prestige in publishing in these journals amongst academics (Wilhite and Fong, 2012:542). The debate around impact factors was discussed in section 2.6, and it was noted in the availability study that the library provided access to international journals. In section 4.4, it was noted that the library provides access to, for example, high impact

journals like *Science* and *Trends in Ecology and Evolution*, which were identified from the faculty's list of citations as required journals.

6.2 Citation Analysis of cited references

The 296 references were searched from the University of Zimbabwe Library collections in order to harvest the list of citations consulted in each paper. The list had 22 non-journal references which were 21 books and one PowerPoint presentation, and a total of 274 references of journal articles. In culling citations from each of the 274 articles, it was found that two journal papers had no references, and 44 papers could not be retrieved from the collections (this will be discussed below). The result was 228 papers that had citations, which in turn generated 5,633 citations. This section provides an analysis to these citations.

6.2.1 Distribution of the 5,633 citations

The 5,633 citations were analysed and the following sources were consulted - 3,118 journal articles (55%), 1,468 books (26%), 350 theses (6%), 256 reports (5%) and 441 (8%) other resources such as newspapers and internet sources. The figures are shown below in Figure 22

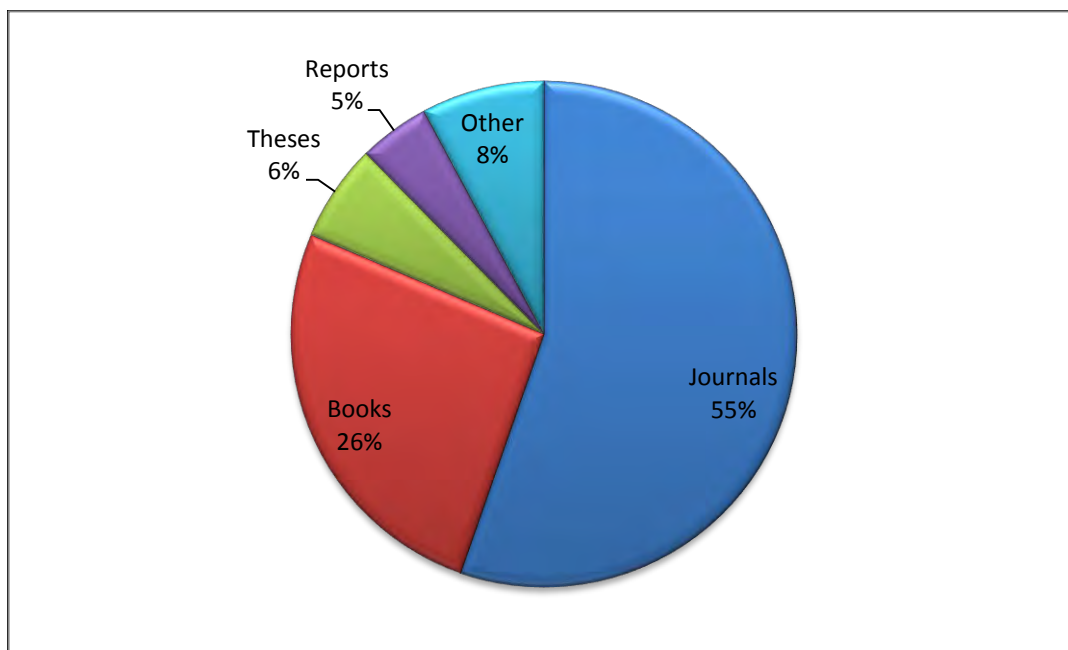


Figure 22: Summary of cited references

This breakdown shows that academic staff used journal content (55%) more than any other source of scholarly information for their publications. Books were the second most consulted resource, with 1,468 citations, the “other” category included internet resources, newspapers and training manuals.

6.2.2 Journals Citations

The 228 papers had 5,633 total citations and 3,118 were journal citations – therefore each paper had an average of 13,5 journal citations per article from journals out of 24,7 average citations in each paper. This showed that faculty members used electronic journals. In the analysis the years of latest³⁰ cited sources in each paper were listed for the 228 papers. The listing showed that the average latest cited source was in 2008. The oldest cited resource was a 1915 book. This analysis show that journal sources are used in citations

³⁰ The year range of references listed in the *University Of Zimbabwe Publications List 2000-2011*, was 2000 to 2010.

however, the 3 years gap between date of article publication and the latest cited resource show that the faculty were not citing the latest sources. This could be an indication that faculty members are not retrieving current journals from online collections.

6.2.3 Un-retrieved Journal Articles

There were 44 references that could not be retrieved from the University of Zimbabwe collections. From the 44 references, 13 journal reference citations were from African journal titles that are not available in electronic format. These included the University of Zimbabwe Publications titles such as JASSA and ZAMBEZIA. There were other journals from the region such as *Zambia Journal of Agricultural Sciences*. This could imply that faculty members could be publishing in regional journals that are still available in print. The 19 other references included references from regional conference proceedings which were not available online. The rest (12) were journal articles from outside Africa not included in the electronic journal titles subscribed to by the University of Zimbabwe library and could therefore not be retrieved.

6.3 Conclusion

The analysis of the Citations University of Zimbabwe List of Publications revealed that, on average between the year 2000 and 2010, the Faculty of Agriculture had an average of 26 articles published per year. It was established that there was a high-rate of co-authorship within and between departments. Faculty members also publish with external authors

and this has led to faculty members collaborating to publish in international journals. While Chapter 4 focused on the availability of needed journals by the faculty members, this chapter focused on the availability of the journals in which faculty members publish, and in this way the present chapter complements the availability study (chapter 4) and corroborates the results of the survey (chapter 5).

Chapter Seven

Summary and Conclusions

7.0 Introduction

This study was about access to electronic journal content by academics at the Faculty of Agriculture, University of Zimbabwe. It was conceived against a background of African academics complaining about the lack of access to subscription journal content (Harle, 2010:12). Academic libraries, especially in developing countries, find it difficult to pay for subscriptions required to the most recent journals (Harle, 2010). However, most Sub-Saharan African countries are eligible for subsidised scholarly electronic journals access schemes discussed in Section 2.2. In addition, many journals which were previously available through subscription only, are also available in open access.

7.1 Overall Summary of the study

The study employed methodological triangulation in order to find whether faculty members in a localised institution have access to journals they need for teaching and research. The following were constructed as the research questions for this study, and were discussed in-depth earlier on in Section 1.4,

- To what extent do the available journal collections meet the needs of the faculty for teaching and research?

- Does the University of Zimbabwe library provide access to the journal literature that academics cite in their published works and their reading lists?
- Are there problems encountered in accessing electronic journal collections, and if so, what is the nature and frequency of these problems?
- To what extent do faculty members publish their own research and what do they regard as the obstacles they face in attempting to do so?

In order to address these questions, three research methods, an availability study, a questionnaire and a citation analysis, were employed. The procedures applied for each respective method were discussed in Section 3.3.

Literature reviewed in chapter 2, indicated that electronic journals are increasingly used by researchers and that most researchers access these from outside the library. Libraries both in developing countries and sub-Saharan Africa seek to increase their journal collections. In western countries the major challenges are rising electronic journal costs and reduced budgets. Developed countries' solution is that of "big deals", and this is proving to be unsustainable for many libraries. Furthermore, there is a push for open access solutions as the ultimate solution to the acquisition of electronic journals. McCreddie (2013) and Burnett and Pyle (2012) challenged librarians in developing countries to increase their value and facilitate access to electronic content. Challenges such as lack of adequate computers, internet connectivity, and power outages inhibit access to electronic journals.

7.2 Findings of this study

The following paragraphs will enumerate the findings in this study. The points are arranged according to the themes as raised in the objectives of this study.

7.2.1 Availability of Electronic journals to Faculty Members.

The following were the findings related to electronic journals availability;

- Academics in the Faculty of Agriculture have access to electronic journals they need for teaching, research and publishing. The overall average availability of electronic journals in agriculture is 85.5% across all electronic platforms. The following are the specific rates within the Research4Life programmes: 63% (AGORA), 47% (ARDI), 51% (HINARI) and 53.5% (OARE). If searched from other sources outside the Research4Life programme, the needed journals availability rate falls from 85.5% to 39.5%.
- Journals titles published by society publishers are not available from the subscribed collections and represent a large portion of the 14.5% unavailable collections. Most African journal titles that are not included in the African Journals Online database, were not available.
- International journals in the faculty core journals list were available, including the three journal titles with the highest impact factors, *Science*, *Nature* and *Trends in Ecology and Evolution*.
- Duplication of titles was noticed across Research4Life programmes (AGORA, ARDI, HINARI and AGORA). However, very limited journals titles were available from TEEAL, which had 11% availability rate.

7.2.2 Retrieval and access to electronic journals

The points itemised below provide a summary of findings related to retrieval and access to electronic journals,

- Faculty members access electronic journals most often from their university offices (96%), their homes (65%) and Internet cafes (40%). Library PCs (14%), faculty laboratories (12%), and departmental laboratories (6%) are not favorite venues for accessing electronic journals.
- Despite a 85.5% availability rate established in the availability study, problems encountered when accessing electronic journals included no passwords (66%), back issues not available (65.6%) and the university did not subscribe to the journals (41.6%).
- On mode of access, 71.7% indicated they could not access journals via the library website. The availability study indicated that six different paths were needed to retrieve electronic journals at the University of Zimbabwe (section 4.2).
- HINARI is the most frequently used database (71%) in retrieving electronic journals, followed by AGORA (46.5%). The Research4Life portals are used more than subscribed databases.
- Google Scholar is highly used to retrieve articles at 91.9%, followed by asking a friend from abroad according to 69% of the respondents, while 45% ask a colleague. The library homepage or a librarian (less than 15% respectively) is not often consulted. The electronic journals access platform on the University of Zimbabwe library website needs to be improved.

7.2.3 Reasons for using electronic journals

The study sought to establish how electronic journals are used in teaching and research, and both the availability study and the questionnaire sought to interrogate reasons for using electronic journals. Findings included:

- Faculty members use electronic journals for research (100%), teaching (95.8%) and student supervision (25%). While the survey confirmed that researchers cite electronic journals (96%), the sampling of the course outlines available online and those for postgraduate students revealed less citation on course outlines.
- 91.6% of the faculty have teaching roles and faculty members indicated (96%) that they encouraged students to use electronic journals and many faculty members award marks for citations.

7.2.4 Issues around electronic journals use

In literature, infrastructural issues related to bandwidth and internet (Harle, 2010; Adams, King and Hook, 2010; UNESCO, 2010), uninterrupted electricity supply (Achonna, 2008; Chingbu, 2012), computers, and training needs are often raised by researchers with respect to electronic online content.

- The study established that 98% of the faculty was of the opinion that they need increased subscriptions, and they considered computers (87.1%), training (97%) and improved electronic journal platforms (90%) as critical to accessing electronic journals.
- Faculty members needed training in accessing and retrieving electronic journal collections, and locating full text articles for specific journal references.

7.2.5 Electronic journals access and publishing

The survey and the citation analysis sought to establish the issues related to electronic journals access and publishing.

- Faculty members endeavored to publish and 52% had published work after 2010. At least 50% of the staff members were engaged in research and were intending to publish. Those who had not published, indicated they were either working on a paper or they had submitted a paper already.
- Section 2.8 reviewed the impact of access to literature and publishing. In the survey, faculty noted that access to electronic journals had not increased their publications (33.9% saying YES and 66.1% disagreed), and this was confirmed by the citation analysis which revealed a decreasing trend from 2004 to 2010. There is no evidence to suggest that access to electronic journals alone leads to increased publications. Issues preventing faculty in publishing included the cost of publishing, the lack of local incentives to publish, too much teaching and a shortage of funding for research.
- This study established that there is no direct link between access to electronic journals and increased publications. In the period 2004-2010 faculty publications fell, an inverse of the increase in the number of electronic collections subscribed to by the University of Zimbabwe library.
- Citation analysis of the references indicated that faculty members use journals more than any other type of information for their research.
- Faculty does not cite the most recent literature in their research work.
- Open Access journals are not fully exploited by faculty members in publishing.

