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Strategies for Managing Scholarly Content at Universities in Kenya

By:

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DECLARATION

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ABSTRACT

This study investigated strategies employed by universities in Kenya in managing scholarly content and addressed the following research questions: What kinds of scholarly content are generated and used in universities in Kenya? How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use? How do Kenyan scholars communicate amongst themselves in the various stages of their research work? To what extent do Kenyan scholars participate in local and/or international professional social networks? To what extent do existing institutional facilities in the universities support scholars' research and communication needs? The study was underpinned by three theoretical lenses namely: The Conversation Theory, the Social Network Theory and the Knowledge Management Process Model. The Knowledge Management Process Model was the main theoretical lens used to underpin the research problem in this study as it encompassed most issues of the research problem on the subject matter of scholarly content management in universities in Kenya.

The study was based on the post-positivist paradigm and applied quantitative and qualitative approaches. A survey plan was employed within a multiple case study design. The population of the study consisted of academic staff and postgraduate students drawn from six purposively selected universities using the 2013 Webometric academic ranking of best Universities in Kenya (based on the qualitative and quantitative aspects of research output). Convenience sampling was used to identify participants for the study from academic staff and postgraduate students. In this strategy, those respondents who were available and willing to participate in the study when the questionnaires were being administered were included in the study. Academic staff and postgraduate students were targeted for the study since they were considered key actors in the scholarly communication process as creators and consumers of scholarly content. Purposive sampling was used to target all the six University Librarians and all six representatives of the universities' research units respectively. Therefore a census of the University Librarians and Representatives of the universities' research units was taken. These respondents were considered key informants since they were directly involved in facilitating and managing research and scholarly communication at the universities. Self-administered questionnaires were used to collect data from 350 academic staff and 370 postgraduate students while interviews were used to collect data from the key informants from the research units and also from the university librarians. Qualitative data were analysed and presented using derived themes while quantitative data were analysed using IBM SPSS Statistics and Gephi Social Network Analysis software. Descriptive and inferential statistics were generated by the statistical software while the social network analysis software was used to depict the social networks existing among scholars at the universities. Results of quantitative data analysis were presented using tables, graphs and charts. Cronbach's Alpha was generated for individual questions in the survey questionnaire to help determine internal validity. The study adhered to the ethical protocol of the University of KwaZulu-Natal. Moreover, permission was obtained from the National Council of Science and Technology in Kenya as well as from individual universities to allow the study to be undertaken in the selected universities.

The results revealed that several types of scholarly content were generated through research and publications in the universities surveyed, with the most common being theses, journal articles and conference papers. The results further revealed that a majority of academic staff in universities in Kenya were not actively involved in knowledge generation through research and publications with only 42% of academic staff and 37% of postgraduate students producing 1-3 journal articles in the period 2010-2014. The results also showed that there was high level of awareness among academic staff and postgraduate students regarding preservation of scholarly content as most respondents documented their research procedures, backed up information, moved files to newer computers and used printouts to preserve content. However, the respondents seemed to hardly use digital archives or university servers for preservation of their scholarly content. The results seemed to suggest heavy reliance on modern technology-enabled communication techniques and face-to-face interactions for communication amongst scholars. Institutional repositories were hardly used for scholarly communication although they existed in all universities surveyed. Social Network Analysis revealed limited participation by respondents in local and international scholarly networks with majority of collaborations taking place as independent dyads or triads. Results also revealed inadequate institutional support for research and scholarly communication including funding, material and physical infrastructure, mentorship, and ICT facilities.

From the results, it is concluded that strategies for managing scholarly content at universities in Kenya are weak, impacting negatively on quality, quantity and visibility of scholarly content. It is therefore concluded that a policy framework that would encompass the different facets of managing scholarly content is necessary. Specifically, research productivity in universities in Kenya was low owing to among other factors poor research culture, poor mentorship, weak social ties between scholars, and inadequate support for research and scholarly communication in the universities. Moreover, visibility of scholarly content was found to be poor owing to reliance by academic staff and postgraduate students on traditional publishing modes such as subject journals and conference proceedings compared to institutional websites and repositories. The study recommended among other things development of specific strategies to enhance management of scholarly content within the universities. The study recommends development of an elaborate policy framework to guide content generation, storage, dissemination, access and use of scholarly content in universities in Kenya. Additionally, the study recommended institutionalization of mentorship programs to entrench scholarship amongst academic staff and graduate students; nurturing of scholarly collaboration to facilitate knowledge sharing and enhance the quality, quantity and visibility of research output from the universities; provision of more research funds especially by government to strengthen research capacity of the universities; and strengthening of university research niches to improve quality of research. The study makes an original contribution to the area of managing scholarly content from the perspective of universities in Kenya. Unlike previous studies that focus primarily on management of scholarly content from academic staff, the present study included academic staff, postgraduate students and librarians. The Social Network Analysis model was used to depict the departmental, interdepartmental and international scholarly collaborations in the universities surveyed.

Suggestions for further research include research to establish the nature of policies required at institutional and government level to improve research capacity and training programs in universities in Kenya. It is evident that absence of such policies is negatively impacting on the quality of research going on in universities in Kenya, despite the large quantity of resources already invested on research. Therefore, without such policies, it is inevitable that quality of research within universities in Kenya will continue to be low. Further research is also necessary to evaluate the actual use of electronic resources in university libraries. The study results revealed low usage of these resources by scholars with some claiming they were inaccessible. Such a study would establish usage levels as well as reasons for use or non-use of the resources. A further suggestion is for analysis of the scholarly collaborations existing among Kenyan scholars by using bibliometric techniques and social network analysis to determine the level of research collaboration among scholars. This will provide a further understanding of the nature of their collaborations, as well as research productivity and visibility of these scholars in the global literature.

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Unless the Lord builds the house, the builders labor in vain (Psalm127:1)

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It always seems impossible until it's done –

Nelson Rolihlahla Mandela (1918-2013)

DEDICATION

I dedicate this thesis to God the Father, the Son and the Holy Spirit; and to Jones, Sonya and Benjamin

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LIST OF ABBREVIATIONS

AAU	Association of African Universities
ADRI	Australasian Digital Recordkeeping Initiative
AI	Artificial intelligence
APARSEN	Alliance for Permanent Access to the Records of Science Network
APSR	Australian Partnership for Sustainable Repositories
AQRM	African Quality Rating Mechanism
ARL	Association of Research Libraries
ARWU	Academic Ranking of World Universities
AUC	African Union Commission
CASPAR	Cultural, Artistic and Scientific Knowledge for Preservation, Access and Retrieval
CENDARI	Collaborative European Digital Archive Infrastructure
CENS	Center for Embedded Networked Sensing
CSIC	Consejo Superior de Investigaciones Científicas
CUE	Commission for University Education
DATAD	Database of African Theses and Dissertations
DCC	Digital Curation Centre
DPE	Digital Preservation Europe
DPC	Digital Preservation Coalition
EABS	East African Backhaul System
EASSy	Eastern Africa Submarine Cable System
GDP	Gross Domestic Product
IR	Institutional Repositories
IUCEA	Inter University Council for East Africa
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KENET	Kenya Education Network Trust

KIPS	Kenya Information Preservation Society
KLISC	Kenya Library and Information Services Consortium
KM	Knowledge Management
KMPM	Knowledge Management Process Model
KU	Kenyatta University
NASW	National Association of Social Workers
NDIIPP	National Digital Information Infrastructure and Preservation Programme
NISO	National Information Standards Organization
OA	Open Access
OECD	Organisation for Economic Co-operation and Development
OpenAIRE	Open Access Infrastructure for Research in Europe
OpenDOAR	Directory of Open Access Repositories
PLANETS	Preservation and Long-Term Access through Networked Services
R&D	Research and Development
SABINET	South African Bibliographic and Information Network
SEACOM	South East Asian Telecommunication Cable
SNA	Social network analysis
SNA	Social network analysis
TEAMS	The East African Marine System
THE	Times Higher Education
UoN	University of Nairobi
URC	University Research Corridor
WACS	West Africa Cable System

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Within living memory, scientists have been communicating and exchanging their ideas, thoughts, hypotheses and scientific results (Ball, 2011:1). Scientific research needs to be communicated to the larger scientific community for it to add to knowledge. Scientific progress depends on the effectiveness of scholarly communication which allows ideas to be formulated, results to be compared and improvements to be made (Warden, 2010). According to the Association of Research Libraries (2014) scholarly communication is the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community and preserved for future use.

The development of today's scholarly communication as we know it has taken a long and winding journey. There has been progression from the oral discourses of the ancient Greek scholars to the printed periodicals and books made possible by Gutenberg's printing press and on to the digital scientific communications modes available to modern scholars (Ball, 2011:4-6). Western Libraries (2013a) asserts that there are different stakeholders involved in the modern scholarly communication process, including authors, publishers, libraries, researchers, higher education institutions, and funding agencies.

The term 'scholarly content' implies formally published scholarly literature, in particular journal articles and conference proceedings (Research Information Network, 2011a:5); editorial documents and doctoral dissertations (Royster, 2007:27-29); the contents of institutional repositories that could include any work generated by the institution's students, faculty, non-faculty researchers and staff. This content may include pre-prints and other works-in-progress, peer-reviewed articles, monographs, enduring teaching materials, datasets and other ancillary research material, conference papers, electronic theses and dissertations and grey literature (Johnson, 2002:3-4).

In the context of this study, scholarly content also includes research data which may be digital manifestations of literature (including text, sound, still images, moving images, models, games, or simulations) and forms of data and databases that generally require the assistance of computational machinery and software in order to be useful. These include

various types of laboratory data including spectrographic, genomic sequencing, and electron microscopy data; observational data, such as remote sensing, geospatial, and socioeconomic data; as well as other forms of data either generated or compiled, by humans or machines (Uhlir & Cohen in Borgman, 2012:1061).

According to Thorin (2003), the scholarly communication process is broader than just publications. Thorin opines that the scholarly communication process is also about how scholars communicate with one another as they create new knowledge and how they measure its worth with colleagues prior to making a formal article available to the broader community (Thorin, 2003:1). Thorin categorises the scholarly communication process into three distinct aspects namely: the process of conducting research, developing ideas and communicating informally with other scholars and scientists; the process of preparing, shaping and communicating to a group of colleagues what will become formal research results; and the ultimate distribution of the formal product either in print or electronically (Thorin, 2003:1). According to Procter, Williams, Stewart, Poschen, Snee, Voss & Asgari-Targhi (2010:4040), scholarly communication is constitutive of researchers' everyday activities and in addition to Thorin's categorisation, Procter et al. opine that scholarly communication also encompasses managing personal careers, research teams and research programmes and communicating scholarly ideas to broader communities. For purposes of this study, management of scholarly content involves managing the scholarly communication process as viewed by Thorin (2003) and Procter et al. (2010). In other words, the study was concerned with investigating both the scholarly communication process in universities in Kenya as well as management of the resulting content thereof.

With the global proliferation of scholarly content from both universities and research institutes, it is clear that strategies for its management need to be carefully considered to enable the communities in and outside these institutions to benefit from the knowledge generated.

1.1.1 Scholarly Content Management Practices around the World

Scholarly communication around the globe is characterised by practices that are common in some fields but specific to others. For example, across most scientific fields, journals are the best known and most available records of on-going research within a field. Journals publish research articles, field or laboratory work notes, and book reviews; use in-house editorial or

outside peer reviews; cater to scholars in a specific field or discipline; and may be considered by the academic practitioners as top, middle, or low-ranking outlets for their scholarly products. The impact of a journal article is often measured by the frequency of citations by other scholarly sources over a given period (Shaw, 2009:242). In the humanities, monographs are the preferable avenue for scholarly communication while, generally, conference proceedings are of secondary importance (Thorin, 2003). However, in fields like computer science and engineering, peer-reviewed conference proceedings have become the primary channel of research communication (Shamir, 2010). Some disciplines rely more on invisible colleges rather than published journal articles to exchange research ideas and monitor progress in their fields of research (Carey, 2011). According to Harvey (2012-14) an invisible college is a community of scientific researchers who are brought together by their common interests within a research paradigm. This community thrives on personal contact and interpersonal relationships. The use of monographs and peer-reviewed journal articles for promotion and tenure is the most well-known practice in universities around the world (Miller, Taylor & Bedeian, 2011; Harley, Acord, Earl-Novell, Lawrence, & King, 2010; Seipel, 2003).

Scholarly communication has been drastically altered by the internet, and Web 2.0 tools such as social media. With modern advancements in technology, new forms of communication have gained importance while at the same time creating new structures of information and publication that include listservs, weblogs ("blogs"), wikis, collective encyclopedias such as Wikipedia, wikisearch, Twitter, and more. More generally, the Web 2.0 technologies not only allow for more informal forms of scholarly communication, but also make possible new pathways into the abundant quantities of information in general and scholarly information, in particular (Schmiede, 2009:625).

Access to scholarly content has also undergone several transitions from the analogue information environment to the digital information environment. For example, digital libraries such as the American Library of Congress Digital Collections and Services, have been offering online access to print, pictorial and audio-visual collections and other digital services since 1994 (Library of Congress, 2013a). Similarly, Duke University's Digital Collections in the United States provide access to the university's unique library and archival materials for teaching, learning, and research at Duke and worldwide (Duke University

Libraries, 2013). In 2011-2012, the University was ranked 22nd globally by the Times Higher Education (Times Higher Education, 2012).

Digital archives are being implemented in many scholarly environments to manage scholarly content and provide access to such content by users. For instance the Collaborative European Digital Archive Infrastructure (CENDARI), a European Commission-funded research collaboration, is aimed at integrating digital archives and resources for research on medieval and modern European history. The project brings information and computer scientists together with leading historians and existing historical research infrastructures (archives, libraries and other digital projects). Its aim is to improve the conditions for historical scholarship in Europe through active reflection of and considered response to the impact of the digital age on scholarly and archival practice (CENDARI, 2013). In Africa, an example of a digital archive is the African Journal Archive, a retrospective digitisation project of full-text journal articles, in the sciences, social sciences and humanities disciplines. It is run by SABINET (South African Bibliographic and Information Network) and provides access to a multi-disciplinary, multi-country digital archive of Africa's research and cultural heritage contained in its journal literature (SABINET, 2013). Digital libraries (and archives) in particular, enable access anytime and anywhere, offer improved and wider access, offer new forms of access, enhance resource sharing, and enable reliable preservation of information (Salanje, 2011:2).

Open Access (OA) is yet another strategy that has been explored since the late 1990s' to facilitate access to limited scholarly content due in part to insufficient budgets of many institutions to sustain rising journal subscription rates (Yiotis, 2005:157). Open-access literature is defined by two essential properties. First, it is free of charge to everyone. Second, the copyright holder has consented in advance to unrestricted reading, downloading, copying, sharing, storing, printing, searching, linking, and crawling (Suber, 2003). Examples of OA initiatives include OpenAIRE (Open Access Infrastructure for Research in Europe) which was a three year project (December 2009 - November 2012) whose goal was to realise and maintain the "Open Access European scholarly communication data infrastructure" (Manghi, Bolikowski, Manola, Schirrwagen, & Smith, 2012: para.12). In Africa, a good example of OA is the SABINET Full Open Access Journal Collection that currently comprises 46 South African journals, which may be searched individually, and provides immediate access to the PDF versions of more than 6 000 full-text articles. New journal titles and issues are added to

the collection on an on-going basis (SABINET, 2013). Other OA initiatives are emerging in other parts of Africa, especially among universities and research institutions, including Kenya, Ethiopia, Nigeria, and Botswana, to name but a few (Ubogu, 2009).

Related to OA collections are Institutional Repositories (IR), which are digital collections capturing and preserving the intellectual output of a single or multi-university community. Usually IRs adopt OA principles which facilitate free and unlimited access to the content (Crow, 2002). They have become one of the fastest growing elements of the digital library genre due to their potential to reform the current system of scholarly communication and their role in advancing the open access movement. As a result, many academic libraries, especially in research universities, have invested human and technical resources to build a robust technical infrastructure that will foster access to the intellectual, cultural, and administrative output of their institutions. The hope is to gain enhanced access to faculty research and increased visibility of research generated within the university (Jantz & Wilson, 2008:187).

OpenDOAR (Directory of Open Access Repositories) lists sixty two OA repositories in Africa. The majority of these repositories (24 of them) are in South Africa and most are owned by universities, while some are even owned by departments within the universities, such as the UCT Computer Science Research Document Archive and the UCT Lawspace. Comparatively, Kenya has eleven operational repositories, out of which six are run by universities in Kenya (OpenDOAR, 2014).

The benefits of sound scholarly content management cannot be over-emphasised. One of the greatest benefits of a sound scholarly content management regime is the lowering of the cost of access to information. Escalating prices of traditional print and electronic journal prices and unfriendly market models have increasingly meant that institutions must explore more sustainable strategies in their structure of scholarly communication (Crow, 2002:5).