7.3 Recommendations

Therefore, this study recommends the following measures to improve the utilisation of electronic journals,

- Electronic journals access should be made as seamlessly and as simple as possible. The library could commission a usability study of the website and establish the real difficulties faced by users in retrieving electronic journals. Irrespective of whether such a study is done or not the following interventions applied elsewhere (Pienaar and Smith, 2007), could be tested:
 - employing a federated search tool or interface, this could be a commercial solution as reviewed in Section 2.3.2.1, or an Open Sources solution.
 - using the Google Scholar access option as described in the Google Scholar Library Support Program³¹.
- The University of Zimbabwe library management can lobby donors such as Research4Life partners to improve or widen access possibilities beyond the institutional password, which could improve the ease of retrieving electronic journals. Since some portals, such as AGORA come with a CABI abstracts indexing and HINARI with PubMed retrieval facilities, these could be IP authenticated to allow seamless retrieval of Research4Life electronic journals.
- Open Access awareness campaigns should be intensified in order for the faculty to be aware of various electronic journals available for them to access and in which to publish, especially if these could be streamlined according to those that require (and those that do not require) Author Article Charges. In this way, opportunities

³¹ Google Scholar Support Program. <http://scholar.google.it/intl/en/scholar/libraries.html> accessed 2013 December 30.

to publish in Open Access journals will be made available to the faculty. Open Access deposits to the Institutional Repository should be encouraged. These interventions could be incorporated into a university-wide Open Access Policy.

- Studies (see section 2.5) show that fewer patrons visit the library for electronic journals. Librarians should strive to introduce guides for accessing journals retrievable from the library website; including videos and online courses such as webinars. The increase in internet speed at the University of Zimbabwe now allows for such possibilities.
- Efforts should be made to increase access to collections from within Africa and other developing countries currently not covered by existing subscriptions.
- The University of Zimbabwe should put in place mechanisms to support publishing within the academic community. Such a support framework should include:
 - Ensuring that journals published by the university are current and attracting manuscripts from the university community.
 - Support staff with publication fees to reputable journals
 - Encourage collaboration with regional and international researchers.

7.4 Future research

This study established potential areas of further research in the area of access to research in Africa and the role of libraries. There is a need to study the issues that inhibit African academics in participating in international scholarly communication. The potential of librarians in facilitating access to these collections could be further examined to uncover the skills and competencies needed in this digital era. In summary, this study could be

replicated across all faculties at the University of Zimbabwe or other universities in Sub-Saharan Africa to establish the challenges faced by researchers in accessing electronic journals and current online literature.

References

- Abadal, E .2012. Approaches for Open Access journals: quality, quantity and economic sustainability. *Hypertext Year*, 10. Available: <http://www.upf.edu/hipertextnet/en/numero-10/challenges-for-open-access-journals-quantity-quality-and-economic-sustainability.html> [2013, January 14].
- Abrahams, L., Buke , M., Gray, E., & Rens, A. 2009. Opening access to knowledge in South African universities . SARUA Report. Available: http://www.sarua.org/files/publications/OpeningAccess/Opening_Access_Knowledge_2008.pdf. [2012, September 6].
- Access to Research for Development and Innovation . 2013. Research for Innovation. <http://www.wipo.int/ardi/en/> [2013, June 13].
- Achonna , A.U. 2008. Awareness, access and usage of e-journal resources of the library, by the students of Yaba College of Technology, Yaba –Lagos Nigeria. *Samaru Journal of Information Science*. 8 (1): 26-24.
- Adams, J.2004. Bibliometrics: The citation Game. *Nature* 510:470-471.DOI:1038/510470a
- Adams J, Gurney K., Hook, D., & Leydesdorff , L.2014. International collaboration clusters in Africa. *Scientometrics*. 98:547-556. DOI 10.1007/s11192-013-1060-2.
- Adams, J., King, C., & Hook, D. 2010.*Global Research Report: Africa* .Leeds, Thompson Reuters.
- Adams, J., King, C., Pendlebury, D., Hook,D., & Wilsdon, J .2010.*Global Research report: Middle East*. Available: <http://sciencewatch.com/global-research-reports> [2013 July 21].
- Adams, J., Pendlebury,D., and Stenbridge,B., 2013. *Global research report: building blocks*. Available: <http://sciencewatch.com/grr/building-bricks> [2013, December 3].
- Akobi,E.I. 2007. The impact of and use of TEEAL on researchers of Faculty of Agriculture, Ahmadu Bello University Samaru, Zaria. *Continental Journal of Information Technology*. 1:6-10.
- Alabi, G. A. 2011. Book availability and performance measure in an academic library: the case of the Walter Sisulu University (WSU) library, Mthatha Campus. *Library Philosophy and Practice*. <http://digitalcommons.unl.edu/libphilprac/454> [2012, March 23].
- Ali, N. & Nisha, F.2011.The use of e-journals among research scholars at Central Science Library, University of Delhi. *Collection Building*. 30 (1):53-60.
- Aman, V. 2013. *The potential of pre-prints to accelerate scholarly communication: a bibliometric analysis based on selected journals*. Master’s Thesis. Humboldt University of Berlin.
- Analysys Mason, 2013. *Lifting barriers to Internet connectivity in Africa*. Available: <http://www.analysismason.com/About-Us/News/Insight/Africa-Internet-development-Jun2013/> [2014, January 3].

- Anderson, R. 2004. Intuitive inquiry: An epistemology of the heart for scientific inquiry. *The Humanistic Psychologists*. 32 (4): 307-3.
- Apt, K. 2001. One more revolution to make free scientific publishing. *Communications of the ACM*. 44 (5):25-29. DOI: 10.1109/JPROC.2008.921613.
- Arivananthan, M., Ballantyne, P., & Porcari, E. M. 2010. Benchmarking CGIAR research outputs for availability and accessibility. *Agricultural Information Worldwide*. 3(1): 17-22.
- Asamoah-Hasan, H., & Frempong, A.T. 2008. Access to e-journals and e-publishing initiatives in Ghana: success, challenges and lessons learnt. Available: <http://dspace.knust.edu.gh:8080/jspui/bitstream/123456789/1194/1/CODESRIA%20Conference%20Paper1.pdf> [2012, September 14].
- Association of Commonwealth Universities [ACU]. 2013. *How to participate in the Low Cost Journals Scheme*. Available: <https://www.acu.ac.uk/membership/low-cost-journals/how-to-participate> [2013, December 29].
- Auranen, O. & Nieminem, M. 2010. University research funding and publication performance: an international comparison. *Research Policy*. 39 (6): 822-834.
- Bajpai, Y. 2013. Concept of Ethiopian University library consortia: a step toward the Information Society. *International Journal of Science and Research*. 2 (10):91-96.
- Barjok, B. 2012. The hybrid model for open access publication of scholarly articles: a failed experiment? *Journal of the American Society for Information Science and Technology*. 63(8): 1496-1504. DOI: 10.1002/asi.22709.
- Barton, M. & Waters, M.M. 2004. *Creating an institutional repository: LEADIRS Workbook*. Available: <http://hdl.handle.net/1721.1/26698>. [2013, October 25].
- Bauer, H. 1992. *Scientific literacy and the myth of the scientific method*. Illinois: University of Illinois Press. 1-180.
- Beagrie, C. 2010. *Ensuring perpetual access: establishing a federated strategy on perpetual access and hosting of electronic resources for Germany*. A report for The Alliance of German Science Organisations. Available: http://www.mpg.de/230683/access__hosting_studie_e.pdf [2014, January 23].
- Besemer, H., C. Addison, F., Pelloni, E.M., Porcari, E., & Manning-Thomas, N. 2011. Agricultural Research, In *Studies on Subject-Specific Requirements for Open Access Infrastructure*. Meier zu Verl, & W. Horstmann, Eds. Bielefeld: Universitätsbibliothek, 19 – 68.
- Bhuvhukani, C., Chiparausha, B. & Zuvalinyenga, D. 2012. Effects of electronic resources skills for lecturers on pedagogical practices and research productivity. *International Journal of Education and Development using Information and Communication Technology (IJEDCT)*. 8(1):16-28. Available: <http://ijedict.dec.uwi.edu/viewarticle.php?id=1383> [2013, 18 November].

Bierman, J. 2012. A citation study of engineering Master's Thesis at the University of Oklahoma: comparing the years 1991 and 2011. *Science and Technology Libraries*. 31: 412-425. DOI:10.1080/0194262X.2012.730461.

BioMedCentral. 2013. *Biomedical funder policies on Open Access*. Available: <http://www.biomedcentral.com/funding/funderpolicies>. [2013, June 26].

Bivens-Tatum, W. 2013. The Big Deal's damage. *Library Journal*, May 9, 2013. Available: http://lj.libraryjournal.com/2013/05/opinion/peer-to-peer-review/the-big-deals-damage-peer-to-peer-review/#_ [2013, September, 16]

Björk, C.B. & Solomon, D. 2012. Open access versus subscription journals: a comparison of scientific impact. *BMC Medicine*. 10:73. DOI: 10.1186/1741-7015-10-73.

Borin, J, & Yi, H. 2011. Assessing an academic library collection through capacity and usage indicators: testing a multi-dimensional model. *Collection Building*. 30(3): 120-125. DOI: 10.1108/01604951111146956.

Borrego, A., Anglada, L., Barrios, M., & Comellas, N. 2007. *Use and users of electronic journals at Catalan universities: the results of a survey*. Available: http://www.recercat.net/bitstream/handle/2072/3692/0609Article_JAL_RECERCAT.pdf?sequence=1 [2012, November 2].

Bosch, S & Henderson, K. 2013. Periodicals survey 2013. *Library Journal*. Available: <http://lj.libraryjournal.com/2013/04/publishing/the-winds-of-change-periodicals-price-survey-2013/#comments> [2013, December 23].

Brace, I. 2008. *Questionnaire Design: How to plan, structure and write survey material for effective market research*. Available: <http://www.gdufs.biz/Questionnaire%20Design.pdf> [2014, January 23].

Brazzeal, B., & Powers, A.P. 2007. Electronic access to agricultural journals: an agronomy case study. *Serials Review*. 33 (3): 155-160. DOI:10.1080/00987913.2007.10765115.

Britz, J., Lor, P., Coetzee, M., & Bester (n.d). *Africa as a knowledge society: a reality check*. Available: [http://repository.up.ac.za/bitstream/handle/2263/291/Britz\(2006\)a.pdf?sequence=3](http://repository.up.ac.za/bitstream/handle/2263/291/Britz(2006)a.pdf?sequence=3). [2013, September 23].

Brower, V. 2001. Public library of science shifts gears. *EMBO Reports*. 2(11): 972-973. DOI: 10.1093/embo-reports/kve239.

Brown P.O., Eisen, M.B, Varmus, H.E. 2003. Why PLoS Became a Publisher. *PLoS Biology*. 1(1): e36. DOI:10.1371/journal.pbio.0000036.

Brown, J., Lund, P, & Walton, G. 2009. *Use of e-journals by academic staff and researchers at Loughborough University*. Available: http://www.lboro.ac.uk/media/www/lboroacuk/content/library/downloads/surveyresults/ejournal_survey.pdf [2013, September 3].

Browse, L, 2013. Co-operation and collaboration to strengthen the global research cycle. *Insights: the UKSG journal*. 26 (1): 34-43, DOI: 10.1629/2048-7754.26.1.34.

- Bryman, A.2004. *Triangulation and measurement*. Available: <http://www.referenceworld.com/sage/socialscience/triangulation.pdf>. [2013, November 23].
- Budapest Open Access Initiative. 2014. *Read the original Budapest Open Access Initiative*. Available: <http://www.budapestopenaccessinitiative.org/read>. [2014, January 13].
- Burnett, P & Pyle, K.2012.*Gateway or Obstacle Course: A survey of selected African library websites*. Available: <http://blog.inasp.info/wp-content/uploads/2012/09/Gateway-or-Obstacle-Course.pdf>. [2013, October 12].
- Cardinal, B. 2013. Judicious use of journal impact factors and the preservation of our fields of study. *Journal of Physical Education Recreation and Dance*. 84 (2): 7-9.
- Carr, P & Collins L. 2009. Forcing the moment to its crisis: thoughts on pay-per-view and the perpetual access ideal. *Against the Grain*. 21 (6): Article 7. Available : <http://docs.lib.purdue.edu/atg/vol21/iss6/7> [2013, October,13].
- Carr, P.2009. Acquiring articles through unmediated, user-initiated pay-per-view transactions: an assessment of current practices. *Serials Review*. 35(4):272-277.
- Cassella, M.2012. *Innovation and experimentation in scholarly publishing: web 2.0 features in Open Access journals*. Available: <http://conference.ifla.org/ifla78> [2012, December, 23].
- Chamberlain, C & MacAlpine, B. 2008. Pay-per-view article access: a viable replacement for subscriptions? *Serials: The Journal for the Serials Community*. 21(1): 30-34.
- Chan, L. 2004. Supporting and enhancing scholarship in the digital age: the role of open access institutional repositories. *Canadian Journal of Communication*. 9(4):277-300.
- Chandler, L.B. 1998. *Book availability in the Cameron village regional library*. A Masters paper. University of North Carolina at Chapell Hill.
- Chaurasia,N.K .2010. INDEST-AICTE consortium: status and future challenges. *Journal of Young Librarians Association*. 3 (2010). Available: http://archive.org/stream/JournalOfTheYoungLibrariansAssociationVolume1To/Vol.32010-Complete_djvu.txt. [2013, April 14].
- Chavarro,D.,Tang,P.,& Rafols,I.2012. The relationship between interdisciplinary research and local knowledge : The case of Colombia. *A paper presented at EU-SPRI Conference*.12-13 June 2012. Available: <http://congreso2013.rieyt.org/files/mesas/1dProduccioncientifica/ChavarroTangRafols.pdf>. [2013, November 12].
- Chifanana, L .2012. Bandwidth management in Universities in Zimbabwe: towards a responsible user-base through effective policy implementation. *International Journal of Education and Development using Information and Communion Technology (IJEDCT)*. 8 (2): 62-76.
- Chikonzo, A. 2010. Digital library services: a case study of the University of Zimbabwe library. *A paper presented at EuroAfricaCTForum2010* .4 February 2010. Available: http://euroafrica-ict.org.sigma-rionis.com/downloads/Forum2/pdf/1d/Agnes_Chikonzo.pptx.pdf [2012, May 30].

- Chikonzo, A.2012. UZ's promotion drive 2011. *A presentation delivered at Publishers for Development action meeting*. Available: <http://pubs-for-dev.info/wp-content/uploads/2012/06/2012-06-Chikonzo-Zimbabwe-INASP2012Presentationfinal.pdf>. [2012, June 26].
- Chimalizeni, M., Chimwanza, G., Chataira, B., & Krkoska, B.2012. Digital innovation for food security: a case study for the TEEAL programme and its contribution to agricultural research output in African Institutions. *Innovation*. 44 (2012). DOI: <http://dx.doi.org/10.4314%2Finnovation.v44i0>.
- Chinama,L., Makaza, D., & Madzima,K.2008. The current state of e-learning at universities in Zimbabwe: opportunities and challenges. *International Journal of Education and Development using Information and Communication Technology (IJEDCT)*.8 (2):62-76.
- Chingbu, E. 2012. Scholarly electronic journals: availability and use in universities in Nigeria . *Library Philosophy and Practice*. Available: <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2010&context=libphilprac> [2013, July 28].
- Chinnock, P.2011. *Access to journals in low-income countries: where do we stand?* Available: http://www.tropika.net/svc/editorial/Chinnock-20110204_EdOp_HINARI. [2013, September 14].
- Chireshe, R.2011.Effective and in-effective lectures: University Students' perspectives in Zimbabwe. *Anthropologists*. 13(4):265-269.
- Chu, H.2000. Promises and challenges of electronic journals: academic libraries surveyed. *Learned Publishing*. 13(3):169-175.
- Collins, T.2012. The current budget environment and its impact on libraries, publishers and vendors. *Journal of Library Administration*.52 (1):18-35.
- Council for Assisting Refugee Academics .2012. *Virtual lecture hall programme*. Available: <http://www.academic-refugees.org/zimbabwe-virtual.asp> [2012, July 7]
- COUNTER.2013. Available: <http://www.projectcounter.org/about.html> [2013, March 27].
- Craig, I. 2010. *Journal metrics: the impact factor and everything else*. Available: <http://www.slideshare.net/CompassJournals/iain-craig>. [2013, November 30].
- Craven V. 2007. Federated search engines – the unified search environment: the Western Health Library experience. *Health Information*. 15 (3):19-23. Available: <http://search.informit.com.au/documentSummary;dn=107811353313966;res=IELHEA> [2012, September 13].
- Creaser, C., & Spezi, V. 2012. *Working together: evolving value for academic libraries*. Available: <http://libraryvalue.wordpress.com/> [2013, June 24].
- Crow, R. 2006. Publishing cooperatives: an alternative for non-profit publishers. *First Monday*. 11 (9): 4. Available: <http://firstmonday.org/article/view/1396/1314> [2012, December 13]

- Crum, J. 2011. An availability study of electronic articles in an academic health sciences library. *Journal of the Medical Library Association* , 99 (4): 290-6. DOI:10.3163/1536-5050.99.4.006.
- Cruz, I. R.2008. Challenging Thompson Scientifics' Journal Citation Reports: deconstructing "Objective", "Impact", and "Global". *Portal: Library and the Academy*. 8(1): 7-13.
- Dauphiné, N., Ochs, M.A., & Joos, N.K .2003. Bringing scientific literature to the developing world: The Essential Electronic Agricultural Library (TEEAL). *Online Information Review*. 27(1):51-54. DOI: 10.1108/14684520310462563.
- Davis, P & Walters, W. 2011. The impact of free access to the scientific literature: a review of recent research. *Journal of Medical Library Association*. 99(3): 208-217.
- Davis, P. 2011. Do discounted journal access programs help researchers in sub-Saharan Africa? A biblio-metric analysis. *Learned Publishing*. 24 (4): 287-298.
- Davis, P.M & Price, J.S.2006.E-journal interface can influence usage statistics: implications for libraries, publishers, and project COUNTER. *Journal of American Society of Information Science and Technology*. 57(9): 1243-8.DOI:10.1002/as.20405.
- Davison, C. N. 2008. The futures of scholarly publishing. In *The State of Scholarly Publishing: Challenges and Opportunities*. A, Greco.ed, New Jersey: Transaction Publishing.1-253.
- De Groote, S.2013. Measures of Health Sciences journal use: a comparison of vendor, link resolver and local citation statistics. *Journal Medical Library Association*. 101(2): 110–119.
- De Groote, S.L. 2010. Impact of online journals on citation patterns of dentistry, nursing, and pharmacy faculty. *Journal of Medical Library Association*. 98(4): 305-308.
- Denzin, N.1970. Strategies of multiple triangulation. In *The Research Act in Sociology: A theoretical introduction to Sociological*. Denzin,N. ed, New York: McGraw-HI:297-313.
- Dessie, Y & Mesfin,F .2013. Researchers' challenges: findings from in-depth interview among academicians in Haramaya University, Ethiopia. *Herald Journal of Education and General Studies* .2 (2): 69 - 71. Available: <http://www.heraldjournals.org/hjlegs/archive.htm> [2012, December 13].
- Dixon, L., Duncan, C., Fagan, J.C., Mandernach, M. & Warlick, S.E. 2010. Finding articles and journals via Google Scholar, journal portals, and link resolvers: usability study results. *Reference and User Services Quarterly*. 50 (2):170-181.
- Dulle, F & Minishi-Majanja. 2009. Researchers' perspectives on open access scholarly communication in Tanzanian public universities. *South African Journal of Information Management*. 11 (4). Available: <http://www.sajim.co.za/index.php/SAJIM/article/viewFile/413/405> [2013, October 23].
- Dzvimbo, K.P.2005. *Africa and the Middle East 2005*. Available: <http://www.connect-world.com/~cwiml/index.php/magazine/africa-and-the-middle-east/item/1847-the-african-virtual-university-avu> [2013, June 5].

- Economic Commission for Africa. 2007. *Digital libraries development : imperatives and best practices : The Need for Capacity Development in the Use of Online Resources, The Case of Funded Online Resources for Africa*. Available: [http://www.uneca.org/istd/resources/digital libraries development - en.pdf](http://www.uneca.org/istd/resources/digital%20libraries%20development%20-%20en.pdf) [2012, July 15].
- Economist, 2013. Scientific publishing: the price of Information. *The Economist*. February, 2. Available: <http://www.economist.com/node/21545974> [2013, December 14].
- Edewor, n. 2013. An Analysis of a Nigerian Library and Information Science Journal: A bibliometric Analysis. *Library Philosophy and Practice*. Paper 1004. Available: <http://digitalcommons.unl.edu/libphilprac/1004/> [2014, January 8].
- EIFL.2012. *Over 50,000 eBooks now available in Kenya and Zimbabwe*. Available: <http://www.eifl.net/news/over-50000-ebooks-now-available-kenya-and-zim> [2012, March 12].
- Essen, C.V., Cartledge, P., Kyamanywa,P., & Manirakiza, A. 2012. Is HINARI appropriate for medical students in the developing world? *Tropical Medicine International Health*. (4):406-8.DOI: 10.1111/j.1365-3156.2011.02938.x.
- Evans, J. 2008. Electronic publication and the narrowing of science and scholarship. *Science*. 321(5887):395-9.
- Faggiolani, C.2011. Perceived identity: applying Grounded Theory in Libraries. *Italian Journal of Library and Information Science*. 2(1). DOI:10.4403/jlis.it4592
- Fanelli, D.2010. Do Pressures to Publish Increase Scientists' Bias? An Empirical Support from US States Data. *PLoS ONE* 5(4): e10271. DOI:10.1371/journal.pone.0010271.
- Farrow, E. 2011. *We are all in this together: library consortium cost sharing models*. Available: http://www.inasp.info/uploads/filer_public/2013/04/08/we_are_all_in_this_together.pdf. [2012, December 13].
- Feather, C. 2007. *ERM Systems: What are they and what do they do?* Columbus Metropolitan Library, Columbus, OH: Ohio NET.
- Fidel, R. 2008. Library and information science research are we there yet?: mixed methods research in library and information science. *Library and Information Science Research*. 30(4), 265–272. DOI:10.1016/j.lisr.2008.04.001.
- Finch, J. 2012. *Accessibility, sustainability, excellence: how to expand access to research publications*. Available: <http://130.206.88.107/revistes224/index.php/IM/article/view/72580> [2013, January 13].
- Flood, A. 2012. Scientists sign petition to boycott academic publisher Elsevier. *The Guardian*. 2 February. Available: <http://www.theguardian.com/science/2012/feb/02/academics-boycott-publisher-elsevier>. [2013, April 14].
- Frazier, F. 2001. The Librarian's Dilemma: contemplating the costs of the 'Big Deal'. *D-Lib Magazine*.7(3). Available <http://www.dlib.org/dlib/march01/frazier/03frazier.html> [2013, April,23].

- French Academie des Sciences .2006. *The World Mapper: science research*. Available: <http://www.worldmapper.org/display.php?selected=205> [2012, April 24].
- Fyffe, R. 2002. Technological change and the scholarly communications reform movement: reflections on castells and giddens. *Library Resources and Technical Services*. 46(2): 14–25.
- Gaible, E., Gedye, R., Ochs, M., Parker, K., & Rudgard, S. 2011. Research4Life: bringing academic and professional peer-review content to developing countries through public-private partnership. *IFLA 2011 conference*. Available: <http://conference.ifla.org/past-wlic/2011/164-gaible-en.pdf>. [2012, September 23].
- Galyani, M.G. 2008. Preserve scientific electronic journals: a study of archiving initiatives. *The Electronic Library*. 26(1): 83-96.
- Gantz, P. 2012. Digital licences replace print prices as accurate reflection of journal costs. *Professional/Scholarly Publishing Bulletin*. 11 (3) 1-4.
- Garfield, E. 2006. The history and meaning of the Journal Impact Factor. *Journal of American Medical Association*. 295(1):90-93.
- Gedye, R. 2013. *Measuring impact of research access in developing world*. Available: <http://www.elsevier.com/connect/measuring-the-impact-of-research-access-in-the-developing-world>. [2013, February 15].
- Giglia, E. 2010. The impact factor of open access journals: data and trends. *ELPUB 2010 international conference on electronic publishing*. Helsinki (Finland), 16-18 June 2010. Available: <http://dhanen.shh.fi/dspace/bitstream/10227/599/72/2giglia.pdf> [2012, September 9].
- Gillham, Bill. 2007. *Developing a Questionnaire* .2nd Ed .London: Continuum International Publishing Group.
- Gitau, S., Plantinga, P., Diga, K., & Hutchful, D. 2011. African ICT research (or the lack thereof). *Interactions*. 18(4):74-77.
- Glaser, B & Strauss, A. 1967. *The discovery of grounded theory*. New York: Aldine.
- Glassier, S. 2013. Judging big deals: challenges, outcomes, and advice. *Journal of Electronic resources Librarianship*. 25(4): 263-276. DOI: 10.1080/1941126X.2013.847672.
- Golafshani, N. 2003. Understanding reliability and validity in qualitative research. *The Qualitative Report*. 8(4): 597–607. <http://www.nova.edu/ssss/QR/QR8-4/golafshani.pdf> [2012, December 7].
- Gray, D. 2004. *Doing research in the real world*. London : Sage Publications.
- Gross, P.L.K & Gross, E.M. 1927. College libraries and chemical education. *Science*. New Series. 66 (1713):385-389. Available: http://www.pilinski.de/Diplomarbeit/Material/grossandgross_science1927.pdf [2013, February 20].
- Guédon, J.C. 2001. In Oldenburg's long shadow: Librarians, Research Scientists, Publishers, and the control of scientific publishing. *Creating the Digital Future, Association of Research Libraries*