OA and IR are expected to cut costs and provide opportunity for long-term preservation of scholarly works for participating institutions. With traditional journal publication methods it is not uncommon for an institution to have to pay for an article twice as they first pay scholars to produce the work and then the institution's library pays to purchase (or licence) the work back from the journal publisher (Corrado, 2005). In Africa, OA and IR are expected to be especially beneficial since most of the journals to which institutions would subscribe are foreign journals that are exceedingly expensive to acquire. The licencing regime is punitive

since the subscribing institution only gets the licence to use the journals for some time but not to own them (Suber 2003). Furthermore, according to Crow (2002:4) IRs "have the potential to serve as tangible indicators of a university's quality and to demonstrate the scientific, societal, and economic relevance of its research activities, thus increasing the institution's visibility, status, and public value".

Increasingly Google Scholar and ResearchGate are being used to assist users to retrieve scholarly literature on the Web. Specifically, Google Scholar covers almost all types of scholarly publications available on the web including full-text papers from conferences and scholarly journals, citations, presentations and technical reports (Jamali & Asadi, 2010). Using its '*cited by'* feature, Google Scholar enables users to locate potentially relevant articles in a given topic by identifying subsequent articles that cite a previously published article (Noruzi, 2005). Additionally, Google Scholar automatically extracts and analyses citations and presents them as separate results, even if the documents they refer to are not available on the Web. This way, it analyses the popularity of a document accordint to the number of times it has been cited by other documents and displays the retrieved results showing the most-cited references first (Noruzi, 2005). On the other hand, ResearchGate is a rapidly growing social networking site that allows scientists to answer each other's questions, share papers and find collaborators (Lin, 2012). ResearchGate is restricted to working scientists who register via institutional e-mail addresses. The site increases visibility of research and citations of scientists' publications making it a useful tool for researchers and scholars in general to use in accessing their colleagues' research output.

1.1.2 University Environment in Kenya

Universities in Kenya are governed by the Commission for University Education (CUE) that was established in 2012 by an Act of Parliament (Universities Act, No. 42 of 2012) as a successor to the Commission for Higher Education, established in 1985. The mission of the Commission is to regulate and assure quality university education through setting and enforcing rules, standards and guidelines for global competitiveness. Its core functions include among others: promoting the objectives of university education; developing policy for criteria and requirements for admission to universities; advising the Cabinet Secretary on policy relating to university education; promoting, setting standards and assuring relevance in the quality of university education; monitoring and evaluating the state of university education systems in relation to the national development goals; undertaking or cause to be

undertaken, regular inspections, monitoring and evaluation of universities to ensure compliance with set standards and guidelines (Commission for University Education, 2013).

Public and private universities in Kenya are also accredited to other regional and global bodies such as the Inter University Council for East Africa (IUCEA), Association of African Universities (AAU) in the case of Kenyatta University, International Association of Universities, and Commonwealth Association of Universities. Being members of such bodies enables them to benefit from quality assurance checks, standardisation of academic and administrative programs, training, and policy development and implementation support.

1.1.2.1 Public Universities in Kenya

As shown in Table 1.1 below, there are 17 public universities in Kenya. These were established through Acts of Parliament and were not subjected to the accreditation process of the then Commission for Higher Education. Accreditation in Kenya means public acceptance and confirmation evidenced by award of a Charter indicating the institution meets standards of academic excellence set by the Commission. For any institution to be accredited, the Commission must be satisfied that the institution concerned has adequate physical, human, library and financial resources, viable relevant academic programmes and sound structure of governance (Commission for University Education, 2013).

According to the Universities Act (2012), a 'public university' means a university maintained or assisted out of public funds (Government of Kenya, 2012). Table 1.1 below represents public universities in Kenya.

Table 1.1: Public Universities in Kenya

S/No	University	Date of establishment
1.	University of Nairobi	1970
2.	Moi University	1984
3.	Kenyatta University	1985
4.	Egerton University	1987
5.	Jomo Kenyatta University of Agriculture & Technology	1994
6.	Maseno University	2001
7.	Masinde Muliro University of Science & Technology	2007
8.	Great Lakes University of Kisumu	2012
9.	Dedan Kimathi University of Technology	2012
10.	Chuka University	2013
11.	Technical University of Mombasa	2013
12.	Pwani University	2013
13.	Kisii University	2013
14.	University of Eldoret	2013
15.	Maasai Mara University	2013
16	Jaramogi Oginga Odinga University of Science and Technology	2013
17.	Laikipia University	2013

Source: Commission for University Education, 2013

1.1.2.2 Private Universities in Kenya

The Universities Act (2012) defines a 'private university' as one established with funds other than public funds (Government of Kenya, 2012). In Kenya, there are 14 fully accredited private universities shown in Table 1.2 below (Commission for University Education, 2013).

Table 1.2: Private Universities in Kenya

S/No	University	Date of establishment
1.	University of Eastern Africa, Baraton	1991
2.	Catholic University of Eastern Africa	1992
3.	Scott Theological College	1992
4.	Daystar University	1994
5.	United States International University	1999
6.	Africa Nazarene University	2002
7.	Kenya Methodist University	2006
8.	St. Paul's University	2007
9.	Pan Africa Christian University	2008
10.	Strathmore University	2008
11.	Kabarak University	2008
12.	Mount Kenya University	2011
13.	Africa International University	2011
14.	Kenya Highlands Evangelical University	2011

Source: Commission for University Education, 2013

Further, there are eleven universities with Letter of Interim Authority (this authorises the university to set up a governing body, and continue the development of physical facilities and assembly of academic resources): fourteen constituent colleges of public universities: five constituent colleges of private universities: two registered universities and three public university campuses. These universities and constituent colleges are not included in the study since they are either not fully operational as recognised universities or are part of parent institutions and run programmes which in most cases are running in the parent institutions.

1.2 Statement of the Problem

Scholarly communication is considered the essence of science (Garvey, 1979) without which scientific progress cannot be achieved (Barjak, 2006). In terms of contribution to the global scholarly debate, Teferra (2004:159) asserts that Africa lies at the periphery of the knowledge market. Statistics on scientific knowledge production show that the entire African continent contributes approximately 0.13 % of the scholarly publications on the web and international bibliographic databases (Worldmapper, 2006; Ubogu, 2001:250). In Africa, the major centres

of knowledge creation and scholarly communication are universities. However, most African universities have been reeling from problems that reduce their scholarly productivity and visibility. These include diminishing or total lack of research funding, escalating student enrolment, poor emoluments and low salaries for researchers and faculty, brain drain and lack of appropriate resources such as laboratories, equipment, journals and access to online databases (Ondari-Okemwa, 2007).

Kenya often does not perform well in academic global ranking of universities. The 2013 Webometric ranking web of universities for example, revealed that University of Nairobi was ranked as best in Kenya but was positioned 1326th in the world rankings and 10th in Sub-Saharan Africa. Kenyatta University on the other hand is second in Kenya, 17th in Sub-Saharan Africa and ranked 1706th globally. This is in direct contrast to universities in South Africa such as Stellenbosch University (ranked first in Africa and number 400th in the world), University of Cape Town (ranked second in Africa and 456th in the world) and University of Kwazulu-Natal which was ranked fifth in Africa and 686th in the world (Cybermetrics Lab, 2013a). Aguillo, Ortega & Fernandez (2008:234), argue that it is now accepted that web data will continue to be used in evaluating universities and research centres and to this end, lack of web visibility for non-participants (like Kenya) will lead to an academic digital divide.

In spite of several initiatives at global and regional levels to improve visibility of Africa's scholarly content such as theses and dissertations, and other types of scholarly content, most universities in Kenya have failed to actively participate in these initiatives. These initiatives include the Database of African Theses and Dissertations (DATAD) a project of the Association of African Universities based in Ghana (Association of African Universities, 2014); and the local Kenya Information Preservation Society (KIPS) (Ratanya, 2010:17-18). Uptake of other initiatives for scholarly content management such as Open Access and Institutional Repositories is limited to a few institutions such as Strathmore University; Jomo Kenyatta University of Agriculture and Technology; University of Nairobi; Dedan Kimathi University of Technology; and Pwani University (OpenDoar, 2014).

It would seem therefore that the majority of Kenya's scholarly output is not being managed adequately to enhance visibility and access. Thus the majority of scholarly works by Kenyan researchers such as theses and dissertations and other research output completed in

universities in Kenya are not published and therefore remain unread and un-cited both on the continent and internationally.

Scholarly communication is a multi-faceted domain with multiple actors (Thorin, 2003; Western Libraries 2013a). Management of the entire process of scholarly communication right from developing research ideas, conducting the actual research, communicating informally with other scholars and scientists; preparing, shaping and communicating formal research results to colleagues; and the final distribution of the research results in print or electronically determines the quantity and quality of research productivity of scholars and their institutions. In addition, formation and management of institutional research teams and research programmes also contribute to quantity of research outputs and their visibility. Given the low visibility of Kenya's research output, and poor ranking in the global systems, it is evident that the scholarly communication in the various universities has not been effectively managed.

This study was therefore aimed at investigating the strategies used in the management of scholarly content in universities in Kenya with a view to recommending practical and policy actions needed to improve visibility and access to scholarly content.

1.3 Major Research Question

The study is aimed at investigating the question: What strategies are used by universities in Kenya in managing their scholarly content?

1.3.1 Subsidiary Research Questions

This study will address the following subsidiary research questions:

1. What kinds of scholarly content are generated in universities in Kenya?
2. How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use?
3. How do Kenyan scholars communicate amongst themselves in the various stages of their research work?
4. To what extent do Kenyan scholars participate in local and/or international professional social networks?

5. To what extent do existing institutional facilities in the universities support scholars' research and communication needs?

1.4 Significance of the Study

This study makes a contribution in bridging the gaps in literature by providing empirical evidence about scholarly content management among scholars in an African setting. The study also contributes to practice by creating awareness among scholars by bringing to their attention modes of self-archiving of scholarly content, modern avenues for scholarly communication, and digital data curation. The findings from this study are expected to help inform the formulation of institutional and national policies on scholarly management practices to improve the visibility of African scholarship. A more substantive exposition of the contribution of this study is provided in Chapter Seven (Summary, conclusions and recommendations).

1.5 Scope and Limitations of the Study

The study focussed on the management of scholarly content in universities in Kenya. The study covered scholarly communication processes such as developing research ideas and conducting research, communicating formally and informally with other scholars and scientists; involvement of scholars in research teams; preparing, shaping and communicating formal research results; and the ultimate process of distributing the formal product in print or electronically. The respondents included academics, postgraduate students, librarians and research officers in public and private universities in Kenya.

Six universities were selected for the study namely: the University of Nairobi, Kenyatta University, Maseno University, Jomo Kenyatta University of Agriculture & Technology, Strathmore University and Egerton University. All these universities are publicly funded except for Strathmore University which is privately funded. The universities involved in the study were selected based on their 2013 Webometric ranking. Only top ranked universities in Kenya were selected. The assumption made in selecting these universities is that since these are the top ranked universities in Kenya that met the criteria for quality and quantity of research output stipulated by the Webometric ranking, they can serve as the best practice model for other lower-ranked or non-ranked universities in the country.

The study was constrained by among other things, limited literature on the subject of scholarly communication in Kenya. Thus a lot of time and effort was expended looking for information from various sources namely electronic journals, online magazines, conference papers, electronic theses among others. The study was also limited in terms of theories and models that would support it. This was attributed to the fact that scholarly communication is a multi-disciplinary subject and has not developed any theories of its own. Thus theories had to be borrowed from other disciplines in social science to buttress the study. While conducting the study, the researcher also faced challenges with collecting data especially from academics who were busy and postgraduate students whose academic schedules meant that in some cases they had to be traced outside their normal study stations or after normal working hours. However, the researcher utilised research assistants drawn from the individual universities who were well versed with the academic programs and in some cases were known to the academic staff and could therefore follow them up to provide the information required.

1.6 Preliminary Literature Review

In the recent past access to scholarly content and scholarly communication has been widely discussed in academic circles. Notable studies have centred on the accessibility to scholarly content via the internet and use of the new models such as OA, IR, communication via the internet and emergent technologies such as Web 2.0. For example, Pelizzari (2004) focussed on authors' attitudes towards electronic publications, knowledge of OA initiatives, use or non-use of OA archives by the academic community and willingness to participate in an Institutional OA archive project. Swan & Brown (2005) carried out a worldwide survey of 1296 authors focusing on their knowledge of and attitudes to self-archiving. Tabasum & Jan (2011) explored the vision, experiences and opinions about publishing in scholarly communication, of scholars at Kashmir University while Maron & Smith (2008) assessed the current models of digital scholarly communication in the United States of America (USA) and Canada. This study relied on both primary and secondary information sources. Primary sources included conference proceedings, reports, theses, unpublished manuscripts, and government publications. Secondary sources included journals, books, magazines and newspapers. Both primary and secondary literatures were sourced with the help of search tools such as online databases, indexes, encyclopaedias and bibliographies (Saunders, Lewis & Thornhill, 2012).

The literature was searched to locate empirical and conceptual studies in the broader issues surrounding the subject of scholarly communication and specifically to help address the research questions of the study. The study reviewed literature on various topics including types of scholarly content, scholarly content generation, acquisition, and use; scholarly conversation and communication; researcher behaviour; scholarly social networks and collaborative research; open access to scholarly communication; academic ranking of universities; knowledge management processes in a university setting; curation, archiving and preservation of scholarly content; and institutional support for communication and research needs of scholars. Focus on these themes was based on research questions, theoretical framework and the broader issues of the research problem.

The literature reviewed studies conducted in various geographical areas of the world including Europe, North America, Asia, Australia and Africa. The study attempted to understand the various methodologies used in these studies, peculiar characteristics of the respondents, outcomes and recommendations of these studies so as to inform the current study.

The review of the literature revealed several gaps. For example, there are limited empirical studies on the scholarly communication process in African universities. Most of the studies in the literature focus on developed countries in Europe and America with a few on developing countries. Furthermore, some of the studies reviewed, despite having a global focus, relied on sources of information about the scholarly communication process in the countries surveyed that excluded majority of African respondents (for example authors who have published in ISI-range of journals). They also required respondents to participate through electronic channels which were out of the reach of most African scholars. For example, some of the studies relied on online questionnaires, or sourced participants from mailing lists of listservs where African scholars were least likely to be participants. Furthermore, the scope of the studies was mostly on singular aspects of communicating the final product of their research to their colleagues, or communicating with their colleagues in the course of their research. This study makes a contribution in bridging these gaps by providing empirical evidence of a wider scope of knowledge, practice and opinions about scholarly communication process among scholars in an African setting. This study endeavoured to capture the scholars' experiences in developing their research ideas, conducting research, communicating with other scholars; their involvement in research teams; and distributing their research findings.

The substantive literature review of the study is presented in Chapter Three of this thesis (Literature review).

1.7 Theoretical Lens of the Study

The study was guided by the Conversation Theory, the Social Network theory, and the Knowledge Management Process Model as the theoretical lenses. No single theoretical lens was found suitable because of the interdisciplinary nature of the subject of managing scholarly content.

1.7.1 The Conversation Theory

This theory was advanced by Gordon Pask in 1976 and is aimed at explaining cognition and how people learn. The core of the theory is that people learn and create knowledge through conversation. Different actors in diverse communities establish meaning, seek agreement and thus create knowledge (Lankes, Silverstein & Nicholson, 2007:18). Moreover, the theory posits that conversation is central to exchanging information, making our positions known and persuading and motivating others (Klemm, 2002:1). The scholarly output of conversation are books, journal articles, videos, presentations and other information products that document, expand or keep the conversation going (Deitering 2011:168, 170; Pask in Lankes et al., 2007). The researcher used this theory as a lens to explore scholarly communication and how researchers interact with each other through different channels to create new knowledge.

This theory informs the understanding of the nature and importance of conversations and communication occurring in the scholarly communities and is important in formulating recommendations on how scholarly conversations can be facilitated, maintained and improved in the face of emergent digital technologies.

1.7.2 Social Network Theory

The pioneers of social network analysis came from sociology and social psychology in the early 1930s and 1960s (Hatala, 2006: 48; Freeman, 1978/79:215; Granovetter, 1973:1362). According to Wasserman & Faust (1994), the first use of the term "social network" is attributed to Barnes in 1954. Kadushin (2004:3) describes as a network of objects (nodes) and a description of the relations between them. In social theory, these nodes represent people

who could form different kinds of networks: ego-centric; socio-centric; and open-systems. The theory emphasises the importance of relationships among interacting social groups. Scientific collaboration networks are an example of social networks. Newman (2001:404-405) observes that the development of scientific communities relies heavily on principles of social networking i.e. such communities will grow where a higher than average number of people know one another.