- Proceedings of the 138th Annual Meeting, Toronto, Ontario. Available: <http://www.arl.org/arl/proceedings/138/guedon.html>. [2013, January 15].
- Gullingham, E. 2013. A new Research4Life training strategy in Africa. Available: <http://exchanges.wiley.com/blog/2013/11/01/a-new-research4life-training-strategy-in-africa/>. [2014, January 8].
- Hajjem,C., Harnard,S., & Gingras,Y.2005. Ten year cross disciplinary comparison of growth of Open Access and how it increases research citation impact. *IEEE Data Engineering Bulletin*.28 (4):39-47.
- Halevi, G.2013. Migration and co-authorship networks in Mexico, Turkey and India. *Research Trends*. Issue 35, <http://www.researchtrends.com/issue-35-december-2013/> [2013, January 13].
- Harle, J. 2009. *Digital resources for research: a review of access and use in African Universities*. Available: <https://www.acu.ac.uk/focus-areas/digital-resources-for-research>. [2012, September 4].
- Harle, J. 2010. *Growing knowledge: access to research in East and Southern African Universities*. The Association of Commonwealth Universities. Available: <https://www.acu.ac.uk/focus-areas/arcadia-growing-knowledge> [2012, December 13].
- Harle, J.2011. Breaking down the barriers: building an African workgroup on research information. *INASP Newsletter*. 46, Winter 2011.
- Harle, J.2011b. *ACU Spotlight 1: access to research in East and Southern African Universities*. Available: <https://www.acu.ac.uk/focus-areas/arcadia-acu-spotlight> [2013, January 14].
- Harley, D., Acord, S., Earl-Novell, S., Lawrence, S., & King, J. 2010. *Assessing the future landscape of scholarly communication: an exploration of faculty values and needs in seven disciplines*. Available: <http://escholarship.org/uc/item/15x7385g> [2013, June 12].
- Hart, C. 1999. *Doing a literature review: realising the social science research imagination*. London: Sage Publications.
- Hartman,J. M., Forsen,J.W., Wallace,M.S., Neely,G.2002. Tutorials in clinical research, Part IV: recognizing and controlling bias. *The Laryngoscope*.113.Available: http://www.toxikonconsortium.org/toxischolar2/Readings_files/Hartman_Bias_2002.pdf. [2013, November 13].
- Harvard University. 2012. *Faculty advisory council memorandum on journal pricing*. Available: <http://isites.harvard.edu/icb/icb.do?keyword=k77982&tabgroupid=icb.tabgroup143448> [2013, September 13].
- Harwood, P & Prior, A. 2008. Testing usage based e-journal pricing. *Learned Publishing*. 21(2):133-139.
- Hirst, A & Altman, D. G .2012. Are peer reviewers encouraged to use reporting guidelines? A survey of 116 health research journals. *PLoS ONE*. 7(4): e35621. doi:10.1371/journal.pone.0035621.
- Hitchcock,S., Carr,L., & Hall,W.1998.*Making the most of electronic journals*. Available: <http://arxiv.org/html/cs/9812016> [2012, June 10].

- Hoffman, K & Doucette, L. 2012. A review of citation analysis methodologies for collection management. *College and Research Libraries*. Available: <http://crl.acrl.org/content/early/2011/07/21/crl-254.full.pdf+html>. [2013, February 10].
- Hongladarom, S.2007. Information divide, information flow and global justice. *International Review of Information Ethics*. 7(9). Available: <http://www.i-r-i-e.net/inhalt/007/08-hongladarom.pdf>. [2013, December 3].
- Hoskins, R & Stilwell, C. 2011. Library funding and journal cancellations in South African university libraries. *South African Journal of Library and Information Science*. 77 (1): 24-35.
- Houghton, J.W & Oppenheim, C. 2010. The economic implications of alternative publishing models. *Prometheus: Critical Studies in Innovation*. 28 (1) :41-54. DOI: 10.1080/08109021003676359.
- Houghton, J & Sheehan, P. 2006. *The economic impact of enhanced access to research findings*. Centre of Strategic Economic Studies Working Paper. No 23. Available: <http://www.cfses.com/documents/wp23.pdf>. [2013, November 14].
- Hunter, K & Bruning, R. 2010. The global economic crisis: what libraries and publishers can do and are doing? *The Serials Librarian*. 59(2): 147-158. DOI: 10.1080/03615261003623161.
- INASP, 2012. *Activities in Zimbabwe*. Available: http://www.inasp.info/file/int_start/10/aacoe2854b5e159cf498b37d52aa3f71/events-calendar.html date accessed 22/06/2012. [2013, April 13].
- Innovative Interfaces .2007. *ARL libraries get e-resource usage statistics faster and easier with innovative ERM: Integration of SUSHI standard improves access and analysis*. News release. December 11,2007. Available: http://www.iii.com/news/pr_display.php?id=360 [2014, January 15].
- International Association of STM publishers. 2008. *An overview of scientific, technical and medical publishing and the value it adds to research outputs*. Oxford: International Association of STM Publishers. Available http://www.stm-assoc.org/2008_04_01_Overview_of_STM_Publishing_Value_to_Research.pdf [2013, August 26].
- International Society for Research Activity.2013. *Journal impact factor*. Available: <http://www.israjif.org/> [2013, November 14].
- International Telecommunications Union.2013. *Study on international internet connectivity in sub-Saharan Africa- March 2013*. Available: http://www.itu.int/en/ITU-D/Regulatory-Market/Documents/IIC_Africa_Final-en.pdf [2014, January 7].
- IVA .2013. *Review of literature on scientists' research productivity*. Available: <http://www.iva.se/PageFiles/16280/Review%20of%20Literature%20on%20Scientists%E2%80%99%20Research%20Productivity.pdf> [2014, January 12].
- Jack, E.P & Raturi, A. 2006.Lessons learned from methodological triangulation in management research. *Management Research News*. 29 (6):345-357.
- Jacobs, D.2006. Analysis of scientific research in selected institutions in South Africa: a bibliometric study. *South African Journal of Libraries and Information Science*, 72(1):72-77.

- Jarwal, S., Brion, A., & King M. 2009. Measuring research quality using the journal impact factor, citations and 'ranked journals' brunt Institutes or Inspired Metrics. *Journal of Higher Education Policy and Management*. 31 (4) DOI: 10.1080/13600800903191930.
- Jewell, T.D., Anderson, I., Chandler, A., Farb, S.E., Parker, K., Riggio, A & Robertson, N.D. 2004. *Electronic Resource Management: Report of the DLF ERM Initiative*. Available: <http://old.diglib.org/pubs/df102/> [2012, September 18].
- Jha, A. 2012. Text mining: what do publishers have against this hi-tech research tool? *The Guardian*. Wednesday 23 May 2012. Available: <http://www.theguardian.com/science/2012/may/23/text-mining-research-tool-forbidden>. [2013, December 14].
- Jick, T.D. 1979. *Mixing Qualitative and Quantitative Methods: Triangulation in Action*. Available: <http://faculty.washington.edu/swhiting/pols502/Jick.pdf> [2014 July 22].
- Jones, M. 2013. Spoilt for choice: a comparative study of e-journal archiving solutions. *Against the grain*. 20 (4) Available: <http://docs.lib.purdue.edu/atg/vol20/iss4/6> [2013, December 13].
- Kachoka, N & Hoskins, R. 2010. Journal cancellations in university libraries in South Africa. *South African journal of Library and Information Science*. 76 (1): 51-63.
- Kalaitzidakis, P., Mammeas, T., & Stengos, T. 2003. *Rankings of academic journals and institutions in economics*. European Economics Association. Available: <http://www.bm.ust.hk/econ/JEEA.Ranking.pdf> [2012, July 3]
- Kantor, P.B. 1976. Availability Analysis. *American Society for Information Science*. 27 (September – October 1976): 311-319.
- Karlsson, S. 2002. *The North-South knowledge divide: consequences for global environmental governance*. Available: <http://bit.ly/1imwroe> [2013, December 12].
- Kaske, N. L. 1994. On my mind: materials availability model and the internet. *Journal of Academic Librarianship*. (November 1994):317-318.
- Kaur, A. 2012. Academics' attitudes towards use of electronic journals: A case study of Punjab and Chandigarh. *The International Information & Library Review*. 44 (4):182-193. DOI:10.1016/j.iilr.2012.09.003.
- Kaur, B & Verma, R. 2009. Use and impact of electronic journals in the Indian Institute of Technology, Delhi, India. *The Electronic Library*. 27(4): 611 – 622.
- Kelty, C. M., Burrus, C. S., & Baraniuk, R. G. 2008. Peer review anew: three principles and a case study in post-publication quality assurance. *Proceedings of the IEEE Special Issue on Educational Technology*. 96(6), 1000–1011.
- Kennedy, P. 2009. *How to combine multiple methods: practical triangulation*. Available: <http://johnnyholland.org/2009/08/practical-triangulation/> [2013, June 12].

- Khan, S.I. 2012 .Use of e-journals by students and research scholars in the Department of Botany of Aligarh Muslim University. *Library Philosophy and Practice* 2012. Available: <http://digitalcommons.unl.edu/libphilprac/752/> [2013, October 11].
- King, D.W, Tenopir, C., Choemprayong, S, & Wu, L.2009. Scholarly journal information-seeking and reading patterns of faculty at five US universities. *Learned Publishing*. 22(2): 126-144.
- King, K. & McGath, S. 2004. *Knowledge for development: comparing British, Japanese and World Bank Aid*. London: Zed Books.
- Kirsop, B & Chan,L .2005. Transforming access to research literature for developing countries. *Serials Review*. 31(4): 246-255.
- Knafl, K.A., Breitmayer, B.J. 1989.Triangulation in qualitative research: issues of conceptual clarity and purpose. *Qualitative Nursing Research: A Contemporary Dialogue*. In Morse, J.M. eds. Aspen, Rockville:226-39.
- Koehlmoos, T.P & Smith, R. 2011. *Big publishers cut access to journals in poor countries*. Available: <http://download.thelancet.com/flatcontentassets/pdfs/S0140673611600676.pdf> [2013, June 14].
- Korobili, S., Tilikidou, I., & Delistavrou, A. 2006. Factors that influence the use of library resources by faculty members. *Library Review*. 55(2): 91-105. DOI:10.1108/00242530610649594.
- Kristin, Y.2005. The Open Access Initiative: A new paradigm for scholarly communications. *Information Technology and Libraries*. December 2005: 157-167.
- Kronick, D. 1976. *A History of scientific and technical periodicals: the origins and development of the scientific and technical press, 1665-1790*. 2d ed. Metuchen. Scarecrow Press, 1976:336.
- Kumar,H., & Dora, M.2011. Citation analysis of doctoral dissertations at IIMA: A review of the local use of journals. *Library Classification, Acquisitions and Technical Services*. 35(1):32-39. DOI: 10.1016/j.lcats.2011.03.002.
- Kuruppu, P.U & Moore, D.C.2008.Information use by Ph.D students in agriculture and biology: a dissertation citation analysis. *Libraries and the Academy*. 8(4): 387-405. DOI: 10.1353/pla.0.0024.
- Langer, A., Diaz-olavamera,C., Berdichevsky,K and Villar, J. 2004. Why is research from developing countries under represented in international health literature, and what can be done about it? *Bulletin of the World Health Organisation*. 82 (10).DOI: 10.1590/50042-96862004001000022.
- Lee, S & Bozeman .2005. The impact of research collaboration on scientific productivity. *Social Studies of Science*. 35(5): 673-702. DOI: 10.1177/0306312705052359.
- Ligthelm, A. A., & Koekemoer, E. M. 2009. Academic publishing : lessons learnt from the ‘Southern African Business Review’. *South African Business Review*. 13 (3): 28-50.
- Lor, P., & Britz, J. 2005. Knowledge production from African perspectives: international information flows and intellectual property. *The International Information and Library Review*. 2005(37):61-76.