The social network theory was useful to this study as it was used as a lens to explore scientific social networks and collaborations that exist in the universities. These networks were also evaluated in terms of their contributions to the scholarly communication processes and productivity of scholars in the universities in Kenya.

1.7.3 The Knowledge Management Process Model

This model was formulated by Botha, Kourie & Snyman (2008) and comprises three knowledge processes that facilitate use of knowledge. These are knowledge creation and sensing; knowledge sharing and dissemination; and knowledge organisation. The essence of knowledge management is that once knowledge is created through various organisational processes, it should be systematically leveraged for it to be useful to the stakeholders. Proper management of knowledge improves efficiency, responsiveness, competency and innovation among its users. The purpose of this theory was therefore to facilitate exploration of the management of the scholarly content that results from scholarly conversations and social interactions among scholars.

Table 1.3 below summarises how each research question maps onto key variables of the models/theories discussed.

Table 1.3: Mapping of Research Questions to Key Variables of the Theories/Models

	Research Question	**Theory/Model**	**Key variables from the theory/model**
1.	What kinds of scholarly content are generated and used in universities in Kenya?	i) Conversation Theory	Conversation (written, oral, digital, public, private conversations)
		ii) KM Process Model	Knowledge creation and sensing
2.	How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use?	i) KM Process Model	Knowledge capture, organisation, transformation, use, long-term care
3.	How do Kenyan scholars communicate amongst themselves in the various stages of their research work?	i) Conversation Theory	Scholarly communication, social scholars
		ii) KM Process Model	Repositories
		iii) Social Network Theory	Relationships, professional linkages, formal/informal communication
4.	To what extent do Kenyan scholars participate in local and/or international professional social networks?	Social Network	Scientific collaboration, scientific community, social relations, loosely structured networks
5.	To what extent do existing institutional facilities in the universities support scholars' research and communication needs?	i) Conversation Theory	Scholarly conversations
		ii) KM Process Model	Repositories, visibility
		iii) Social Network Theory	Scholarly collaborations, scholarly community, invisible colleges

A detailed discussion of the theoretical framework is provided in Chapter Two (Theoretical Framework) of this thesis.

1.8 Methods

The study is based on the postpositivism paradigm which combines quantitative and qualitative approaches (Edmonds & Kennedy, 2013:146). The study employed the multiple

case study design where selected universities were explored in-depth and in real-time (Creswell, 2003:15). Within the case study a survey research design was applied utilising questionnaires to collect data from academic staff and students (Masters and PhD). Postgraduate diploma students were excluded because they are less involved in research.

Out of the 31 universities in Kenya, six universities were purposively selected. The criterion for selecting universities involved in the study was top ranked universities in Kenya according to the 2013 Webometrics Ranking of World Universities (Cybermetrics Lab, 2013a).

Sampling was guided by the table for determining sample size in Saunders et al. (2012:266) based on 5% error margin. Convenience sampling was used to select members of the academic staff and graduate students from each university who would participate in the study, and sample sizes were calculated based on the population of each university. Academic staff and postgraduate students were considered pertinent to this study since they are the main actors in creating and consuming scholarly content. Purposive sampling was used to obtain information from the population of librarians who were the University Librarians for the universities while the research office populations were the representatives of Research Departments for the universities. These were considered key informants for this study since they are directly involved with facilitating and managing research and scholarly communication at the different universities.

Self-administered questionnaires (Appendices 1 and 2) and interviews (Appendices 3 and 4) were used to collect data. The questionnaires collected quantitative data relating to types of scholarly content generated by academic staff and students, numbers of publications output by these groups, and levels of knowledge on aspects of content management such as data curation and institutional repositories. The questionnaires were adapted from questionnaires used in related studies. Cronbach's Alpha was calculated for individual questions in the questionnaire to determine their internal validity. Personal interviews were used to collect qualitative data from the University Librarians and the research office representatives. The data collection instruments were piloted to verify their usefulness and performance in the actual data collection.

Data from interviews were analysed qualitatively using derived themes and presented thematically. Data from the questionnaires were analysed using IBM SPSS Statistics software

to generate descriptive and inferential statistics. This data was then presented using tables, graphs and charts. Gephi Social Network Analysis software was used to generate and analyse the social networks that exist among scholars in universities in Kenya.

Ethical clearance was sought from the University of KwaZulu-Natal while informed consent was obtained from all the participants in the study. The respondents were required to sign a participation declaration indicating that they understood the nature of the research and were willing to participate in it. Respondents were free to withdraw from the study at any time if they wished. The reporting of results ensured no individuals were mentioned by name. Permission was sought from the National Council for Science and Technology in Kenya to carry out the study in the six universities in Kenya.

1.9 Dissertation Outline

Chapter One: Introduction

This chapter describes the general context of the study, introducing the concept of scholarly communication and scholarly content management in the global and African settings. It provides information on the background to the problem area, statement of the problem, defines the research question, explains why the topic is important, describes the limitations/delimitations of the study, and contributions to be made by the research.

Chapter Two: Theoretical Framework

This chapter presents the theories and models that guide the study. These theories include the Conversation Theory, the Social Network theory, and the Knowledge Management Process Model.

Chapter Three: Literature Review

This chapter contextualises the study within existing literature i.e. within the areas of scholarly communication and content management. The chapter describes related empirical and theoretical studies along with their key findings that inform the current study. Gap analysis in the literature is provided.

Chapter Four: Research Methodology

This chapter addresses the research paradigm, research approaches, research designs, population of the study, sampling procedure, instrumentation data collection, validity and reliability, data analysis and ethical considerations.

Chapter Five: Research Findings

This chapter presents the results of the study. It describes the results from interviews and questionnaires and presents these using narrative and graphical reporting techniques.

Chapter Six: Discussion of Research Findings

Interpretation and discussion of the research findings from Chapter Five is provided using research questions as the framework for discussing the findings. The originality of the study is adduced.

Chapter Seven: Summary, Conclusions and Recommendations

This chapter summarises the findings and their implications for theory, practice and society. Recommendations and suggestions for further research are provided.

1.10 Summary

This chapter described the general background of the study and introduced the concepts of scholarly communication and scholarly content management in the global and African settings. It also provided the statement of the problem, the research questions, significant of the study, delimitations of the study. The chapter also provided indicative empirical and theoretical literature, theoretical lenses, and methods. The ethical considerations were provided as well.

CHAPTER TWO

THEORETICAL FRAMEWORK

2.1 Introduction

A theoretical framework can be thought of as a map or travel plan to guide the research study in its quest to develop new knowledge that will contribute to practice (Sinclair, 2007). Khan (in Ocholla & Le Roux, 2011) points out that the theoretical framework of a study is the lens the researcher uses to examine a particular aspect of the subject field and thus it explains the rationale, justification or basis of the study. Further, the theoretical framework must demonstrate an understanding of theories and concepts relevant to the study. It thus permits the researcher to move from simply describing phenomena to generalizing about their various aspects within a given scope defined by specific variables (of the theory) (USC LibGuides, 2013).

Kerlinger, in Creswell (2009) defines a theory as a set of interrelated constructs (variables), definitions, and propositions that present a systematic view of phenomena by specifying relations among variables, with the purpose of explaining natural phenomena. Creswell elaborates that theories develop when researchers test a prediction about the relationship between the variables over and over in different settings and with different populations.

The aim of this study was to examine the strategies used by universities in Kenya in managing scholarly content. The study addressed various research questions namely: what kinds of scholarly content are generated and used in universities in Kenya? How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use? How do Kenyan scholars communicate amongst themselves in the various stages of their research work? To what extent do Kenyan scholars participate in local and/or international professional social networks? To what extent do existing institutional facilities in the universities support scholars' research and communication needs?

The study was concerned with both the scholarly communication process and management of the content resulting therefrom. Thus the study was underpinned by the Conversation Theory, the Social Network Theory, and by the Knowledge Management Process Model. The subject of scholarly content management is multidisciplinary in nature, encompassing various aspects in the scholarly communication process as well as issues in the management of scholarly

output to facilitate easy access and reuse of content. The issues at hand include creation, curation, and dissemination of the scholarly content. Moreover, scholarly content management is an emerging discipline that has not yet developed its own theoretical framework. The USC LibGuides (2013) asserts that building theoretical frameworks based on the postulates and hypotheses developed in other disciplinary contexts can be both enlightening and an effective way to fully engage with the research topic.

2.2 The Conversation Theory

The Conversation Theory was formulated by Gordon Pask in 1976. It came as a result of studies to explain cognitive techniques in learning and teaching (Pask, 1976). Pask argues that the basic unit of psychological or educational observation is a conversation whose main features are that: the participants by consent play by the rules of the conversational language; the conversation is anchored upon a conversational domain which involves an epistemological commitment; and each topic in the conversation is understood.

Scott (2001:344-345) opines that the Conversation Theory may also be interpreted as a model of communication amongst scientists, where theories are exchanged and evaluated. Between these scholars, 'why' and 'how' questions and responses as well as demonstrations, models and problem solutions abound in their interactions. The Conversation Theory therefore provides an elaborated set of concepts and models that can inform effective "doing" of science, i.e. it comments on all the social and reflective processes that constitute what scientists engage in doing science. Elbow (1995) postulates that intellectual life is an unending conversation where academics carry on an unending conversation not just with colleagues, but with the dead and unborn. As Lankes, Silverstein & Nicholson (2007:18) state, conversation creates knowledge. Thus for scientists, the conversation occurs in a given subject domain and within a specific theoretical framework. Participants in the conversation manipulate content within this context to make meaning for themselves. Concurrently, they check with their peers engaged in corresponding operations to see that they produce the same results or create new knowledge.

Pask proposed a new concept of communication whereby communication is not just the exchange of messages through an inert and transparent medium, but involves program sharing and linguistic interaction within a pervasive computational medium in which mind-endowed individuals (people and intelligent systems) converse (Sharples, n.d:2-3). The

fundamental idea of conversational theory is that humans are dynamic self-organising systems with a need to learn and that learning is mediated by external and internal conversations about a topic or subject matter (Cong & Scott, 2008:377).

The Conversation Theory focuses on the actors in a conversation and the linkages or relationships between them. Conversations happen between scholars and researchers either inter or intra domain. These conversations and related processes need to be facilitated; this is the only way for new knowledge and new insights to be born, as well as opening up scholarly content for access by scholars, researchers and other stakeholders on the global arena. Batts, Anthis & Smith (2008:1837) affirm that scientific discovery occurs in the lab one experiment at a time, but science itself moves forward based on a series of on-going conversations. Conversation Theory has contributed tremendously to modern understanding of human learning and teaching, as well as research. The theory is directed at the way exchange of information and creation of new knowledge takes place and is also concerned with creating an appropriate environment for this. According to Kleine, in McMillen & Hill (2004), the impetus for research is generated from the discourse among colleagues. Discussion then serves as the means to discover gaps in the community's knowledge that need to be addressed and subsequent researching/writing is seen not just as a communication process but also as a learning process. As Navarro (2001:777) acknowledges, the Conversation Theory is very illuminating for anyone trying to understand how agreements, consensus, new concepts, norms and common assumptions emerge in the course of social exchanges of a conversational kind.

As the Conversation Theory postulates, all undertakings in this environment are based on how well participants are able to converse and share their knowledge and experiences especially with regard to creation of new knowledge via research. Stylianou (2012) argues that within science lies the art of communication. Transparency and openness are science's most cherished virtues. Hypotheses are formed which are either accepted or rejected based on arguments and counter arguments. As a result, openness (in conversation) leads to public knowledge.

2.2.1 Suitability of Conversation Theory to the Research Problem

The variables of the Conversation Theory are: the conversation, the participants/peers in the conversation, the subject domain (either intra or inter disciplinary), and the connections or

relationships between them. As has been explained previously, the theory demonstrates a typical conversation between two peers exchanging ideas, discussing theories and defending their positions on various issues. All this happens within a certain subject domain which could be intra or inter disciplinary. The participants in the conversation are linked by the various queries and explanations that flow between them.

The conversation theory presents 'conversation' as the main variable. Of concern here is "what are the peers conversing about?" and "how are they conversing?" This can be addressed in terms of the types of subject-specific content generated and circulated among the peers, who in this case are the scholars. According to Scott (2001:352), these scholars are 'exchanging, justifying and demonstrating theories and their associated models and procedures' within various subject domains. Within this scholarly context, different dynamics come into play to define the conversation between peers within similar or diverse subject domains. Most important is the format of conversation. Conversation can either be written or oral, presented in digital or traditional formats, presented in public or in private and as formal or informal communication. Klemm (2002) observes that written forms of conversation have special value as opposed to oral forms as both author (s) and reader(s) engage more vigorously with the content. Additionally, written conversation can be archived and filed in searchable databases. Academic writers and researchers converse through books, articles and presentations on various topics. This way, they contribute to the ongoing scholarly conversations (Deitering, 2011:168, 185) by way of exchanging and evaluating theoretical concepts in the various subject domains. According to Hyland (2011) textbooks, essays, conference presentations, dissertations, lectures and research articles are central to the academic enterprise and are the very stuff of education and knowledge creation. Hyland acknowledges that discourse is at the heart of the academic enterprise and is the way individuals collaborate and compete with others to create knowledge, educate neophytes, reveal learning and define academic allegiances. Furthermore, no new discovery, insight, invention or understanding has any significance until it is made available to others and no university or individual will receive credit for it until it has seen the light of day through publication.

Despite the importance of written communication in science as documentation and an archive of work carried out, and of scientific conferences as a broadcast medium for summary results, the majority of scientific communication still takes place by private conversation. Through

such conversations, members of scientific communities are able to share news of important discoveries and carry out other scientific exchanges (Newman, 2001:407). Kling & Covi (1995) state that through collegial conversation, conference presentations, attending invited seminars, acting as journal editors and reviewers, and receiving manuscript drafts or preprints from close colleagues, scholars often learn about new studies and results in their immediate areas well before they are published. Active scholars are usually well positioned in these (primarily) verbal networks.

The nature of conversation is also another dynamic that defines conversation amongst scholars especially in the modern age. The nature of modern communication has been drastically impacted by technological innovations and scholarly practice has not been left behind. The use of technology in scholarship today includes the use of bibliographic management software, data analysis tools, and transcription services to aid efficiency; publications in online journals, self-archiving in personal or institutional websites (Veletsianos & Kimmons, 2012:767); and the use of web logs to share instructional material and network with various audiences (Martindale & Wiley, 2005). Adoption of these technologies has led to descriptions of scholars variously as "digital scholars", "social scholars", and "open scholars" (Veletsianos & Kimmons, 2012:767). Cohen in Veletsianos & Kimmons (2012) states that this modern technology-enabled scholarship is characterised by openness, conversation, collaboration, access, sharing and transparent revision. Although it is generally accepted that scholars have always shared their work with colleagues through avenues such as face-to-face, via correspondence, over the telephone, and through conferences; and that disciplines have always had open (and less open) scholars, modern scholars need to consider how their needs and values are supported by new technologies and participatory practices (Veletsianos & Kimmons, 2012:767).

The Conversation Theory was found to be suited to this study as it addressed key issues emerging in the management of scholarly content generated by the conversation amongst Kenya's scholars and researchers. These issues include communicating with colleagues while conducting research, preparing and communicating formal research results and the ultimate distribution of research findings in form of written or oral scholarly conversations as described by Deitering (2011:168, 185). Specifically, the Conversation Theory helped to address the following research questions: "*What kinds of scholarly content are generated and used in universities in Kenya?"; "How do Kenyan scholars communicate amongst*

themselves in the various stages of their research work?"; "To what extent do Kenyan scholars participate in local and/or international professional social networks?" and *"To what extent do existing institutional facilities in the universities support scholars' research and communication needs?"*

In the Kenyan scholarly communication context, there seems to be a breakdown in these processes resulting in much of the research output and scholarly content being unavailable to the society that needs it. As has been highlighted elsewhere, less than 1% of African research work is covered in international bibliographic databases (Ubogu, 2001). Additionally, few universities in Africa are ranked highly in global university ranking schemes, whose main criteria is visibility of research output, mainly because they are invisible on the web. Kenya as a country is a victim of this.

Various studies have used the Conversation Theory. Examples include the study by Kwanya (2011) who studied the potential of Library 2.0 for research libraries in Kenya. Library 2.0 is a change in the interaction between users and libraries in a new culture of participation catalysed by social web technologies (also known as Web 2.0). These technologies foster, among other outcomes, interaction, participation, collaboration and sharing (Holmberg, Huvila, Kronqvist-Berg & Widen-Wulff, 2009). In the study by Kwanya (2011), the Conversation Theory was relevant in understanding the nature of conversations in the research libraries which are in the business of conversation. The study recommended various ways of stimulating, maintaining and facilitating these conversations through the Library 2.0 model so as to make the library services more user-centric and participatory.