- Lor, P.J. 2006. Bridging the North-South divide in scholarly communication in Africa –a library and information systems perspective. Keynote address presented to the CODESRIA-ASC Conference on *Bridging the North-South Divide in Scholarly Communication on Africa: Threats and Opportunities in the Digital Age*, Leiden, The Netherlands, 6-8 September 2006. Available: <http://www.ascleiden.nl/Pdf/elecpublconflor.pdf>. [2013, June 4].
- Luther, J. 2001. *White paper on electronic journal usage statistics*. Available: <http://www.clir.org/pubs/reports/pub94/pub94.pdf> [2013, December 14]
- MacAlpine, B. 2010. Journal Article Access Via a Pay-Per-View Model: Report and recommendations from an academic leave. *Library Faculty Research*. Paper 14. Available: http://digitalcommons.trinity.edu/lib_faculty/14 [2013, July 10].
- MacRoberts, M. H., & MacRoberts, B. R. 1989. Problems of citation analysis: a critical review. *Journal of the American Society for Information Science*. 40(5): 342–349.
- Mansbridge, J. 1986. Availability studies in libraries. *Library and Information Science Research*. 8(4): 299-314.
- Mapulanga, P. 2012a. Adequacy of budgets for University of Malawi. *Managing Library Finances*. 25(3): 115-122.
- Mapulanga, P. 2012b. Impact of the optic fibre network and increased bandwidth on e-resources access in Malawi. *OCLC Systems & Services*. 28 (4): 221 – 234.
- Mapulanga, P. 2013. Licensing and negotiations for commercial e-resources in African libraries: Perils and promises for libraries in Malawi. *Library Review*. 62 (4/5): 253 – 265.
- Maron, N. & Smith, K. 2008. *Current models of digital scholarly communication: results of an investigation conducted by Ithaka for strategic services for the association of research libraries*. Washington: Association of Research Libraries. Available: <http://quod.lib.umich.edu/jjep/3336451.0012.105?rgn=main;view=fulltext> [2012, November 12].
- Masinde, S., & Rahim, T.O. 2011. Challenges of broadening scholarly e-resources in Africa-the JSTOR example. *African Research & Documentation*. 117. Available: <http://www.nai.uu.se/ecas-4/panels/141-156/panel-145/Siro-Masinde-Toja-Okoh-Rahim-Rajan-full-paper.pdf>. [2012, November 13].
- Mbambo -Thata, B. Ed. 2007. *Building a digital library at the University of Zimbabwe: a celebration of teamwork and collaboration*. London: INASP.
- McBurney, D and White, T. 2009. *Research Methods*. Belmont: Wadsworth.
- McCook, A. 2003. Researchers boycott 'Cell Press'. *The Scientist*, October 23, 2003. Available: <http://www.the-scientist.com/?articles.view/articleNo/22548/title/Researchers-boycott-Cell-Press/> [2013, June 17].
- McCreadie, N. 2013. *Library value in the developing world*. Available: <http://www.uk.sagepub.com/repository/binaries/pdf/LibValReport-2013.pdf> [2013, November 12].

- McGuigan, G. and Russel, R.D. 2008. The Business of academic publishing: a strategic analysis of the academic journal publishing industry and its impact on the future of scholarly publishing. *Electronic Journal of Academic and Special Librarianship*. 9 (3). Available: http://southernlibrarianship.icaap.org/content/v09n03/mcguigan_g01.html [2013, November, 28].
- McVeigh, M. 2004. *Open Access journals in the citation databases: analysis of impact factors and citation patterns. a citation study for Thompson Scientific*. Available: <http://ip-science.thomsonreuters.com/m/pdfs/openaccesscitations2.pdf> [2011, June 13].
- Michaels, D. 2006. Politicising peer review: scientific perspective. *Rescuing science from politics: regulation and the distortion of scientific research*. In Wagner, W & Rena, S, Eds. London: Cambridge University Press: 224.
- Mlambo, E. 2010. *New skills bring new opportunities: developing an information literacy skills programme at the University of Zimbabwe*. Available: <http://www.inasp.info/media/www/documents/2010-ZW-Information-Literacy-Report-Mlambo-p.pdf> [2012, June 19].
- Moghaddam, G.G and Talawar, V.G . 2008. The use of scholarly electronic journals at the Indian Institute of Science: a case study in India. *Inter-lending & Document Supply*. 36(1): 15 – 29.
- Mouton, J., Boshoff, N., De Waal, L., Esaa, S., Imbayarwo, B., Ritter, M & Van Niekerk, D. 2008. The state of public science in the SADC region. In *Towards a common future: Higher education in the SADC region: research findings from SARUA studies (study Series)*. P, Kotecha. Ed. Johannesburg: SARUA. Available: <http://www.sarua.org/?q=publications/towards-common-future-higher-education-sadc-region-research-findings-four-sarua-studies>. [2013, November 23].
- Mvungi, S., De Jager, K, & Underwood, P. 2008. An evaluation of the information architecture of the UCT library website. *South African Journal of Libraries and Information Science*. 74 (2): 171-182.
- Nabe, J. 2001. E-journal bundling and its impact on academic libraries : some early results. *Issues in Science and Technology Librarianship*. Spring 2001. Available: <http://www.istl.org/01-spring/article3.html> [2014, March 23].
- Nchinda, T.C.2002. Research capacity strengthening in the south. *Social Science and Medicine*. 54 (11): 1699-1711. Available: <http://www.ncbi.nlm.nih.gov/pubmed/12113452> [2013, March 12].
- Ndlovu, S. 2011. *Skirting on thin ice: the resilience of the Zimbabwean libraries during the decade 2000 to 2010*. Available: <http://conference.ifla.org/past/2011/113-ndlovu-en.pdf> [2013, September 12].
- Newtown, H.2013. Breaking the boundaries in academic publishing: launching a new format for scholarly research. *Insights: The UKSG Journal*. 26 (1):70-76.DOI: 10.1629/2048-7754.26.1.70.
- Ngobeni, S. 2012. *Publish and still perish: The challenges facing scholarly publishers in Africa*. Available: <http://afroeuro.org/magazine/?p=5554> [2012, May 30].

- Ni, C., Shaw, D., Lind, S. M. & Ding, Y. 2013. Journal impact and proximity: An assessment using bibliographic features. *Journal American Society for Information Science*. 64 (4): 802–817. DOI: 10.1002/asi.22778.
- Nicholas, D., Huntington, P., & Watkinson, A. 2005. Scholarly journal usage: the results of deep log analysis. *Journal of Documentation*. 61(2), 248–280. DOI:10.1108/00220410510585214.
- Nicholas, D., Rowlands, I., Huntington, P., Jamali, H.R., & Hernández Salazar, P. 2010. Diversity in the e-journal use and information-seeking behaviour of UK researcher. *Journal of Documentation*. 66(3):409 – 433.
- Nisonger, T. E. 2000. Use of Journal citation reports for serials management in research libraries: an investigation of the effect of self-citation on journal rankings in library and information science and genetics. *College and Research Libraries*. 61 (May 2000): 263-75.
- Nisonger, T. E. 2007. A review and analysis of library availability studies. *Library Resources and Technical Services*. (51)1:30-40.
- Nisonger, T. E. 2009. A simulated electronic availability study of serial articles through a university library web page. *College and Research Libraries*. 70 (5): 422-445.
- Nyagura, L. 2013. *Professor Levi Martin Nyagura speech on the occasion of the 2013 graduation ceremony*. Available : <http://www.uz.ac.zw/index.php/campus-uz-news/1246-professor-levi-martin-nyagura-on-the-occasion-of-the-2013-graduation-ceremony> [2013, December 28]
- OASIS. 2013. *Why librarians should be concerned with open access?* Available: http://openoasis.org/index.php?option=com_content&view=article&id=254&Itemid=256 [2012, July 12].
- Oberg, S. 2009. Thoughts on the future of e-journal management and access. In *E-Journals Access and Management*. W, Jones .Ed. New York, Routledge.
- Ocholla, D.N & Ocholla, L. 2007. Research in library and information science in South Africa: an analysis of journal research output from 1993-2006. *South African Journal of Libraries and Information Science*. 73(2):109-118.
- Oduwule, A & Sowole . 2006. Utilization and impact of the Essential Electronic Agricultural Database (TEEAL) on library services in a Nigerian University of Agriculture. *Program Electronic Library and Information Systems*. 40(2): 157-167.
- Olatokun, M.O & Makinde, O. 2009. Citation analysis of doctoral works submitted to the Department of Animal Science, University of Ibadan, Nigeria. *Library Philosophy and Practice*. Available: <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1305&context=libphilprac> [2013, July 14].
- Ollé, C & Borrego, Á. 2010. A qualitative study of the impact of electronic journals on scholarly information behaviour. *Library and Information Science Research*. 32 (3):221-228. DOI:10.1016/j.lisr.2010.02.002.

- Olorunsola, R & Adeleke, A. A . 2010. Electronic journals in Nigerian university libraries: the present situation and future possibilities. *Library Review*. 60(7): 588-598. DOI 10.1108/00242531111153605.
- Olsen, W. 2004. *Triangulation in social research: Qualitative and quantitative methods can really be mixed*. Available. <http://www.ccsr.ac.uk/staff/Triangulation.pdf> [2013, January 4]
- Ondari-Okemwa, E.2007. *Scholarly publishing in sub-Saharan Africa in the twenty-first century: challenges and opportunities*. Available: <http://firstmonday.org/article/view/1966/1842#author> [2012, December 12].
- Oronge, R.N.2012. *Academic journals are not available at African Universities*. Available: <https://www.acu.ac.uk/focus-areas/accessing-journals-resources-africa> [2013, January 14].
- Ouya, D and Smart, P .2007. *Open access survey of african published journals*. Available: http://www.codesria.org/IMG/pdf/Daisy_Ouya_Paper.pdf [2013, November 30].
- Oyancha, O & Maluleka, J.2011. Knowledge production through collaborative research in sub-Saharan Africa: How much do countries contribute to each other's knowledge output and citation impact? *Scientometrics*. 87:315-336.
- Oyancha, O.B .2008. Growth, productivity and scientific impact of source of HIV/AIDS research in eastern and southern Africa, 1980-2005. *African Journal of AIDS Research*. 7(1): 55-70.
- Oyancha, O.B .2009. A citation analysis of Sub-Saharan african library and information science journals using Google Scholar. *African Journal of Library, Archives and Information Science*. 19(2):101-116.
- Pagell, R. 2009. University research rankings; from page counting to academic accountability. *Research Collection Library*. Paper 1 33-63. http://ink.library.smu.edu.sg/cgi/viewcontent.cgi?article=1000&context=library_research&sei-redir=1&referer= [2012, June 27].
- Panitch, J. M & Michalak. S. 2005. *The Serials Crisis: A White Paper for the UNC-Chapel Hill Scholarly Communications Convocation*. Available: <http://www.unc.edu/scholcomdig/whitepapers/panitch-michalak.html> [2012, July 28].
- Park, K.2007. Quality measurement of Croatian public and academic libraries: a methodology. *Performance Measurement and Metrics*. 8 (3):170-179.
- Peters, T.A. 2001. What's the big deal? *The Journal of Academic Librarianship*. 27 (4):302-304.
- Pienaar, H & Smith, I. 2007. Development and implementation of an e-Information strategy for a university library. *Smith 2nd Africa Libraries and Information Management Systems Conference 2007*. Available : <http://repository.up.ac.za/xmlui/bitstream/handle/2263/1681/africa.pdf?sequence=1> [2013, October 18].
- Pinfield, S. 2013. Is scholarly publishing going from crisis to crisis? *Learned Publishing*. 26 (2): 85-88. DOI: <http://dx.doi.org/10.1087/20130204>.

- Pinfield, S. 2004. What do universities want from publishing? *Learned Publishing*. 17 (4) 305-311. DOI: <http://dx.doi.org/10.1087/0953151042321626>.
- PLoS Medicine Editors .2011. On the path to global Open Access: a few more miles to go. *PLoS Medicine*. 8(3): e1001014. DOI:10.1371/journal.pmed.1001014.
- Prathap, G ., & Mittal, R. 2010. A performance index approach to library collection. *Performance Measurement and Metrics*. 11 (3): 259-265. DOI: 10.1108/14678041011098532.
- Publishers for Development, 2013. *Brill and INASP sign agreement for inclusion in Brill's Developing Countries Program*. Available: <http://www.pubs-for-dev.info/> [2014, January 30].
- Publishers for Development. 2011. Cambridge University Press low bandwidth mobile access point– CJOM. *PfD Newsletter* 1(1). Available: <http://www.pubs-for-dev.info/2011/03/research-in-the-palm-of-your-hand/> [2013, June 14].
- Publishers for Development. 2013b. Publishers urged to consider the importance of a research cycle that represents both the global South and North. *PfD Newsletter*. 4(2). Available: <https://www.acu.ac.uk/news-events/blog/publishers-urged-consider-importance-a-research-cycle-that-represents-both-global-south-north> [2013, November, 8].
- Raju, R., Smith, I., & Gibson, H .2013. Opening access to African scholarly content: Stellenbosch University's AOARI platforms. *Insights: UKSG Journal*. 26(1): 44-50.
- Research Information Network. 2011. *E-journals: their use, value and impact final report*. Available: <http://www.rin.ac.uk/our-work/communicating-and-disseminating-research/e-journals-their-use-value-and-impact>. [2013, April 14].
- Research4Life. 2013. *Beyond the 2015 Horizon*. Available: <http://www.research4life.org/wp-content/uploads/2012/10/StrategyR4L2012.pdf>. [2013, May 13].
- Research4Life. 2013b. *Research Output in Developing Countries Reveals 194% Increase in Five Years*. Available: http://www.research4life.org/wp-content/uploads/2012/10/Increase_in_developing_country_research_output.pdf. [2013, January 13].
- Riedel, S. 2005. Edward Jenner and the history of smallpox and vaccination. *Baylor University Medical Proceedings*. 18 (1):21-25.
- RIN & RLUK. 2011. *The value of Libraries for Research and Researchers*. <http://www.rin.ac.uk/our-work/using-and-accessing-information-resources/value-libraries-research-and-researchers> [2013, July 8].
- Ritz, L., Adam, T & Laing, R. 2010. A bibliometric study of published patterns in access to medicines in research in developing countries. *Southern Medical Review*. 3(1):2-6.
- Robertson, N.D. 2004. *Electronic Resource Management: Report of the DLF ERM Initiative*. Available: <http://old.diglib.org/pubs/dlf102/> [2012, September 18].