Lankes et al. (2007) published a technology brief, the goal of which was to familiarise library decision-makers with the opportunities and challenges of participatory networks. Based on the Conversation Theory, the key thought in the brief is that knowledge is created through conversation and libraries are in the knowledge business. Lankes et al. argue that the best knowledge comes from an optimal information environment, one in which the most diverse and complete information is available to the conversant(s). Web 2.0, social networking, Library 2.0 and participatory networks provide such an environment which is characterised by among others, user-created content, unique sharing of content, unique communication and collaboration, more user control over information, and the 'wisdom of crowds' based on the collective intelligence of group members (Lai & Turban, 2008).

Pangaro (1987) used the Conversation Theory to support his study on man-machine interactions. The theory was used to model conversations and interactions between one or more authors in a man-machine environment. Pangaro developed a system that would facilitate sharing of meanings in the different topics by different authors. Mechanisms within the system aid the user in reaching agreement with others' (as well as one's own) elicited knowledge structures.

However, the Conversation Theory does not go further to evaluate the social and professional nature of the relationships between the parties to a conversation and does not address questions such as "how are these relationships formed in the first place?" and "what else do communicating peers have in common other than 'how/why' questions?" Navarro (2001) contends that in real life, we converse with further intentions and specific interests beyond the subject and circumstances of a particular conversation. Developed in an experimental environment, Conversation Theory overlooks that complex intentional and pragmatic context surrounding real conversations. Further, conversations amongst peers are dynamic and unique in that there are likely to be more than two peers in the conversation. How are connections with the other peers initiated and sustained? What roles do subsequent participants play? How do subsequent conversations affect the initial conversation? What is the motivation for these conversations? For scholarly communication, the nature and dynamism of the connections between parties in a conversation are important as they determine the success of the initial intent to get clarification from the other party or create new knowledge. These gaps are addressed using the Social Network Theory.

2.3 The Social Network Theory

The pioneers of social network analysis came from sociology and social psychology and include Moreno, Cartwright, Newcomb, and Bavelas. Other theorists came from anthropology, among them Barnes, Mitchell and Bott (Wasserman & Faust, 1994; Freeman & Wellman, 1995). These researchers explored patterns of interpersonal relations between members of diverse social groups ranging from families to entire communities and societies (Crossley, Prell & Scott, 2009; Hatala, 2006:48; Freeman & Wellman, 1995:15; Freeman, 1978/79:215; Granovetter, 1973:1362; National Taiwan University, n.d:10).

According to Kadushin (2004:3), a network is a set of relationships depicted by a set of objects (nodes) and a mapping or description of the relations between them. The simplest network contains two objects, 1 and 2, and one relationship that links them (see Fig. 2.1a).

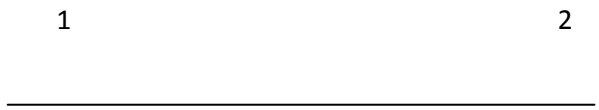


Figure 2.1a: A simple relationship

Source: Kadushin, 2004:1

In a network diagram, the nodes are represented by points while directional arrows show the relationships between the points (see Fig. 2.1b).

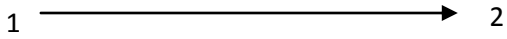


Figure 2.1b: Directed relationship

Source: Kadushin, 2004:2

Other concepts fundamental to the discussion of social networks include the *dyad* which is the basic unit of analysis and consists of a pair of actors (nodes) and the (possible) tie(s) between them; the *triad* which is a subset of three actors and the (possible) tie(s) among them; the *subgroup* which is any subset of actors and all ties among them; the *group* which is the collection of all actors (in a more or less bounded set) on which ties are to be measured; the *relation* which is the collection of ties of a specific kind among members of a group; and the *social network* itself which consists of a finite set or sets of actors and the relation or relations defined on them (Wasserman & Faust, 1994:17-20).

A social network is made up of nodes (which are generally individuals or organisations) that are tied by one or more specific types of interdependency, such as values, visions, ideas, financial exchange, friendship, kinship, dislike, conflict or trade. The resulting structures are often very complex (Cahill, 2009). Networks which comprise only one type of node are homogeneous, if not, they are heterogeneous (Coulon, 2005). The diagrams below (figure 2.2 and 2.3) illustrate social networks.

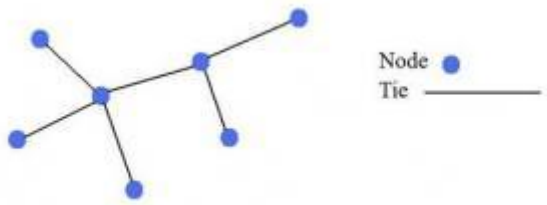


Figure 2.2: Social Network Diagram

Source: Cahill, 2009

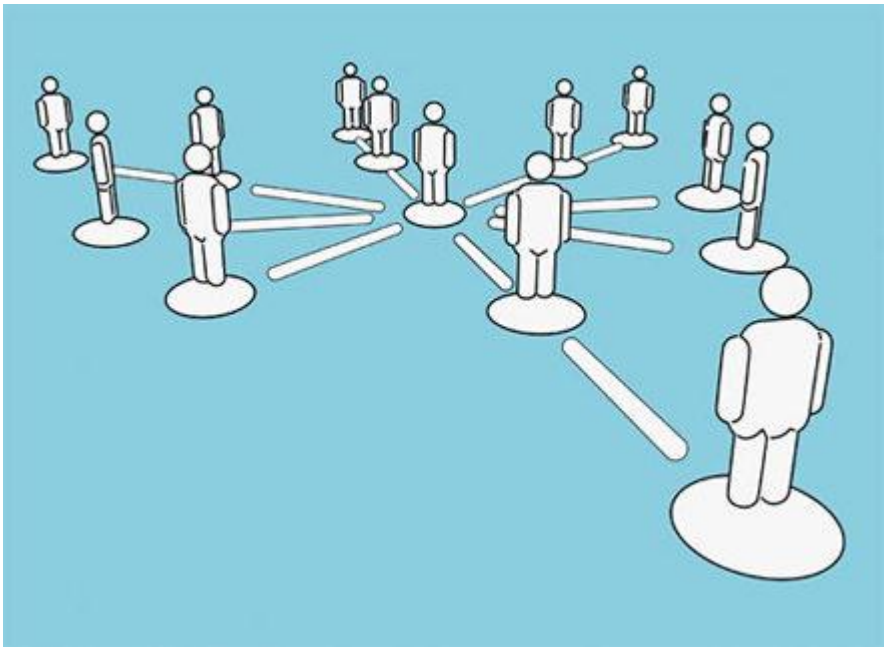


Figure 2.3: A social network

Source: King, 2006

Kadushin observes that social scientists have investigated three kinds of networks: ego-centric (those networks that are connected with a single node or individual, for example, a person's friends or all the companies doing business with an organisation); socio-centric (networks in a closed system e.g. between workers in an organization or children in a classroom); and open-system networks (networks where the boundaries are unclear e.g. the elite in a country or connections between corporations). When they succeed, social networks influence larger social processes by accessing human, social, natural, physical, and financial capital, as well as the information and knowledge content of these (Serrat, 2009:1).

The Social Network Theory seeks to visualise, among other things, the channels through which information flows from one person to another and through which one individual could influence another (Scott, 2000). Social network analysis (SNA) is a set of procedures and strategies for investigating when, why and how social networks perform. SNA prioritises the structure of the relationships between the nodes and the individual properties of the nodes are only secondary (Serrat, 2009:1-2; Otte & Rousseau, 2002:441-442). Social network analysis views social relationships in terms of nodes and ties, as basic building blocks. Nodes are the individual actors within the networks, and ties are the relationships between the actors (Cahill, 2009).

Katz, Lazer, Arrow, & Contractor (2004:308) indicate that network researchers have examined a broad range of types of ties between nodes. These include communication ties (such as who talks to whom, or who gives information or advice to whom), formal ties (such as who reports to whom), affective ties (such as who likes whom, or who trusts whom), material or work flow ties (such as who gives money or other resources to whom), proximity ties (who is spatially or electronically close to whom), and cognitive ties (such as who knows who knows whom). This study focussed on communication ties between both scholars and researchers and examined the extent to which they talk to each other, share information and professional insights.

In a social network, every node is not tied to every other node; this results in clusters where many actors (nodes) are tied to each other and the clusters are in turn connected to other clusters via bridges (Williams & Durrance, 2008). The relational ties between nodes are channels for the flow of resources that can be material or non-material (Wasserman & Faust 1994:4). The resources might include social support, emotional support, companionship, time, information, expertise, money, business transactions, and shared activity. Since a resource flow generally attenuates as it travels from node to node, an actor's position—as a bridge, or near a bridge, at the edge of a cluster or at the centre of a cluster, influences his or her access to resources (Williams & Durrance, 2008).

In Social Network Theory, an important concept is that of strong ties and weak ties. Strong ties connect groups of individuals already sharing similar interests thus enable them to share common information whereas weak ties bridge dissimilar groups and are therefore a source of new knowledge (Granovetter, 1973). Research has shown that strong ties are required for

knowledge creation and sharing (McFadyen, Semadeni, & Cannella, 2009; Dyer & Nobeoka, 1998).

The Social Network Theory is made up of two key elements, the nodes and the links between them. In a social network, the objects under observation are not individuals and their attributes, but the relationships between individuals and their structure. The advantage of such a representation is that it permits the analysis of social processes as a product of the relationships among social entities (Martino & Spoto, 2006:54). The Social Network Theory applies to a variety of levels of analysis from small groups to entire global systems (Kadushin, 2004) making it amenable to analysis and application to various social situations. Network analysis allows one to have a bird's eye-view of the goings on in a social network.

In research and scholarly work, social networks in the form of collaboration between scholars and researchers are on the rise. As science has expanded in the late 20th and into the 21st centuries, it has become increasingly interconnected. Today, less than 26% of papers are the product of one institution alone, and over a third have multiple nationalities sharing authorship. Collaboration enhances the impact of research and brings together diverse experience, funding and expertise to bear on a large range of research questions (The Royal Society, 2011). Participation in research networks and collaborations provide timely access to knowledge and resources that are otherwise unavailable, while also testing internal expertise and learning capabilities (Powell, Koput, & Smith-Doerr, 1996:119). Collaboration frequently emerges from, and is perpetuated through social networks (Sonnenwald, 2007:655). Studies have shown a positive relationship between collaborations and research productivity (Woo, Kang & Martin, 2013; Olmeda-Gomez, Perianes-Rodriguez, Ovalle-Perandones, Guerrero-Bote, & Anegon, 2009; Barjak & Robinson, 2007).

In scientific research communities, the creation of scientific knowledge is a socially embedded process that thrives on the critical analysis and review of members of the community who provide the background, norms, methods, audience, values, and forums for inquiry (Tuire & Erno, 2001:494). Tuire & Erno further observe that scientific research is carried out through both formal and informal means. Informal communication allows theories, ideas, procedures, and methods to be socially evaluated before the formal publication process. Moreover, Tuire & Erno argue that other people are the most important resource in scientific knowledge building. This is because the passing on of skills and knowledge to novices via scientific training and the need of scientists to be aware of their

colleagues' research findings are examples of the important activities of researchers which are social in nature. For research to contribute to solving major social, environmental and technical problems, collaborations across disciplines and between researchers and practitioners are essential (Bammer, 2008:875). Belcher (2009a:6-7) also postulates that successful academic writers make their writing social. Belcher argues that by working in teams where each researcher makes a contribution, scholars are more productive, a trend that is more common in the sciences than in the humanities. According to Belcher, the best writing is created in communities with a strong sense of audience.

2.3.1 Suitability of Social Network Theory to the Research Problem

The Social Network Theory was considered suitable for this study as it addresses the nature of scholarship with respect to networks and collaborations. The theory addressed the research questions "*How do Kenyan scholars communicate amongst themselves in the various stages of their research work?"* and *"To what extent do Kenyan scholars participate in local and/or international professional social networks?"* and *"To what extent do existing institutional facilities in the universities support scholars' research and communication needs?"* To this end, the theory guided investigation into the mechanisms of communication that link Kenyan scholars in their quest to share information or consult with their peers in their research endeavors. The study was interested in finding out whether Kenyan scholars are networked amongst themselves and with peers in other local and international institutions. The theory facilitated investigation into the kind and extent of networks that Kenyan scholars involve themselves in or participate in. Additionally, the study investigated the support available in universities for researchers to collaborate and communicate with their peers locally and globally.

Given the dynamics of social networks and the benefits therein, the theory guided the study to analyse and evaluate the workings, successes and challenges of networks (if any) within the Kenyan scholarly community. The theory facilitated an analysis of the kind of ties that bind scholars and researchers with an examination of the resources flowing between them. Additionally, the study analysed the extent of networks amongst Kenyan scholars with respect to disciplinary and interdisciplinary and geographical coverage of these networks. Further, the theory helped to uncover possible opportunities that scholars could be beneficiaries of as a result of participation in research networks.

In the scholarly environment, the Social Network Theory focuses on the network and subsequent links built after the first dyad, i.e. after the initial contact between two peers. Subsequent linkages with other scholars expand the connection creating triads, groups and eventually disciplinary and interdisciplinary networks of scholars. Thus after the first conversation with an academic peer to seek clarification or create new knowledge, these activities are eventually expanded in subsequent conversations to include a wider social network of researchers interested in a given subject. These are carried out either in writing through journal articles or in conference presentations in oral formats. The Social Network Theory also sheds light on the motivation behind scholarly conversations and collaboration namely seeking clarification, sharing insights, seeking excellence, gaining access to other knowledge networks, as well as seeking access to facilities, funding and equipment (The Royal Society, 2011).

In placing emphasis on the ties between nodes in a network, the Social Network Theory advocates for the description and careful analysis of the different facets of social interaction between participants in a network. In a scholarly environment, this entails studying the strength of ties between scholars, disciplinary and geographical collaborations.

This analysis was further scrutinised in the light of the Internet/ICT age that has facilitated successful scholarly collaborations and networks in other geographical locations as has been highlighted by various authors (Sonnenwald, 2007; Neubauer & Brewer, 2004; Koku, Nazer & Wellman, 2001). ICT has given rise to new types of scientific collaboration including shared instrument systems, community data systems, open community contribution systems, virtual communities of practice and distributed research centers (Sonnenwald, 2007:660)

Furthermore, the study evaluated the extent of support given to Kenyan scholars by their respective universities in pursuit of their research endeavours. The Social Network Theory informed the study in its quest to understand the growth of the scholarly community and invisible colleges as supported by institutional facilities and infrastructure. The theory also informed the study in evaluating the participation of institutions and units in local and international research networks and the attendant benefits such associations have brought to local researchers.

The social network theory has made major contributions to our understanding of human social groups. The notion of a network of relations linking social entities has found wide

expression throughout the social sciences, further developing as researchers try to solve empirical or theoretical puzzles (Wasserman & Faust, 1994:10). Recent advances have brought social network analysis to the fore in various fields including mathematics, physics, neuroscience, psychology, computing, business and management (Borgatti & Halgin, 2011; Sonnenwald, 2007; Newman, 2006; Martino & Spoto, 2006).

Various studies in scholarly communication have benefited from the theoretical support of the Social Network Theory. Woo, Kang & Martin (2013) explored collaborations among maritime researchers and institutions with emphasis on whether the collaborations had increased publishing productivity. The study used co-authorship as an indicator of research collaboration and the number of papers as an indicator of research productivity. Social network analysis metrics were then used to analyse the resulting collaboration networks. The study found that there has been a substantial increase in the number of co-authored papers in the last three decades. Co-authorship between two authors was found to be the most prevalent. The study established that co-authorship takes various forms i.e. within institutions, between institutions and with international institutions. International collaboration was found to have increased significantly. The study also found that the number of co-authors in the period since 2000 is over four times that of the 1990s and 45% of the co-authors have one or two collaboration partners. In the 2000s, the emergence of several large sub-networks (with more than ten nodes) was also observed.

Kimiloglu, Ozturan & Erdem (2012) carried out a study to investigate collaborative research in general and the importance of and attitudes towards use of IT in collaborative research projects. The study showed a positive tendency toward the idea of research collaboration among academicians in general, pointing to the need to increase collaborative research environments in general in universities and research centres. The study also found a positive inclination to make use of IT to increase the possibility to conduct collaborative studies more easily and effectively. The major advantages cited for use of IT were increased convenience of jointly working from a distance, continuity of communication and information sharing.

Olmeda-Gomez et al. (2009) carried out a study to visualise the inter-university and international collaboration networks generated by Spanish universities based on the co-authorship of scientific articles. The study found that from an institutional perspective, the proportion of university production involving national and international collaboration is on the rise, whereas the percentage of non-collaborative papers is declining, in accordance with

patterns observed in other countries. Additionally, public universities collaborate more intensely than private institutions and long-standing universities are more active in this regard than those recently founded. The fact that scientists from more recently founded universities, whose production is lower and whose researchers are younger, seek to collaborate with more active nodes on the network where they appear as satellites, is the reflection of an attempt to work with more productive researchers or form part of networks with greater influence and visibility.

The key variable derived from this model that is relevant to the study is the social network that can be applied to the scholarly environment in relation to how scholars work together and share ideas and information to generate new knowledge especially in a research setting. Both the Conversation Theory and the Social Network Theory address issues of communication and collaboration amongst scholars and researchers. However, they do not address the issue of the scholarly content that results from their interactions and management of the same. To fill this gap, it was necessary to turn to Knowledge Management theories.

2.4 The Knowledge Management Process Model

The researcher surveyed a number of knowledge management theories such as the SECI model by Nonaka (1994), which focuses on organisational knowledge creation; Successful Knowledge Management Projects by Davenport, de Long & Beers (1998) which evaluates the success factors for a knowledge management project; and the Knowledge Architecture Model by O'Leary (1998) which focuses on the use of artificial intelligence (AI) in knowledge-management systems using AI-related technologies such as knowledge bases and ontologies.

These models and others were found unsuitable for the needs of this study which focussed on managing scholarly content - developing the research ideas, conducting research to create new knowledge, communicating and sharing knowledge with professional colleagues and distributing formal research results to the wider community of stakeholders. Therefore the researcher chose to fill this gap using the Knowledge Management Process Model by Botha et al. (2008) which addresses the knowledge processes ranging from knowledge creation and dissemination to organisation. This model was thought to be especially suitable for this study since it focuses more on the managerial issues surrounding knowledge and emphasises its important role in the organisation by articulating its management right from creation to

dissemination to organisation. Significantly, the model operationalizes knowledge management within the modern technology environment in which organisations find themselves. In the current digital dispensation, it is technology that is facilitating knowledge creation, dissemination and organisation. Additionally, unlike the other knowledge management models that were surveyed, this model was developed in an African setting compared to the others that were developed in Asian, European and American settings. Using this model for the study enabled generation of unique aspects in management of scholarly content from an African perspective. It is worth noting however, that this model has not been tested in any studies so far. Nevertheless, the authors of the model invited scholars and researchers to employ and test the model in real world cases and projects and the present study therefore employed the model in relation to managing scholarly content in educational institutions.

The *Gartner IT Glossary* (2013) defines Knowledge Management (KM) as a business process that formalises the management and use of an enterprise's intellectual assets. For the Gartner group, KM promotes a collaborative and integrative approach to the creation, capture, organisation, access and use of information assets, including the tacit, un-captured knowledge of people. The idea of knowledge management is a contemporary response to the challenges of the economy in the new millennium (Botha et al., 2008). Wiig (2004:xxi) contends that in today's world, each business and enterprise is constantly required to change; to be reinvented in order to provide new capabilities and perspectives; to be able to cope with new challenges and to renew itself to adopt new approaches, keeping those that work well and discarding those that are out-dated. Botha et al. (2008) define knowledge management as a discipline whose objective is to systematically leverage expertise and information to improve organisational efficiency, responsiveness, competency and innovation. The authors argue that before knowledge, experience and expertise can be effectively leveraged and transformed into valuable organisational assets, they must be formalised, distributed, shared and applied. This implies that knowledge is managed through a process. Therefore, they propose a knowledge management process model where knowledge fulfils an important role in business processes (Fig. 2.4a).

The Knowledge Management Process Model by Botha et al. (2008) is comprised of the three overlapping and interacting knowledge processes that give rise to knowledge usage namely:

knowledge creation and sensing; knowledge sharing and dissemination and knowledge organisation.

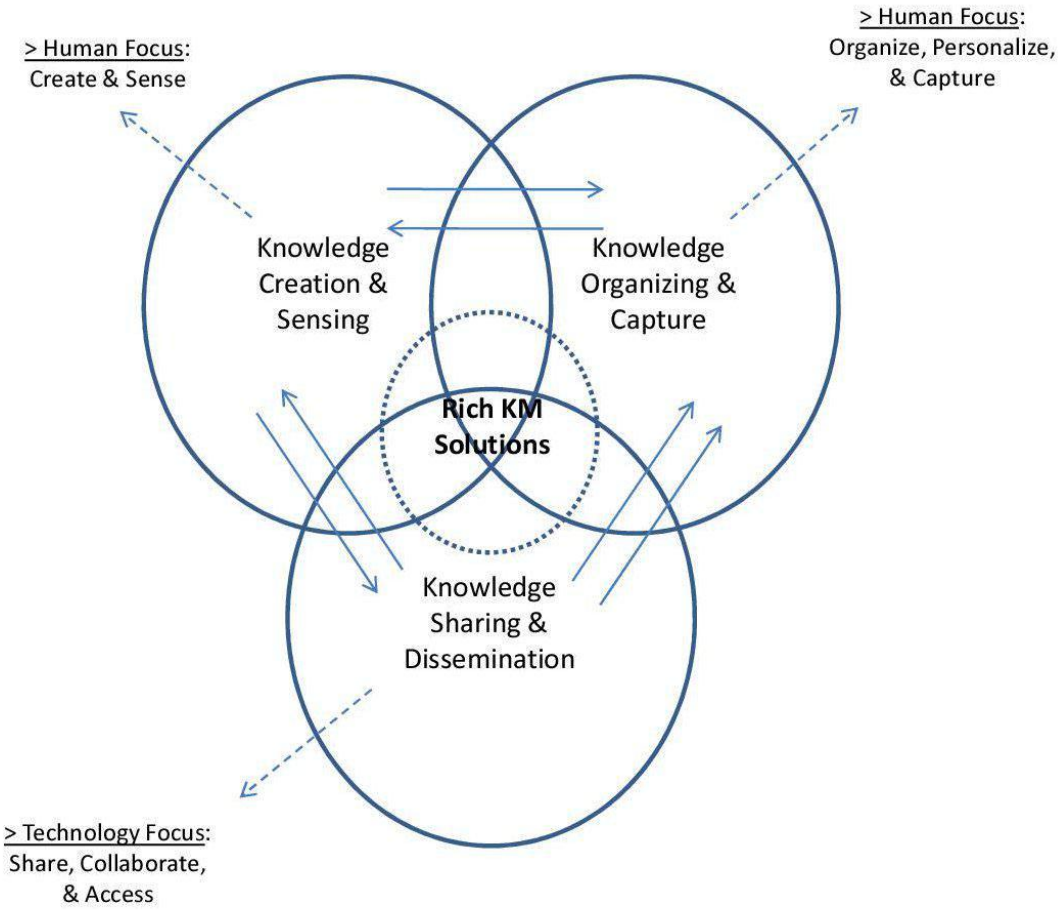
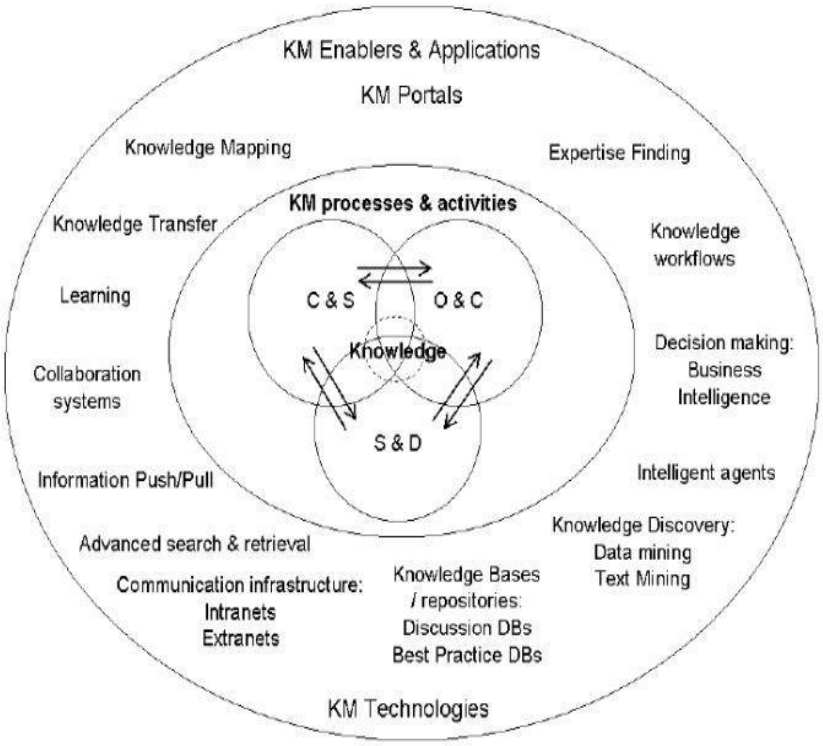


Figure 2.4a: Knowledge management process model - activities

Source: Botha et al., 2008:51

Further to the Knowledge Management Process Model, Botha et al. propose the Knowledge Management Technology Framework (Fig. 2.4b) which facilitates additional understanding of knowledge management. The Knowledge Management Technology Framework incorporates the Knowledge Management Process Model and thereafter includes various categories of knowledge management enablers consisting of knowledge management technologies, infrastructure and applications. Botha et al. (2008:54-55) emphasise the importance of technology in knowledge management arguing that leveraging IT in its various forms will enable the effective application of knowledge and expertise to give organisations the desired competitive edge. In the authors' opinion, organisational knowledge and expertise

can only be leveraged if they are easily accessible, understandable, and retrievable. They argue that technology is and will remain a critical success factor for knowledge management. The important role of IT in knowledge management has been recognised by other authors (Zyngier, n.d.; Subashini, Rita & Vivek, 2012).



Key: C & S – Creation and sensing; O & C- Organising and capture;
S & D – Sharing and dissemination

Figure 2.4b: Knowledge Management Technology Framework – enablers and applications

Source: Botha et al., 2008:139

a) Knowledge creation and sensing

In Figure 2.4a above, knowledge creation and sensing is the process by which, new knowledge is created by regrouping and combining older concepts and the sensing and invention of new ones. This occurs through learning and happens within an individual, team, community or organisation. According to Jarche (2014), Sensing is how we personalize information and use it. Sensing includes reflection and putting into practice what we have learned. Often it requires experimentation, as we learn best by doing. Botha et al. explain that when a question is asked or a hypothesis developed, one step in

knowledge production is to search for and retrieve older knowledge statements to try to prove the new hypothesis. Thus new knowledge is created when new concepts are reformulated from older concepts. The creation of a knowledge idea stems from a supply chain of knowledge, information and data. Furthermore, knowledge creation and sensing can typically be linked to the tacit-to-tacit and explicit-to-tacit knowledge conversion patterns as described by Nonaka and Takeuchi (Botha et al., 2008:173). Tacit knowledge is built and shared in face-to-face meetings and informal and formal shared experiences which traditionally had little reliance on KM technologies. However, increasingly, groupware application software are now being used to supplement or replace conventional meetings. In the explicit-to-tacit conversion phase, a knowledge management system should offer information retrieval and also facilitate the understanding and use of information. The system needs to facilitate search, exploration, classification as well as enable associations between documents in order to assist the knowledge workerto form new tacit knowledge easily.

In the model, Botha et al. indicate that knowledge creation and sensing are human-focused activities. Individuals operate within teams and communities within the organisational structure and exploit organisational links to the external environment. According to Botha et al., organisations create knowledge by creating infrastructure and processes that enable individuals and teams to share and improve new knowledge created by individuals. In their opinion, most new knowledge is incremental, mediated more through invention than through true discovery. Invention involves assembling known pieces of knowledge in new ways; the latter consists of finding ideas, approaches and technologies that are truly revolutionary. Botha et al. argue that knowledge management technology facilitates new knowledge creation by providing access to other knowledge workers' experiences, insights and ideas.

b) Knowledge sharing and dissemination (or transfer)

According to Botha et al., knowledge dissemination is the process by which new knowledge is communicated through certain channels over time among the members of a team or organisation. The authors argue that even if vast pools of high- quality knowledge exist, the knowledge may be worthless without effective dissemination (or diffusion). In their opinion, the best knowledge dissemination occurs within communities of practice. Wenger & Snyder (2000) define communities of practice as groups of people informally

bound together by shared expertise and passion for a joint enterprise. People in communities of practice share their experiences and knowledge in free-flowing, creative ways that foster new approaches to problems. Allee (2000) refers to the social nature of knowledge and learning, arguing that every conversation is an experiment in knowledge creation. Knowledge cannot be separated from the communities that create it, use it and transform it.

In the Knowledge Management Process Model, Botha et al. (2008) allude to the technology focus of knowledge sharing and dissemination. The authors clarify that these activities are facilitated by technology which enables people to share, collaborate and access knowledge. Technologies have evolved from number-crunching abilities to primarily communication abilities which enable people to work together in a collaborative and integrated environment that is well suited for knowledge sharing and transfer activities. Specifically, these technologies allow more than one person to work on a document simultaneously, allow intelligent tracking of messages and documents within a process and generally allow people to view and manipulate information concurrently and efficiently. According to Botha et al., the range of technologies that support sharing, collaboration and access to knowledge include integrated systems (such as Enterprise Resource Planning systems); business process management and workflow systems; and systems for personal productivity and groupware (for example e-mail, newsgroups, discussion databases and videoconferencing).

c) Knowledge organisation and capture

According to Botha et al., knowledge organisation presupposes that knowledge already exists and that it is beneficial to capture that knowledge. Capturing knowledge moves it from the individual to the team, community and the enterprise. Once knowledge has been captured, it needs to be classified, mapped, indexed and categorised so that it can be navigated, stored and retrieved. According to Botha et al. (2008), most information today is produced online, and can be readily available to enable users to make decisions using relevant information created by unseen collaborators. The authors draw attention to the current challenge of information overload resulting from the staggering growth of information/knowledge existing as text, sound, images, animation, film and virtual reality simulation. Botha et al. observe that this enormous amount of information has made it increasingly difficult to find, access, present and maintain relevant information.

In this regard, they note that KM requires a complex suite of tools to capture the information, store it and keep access widely available. These include HTML publishing tools for producing web-type documents and/or preferably the ability to distribute knowledge in XML format; relational databases for storing these documents in XML-based format; knowledge bases/repositories to enable online access to knowledge; text search-and-retrieval engines; approaches to managing meta-knowledge that describes and facilitates access to the available information/knowledge; and online thesaurus to facilitate online retrieval of relevant information/knowledge.

2.4.1 Suitability of Knowledge Management Process Model to the Research Problem

The modern university is a business organisation and stands to benefit from KM principles and practices. As President Andrew Draper of the University of Illinois observed, the university "is a business concern as well as a moral and intellectual instrumentality, and if business methods are not applied to its management, it will break down" (Bok, 2003:2). This is supported by Rowley (2000) who says that universities are increasingly exposed to marketplace pressures similar to other businesses and it would be reasonable therefore to suppose that knowledge management might have something to offer higher education institutions. Bok further observes that today, opportunities to make money from intellectual work are pursued throughout the university by professors of computer science, biochemistry, corporate finance, and numerous other departments. In his opinion, entrepreneurship is no longer the exclusive province of athletics departments and development offices; it has taken hold in science faculties, business schools, continuing education divisions, and other academic units across the campus (Bok, 2003:3).

The Knowledge Management Process Model by Botha et al. suggests a unified approach towards knowledge management that would steer an organisation towards using the knowledge within itself for competitive advantage. According to Rowley (2000:329) universities have a significant level of knowledge management activities, and it is important to recognise these, and use them as foundations for further development. Rowley advises that universities and their staff ought to recognise and respond to their changing role in a knowledge based society. They need to consciously and explicitly manage the processes associated with the creation of their knowledge assets, and to recognise the value of their intellectual capital to their continuing role in society, and in a wider global marketplace for higher education.

The Knowledge Management Process Model was considered suitable for this study as it addresses various aspects of knowledge creation, transfer and organisation and is applicable within a university setting. The theory addressed the following research questions: *"What kinds of scholarly content are generated and used in universities in Kenya?"*; *"How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use?"*; *"How do Kenyan scholars communicate amongst themselves in the various stages of their research work?"*; and *"To what extent do existing institutional facilities in the universities support scholars' research and communication needs?"* The model guided investigation into the types of codified knowledge that universities in Kenya were generating; the extent to which sharing and dissemination of codified and tacit knowledge was occurring amongst scholars, the kind of support that exists in universities in Kenya for interaction between scholars to enable them create and share knowledge and how universities are managing this knowledge to make it visible and useful to local and international stakeholders.