- Rodriguez-Esteban, R .2009. Biomedical text mining and its applications. *PLoS Computational Biology*. 5(12): e1000597. DOI:10.1371/journal.pcbi.1000597.
- Ross, S.V.T.2008. *The Scholarly use of electronic journals through the Health Internet Access to Research Initiative (HINARI) and Access to Global Online Research in Agriculture (AGORA) programs as suggested by the journal-citing patterns of authors in the least developed nations*. A Ph.D Thesis. Florida State University.
- Roth, K .2013. Shared ownership: What's the future? *Medical Reference Services Quarterly*. 32(2): 203-208, DOI: 10.1080/02763869.2013.776905.
- Rowlands,I. 2007. Electronic journals and user behaviour: a review of recent research. *Library and Information Science Research*, 29 (3):369-396. DOI:10.1016/j.lisr.2007.03.005.
- Rumsey, A.S. 2011. *New-model scholarly communication: road map for change*. Scholarly Communication Institute. Available: <http://www.uvasci.org/wp-content/uploads/2010/09/SCI-8-report-final.pdf> [2012, July 24]
- Sadeh,T. & Ellingsen, M. 2005. Electronic resource management systems: the need and the realization. *New Library World*.106 (5/6): 208 – 218.
- Salaam, M. and Aderibigbe,N. 2010. *Awareness and utilisation of the essential electronic library by academic staff: A case of University of Agriculture, Abeokutu, Nigeria*. Available: <http://www.whiteclouds.com/iclc/cliej/cl30SA.pdf> [2013, September 14].
- Sasireka,I. 2011. Present status of availability of electronic resources in engineering institutions in Tamul Nadu. *A paper presented on the 8th International CALIBER-2011*. Goa University. March .2011. Available: <http://ir.inflibnet.ac.in/bitstream/1944/1613/1/23.pdf>. [2012, December 5]
- Saunders, M, Lewis, P & Thornhill, A. 2009. *Research Methods for Business Students*. 5th Ed. Harlow: Pearson Education.
- Schell, L , Ginanni,K & Heet,B .2010. Playing the field: pay-per-view e-journals and e-books. *The Serials Librarian*. 58(1-4): 87-96, DOI: 10.1080/03615261003623062.
- Schemn, Y. 2013. Africa doubles research output over past decade, moves towards a knowledge based economy. *Research Trends*. Issue 35. Available: <http://www.researchtrends.com/issue-35-december-2013/africa-doubles-research-output/>. [2013, December 31].
- Scholarly Societies Project. 2013. *History of Scholarly Societies: Journal des Sçavans*. Available: <http://www.scholarly-societies.org/history/JournaldesScavans.html> [2013, December,21]
- Shaw-Kokot,J.& De La Varre, C.2001. Using a journal availability study to improve access. *Bulletin of the Medical Library Association*. 89 (1): 21-28. Available: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC31700/> [2012, September 9].
- Shibanda, G.2006. *Enhancing e-journal use in Kenyan universities*. Available: http://www.codesria.org/IMG/pdf/George_Shibanda_paper.pdf [2013, October 18].

- Shija, H. 2009. *E – Resources use via the internet improvement is a must: a case of special libraries in Tanzania*. Available: http://www.ais.up.ac.za/digi/docs/shija_present.pdf. [2012, May 23].
- Singh, K., & Bebi,?.2012. Use of e-journals by agricultural scientists: A case study of the ICAR libraries in Delhi. *Library Herald*. 50 (2):169-179. Available: <http://people.du.ac.in/~kpsingh/sites/default/files/Use%20of%20E-journals%202012.pdf> .[2013, February 26].
- Song, 2014. *Africa undersea cables*. Available: <http://manypossibilities.net/african-undersea-cables/> [2013, December 14].
- SPARC.2013. *Pushing the frontier of access for text mining: a conversation with Heather Piwowar on one researcher’s attempt to break new*. Available: <http://www.sparc.arl.org/news/pushing-frontier-access-text-mining-conversation-heather-piwowar-one-researcher%E2%80%99s-attempt-break>. [2013, December 4]
- Squires,S.J., Moore,M.E & Keesee,S.E. n.d. *Electronic journal availability study*. Available: <http://www.eblip4.unc.edu/papers/Squires.pdf> [2012 , July 27].
- Stake, R.E. 2010. *Qualitative research: studying how things work*. New York, NY: Guilford Press.
- Stellenbosch University. 2014. Open Access. Available: <http://libguides.sun.ac.za/content.php?pid=282279&sid=3948603> [2014, February 3]
- Stemper, J & Barribeau, S.2006. Perpetual access to electronic journals: a survey of one academic research library's licenses. *Library Resources and Technical Services*.50 (2): 91-109.
- Steyneberg, S & Rossouw, S.F.1993. The availability of research journals in South African academic medical libraries. *South African Medical Journal*. 83 (Nov. 1993): 837-39
- Strauss, A & Corbin, J.1998. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*.Oaks: Sage
- Suber, P.2012. *Open Access*. Cambridge, M.A: The MIT Press.
- Sugarman,T, Krueger,S & Kelly,L. 2011. Evaluating usage of non-text resources: What the COUNTER statistics don’t tell you. *The Serials Librarian: From the printed page to the digital age*. 60 (1-4): 83-97. DOI:10.1080/0361526X.2011.556445.
- Swan, A .2009. A key piece of the jigsaw for improving World Health. *Bulletin of the World Health Organisation*. 87(8) : 565-644.
- Swan, A. 2012. *Policy guidelines for the promotion of open access*. (Open guidelines series). Paris: UNESCO. ISBN: 978-92-3-001052-2 Available: <http://bit.ly/LXaiKK> [2013, January 23].
- Swan, A., & Brown, S .2005. *Open Access self-archiving: An author study*. Available: <http://bit.ly/O5Lmp3> [2013, December 16].
- Swan,A., Willmers,M., & King, Thomas.2014. *Research publishing models: a guide for University Managers*. Available:

http://openuct.uct.ac.za/sites/default/files/media/SCAP_Brief_3_Swan_et_al_Publishing_Models.pdf [2014, March 4].

Swartz, M.K.J. 2013. HINARI: providing global access to health care information. *Journal of Pediatric Health Care*. 27(1):1. DOI: 10.1016/j.pedhc.2012.09.007.

Takagi, Y & Czajkowski, A. 2012. WIPO services for access to patent information - Building patent information infrastructure and capacity in LDCs and developing countries. *World Patent Information*. 34(1): 30-36, DOI: <http://dx.doi.org/10.1016/j.wpi.2011.08.002>.

Tandon, G., Poluru, L., Gutam, S., Mishra, A.K., Pandey, P.S., Chandrasekharan, H. 2012. Availability and accessibility of research outputs in NARS: a case study with IARI. *Scholarly and Research Communication*. 4(2):020156.

Taole, N & Dick, A.L. 2009. Implementing a common library system for the Lesotho library consortium. *The Electronic Library*. 27 (1): 5 – 19.

TEEAL, 2013. What is TEEAL? Available: <http://www.teeal.org/what-is-teeal>. [2013, January 12].

Tenipor, C., & King, D.W. 2002. Reading behaviour and electronic journals. *Learned Publishing*. 15(4) : 259-265.

Tenopir, C, Maysa, R & Wua, L. 2011. Publishing models and article dates explained. *Journal Article Growth and Reading Patterns*. 16 (1). DOI: 10.1080/13614576.2011.566796 [2013, January 14].

Tenopir, C; Wilson, Concepcion S.; Vakkari, P; Talja, S; King, D. 2010. Cross country comparison of scholarly e-reading patterns in Australia, Finland, and the United States. *Australian Academic and Research Libraries*. 41 (1): 26-41.

Tenopir, C, Maysa, R and Wua, L. 2011. Journal article growth and reading patterns. *The Journal Publishing Ecosystem and the Challenge of Change* .16 (1):4-22.

Thanuskodi, S. 2001. User awareness and use of electronic journals among Education Faculty members in Chennai. *Journal of Library and Information Science*. 1(11):1-13.

Thatcher, S.G. 1995. The crisis in scholarly communication. *Chronicles of Higher Education*. 41(25):B1.

Thein, A.M & Beach, R. 2010. Mentoring doctoral students towards publication within scholarly communities of practice in Aitchison, Kamler & Lee (eds) .2010. *Publishing pedagogies for the doctorate and beyond*. London: Routledge: 1-176.

Thomas, G & Fourie, I. 2006. *Academic library consortia in South Africa: where we come from and where we are heading*. Available: http://eprints.ru.ac.za/428/1/Thomas_Academic_Library.pdf [2013, November 24]

Treptow, R & James, M. 2011. Use of online knowledge resources by prominent South African researchers. *South African Journal of Library and Information Science*. 77(1):64-74.

Tripathi, M & Jeevan, K. 2013. A selective review of research on e-resource usage in academic libraries. *Library Review*. 62(3) : 134 – 156.

- Tucker, D. 2013. History of publishing. In: *Encyclopaedia Britannica*. Available: <http://www.britannica.com/EBchecked/topic/482597/history-of-publishing> [2013, July 13].
- UNAIDS (n.d). *An introduction to triangulation*. Available: http://www.unaids.org/en/media/unaids/contentassets/documents/document/2010/10_4-Intro-to-triangulation-MEF.pdf [2012, November 24].
- UNESCO.2005. *Towards Knowledge Societies: UNESCO World Report*. Paris: UNESCO, 2005.
- UNESCO.2010. *UNESCO Science Report 2010*.Paris:UNESCO,2010. Available: <http://unesdoc.unesco.org/images/0018/001899/189958e.pdf> [2013, December, 14]
- University of Illinois. 2013. *The cost of journals*. Available: <http://www.library.illinois.edu/scholcomm/journalcosts.html> [2013, December , 3]
- University of Michigan.2014. *Library Research Guides: Citation Analysis*. Available: <http://guides.lib.umich.edu/content.php?pid=98218&sid=736298> . [2014, September 09].
- University of Zimbabwe Library .2010. *University of Zimbabwe Libraries annual report 2010*. unpublished.
- University of Zimbabwe. 2011. *A handbook of research publications 2000 to 2011*. Available: <http://www2.uz.ac.zw/documents/Expo%20Handbook-10pt.pdf>. [2011 September 9].
- University of Zimbabwe. 2011b. *A handbook of research publications 2000 to 2011 (Supplement)*. Harare: UZ Press.
- University of Zimbabwe. 2011c. *Faculty of Agriculture - research and intellectual expo brochure(2010)*. unpublished.
- Urra,P. 2013. A Letter to the Editors of MEDICC Review. *MEDICC Review*. 15(3). Available: <http://www.medicc.org/mediccreview/pdf.php?lang=&id=309> [2013, November 13].
- Van Orsdel, L & Kathleen, B. 2004.Periodicals price survey: closing on open access. *Library Journal*. Available: http://works.bepress.com/lee_vanorsdel/5/ . [2013, July 13].
- Vanclay, J.2011. An evaluation of the Australian Research Council's journal ranking. *Journal of Informetrics*. 5(2): 265-274. DOI:10.1016/j.joi.2010.12.001.
- Vanouplines, P & Beullens, R 2008. De impact van open access tijdschriften. *IK Intelectueel Kapital*. 7(15): 14-17.
- Vent, O.2005. TEEAL & AGORA: improving access to agricultural journals in low-income countries. *Serials Review*. 31(4): 266–269.
- Villarroya, A., Claudio-González, M., Abadal, E., Melero, R.2012. Modelos de negocio de las editoriales de revistas científicas: implicaciones para el acceso abierto. *El profesional de la información*. 21 (2): 129-135.
- Weddle, J & Grogg, J. 2008. E-journal management tools. In *E-Journals Access and Management*. W, Jones, W .Ed. New York, Routledge.

- Welcome Trust, 2009. *Welcome Trust calls for greater transparency from journals on open access publishing costs*. Available: <http://blog.europepmc.org/2009/10/welcome-trust-calls-for-greater.html>. [2013, December 2].
- Weller, K, Droge, E, and Puschmann, C.2011. *Citation Analysis in Twitter: Approaches for Defining and Measuring Information flows within Tweets during scientific conferences*. Available: http://ceur-ws.org/Vol-718/paper_04.pdf [2014, August 23].
- Wells, A.2011. *E-books : A university perspectives*. Available: <https://www.alia.org.au/sites/default/files/documents/advocacy/Andrew%20Wells%20ALIA%20ebooks%20think%20tank%2028%20May%202013.pdf> [2012, November 13]
- Willhite, A & Fong, E. 2012. Coercive citation in academic publishing. *Science*. 335:542-543.
- Willinsky, J.2006. *The access principle: the case for open access to research and scholarship*. Cambridge, MA; MIT Press: 1-308. Available: http://mitpress.mit.edu/sites/default/files/titles/content/9780262512664_Download_the_full_text.pdf [12 December, 2013]
- World Bank , 2003. *The African Virtual University and growth in Africa : a knowledge and learning challenge*. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2005/01/03/000160016_20050103172248/Rendered/PDF/310450ENGLISHofind223.pd. [2013, August 12].
- Wouter, G .2011. *The impact factor in open access journals*. Available: <http://wowter.net/2011/01/06/the-impact-factor-of-open-access-journals/> [2013, November 13].
- Wulff, J. L.2004. Quality markers and use of electronic journals in an academic health sciences library. *Journal of Medical Library Association*. 92(3): 315–322.
- Wysocki,B.2004. Journals resist free access to medical data. *Wall Street Journal*. October 28, 2004: B1.
- Young, P.2009. *The Serial Crisis and Open Access. A White Paper for the Virginia Tech Commission on Research*. Available : http://scholar.lib.vt.edu/faculty_archives/YoungP/OAwhitepaper.pdf [2013, December 27]
- Yu, H & Breivold, S.2008. *Electronic resource management in libraries: research and practice*. London: Information Science Reference. New York.
- Zárate, B. V & Cerda, L. J.2007. Strengths and weaknesses of the impact factor of scientific journals. *Revi Med Chil*. 135 (11):1474-8. DOI: /S0034-98872007001100016.
- Zhang, M & Eschenfelder, K.2012. *Licence analysis on e-journal perpetual access of library*. Available: <https://www.asis.org/asist2012/proceedings/Submissions/273.pdf> [2014, January 12].
- Zondi, L.1996. Measuring availability and non-availability rates at the University of Zululand library. *South African Journal of Library and Information Science*. 64 (2): 108-113.

Zupac, G.K.2014.Impact beyond the Impact factor. *Journal of Comparative Physiology Analysis*.
200:113-116. DOI:10.1007/500359-013-0863-1

Appendices

Appendix 1: Questionnaire for this Study

Appendix 2: Faculty Core-journal's list

Appendix 1: Questionnaire

Dear Participant,

My name is Thembani Malapela and I am a Masters Student in Library and Information Science at the University of Cape Town. I am conducting research on the access and use of electronic journal collections and their impact on publications in the Faculty of Agriculture at the University of Zimbabwe. Therefore, I wish to invite you to participate in this study by completing the attached questionnaire.

The major objective of this study is to establish the extent of electronic access to agricultural journals and their utilization in teaching and publication by the Faculty members. This study seeks to explore whether available journal collections meet the teaching and research needs of the Faculty members.

Please note that this study is for academic purposes and your responses will be treated with confidentiality. Please do not indicate personal details (e.g. names or id numbers) on any of the responses. In order to obtain a conclusive picture of the issues, I urge you to complete all questions and you may also use the last question to provide additional details.

Please Note: You may decline to answer any question and you have the right to withdraw from participation at any time.

Specific questions about this research project and the questionnaire may be mailed to tmalapela@gmail.com

Yours faithfully

Thembani Malapela

**EXPERIENCES IN ACCESS & USE OF E-JOURNALS AND THEIR IMPACT ON PUBLICATION
AT THE UNIVERSITY OF ZIMBABWE**

1. Please choose the category that best describes yourself?

- Professor
 - Research Scientist
 - Lecturer
 - Technician
 - Tutor
 - Other, please specify
-
-

2. What is your field of interest or your main research area?

- Animal Science
 - Crop Science
 - Agriculture Economics
 - Veterinary Science
 - Agricultural Economics
 - Aquaculture
 - Biology
 - Other , please specify
-
-

3. Do you use electronic journals (e-journals) for study and/or research purposes?

- Yes
- No

If “No”, proceed to question 13

If Yes, proceed to the **next question**

4. How often do you access e-journals in the following in locations?

(Tick All)

Location	Often	Sometimes	Never
University Office			
Internet Cafe			
Departmental lab			
Library PC			
Home			
Other, please Specify _____			

5. Have you experienced difficulties in accessing e-journals for the following reasons

(tick all)

Reason	Often	Sometimes	Never
No password, or required Password not known			
Access restricted to campus only			
University not subscribed to the journal			
Back issues not available			
Other, please Specify _____			

6. List below the journal titles you require for your teaching and for your research

7. Do you have access to all of these through the University Library Website /electronic collections?

Yes

No

If No, where do you normally get these?

8. Have you ever suggested any new journals to the library?

Yes

No

If yes, please state the titles

9. Which of the following databases do you use to obtain journal articles for your teaching or your research?

(tick all)

Database Name	Daily	Weekly	Fortnightly	Monthly	Never
LanTeaal Database					
AGORA					
HINARI					
OARE					
CABI Abstracts					
EBSCO Host					
Emerald					
Beech Tree Publishing					
Science Direct					
Springer					
JSTOR					
Wiley-Blackwell					
Gale Thompson					
Academic Search Premier					
Annual Reviews					
Sage					
Other, please State _____					
—					
Other, please State _____					
—					

10. Which of the following approaches do you use to locate the e-journals (and citations) that you need
(tick all)

Method	Often	Sometimes	Never
Google ; Google Scholar and other search engines			
University Library's home page			
Publisher's websites (for example, Science Direct)			
Citation Databases (i.e Web of Knowledge)			
I ask a colleague			
I ask the librarian			
Other, please Specify _____			

11. For what purposes do you use e-journals?

- Teaching
- Research
- Consultancy
- Student Supervision
- Other, please Specify _____

12. Do you cite journals that you find electronically in your research or in your course notes or outlines

- YES
- NO

13. Do you have teaching responsibilities in the Faculty of Agriculture?

- YES
- NO

14. If YES, how many classes do you teach during the year?

1-3

3-5

6+ Specify _____

15. Do you encourage your students to use electronically available journals?

Yes

No

If YES, elaborate on how you acknowledge the student's use of journals

16. In which of the following areas around e-journals do you require training or additional training?

(tick all)

Area	YES	NO
Retrieving e-journal references		
Locating full text articles for specific e-journal references		
Managing electronic journal references		
Accessing UZ Library electronic collections		
Other, please Specify _____		

17. Which of the following do you think are required to improve and to enhance access to current research information available online

Reason	YES	NO
Internet bandwidth		
Computers for faculty		
Training		
Increased subscriptions		
The e-journal platform for UZ Library		
Other, please Specify _____		

18. What other issues do you think are important to ensure that academics use electronic research resources in their work?

19. Have you published (or co-published) a paper in a research journal since 2010?

YES

NO

If yes, list your publications below?

20. If NO, select one of the following:

I have submitted a paper for publication but have had it rejected

I am working on a paper, but it is not yet complete

I am not currently working on a research project

Other – please explain _____

21. Has access to e-journals enabled you to publish, or to publish more than before journal articles were available electronically?

YES

NO

22. Does anything *prevent* you from publishing in peer reviewed journals?

- No local incentive to publish
 - The high cost of publishing
 - Lack of time due to teaching roles
 - Writing skills
 - Other
-

23. What can be done to improve your access to current research in your field?

24. How has access to electronic journals impacted on your work?

25. Do you use electronic journals in preference to print for your teaching and research?

26. Are there any other issues relating to e-journals affecting your work which you would like to bring forward?

Thank you for your time to complete this questionnaire

Them bani Malapela

	Journal Title	Publisher	Research4Life				LanTE EAL	UZ Library Subscriptions (PERii & EIFL)	JSC Citation Index	Overall access
			AGO RA	AR DI	HINA RI	OA RE				
1.	Acta Agriculture Scandinavia	Taylor & Francis	✓	✓	✓	✓	✓	6.9	Y	
2.	Acta Agrobotanica	Academic Search	✓				✓	-	Y	
3.	Acta Horticulture	IndexCopernicus	✓				x	-	Y	
4.	Acta Tropica	Elsevier	✓		✓	✓	X	2.722	Y	
5.	Africa Birds and Birding	Africa Geographic					X	-	N	
6.	Africa Entomology	SABINET					x	-	N	
7.	African Crop Protection	SABINET					x	-	N	
8.	African Crop Science	AJOL	✓				✓	-	Y	
9.	African Crop Science Journal	BIO-ONE	✓				✓	-	Y	
10.	African Journal of Agricultural Research	Academic Journals					✓	-	Y	
11.	African Journal of Biotechnology	BIO-ONE	✓		✓	✓	✓	-	Y	
12.	African Journal of Ecology	Wiley-Blackwell					✓	0.655	Y	
13.	African Journal of Range and Forage Science	Taylor & Francis /NISC		✓	✓	✓	✓	0.600	Y	
14.	African Journal of Root and Tuber Crops	Intr. Soc. for Tropical Roots					x	-	N	
15.	Agricultural Ecosystems and Environment	Elsevier	✓	✓	✓	✓	X		Y	
16.	Agricultural Systems	Elsevier	✓	✓	✓	✓	X	3.004	Y	
17.	Agriculture and Human	Springer	✓	✓	✓	✓	x		Y	

	Values									
18.	Agriculture Science Digest	IndianJournals						x	-	N
19.	Agroanimalia	S.A Dept of Science						x	-	N
20.	Agroforestry Systems	Springer	✓					x	1.378	Y
21.	Agronomy Journal	Amer.Soc.Agro.					✓	x	1.794	Y
22.	American Journal of Potato Research	Springer			✓	✓	✓	x	1.234	Y
23.	Analytica Chimica Acta	Elsevier	✓	✓	✓	✓		X	4.555	Y
24.	Animal	Cambridge	✓	✓	✓	✓		✓	1.744	Y
25.	Animal Behaviour	Elsevier	✓	✓	✓	✓		X	3.493	Y
26.	Animal Conservation	Wiley-Blackwell						✓	2.931	Y
27.	Animal Feed Science and Technology	Elsevier		✓	✓	✓	✓	X	1.691	Y
28.	Animal Production Science	CSIRO Publishing	✓					x	0.986	Y
29.	Animal Reproduction Science	Elsevier	✓	✓	✓	✓		X	1.750	Y
30.	Animal Research International	AJOL						✓	-	Y
31.	Animal Review of Entomology	Annual Reviews	✓	✓	✓	✓		✓	11.6	Y
32.	Animal Science Journal	John , Wiley & Son	✓	✓	✓	✓		✓	0.857	Y
33.	Annals of Applied Biology	John , Wiley & Son	✓	✓	✓	✓		✓	2.179	Y
34.	Annals of Applied Biology	Wiley-Blackwell						✓	2.179	Y
35.	Annals of Botany	John, Wiley & Son	✓	✓	✓	✓		✓	4.030	Y
36.	Annals of the Entomological Soc. of	Ent.Soc.America						x	1.317	N

	America									
37.	Annual Review of Ecology, Evolution and Systematics	Annual Reviews	✓		✓	✓		✓	-	Y
38.	Annul Rev. Plant Biology	Annual Reviews	✓		✓	✓		✓	25.962	Y
39.	Applied Micro-Biology	PubMedCentral						✓	3.425	OA
40.	Applied Soil Ecology	Elsevier	✓	✓	✓	✓		X	2.368	Y
41.	Australian Journal of Soil Research	CSIRO Publishing	✓		✓	✓	✓	x	1.530	Y
42.	Australian Journal of Agricultural Research	CSIRO Publishing	✓		✓	✓	✓	x	1.061	Y
43.	Australian Journal of Botany	CSIRO Publishing	✓		✓	✓	✓	X	1.111	Y
44.	Australian Journal of Experimental Agriculture and Animal Husbandry	CSIRO Publishing	✓		✓	✓		X	1.417	Y
45.	Behavioural Ecology	Oxford	✓	✓	✓	✓		✓	3.083	Y
46.	Biochemical Engineering Journal	Elsevier	✓	✓	✓	✓		X	0.706	Y
47.	Biochemical Systematics and Ecology	Elsevier	✓	✓	✓	✓		X	0.931	Y
48.	Biodiversity and Conservation	Springer	✓	✓	✓	✓		x	2.238	Y
49.	Biologica	Elsevier	✓	✓	✓	✓		X	0.557	Y
50.	Biological Conservation	Elsevier	✓	✓	✓	✓		X	4.115	Y
51.	Biometrical Journal	Wiley-Blackwell						✓	1.252	Y
52.	Biometrics	John, Wiley & Sons	✓	✓	✓	✓		✓	1.827	Y
53.	Bioresource Technology	Elsevier	✓	✓	✓	✓	✓	X	4.980	Y
54.	Biotechnology Advances	Elsevier	✓	✓	✓	✓		X	9.646	Y