For this study, the Knowledge Management Process Model is the dominant model because it addresses issues across the scholarly content management domain. It supports creation of new knowledge through interaction with existing knowledge by individuals, teams, communities and organisations; sharing and dissemination of this knowledge through various avenues such as from an expert to a novice or through writing and publishing; capture and organisation of this knowledge so that it is accessible to a wider community of users and that it can be navigated, stored and retrieved as and when required. Furthermore, alongside its accompanying Knowledge Management Technology Framework, it gives guidance as to how universities in the modern technology environment can leverage the power of technology to facilitate creation, sharing and organisation of its knowledge assets to give them competitive advantage. The key variables derived from this model that guided the study are knowledge creation, knowledge sharing and dissemination, and knowledge capture and organisation.

A review of the literature seems to indicate that studies are yet to adopt this model which was based on a PhD study conducted by one of the authors of the model. No recorded studies were identified that are based on this model and it is therefore assumed that this current study is one of the pioneering studies that is guided by the model. Although it is an untested model, it however helps to identify key factors that support effective knowledge management in a university setting in the technology age.

2.5 Summary

This chapter has provided an in-depth discussion of the theories and model that guide the study namely the Conversation Theory, the Social Network Theory and the Knowledge Management Process Model.

The key themes emerging from this chapter are that conversation is the basic ingredient among scholars and researchers and it is what enables them to understand concepts in their domains of practice. Furthermore, it is conversation that equips them to generate new knowledge by analysing and building on the conversations of their colleagues both past and present. This implies that new knowledge can only be generated when scholars are involved in social networks within which they exchange ideas, share information, critique each other and generally collaborate along professional lines. The chapter also recognises that from the professional interactions among scholars, a lot of content is generated that needs to be effectively managed to ensure its dissemination and use by various stakeholders both in the short and long term.

The theories articulated in this chapter lay the ground for the next chapter, an in-depth discussion of the literature review. Variables from the theoretical framework form the basis of the literature review namely scholarly conversations, scholarly social networks and collaborative research, and knowledge management processes in a university setting.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

A literature review is a detailed overview of prior research regarding a specific topic that shows the reader what is known and what is not yet known about a topic, thus setting the justification for the new investigation (Denney & Tewksbury, 2012:1). The literature sources suitable to provide this information consist of primary sources including reports, theses, conference proceedings, unpublished manuscripts and some government publications on the one hand and secondary sources such as journals, books, newspapers; and tertiary sources, for example indexes, databases, catalogues, encyclopaedias, and bibliographies on the other hand (Saunders et al., 2012).

An effective literature review should methodologically analyse and synthesise quality literature, provide a firm foundation to a research topic, guide selection of research methodology, and demonstrate that the proposed research contributes something new to the overall body of knowledge therefore advancing the subject's knowledge-base (Levy & Ellis, 2006; Webster & Watson, 2002). To be useful and meaningful, research must be cumulative; it must build on and learn from prior research and scholarship on the topic. The literature review sets the broad context of the study, clearly demarcates what is and what is not within the scope of the investigation, and situates an existing literature in a broader scholarly and historical context (Boote & Beile, 2005).

The purpose of the literature reviewed in this study was aimed at examining conceptual and empirical research that provided further understanding of the subject of scholarly content management. The aim of this study was to examine the strategies that universities in Kenya use in managing their scholarly content. Various research questions were addressed namely: what kinds of scholarly content are generated and used in universities in Kenya? How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use? How do Kenyan scholars communicate amongst themselves in the various stages of their research work? To what extent do Kenyan scholars participate in local and/or international professional social networks? To what extent do existing institutional facilities in the universities support scholars' research and communication needs? The literature necessary to answer these research questions was obtained from primary and

secondary sources as described above. However, the majority of the literature was sourced from electronic peer-reviewed academic journals which have been proven most useful for a study of this nature. As Saunders et al. (2012) advise, these journals were found to be detailed and being written and reviewed by experts in the field, they contain authentic reports of relevant earlier research necessary for this study.

The chapter is organised by way of thematic areas derived from the research questions outlined above, theoretical framework variables, and the broader issues around the research problem. The variables from the theoretical framework were: scholarly conversations, scholarly social networks; and knowledge management processes. The broader issues to be investigated alongside the key research questions included: scholarly communication; researcher behaviour; ranking of world universities; digital curation, archiving and preservation; and open access. The literature review therefore covers: types of scholarly content, scholarly content generation, acquisition, and use; scholarly conversation and communication; researcher behaviour; scholarly social networks and collaborative research; open access to scholarly communication; academic ranking of universities, knowledge management processes in a university setting; digital curation, archiving and preservation of scholarly content; and institutional support for communication and research needs of scholars. The literature review endeavoured to provide an in-depth coverage of the concepts in these thematic areas as they relate to the research questions, variables of the theoretical framework and broader issues of the study area. The literature reviewed covered both empirical and theoretical studies.

3.2 Types of Scholarly Content, Scholarly Content Generation and Acquisition

As noted in the preceding chapter, scholars and researchers engage in scholarly conversation between themselves within their disciplines and also across disciplines. These scholarly conversations result in the generation of various types of scholarly content. Most of this content is manifested as publications or formal communication in the form of books and book chapters, journal articles, conference proceedings, dissertations and theses (Max Planck Institute for Psycholinguistics, 2013; Research Information Network, 2011a:5; Barjak, 2006). Maron & Smith (2008) in an investigation of current models of digital scholarly communication, surveyed colleges and universities in the United States and Canada and noted that in the digital age, blogs, discussion forums, and professional and scholarly hubs are gaining popularity as methods of scholarly communication. However, as the European

Commission (2010:25-26) acknowledges, the complexity of knowledge has led to a diverse range of research output formats in addition to the traditional academic texts such as journal articles. These include audio-visual recordings, computer software and databases, technical drawings, major art works, designs or working models, patents or plant breeding rights, policy documents or briefs, and maps among others. Muriithi, Horner & Pemberton (2013) reiterate this noting that publications are not the only output emanating from scientific research and, especially in developing countries where much output is in the form of reports and working papers, it is also important to consider other forms of output.

Currently, increased attention is being given to non-published scholarly content existing in what is known as 'grey' or 'gray' literature. According to Tillet & Newbold (2006), the term 'grey literature' is not well understood outside the library and information sciences field and has been defined and spelled variously. However, a widely accepted definition given by the US Interagency on Gray Literature Working Group (1995) in Tillet & Newbold (2006) is that gray literature is:

> Foreign or domestic open source material that usually is available through specialised channels and may not enter normal channels or systems of publication, distribution, bibliographic control or acquisition by booksellers or subscription agents.

The spelling 'grey' is adopted for this study since the researcher is used to this particular spelling. Several authors (Okoroma, 2011; Carpenter et al., 2011; Tillet & Newbold, 2006; Weintraub, n.d.) recognise grey literature to include theses and dissertations, faculty research works, reports of meetings, conferences, seminars and workshops, technical reports, students' projects, in-house official publications of associations and organisations, white papers produced by businesses, web pages and all forms of government publications including legislative materials, budgets and development plans. Much of this grey literature has previously existed in print format but increasingly it is available to the public in electronic formats via institutional repositories, government, organisational and personal websites. According to Weintraub (n.d), grey literature is gaining greater importance as a source of information for the world's informed and enlightened population and will continue to serve as a necessary supplement to journal literature well into the future. It is increasingly being recognised in various sectors for its contributions to research, activity, policy and decision making (Aina, 2000) in addition to being timely, innovative and unique (Franks, Hardiker, McGrath & McQuarrie, 2012).

Generally, acquisition, organisation and dissemination of scholarly content have been the preserve of institutional libraries. Libraries play the roles of both knowledge accumulator and disseminator ensuring the free flow of information and offering support services to researchers in academic institutions, autonomous research organisations, policy making bodies, and planning and research units of government departments, business and industry. (Kumar & Moorthy, 2011:203). However, in the technology age, users now have unprecedented access to all sorts of information in addition to being enabled to create and disseminate their own information (Castells, 2010). With the increased availability of broadband and high-speed internet access, dynamic, multimedia-laden websites are replacing formerly static web pages with the consequences that users have the expectation of being able to interact with the information for which they are searching. Users are turning to smartphones and other mobile devices for access to the World Wide Web, social networking and email. Consequently, those who disseminate information will need to react to these changes and leverage the newest means to access and interact with information on the web (National Research Council, 2011).

Studies have shown that many scholars regard the library as a central part of the university environment and see it as a key discriminator between world-class universities and less prestigious institutions. In their opinion, a well-stocked library inclusive of e-materials is absolutely essential to all scholarly activity. Volentine & Tenopir (2013) studied two thousand academic staff members from six UK universities via a web-based survey to establish the extent to which they valued their library. They found that academic staff highly regarded article reading and emphasised the value of the library's e-journal collections. In content acquisition, dissemination and use, libraries and institutions provide services to the scholarly community including provision of print publications, new electronic resources, digitisation, promotion and exploitation of new technologies and models of scholarly communication, implementation and management of institutional repositories, provision of dedicated work spaces for researchers, data curation and preservation (and the necessary education and support for researchers in data curation), services to help scholars meet new data management and sharing requirements, copyright education, among others (Research Information Network & Research Libraries UK, 2011; Carlson & Garritano, 2010; University

of Tennessee, Knoxville, 2014). These enable researchers and academics to effectively meet their research and information needs.

This study addressed the question: '*What kinds of scholarly content are generated and used in universities in Kenya?* Specifically, the study sought to ascertain from the respondents, the types of scholarly content they had generated or participated in generating and the quantity of different scholarly output(s) they had made in the last five years. In addition, from the university librarians, the study sought to find out how grey literature is handled in the various institutions.

3.3 Scholarly Conversation and Communication

Several authors recognise scholarly communication as exchange of ideas, thoughts, hypothesis and scientific results occurring between members of the scientific community (Association of College and Research Libraries, 2003; Ball, 2011). In this (cyclical) process, content is generated, reviewed, disseminated, acquired, preserved, discovered, accessed, and assimilated for the advancement of scholarship (Western Libraries, 2013a). This content may include pre-prints, peer-reviewed journal articles, monographs, enduring teaching materials, datasets and other research material, conference papers and proceedings, electronic theses and dissertations and grey literature (Research Information Network, 2011a; Royster, 2007; Johnson, 2002). Scholarly communication is often the first occurrence of the dissemination of research results, after which they may be circulated in society through other means. It also plays an important role in the research process because it ensures that research output is certified and archived (Birdsall & Shearer, 2005). Thorin (2003) broadens the scope of the scholarly communication process to include conducting research; preparing, shaping and communicating to colleagues; and the ultimate formal product that is distributed to libraries and others in print or electronically.

Scholarly communication includes formal means of communication, such as publication in peer-reviewed journals, and informal channels, such as electronic listservs facilitated by the internet, and conferences and seminars where information is exchanged (Sawant, 2012; Association of College and Research Libraries, 2003). Barjak (2006) notes that informal communication is personal and social with the communication partners either conversing through face-to-face discussions or involving larger groups through one-to-many channels such as postal or computer-based mailings. Formal written channels present several

advantages for example, easy presentation of detailed information such as methods, tables and diagrams; written information can be critically examined and verified; documents can reach a wider group of readers and can be easily referred to when required (Fjällbrant, 1997).

Scientific communication occurs within two main fields: research and publication (Eisend, 2002), but publication is the means by which scientists' endeavours move into the public sphere (Cronin, 2003). Without publication, years of scientific toil might easily be lost to the world at the demise of the scientist, or the scientist(s) would miss out on the evaluative benefits of peer review (Clapham, 2005). As Tabasum & Jan (2011:141) put it, "publishing is a hallmark of good scientific research. The aim of publishing is to disseminate new research knowledge and findings as widely as possible in a timely and efficient manner". According to Ngobeni (2012) scholarly publishing and outputs consist of peer-reviewed journal articles, peer-reviewed monographs, peer-reviewed conference proceedings, and peer-reviewed research-based books. But scientists do not only communicate to give peer-reviewed scholarly outputs. Besides communicating to get advice, learn about new methods or theories or hear about new results, scientists communicate informally to collaborate on research, co-author formal publications, mentor graduate students, and also to gossip and be creative (Tabasum & Jan, 2011; Koku et al., 2001; Allen, 1991). Koku et al. (2001:1753) observe that scholars have to get their work out to the world if they want to advance scholarship, influence public opinion, advise policy makers, or promote their careers. This study sought to establish the extent of interaction between colleagues on scholarly matters and also the mentoring culture among scholars in the various universities. Specific questions included: "*Are you mentoring (or being mentored by) anybody academically at the moment?"*; *"Please comment on the mentoring culture amongst scholars at your institution"*; and *"How often do you spend time on personal interactions with colleagues so as to discuss ideas, solutions, and scientific proposals?"*

Allen (1991) argues that formal written communication is the most accepted form of reporting on scientific research within the scholarly community. However, other scholars argue that informal scientific communication is equally important not only through all the stages of a research project, but also in the communication of intermediate results to fellow scientists (Barjak, 2006). Baptista & Ferreira (2007) assert that informal communication has always played an important role in scholarly communication evidenced by the existence of 'invisible colleges'. The term 'invisible college' was first used in seventeenth century Europe

when the Royal Society of London was founded as an informal discussion group of like-minded, curious students of nature. Members exchanged ideas, reported findings of experiments, and listened to scientific news brought by travellers from the Continent (Paisley, 1972). Within invisible colleges, ideas get transmitted more quickly and innovatively than in formal journals constrained by publication lags and orthodoxy-promoting refereeing (Koku et al., 2001). Mulligan & Mabe (2011) cited the importance of informal communication in scholarly discourse showing that in an electronic environment, informal exchanges (via bulletin boards, conferences, emails and telephone conversations) were valuable to 61% of the respondents.

Information technology has radically changed the nature of scientific communication. In particular, formal and informal communications have been altered such that the distinction between the two is increasingly blurred. The traditional roles of information producers, processors and users have also been transformed (Russell, 2002). In the internet age, informal communication has benefitted from computer networks that have enabled geographically dispersed scholars and researchers to interact and share information (Barjak, 2006). Hurd (2000) predicted that in 2020, the 'virtual invisible college' relying on the internet would be the norm for communication among its members. The characteristics of these would be research-related information and raw data stored on servers for access by others to build on their findings or include them in their own analyses. However, these features are already a reality in the first decade of the 21st century with the existence of powerful databases offering public access to multi-terabyte data sets (Bell, Hey & Szalay, 2009). Various institutions around the world are actively installing and making use of digital repositories in various forms including institutional repositories, digital libraries and archives (Dabholkar, Prabakaran, & Kurahatti, 2008; Amaral, 2008). Universities and research institutions are establishing institutional digital repositories to collect, showcase, and disseminate their research associated output (Amaral, 2008:1). This study sought to establish whether universities in Kenya have implemented institutional repositories and whether members are using them. Specific questions included: *"Does your university have an IR";* and *"Have you ever deposited any of your research output in your institutional repository?"*

Various studies reveal that scholars and researchers globally continue to embrace the internet as a modern communication medium. Notable studies include Maron & Smith (2008), Kanungo (2007), Ajegbomogun (2007) who showed that a majority of the respondents

regarded the internet as an important tool not only for research and scholarly communication, but also for enhancing teaching and professional development. More recent studies show increasing use of Web 2.0 as a technical platform to enable new forms of scholarly communications (Procter et al., 2010; Collins & Hide, 2010; Mahapatra, 2010; Gu & Widén-Wulff, 2010; Wang, Jiang & Ma, 2010; Maron & Smith, 2008). The studies found that Web 2.0 has gained popularity amongst scientists as they provide a platform for both personal publishing and informal communication, thus catering to scientists in a wide range of disciplines. Procter et al. (2010) also found that the extent to which researchers are engaged in collaborative research activities strongly influences adoption of Web 2.0. Those who work in collaboration with different institutions are significantly more likely to be frequent or occasional users of Web 2.0. Those not involved in collaborative research activities are much less likely to adopt. Respondents in this study were asked to indicate the importance of various means of communication (including Web 2.0) to their research work.

Most of the documented studies on scholarly conversation and communication have been conducted in the developed world where participants were selected mainly on the basis of email contacts harvested from online domains (Gu & Widén-Wulff, 2010; Proctor et al., 2010). Lately, however, more studies focussing on scholars in developing countries and their experience with the internet are on the rise. In particular, the experiences of African scholars are increasingly being documented (Bankole, 2013; Matiquite, 2011; Dulle, 2011; Ani, Edem & Ottong, 2010) although the available literature is mainly from Southern Africa and Nigeria.

As the reviewed literature shows, scholarly communication is an important activity in the professional life of a scientist, fulfilling a fundamental role of disseminating knowledge and facilitating knowledge creation. The literature also reveals that the dynamic nature of technology has greatly influenced scholarly communication trends and employing ICT especially the internet in scholarly communication has brought many gains. A review of the literature also indicates few studies on scholarly communication in the African setting. Therefore, this study sought to fill this gap and addressed the following fundamental questions: "*What kinds of scholarly content are generated and used in universities in Kenya?*" and "*How do Kenyan scholars communicate amongst themselves in the various stages of their research work*?"

3.4 Researcher Behaviour

For purposes of this study, researcher behaviour focused on academics' approaches to discovering, accessing, analysing, using, managing and disseminating information and information resources, especially in the modern technologically advanced world of the internet and related technologies. Of further interest for the current study was how researchers communicate and share information. Researchers have to be able to access, retrieve and use information for the successful accomplishment of their research work (Angello, 2010).

Katzen in Johnson (2011) observes that researchers today have easier and quicker access to an unprecedented amount of information from around the world. Other authors (Tenopir & King, 2008) corroborate this observation. Over a period of four decades (1977-2005), they surveyed the reading and citation patterns of thousands of scientists. Their study found that over the years, the advent of digital technologies for searching and publishing has dramatically influenced information seeking and reading patterns in science. Modern scientists clearly have vastly improved capabilities and resources available to them for identifying and obtaining the articles they read. These scientists read from a much broader range of sources of articles made possible by access to enlarged electronic library collections, online searching capabilities and access to other new sources such as author websites. Veletsianos & Kimmons (2012) cite other examples of the use of technology in scholarship including the use of bibliographic management software, data analysis tools, and transcription services and publication in online journals, personal or institutional websites.

However, access to and use of electronic information is not free of challenges for many scientists in African countries who are still struggling to come to terms with the digital environment (Kanyengo, 2009) which although steadily improving, still presents a challenge to researchers. In a series of case studies undertaken at four universities in east and southern Africa to explore issues surrounding researchers' access to the latest academic information, Harle (2010) found that librarians, with the assistance of a number of access schemes, have secured access to a wide range of journals and other resources, many of which are currently underutilised by their staff and students. Limited access to computer facilities particularly for postgraduate students and erosion of a research culture as a result of resource constraints and the low priority given to research and postgraduate supervision has prevented staff from effectively utilising the resources. Additionally, there is little awareness of the available

information resources and the researchers' abilities to make effective use of e-resources are often underdeveloped.

In connection with ease of access to information, studies have found that use of digital resources has extended the range of literature available to scholars thus supporting them to keep abreast of developments in their field and improve their research productivity (Vakkari, 2008; Barjak, 2006). Another study of the information seeking behaviour of humanities scholars found that in spite of the many problems faced in retrieving and using electronic facilities, their work has become easier with technology and thus they are increasingly embracing electronic resources (Tahir, Mahmood & Shafique, 2010). These findings are also in line with the findings of a study conducted at Tennessee State University to examine how electronic information resources influence the information-seeking process in the social sciences and humanities (Ge, 2010). The study found that although the researchers relied heavily on periodicals, books and primary sources, their use of electronic sources is increasing. Indeed, many of the researchers preferred electronic resources over print. However, in certain cases, print resources better satisfied participants' information needs, for example where the respondents were more accustomed to using print resources and were thus unfamiliar with new technologies and electronic information resources; where electronic or online information resources were not available for some projects or disciplines such as local history, court records and deeds; and where older materials were not available in electronic format. The current study sought to establish some of the information sources used by Kenyan scholars and specifically asked them to indicate their preferred source of scholarly content along with the reasons for use or non-use of various options from a given list.

Mulligan & Mabe (2011) found that the introduction of electronic communication has also affected the way researchers access information. Traditional researchers had to physically visit the library to interrogate scholarly literature. Ubiquity of electronic access to information has meant that library visits are increasingly redundant with more and more scholars preferring to access the scholarly literature from their homes, offices or elsewhere (see also Haglund & Olsson, 2008; Islam & Panda, 2007; King & Montgomery, 2002). However, Volentine & Tenopir (2013) showed that academics still value the library as the main avenue to finding and obtaining the scholarly literature either through subscriptions or facilitating interlibrary lending.

Additionally, Katzen in Johnson (2011) states that global communications technology allows collaboration on the individual, national and international levels like never before and thus is facilitating the entire research process from the funding stages through discovery and publication. In support of this, various authors also note that with the advent of the internet and e-mail exchanges, as well as the ability to exchange large data sets online, researcher interaction and collaboration has increased (Kimiloglu et al., 2012; Mulligan & Mabe, 2011).

On the information seeking behaviour of researchers, Haines, Light, O'Malley & Delwiche (2010) conducted a qualitative study on a sample of basic science researchers employed at a university medical school. The study found that the researchers used a variety of information resources ranging from popular internet search engines to highly technical databases. Further, they generally relied on basic keyword searching, using the simplest interface of a database or search engine. Haines et al. (2010) also found that the researchers interacted within small networks of individuals in their institution and at other institutions to satisfy their information needs and did not view the library resources or services as integral to their work. Other studies support these findings, such as the one that studied the patterns of information use and exchange amongst researchers in the life sciences (Research Information Network & British Library, 2009). The study found that in seeking to identify relevant information resources, researchers use a limited range of services, and resort to informal advice from colleagues rather than institutional service teams. Further, the study established that individual researchers wish to choose what to share, with whom and when. The study recommends that an understanding of the practices of different research communities must inform the policies and strategies of information service providers so as to effectively optimise the use and exchange of information.

Researchers' management of the information they access has been cited as being problematic. Studies have established that in an increasingly data-rich world, made possible by the ubiquity of digital information resources, information management is becoming more and more important and challenging, with many researchers finding it difficult to organise the digital materials they collect (Ge, 2010). There is evidence to suggest that researchers in many different fields lack the understanding and skills to make use of the new technologies and effectively manage the information they accumulate in the course of their work (Research Information Network, 2008). Effective tools are needed for information management (Ge, 2010).

On the other hand, researchers generate a lot of data from their research which also needs to be managed. Good data management practice ensures consistency and integrity of research data, minimises the risk of data loss, and minimises duplication of effort (University of Oxford, n.d). Furthermore, it allows reliable verification of results and permits new and innovative research built on existing information (Hodson in van den Eynden, Corti, Woollard, Bishop & Horton, 2009). Data management issues encompass storage, backup, documentation, copyright, intellectual property, ethical concerns, best formats for data creation, access and control, any sharing requirements, and long-term preservation (University of Oxford, n.d). For example, a study at the University of Minnesota found that despite the abundance of digital materials, 60.7% of scholars interviewed printed hard copies of the resources while 78.9% saved the resources digitally. Factors that determined methods of storage included space constraints, lack of technological skill, preference for hard copy and fear of computer failure (University of Minnesota Libraries, 2006).

The literature reveals that indeed, the presence of information technologies has modified research behaviour. With the attendant changes taking place in the research environment, scholars have to develop new skills and attitudes to benefit from the new technologies. Again, a review of the literature indicates few documented studies on how the new technologies have influenced the behaviour and motivations of African researchers. Most documented studies are from developed countries where electronic access to information resources is ubiquitous, thus researchers are quite advanced in their appreciation of electronic information resources. This study attempted to fill this gap by answering the questions: *"How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use?"; "How do Kenyan scholars communicate amongst themselves in the various stages of their research work?";* and *"To what extent do Kenyan scholars participate in local and/or international professional social networks?"*

3.5 Scientific Social Networks and Collaborative Research

Scientific research is a social rather than an isolated undertaking which is heavily dependent on social interactions such as communication and collaboration (Lievrouw in Barjak, 2006:1350). Kraut, Egido & Galegher (1988:1) note that in most disciplines, the development of new ideas for scientific research, the execution of research tasks, and the preparation of formal research reports are all processes that involve extensive social interaction. Crane in Lievrouw, Rogers, Lowe, & Nadel (1987) suggests that scientists form informal interpersonal

networks known as invisible colleges usually based on similar interests and through which they exchange information. According to Crane, the invisible college is the key unit of scientific growth. As the invisible college attracts more members and grows in size, it becomes "visible" in the research literature as its members publish more and more interrelated work.

Much has been documented on the social nature of science and scholarly communication. Sonnenwald (2007) observes that scientific collaboration (also referred to as research collaboration, R&D collaboration, or team science) is increasing in frequency and importance and it has the potential to solve complex scientific problems and promote various political, economic, and social agendas, such as democracy, sustainable development, and cultural understanding and integration. Hsieh (2013) corroborates this in his bibliometric study of research articles published between 1975 and 2005 and published in the Thomson Reuters Web of Science collection. The study demonstrated that multinational scientific teams have an increasing role in the production of knowledge and are evolving into larger scale structures of three or more nationalities. The study also showed that developing countries are more often associated with international collaborative initiatives when compared to developed countries.

According to Sonnenwald (2007:645), scientific collaboration can be defined as interaction taking place within a social context among two or more scientists that facilitates the sharing of meaning and completion of tasks with respect to a mutually shared, superordinate goal. Additionally, collaborating scientists may also bring additional, individual goals to the collaboration. Duque, Ynalvez, Sooryamoorthy, Mbatia, Dzorgbo & Shrum (2005:3) attribute the surge in scientific collaboration to the increase in specialisation across disciplines and fields, the complexity of research problems, the rising costs of technological apparatus, the development of new information and communication technologies, and lower travel costs. Increasingly, public and private research funding agencies require interdisciplinary, international, and inter-institutional collaboration (Sonnenwald, 2007). Katz & Martin (1997) outline several advantages of collaboration namely: sharing of knowledge, skills and techniques; transfer of knowledge or skills especially tacit knowledge; cross-fertilisation of ideas which may generate new insights or perspectives which may not have happened with individuals working alone; provision of intellectual companionship thus overcoming

intellectual isolation; and potentially increase the visibility of the work by each collaborator diffusing the findings either formally or informally.

Most studies on scientific collaboration have used co-authorship as an indicator of collaboration (Woo, Kang & Martin, 2013) although Duque et al. (2005) attribute this to the availability of data and the ease of analysis, and argue that it represents only a limited kind of collaborative relationship. Katz & Martin (1997) opine that collaboration can take various forms ranging from offering general advice and insights to active participation in a specific piece of research. Researchers from different organisations may also collaborate by sharing data or ideas through correspondence or discussions at conferences, by visiting each other, or by performing parts of a project separately and then integrating the results. In supporting these opinions, other authors (Bukvova, 2010; Laudel, 2002) argue that not all research collaborations will necessarily lead to a publication and not all co-authored papers are results of a collaborative research process. Furthermore, some of the contributions to the success of a project are invisible to formal communication and could include service collaboration, provision of access to research equipment and transmission of know-how.

Several studies have attempted to show the positive relationship between collaboration and research productivity. Carillo, Papagni & Capitanio (2008) conducted an econometric analysis of data on publications in four scientific fields of seven advanced countries. They found that social interactions among researchers have positive effects on a scientist's productivity and there is a U-shaped relation between the size of a scientific network and individual productivity. Bozeman, Fay & Slade (2013) and Lee & Bozeman (2005) agree with these findings and suggest that the relationship is more evident than it appears at first glance.

With the advent of information technologies and the internet, the social structure of scientific communication has been dramatically altered. According to Kotecha (2011:2) improved information and communications technologies mean that universities and researchers gain more ability to access global research facilities, collaborate with experts on the continent and the world, conduct complex research and, essentially, build, store, and share their own knowledge bases. Historically, collocated scientists carried out most of the collaborations being able to converge in one location and participate in one project. However, many of today's scientific problems are beyond the realm of one discipline or scientist to solve and are therefore benefitting from cost-effective and reliable ICTs which have made it possible for

scientists to put together more long-distance collaborations than ever before (Olson, Bos & Zimmerman, 2008). According to Olson et al. (2008), scientific colleagues no longer have to come together in a single laboratory but can partner using technologies such as e-mail, videoconferencing, shared whiteboards, and centralised databases. The new technologies have made it possible to gather, share and analyse large amounts of data with increasingly specialised, sophisticated, and often expensive instrumentation.

De Moor & van Zanden (2008:67, 69) describe the growth of 'collaboratories' (laboratories without walls) where scientists are connected to one another, to instruments, and to data, independent of time and location, thereby creating a virtual community of peers. De Moor & van Zanden explain that collaboratories can provide communication environments and tools for scientists; serve as a communication tool for students; allow the collection of data, give online access to data to members and, in some cases, non-members of the collaboratory, and create the means to share scientific instruments within research or learning communities.

Today's social networking technologies greatly influence scientific collaboration. These are web applications aiming at facilitating collaborative knowledge creation and sharing and usually referred to as Web 2.0, social media, social tools or participatory media (Ponte & Simon, 2011; Cann, Dimitriou & Hooley, 2011). Social media have big implications for how researchers (and people in general) communicate and collaborate (Cann et al., 2011) and research has shown that the use of these tools among researchers is on the rise. In interviews with researchers who are already using social media in their research, Cann et al. (2011) found that they are using social media to bridge disciplinary boundaries, to engage in knowledge exchange with industry and policy makers, and to provide a channel for the public communication of their research. Procter et al. (2010) showed that the adoption of Web 2.0-based novel forms of scholarly communications among UK researchers had reached only modest levels at the time. However, the services were being rapidly adopted, although in a rather fragmentary manner. In 2011, Ponte & Simon surveyed researchers from different disciplines who showed a strong positive attitude towards Web 2.0. Their study found that more than a third of all respondents used Web 2.0 inspired tools including wikis such as ScienceWikia, blogs (Science Blog), and social networks (Nature Network). However, social bookmarking such as (CiteULike,) (25.8%) and micro-blogging (Twitter) (17.7%) are used to a lesser degree.

In spite of all the benefits that collaboration presents to researchers, Duque et al. (2005) assert that research collaboration presents a paradox for less developed areas. Based on a comparative study of scientists in Ghana, Kenya and Kerala in India, Duque et al. found that the research institutions of sub-Saharan Africa, for which collaboration has seemed to hold the greatest promise, are the least equipped to benefit, since the very conditions that problematise the relationship between collaboration and productivity also undermine the benefits of new information and communication technologies. Duque et al. argue that it is not collaboration alone, that causes research problems, but the routine of everyday life built around poverty, corruption and family obligations. Moreover, that same routine may change the relationship between connectivity and collaboration, between internet access and use, between the advantages and costs of regular efforts to coordinate activity. While collaboration may enhance productivity in the developed world, this study suggests that no such relationship should be expected where donors from afar introduce collaborations.

Luo & Olson (2008) observe that access to resources and knowledge gained from colleagues drives productivity in science. However, for scientists from developing countries, this access is lacking. This can be blamed partly on limited access to resources and knowledge. For example, the UNESCO Science Report of 2010 indicated that the average proportion of GDP allocated to R&D in Africa is about one-tenth the proportion in industrialised countries, meaning therefore that scientists from such developing countries are disadvantaged in terms of access to laboratory facilities, computers, library holdings, graduate student skills, and time available for research (Luo & Olson, 2008). Scientists in developing countries are also isolated interpersonally since they are usually part of smaller research communities and tend to be dispersed over long distances. Furthermore, infrastructure problems with transportation and communication hinder scientists in developing areas from engaging in regular collegial communication as well as benefiting from the intellectual stimulation that accompanies contact (Luo & Olson, 2008:366). Onyancha (2009) and Ocholla & Ocholla (2007) through a bibliometric count and analysis of publications from various parts of Africa showed limited collaborations between institutions and between authors. Few instances of collaboratories in Africa are also documented (Olson, Teasley, Bietz & Cogburn, 2002).

A review of the literature brings to the fore the importance of scholarly collaboration in the research process. The important role of the internet in enabling effective collaboration has been well captured. However, several of the documented studies are from the developed

countries and little is published on the state of scholarly collaborations in the developing world and especially in Africa. This study therefore attempts to provide an empirical description of the situation in Africa and Kenya in particular, in terms of scientific collaborations, sharing of knowledge amongst scholars, and the influence of technology on scholarly communication and collaboration. Specific questions the study addresses in this regard are: '*How do Kenyan scholars communicate amongst themselves in the various stages of their research work?'* and '*To what extent do Kenyan scholars participate in local and/or international professional social networks?*' Specific questions included: *"How often do you hold professional meetings with colleagues in your department based on a pre-planned schedule?"; "Are you collaborating with members from other departments in your university or with other research groups in the country?"; "If yes, please state the nature of the collaboration."*

3.6 Open Access to Scholarly Communication

Scholars and researchers in universities are required to publish to gain promotion and tenure appointments and for this they need access to current and relevant literature (Gbaje, 2010:1). The process of scholarship depends on the free exchange of information, from disseminating the latest research findings to preserving them for future use. Access to scholarly content entails interested parties gaining access to scholarly content in the various formats in which it exists, and according to their unique needs. According to Mutula (2013:1), access refers to users finding the information they require, successfully retrieving it and making use of it. Jaegar & Burnett (2005:465) on the other hand define information access as the presence of a robust system through which information is made available to citizens and others, with storage facilities ranging from physical libraries to digital databases, yoked with mechanisms for finding specific types of information stored in such facilities. Quinn (2003) states that information access serves as a permanent record available for citizens and scholars to reflect upon indefinitely. Without access to information, there can be no exchange, use, collection or management of information (Jaegar, 2007:843).