55.	BIOTROPICA	Wiley-Blackwell						✓	2.229	Y
56.	BMC Veterinary Research	BioMedCentral						✓	2.000	OA
57.	Breeding Science	Jap.Soc.Breeding						x	1.248	N
58.	British Journal of Nutrition	Cambridge	✓	✓	✓	✓		✓	3.013	Y
59.	Canadian Journal of Animal Science	Can.Ass.Ani.Scie	✓					x	0.770	Y
60.	Canadian Journal of Zoology	NRCC	✓					X	1.205	Y
61.	Canadian Journal of Forestry Research	NRCC	✓	✓		✓	✓	X	1.058	Y
62.	Canadian Journal of Plant Science	Agr. Inst. Can.						X	0.613	N
63.	Canadian Journal of Plant Science	Can.Ass.Pl.Scie	✓					x	0.613	Y
64.	Canadian Journal of Soil Science	Agr.Inst.Canada	✓				✓		0.821	Y
65.	Canadian Journal of Veterinary Research	Elsevier	✓	✓	✓	✓		X	0.939	Y
66.	Cell Biology International	Elsevier	✓	✓	✓	✓		X	1.482	Y
67.	Cereal Research Communications	Akademiai Kiado ..						X	0.385	N
68.	Climate Change	Springer	✓	✓	✓	✓		x	3.385	Y
69.	Climate Research	Inter-Research						x	1.994	N
70.	Conservation Biology	John, Wiley & Sons	✓	✓	✓	✓		✓	4.692	Y
71.	Conservation Genetics	Springer	✓	✓	✓	✓		x	1.610	Y
72.	Conservation Letters	Wiley-Blackwell						✓	4.082	Y
73.	Critical Review in Food	Taylor & Francis	✓	✓	✓	✓		✓	0.569	Y

	Science Nutrition									
74.	Crop Protection	Elsevier	✓	✓	✓	✓		X	1.402	Y
75.	Crop Research Journal	Gauruv Soc.of Agri.R						x	-	N
76.	Crop Science	Crop Sci.Soc.Amer	✓					x	1.641	Y
77.	Ecological Economics	Elsevier	✓	✓	✓	✓		X		Y
78.	Ecological Management and Restoration	Eco. Soc. of Aus				✓		X	1.565	Y
79.	Ecology	Eco. Soc. Amer.				✓		X	4.849	Y
80.	Ecology Applied	British Ecology Soc.						x	5.102	N
81.	Econometrica	Wiley-Blackwell	✓					✓	2.976	Y
82.	Economic Botany	Springer	✓	✓	✓	✓		x	1.604	Y
83.	Electrophoresis	Wiley-Blackwell	✓					✓	3.303	Y
84.	Entomological Science	Wiley-Blackwell						✓	0.673	Y
85.	Environmental Entomology	BIO-ONE	✓		✓	✓		✓	1.561	Y
86.	Euphytica	Springer	✓	✓	✓	✓		x	1.554	Y
87.	European Journal of Agronomy	Elsevier	✓	✓	✓	✓		X	2.477	Y
88.	Experimental Agriculture	Cambridge	✓	✓	✓	✓		✓	1.060	Y
89.	FAO Soils Bulletin	FAO					✓		-	Y
90.	Field Crops Research	Elsevier	✓	✓	✓	✓		X	2.474	Y
91.	Food Policy	Elsevier	✓	✓	✓			X	2.054	Y
92.	Forestry, Ecology and Management	Elsevier	✓	✓	✓	✓	✓	X	0.962	Y
93.	Frontiers of Ecology Environment	Elsevier	✓	✓	✓	✓		X	9.113	Y
94.	Functional Ecology	Wiley-Blackwell						✓	4.567	Y

95.	Genetics	Genetics Soc.Am					✓		4.007	Y
96.	Global Change Biology	Wiley-Blackwell						✓	6.862	Y
97.	Global Environment Change	Elsevier	✓	✓	✓	✓		X	6.868	Y
98.	Grass, Forage and Agriculture	Wiley-Blackwell						✓	1.099	Y
99.	Horticultural Science	CZECH. Acad. Agric.Sci.						x	0.477	N
100	Indian Journal of Animal Science	IOS Press						X	0.170	N
101	Insect Conservation and Diversity	Wiley-Blackwell						✓	1.705	Y
102	Insect Science	John,Wiley & Sons	✓	✓	✓	✓		✓	1.103	Y
103	International Journal of Agricultural and Bio-Systems Engineering	World Academy of Science						x	-	Y
104	International Journal of Agricultural Sustainability	Taylor &Francis /EarthScan	✓					✓	1.696	Y
105	Journal of Agricultural and Biological Science	ARP Journals						x	1.210	N
106	Journal of New Seeds	Taylor & Francis /Food Pro. Press	✓	✓	✓	✓	✓	✓	-	Y
107	Journal of Reproduction and Fertility Supplement	Soc. Rep. Fert.						x	-	N
108	Journal of Science of Food and Agriculture	Wiley-Blackwell						✓	1.436	Y
109	Journal of Zoology	Wiley-Blackwell						✓	1.5	Y
110	Journal of Agricultural	Elsevier	✓	✓	✓	✓		X	-	Y

	Engineering Research									
111	Journal of Agricultural Science	Cambridge	✓	✓	✓	✓		✓	2.041	Y
112	Journal of Agriculture and Food Chemistry	Ame.Chem.Soc						x	2.47	N
113	Journal of Agriculture Environment Science and Technology	Int. Soc.Food.Agri						x	0.52	N
114	Journal of Agronomy and Crop Science	Wiley-Blackwell						✓	2.433	Y
115	Journal of American Society for Horticultural Science	Am. Soc.Hort.Scie.						X	0.938	N
116	Journal of American Statistical Association	Am. St.Ass						X	1.782	N
117	Journal of Animal Breeding and Genetics	Wiley-Blackwell						✓	1.455	Y
118	Journal of Animal Ecology	Wiley-Blackwell						✓	0.636	Y
119	Journal of Animal Feed Science	Kiel Inst.Ani. P Nutr						x	0.636	N
120	Journal of Animal Physiology and Animal Nutrition	Wiley-Blackwell						✓	0.855	Y
121	Journal of Animal Science	Am.Soc.Ani.Sci	✓					x	2.096	Y
122	Journal of Applied Ecology	John, Wiley & Sons	✓	✓	✓	✓		✓	5.045	Y
123	Journal of Applied Entomology	John Wiley & Sons	✓	✓	✓	✓		✓	1.311	Y

141	Journal of Theoretical Biology	Elsevier	✓	✓	✓	✓		X	2.208	Y
142	Journal of Veterinary Science	Korean Soc.Vet.Sci.						x	1.161	N
143	Journal of Wildlife Management	BIO-ONE	✓		✓	✓		✓	1.522	Y
144	Livestock Production Science	Elsevier	✓	✓	✓	✓		X	1.506	Y
145	Livestock Research for Rural Development	Univ. Trop. Ac						x	0.03	N
146	Livestock Science	Elsevier	✓	✓	✓	✓	✓	X	1.500	Y
147	Natural Resources Forum	Wiley-Blackwell						✓	0.667	Y
148	Natural Resources Modelling	Wiley-Blackwell						✓	0.556	Y
149	Nature	Nature Publishing Group	✓	✓	✓	✓		✓	36.280	Y
150	Neurogenetics	Springer	✓	✓	✓	✓		x	3.354	Y
151	New Phytologists	Wiley-Blackwell	✓					✓	6.645	Y
152	New Scientists	Elsevier	✓	✓	✓			X	0.313	Y
153	Nigeria Agriculture Journal	BIO-ONE	✓		✓	✓		✓	-	Y
154	Nuclei Acid Research	Oxford	✓	✓	✓	✓		✓	8.026	Y
155	Nutri. Cycl. Agro Ecosystem	Springer	✓	✓	✓	✓			1.792	Y
156	Nutrition and Food Science	Emerald						✓	-	Y
157	Nutrition Research Reviews	Cambridge	✓	✓	✓	✓		✓	4.842	Y
158	Pesquisa agropecuaria	SciELO	✓						0.756	Y

	brasileria									
159	Photosynthetican	Springer	✓	✓	✓	✓		x	1.283	Y
160	Physics and Chemistry of the Earth	Elsevier	✓	✓	✓	✓		X	1.110	Y
161	Physiologica Plantarum	John,Wiley & Sons	✓	✓	✓	✓		✓	3.112	Y
162	Physiological Reviews	Am Phys Soc	✓						1.555	Y
163	PhytoChemistry	Elsevier	✓	✓	✓	✓	✓	X	3.351	Y
164	Phytoparasitica	Springer	✓	✓	✓	✓		x	0.887	Y
165	Plant and Soil	Springer		✓	✓	✓		x		Y
166	Plant Cell Environment	John, Wiley & Sons	✓	✓	✓	✓		✓	5.215	Y
167	Plant Cell Reports	Springer	✓	✓	✓	✓		x	2.274	Y
168	Plant Cell, Tissue and Organ Culture	Springer	✓	✓	✓	✓		x	3.090	Y
169	Plant Growth Regulation	Springer	✓	✓	✓	✓		x	1.604	Y
170	Plant Journal	Wiley-Blackwell						✓	6.160	Y
171	Plant Physiology	Ame. Soc. Plant Bio	✓					x	6.535	Y
172	Plant Production Science	Crop.Sci. Soc.Jap						x	1.000	Y
173	Planta	Springer	✓	✓	✓	✓		x	3.000	Y
174	Poultry Science	Pol.Sci.Ass.Inc						X	1.728	N
175	Range and Ecology and Management (Journal of Range Management)	JSTOR					✓	✓	1.461	Y
176	Research in Veterinary Science	Elsevier	✓	✓	✓	✓		X	1.649	Y
177	Research on Crops	Gaurav Soc.Agric						x	0.050	N
178	Restoration Ecology	Wiley-Blackwell						✓	1.681	Y
179	Science	Ame. Ass. Adv.Sci.	✓					X	31,201	Y

180	Scientia Horticulturae	Elsevier	✓	✓	✓	✓		X	1.527	Y
181	Seed Science and Technology	ISTA-INT Seed	✓					X	0.620	Y
182	Seed Science Research	Cambridge	✓	✓	✓	✓		✓	1.059	Y
183	Small Ruminant Research	Elsevier	✓	✓	✓	✓		X	1.295	Y
184	Soil and Tillage Research	Elsevier	✓	✓	✓	✓	✓	X	2.425	Y
185	South African Journal of Animal Sciences	AJOL	✓					✓	0.242	Y
186	South African Journal of Plant Soil	Taylor & Francis	✓	✓	✓	✓		✓	-	Y
187	South African Journal of Wildlife Research	BIO-ONE	✓		✓	✓		✓	1.085	Y
188	Theoretical and Applied Genetics	Springer	✓	✓	✓	✓		x	3.297	Y
189	Trends in Ecology and Evolution	Elsevier	✓	✓	✓	✓		X	15,748	Y
190	Tropical Animal Health and Production	Springer	✓	✓	✓	✓		x	1.115	Y
191	Tropical Grasslands	Springer	✓	✓	✓	✓	✓	x		Y
192	Tropical Grasslands	Trop. Gra. Soc. Aust						x	0.224	N
193	Vet Quarterly	Taylor and Francis	✓	✓		✓		✓	-	Y
194	Veterinary Microbiology	Elsevier	✓	✓	✓	✓		X	3.327	Y
195	Veterinary Parasitology	Elsevier	✓	✓	✓	✓		X	2.579	Y
196	Veterinary Research Communications	Springer	✓	✓	✓	✓		x	0.822	Y
197	Water and Environment Journal	John, Wiley and Sons	✓	✓	✓	✓		✓	0.792	Y
198	Wood , Science and	Springer	✓	✓	✓	✓		x	1.727	Y

	Technology									
199	World Poultry Science Journal	Cambridge	✓	✓	✓	✓	✓	✓	1.104	Y
200	Zimbabwe Vet Journal	AJOL	✓					✓	-	Y
201	AVAILABILITY RATES		63%	47%	53.5%	51%	11%	39.5%		85.5%