An increasingly pressing priority of many governments is to make sure that their top universities are actually operating at the cutting edge of intellectual and scientific development (Salmi, 2009:3). Ensuring that university researchers have the best access to scientific information and that their own research output is widely visible and accessible will achieve this (Kabugu, n.d.).

Access to scholarly information has undergone several changes in the recent past. The advent and rapid expansion of the internet and networked technologies and enormous increases in journal costs due to consolidation, pricing and title aggregation structures in the commercial journal publishing industry have fuelled these changes. These factors have created a scholarly communication 'crisis' leading to the exploration of new mechanisms for scholarly discourse and sharing of new research. Key among these is the support for Open Access mechanisms that include OA journals, digital e-print archives and institutional repositories (Bergman, 2006:108). Jacsó (2006:587) notes that currently, digital depositories and repositories maintained by government agencies, associations, universities, professional volunteer groups, as well as new and traditional scholarly publishers (directly or indirectly through their digital facilitators) provide the largest collections of scholarly full-text documents.

Advocates of OA emphasise the need for free and openly accessible research findings especially those from publicly funded studies (Harnard, 2011; Willinsky, 2006; Suber, 2004). Arzberger, Schroerder, Beaulieu, Bowker, Casey, Laaksonen, Moorman, Uhlir & Wouters (2004:136) argue that publicly funded research data are a public good, produced in the public interest and as such, they should remain in the public realm. Only legitimate considerations of national security restrictions; protection of confidentiality and privacy; intellectual property rights; and time-limited exclusive use by principal investigators should restrict their availability. Further, Arzberger et al. emphasise that open access to, and sharing of, data reinforces open scientific inquiry, encourages diversity of analysis and opinion, promotes new research and makes possible the testing of new or alternative hypotheses and methods of analysis. Additionally, it facilitates the education of new researchers, enables the exploration of topics not envisioned by the initial investigators, and permits the creation of new data sets when data from multiple sources are combined.

The Open Access model has a long history and several champions. Suber (2009) points out that the development of technology was the seed that triggered the Open Access (OA) Movement. Early champions of OA as we know it today include Stevan Harnard who, in 1989, launched the free online journal Psycoloquy, and has been an influential advocate of OA. Another champion is Peter Suber prolific writer, and researcher who is now regarded as the most influential and effective leader of the OA revolution (Poynder, 2011).

According to Suber (2013), Open Access literature is digital, online, free of charge, and free of most copyright and licensing restrictions. The Bethesda Statement on Open Access

Publishing (2003) describes an OA publication as one that meets two basic conditions: firstly, the author(s) and copyright holder(s) grant(s) to all users a free, irrevocable, worldwide, perpetual right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship, as well as the right to make small numbers of printed copies for their personal use. Secondly, a complete version of the work and all supplemental materials, including a copy of the permission as stated above, in a suitable standard electronic format is deposited immediately upon initial publication in at least one online repository that is supported by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, interoperability, and long-term archiving.

The Budapest Open Access Initiative (2012) recommended two primary strategies to achieve open access namely: OA through repositories (green OA) and OA through journals (gold OA) which they affirm, are direct and effective means within the reach of scholars themselves and need not wait on changes brought about by markets or legislation. Springer (2013) defines gold OA as the publication of an article by Open Access publishers or in typically peer-reviewed Open Access journals and financed either upfront through publishing fees or through public or private funds, whereas green OA is the concept of researchers self-archiving their work in online repositories (personal, institutional or subject-specific).

The possibilities offered by the web and the reaction to the ever rising cost of subscriptions to serials which had triggered the 'serials crisis' led to Open Access *per se* in the early 1990s (Bjork, Welling, Laakso, Majlender, Hedlund, & Guonason, 2010). In some disciplines especially the sciences such as Physics and Mathematics, OA models are already established as an avenue for communicating research results. The arXiv central repository is accepted among scholars in physics and mathematics for self-archiving preprints and published versions of articles and they can be freely accessed via the internet (Bernius, Hanauske, Dugall & Konig, 2013).

Harnad (2011) opines that through OA, society as a whole benefits from an expanded and accelerated research cycle in which research can advance more effectively because researchers have immediate access to all the findings they need. Additionally, the visibility, usage and impact of researchers' own findings increases with OA, as does their power to find, access and use the findings of others. Universities co-benefit from their researchers' increased

impact, which also increases the return on the investment of the funders of the research, such as governments, charitable foundations, and the tax-paying public. Hoskins (2009) observes that to mitigate some of the challenges occasioned by the scholarly communication crisis facing university libraries, librarians ought to make concerted efforts to facilitate access to local research by way of institutional repositories and free content available through OA.

Despite the benefits that OA offers, Anderson (2007:83-84) points out that like any distribution system, OA incurs costs. The decision to make content freely available does not make the costs of publication disappear but only shifts them from the library or end-user to another party, in most cases, the authors. He notes that authors usually rely on institutional support or grant funding to meet this cost. Bosch (2008) observes that at a glance, it seems that OA online articles are cheaper to produce than printed articles. However, this does not take into account the editorial costs that increase with a journal's rejection rate. These costs are made up of various professional and technical experts employed to improve the quality of accepted articles. Bosch states that one of the main arguments against OA is that to survive mainly on author charges, OA journals will either have to have very high acceptance rates - thereby reducing quality - or find support from public or private institutions, which could jeopardise their independence.

Other costs, according to Anderson (2007), include the costs of setting up a repository and the loss of revenue for publishers. Anderson emphasises that the latter is a serious concern that cannot be downplayed since a publishing system that undermines the ability of publishers to make money in the marketplace may also undermine scholars and scientists in their ability to do their work. This is because publishers add value to the scholarly communication chain and also support various scholarly activities such as conferences and peer review that will remain important in an OA environment. Furthermore, Anderson argues that author-funded OA will cause funding to be redirected from creation of knowledge to dissemination of the same, thus reducing the amount of funds dedicated to the actual research. He advises that in spite of the benefits of OA, participants should be cognisant of the underlying costs and work towards solutions that offer a net benefit to society.

Several versions (also known as types or flavours) of OA exist. Willinsky (2006) describes ten flavours, among them: *home page OA* where a university department maintains home pages for individual faculty members on which they place their papers and make them freely available; *author fee OA* in which author fees support immediate and complete access to open

access journals (or, in some cases, to the individual articles for which fees were paid), with institutional and national memberships available to cover author fees; *delayed OA* where subscription fees are collected for print edition and immediate access to online edition, with open access provided to content after a period of time (for example, six to twelve months); and *dual mode OA* in which subscriptions are collected for print edition and used to sustain both print edition and online open access edition.

Some studies have investigated the benefits of OA. In addition to improving the visibility of scientific research, OA journals have been shown to have a citation advantage over non-OA publications. Norris, Oppenheim & Rowland (2008) point out that in recent years, authors have been able to self-archive electronic versions of their work in various locations, making it OA and therefore freely available to anyone with internet access. They opine that such research has a clear citation advantage as opposed to that research that is only accessible via personal or institutional subscription. Several studies back this opinion (Xia, Myers & Wilhoite, 2011; Gargouri, Hajjem, Lariviere, Gingras, Carr, Brody & Harnad, 2010; Eysenbach, 2006; Antelman, 2004). However, several other studies show no such advantage or direct cause-effect relationship (Davis, Lewenstein, Simon, Booth & Connolly, 2008; Gaule & Maystre, 2008; Craig, Plume, McVeigh, Pringle & Amin, 2007; Kurtz, Eichhorn, Accomazzi, Grant, Demleitner, Henneken, & Murray, 2005). Critics of the open access model have based their arguments on the notion that open access publications are of lower quality stemming from lack of peer review and low impact factor of OA journals although this has been vigorously shown to be untrue (Abadal, 2012; Suber, 2002)

Several studies have been undertaken to investigate the adoption and use of OA initiatives. Studies have shown that appreciation of the open access model is increasing and already OA has a significant positive impact on the availability of the scientific journal literature (Bjork et al., 2010). From a Google search of articles published in 2008, Bjork et al. found that 20.4% of articles were published as OA. They noted differences in disciplinary uptake of OA with Chemistry having the lowest share of OA (13%) and Earth Sciences the highest (33%). Since the year 2000, several surveys have indicated an increased awareness amongst scholars concerning OA (Hess, Wigand, Mann & von Walter, 2007; Warlick & Vaughan, 2007; Swan & Brown 2005, 2004a, 2004b; Rowlands & Nicholas, 2005). Park & Qin (2007) identified seven factors (perceived journal reputation, perceived topical relevance, perceived availability, perceived career benefit, perceived cost, perceived content quality, and perceived

ease of use) that increase or decrease scholars' willingness to publish and use articles from OA journals. However, Xia (2010) notes that although studies have shown that scholars have become more knowledgeable about OA journal publishing and have expressed interest in contributing to OA journals, there is no concrete evidence to show fulfilment of this interest.

In relation to this, it has also been shown that authors are not depositing articles in institutional repositories as much as it had been hoped. The OA movement advocates the establishment of institutional repositories (also known as the Green model of OA) as one of the information access mechanisms. Here, authors are required to populate the repository through self-archiving or posting articles destined for or published in subscription-based journals (Bankier & Perciali, 2008:21). This would give authors wider dissemination of their papers, thus allowing their research to have an impact in countries and institutions that would otherwise not afford to subscribe to the journal in which the paper originally appeared. Swan & Carr (2008:32) opine that the primary reason for establishing an open access digital repository is to increase the visibility of the institution's research output. This has a direct impact on the rating of world universities in the various global ranking systems. In spite of the evident advantages of having such an IR, studies have shown that recruiting content for the repositories is a challenging undertaking (Salo, 2008; Swan & Carr, 2008; Bankier & Perciali, 2008; Davis & Connolly, 2007; Rowlands & Nicholas, 2005).

A few studies have undertaken to understand why, and recommend ways in which the IR can play a more effective role in scholarly communication (Ferreira, Baptista, Rodrigues & Saraiva, 2008; Davis & Connolly, 2007; Foster & Gibbons, 2005). The studies show that faculty members and university researchers want to do their research, read and write about it, share it with others, and keep up in their fields without necessarily engaging in any additional activity that will eat into their research and writing time (Foster & Gibbons, 2005). Reasons for non-use of repositories include: redundancy with other modes of disseminating information; the learning curve; confusion and fears associated with copyright; fear of plagiarism; associating one's work with inconsistent quality; time and effort required to upload items into an IR; and faculty lack of knowledge regarding the advantages of Open Access (Kim, 2010; Ferreira et al., 2008; Davis & Connolly, 2007). The authors suggest strategies to improve adoption of IR including promotion (through presentations, papers, interviews, news in the press, promotional materials, flyers, websites, etc., and participation in meetings, conferences, workshops and projects related to OA); development of

informational and value-added services for authors and readers especially to educate them on intellectual property rights; increased engagement with international communities in Open Access and institutional repositories; and definition of institutional self-archiving policies and creating financial incentives to increase deposit in the repositories.

OA has been proposed as an ideal model to improve access to information for scholars in the developing countries whose inability to access the global library of research information is a disadvantage (Chan, Kirsop & Arunachalam, 2005). Quite a few studies have been undertaken to establish levels of awareness of the OA model among scholars in developing countries and their levels of adoption of the same (Chalabi & Dahmane, 2011; Khalili, 2011; Dulle & Minishi-Majanja, 2009). The studies show that there is increasing awareness and acceptance of the OA model amongst scholars and most of the researchers would support OA publishing more if issues of recognition, quality and ownership were resolved.

The present study seeks to add to knowledge concerning awareness and acceptance of current strategies for increasing access to scholarly content amongst scholars in developing countries specifically Kenya. One of these strategies is open access through which scholars can make their research available to the widest possible audience while improving the discoverability of the research. The key question this study addresses in this regard is "*To what extent do existing institutional facilities in the universities support scholars' research and communication needs?"*

3.7 Ranking of World Universities

According to Salmi & Saroyan (2007), over the past 20 years, universities that were largely autonomous are now being challenged to be more accountable for their performance and the use of public resources. Demands for increased accountability emanate from students, governments, employers and the public at large. Various forms of accountability are used including accreditation, cyclical reviews, external evaluation by peers, inspection, audits, performance contracts based on predetermined indicators, benchmarking and research assessments. Other types of evaluation are based on reputation and peer review as a measure of the quality of education offered by institutions.

At present, ranking systems (also known as league tables or university report cards) are the most widely known tools for evaluating the performance of universities. Although criticised by some and welcomed by others, clearly they are here to stay (Stensaker & Kehm, 2009;

Salmi & Saroyan, 2007; van Dyke, 2005). According to Usher & Savino (2006:38) university rankings satisfy a public demand for transparency and information that institutions and governments have been unable to meet on their own. In their opinion, as higher education becomes more costly for individuals and families, the demand for comparative information on universities will increase. Several authors (Marginson, 2014; Hazelkorn, 2011; Salmi & Saroyan, 2007) observe that in spite of the criticism they receive, these performance indicator exercises have an almost hypnotic power that universities and the public alike seem unable to resist. Governments and institutions, the press and political parties, and students have all responded in one way or another to the power of university rankings as the institutions battle for worldwide excellence.

It is worth noting however that the rankings have been widely criticised on various fronts for their alleged data and methodological flaws. Specifically, detractors question the rankings' methodology that emphasises what can be measured rather than what is relevant and important for educational institutions; overemphasis on research over teaching; the arbitrary nature of the weightings and rankings formula considered by some to be limited, subjective and fickle; their bias towards the sciences and towards older and better endowed institutions; bias towards English publications; and the general feeling among critics that higher education is too complex a product and that consumers' individual preferences are too diverse for all institutions to be fairly judged by a singular ranking scale (Marope & Wells, 2013; Woodhouse, 2008; Diver, 2007; Salmi & Saroyan, 2007; van Dyke, 2005)

University rankings trace their origins from as early as 1870 when tertiary institutions in America were first ranked by the Commission of the US Bureau of Education (Salmi & Saroyan, 2007). The ranking systems as we know them today were initiated in the early 1980s by the US News & World Report (an American periodical) which ranked American universities against each other to meet a perceived market need for more transparent, comparative data about educational institutions (Usher & Medow, 2009; van Dyke, 2005). Salmi & Saroyan (2007) view the current ranking systems as broadly categorised into national and international systems with more of them existing in industrial countries. However, although most rankings are national in focus, more attention is given to global ranking systems owing to the emerging global economy, trade and liberalisation and increased mobility among students and academic staff (Stensaker & Kehm, 2009:x). Today's notable ranking schemes include the Academic Ranking of World Universities (ARWU),

Times Higher Education (THE) World University Rankings, QS World University Rankings, and the Webometrics Ranking of World Universities among others (Mohamedbhai, 2012).

According to Usher & Medow (2009:4), university rankings are lists of groupings of institutions comparatively ranked according to a common set of indicators in descending order from best to worst. The rankings are made up of a series of individual indicators used to present a statistical picture about a range of institutional qualities or activities thereby emphasising differences between institutions. These rankings are meant to help citizens understand what they are getting for their public expenditure on education and to help parents and students make informed decisions about where to spend their private dollars on education. Additionally, they are a valuable tool for policy makers, helping to inform strategic choices about the overall design of higher education systems (Bengoetxea & Buela-Casal, 2013:68). However, the rankings have also been viewed as serving a commercial motive in that they are a form of business transaction geared towards enhancing the economic fortunes of institutions being ranked as well as the fortunes of ranking bodies (Obasi, 2008:201).

The different ranking systems are based on a large variety of indicators as representations of quality. Indeed, Usher & Savino (2006) report that the indicators run into hundreds thus compounding the comparative analysis and assessment of quality by the different ranking systems. Several authors, (Usher & Medow, 2009; Usher & Savino, 2006) have attempted a categorisation of these indicators to enable a more manageable understanding of the same. In their survey of the different ranking systems, the authors reveal that the ranking systems each place differing weighting on each of the indicators and then aggregate these weightings to arrive at a single, all-encompassing quality 'score'. The categories are:

i) *Beginning characteristics*, which represent the characteristics, attributes and abilities of incoming students as they start their programs.

ii) *Learning inputs*, which come in two main types:

- *resources* (both financial and material) available to students and faculty for educational purposes;
- *staff*, in terms of their numbers and the way in which they are deployed to teach and the learning environment they create, as measured by the amount

of contact time students have with their teachers, the kinds of exams they face, etc.

iii) *Learning outputs*, which represent the 'skill sets' or other attributes of graduates, which culminate from their educational experiences, such as critical thinking, analytic reasoning and technical knowledge. They also include records relating to retention and completion.

iv) *Final outcomes* represent the ultimate ends to which the educational system may contribute, including measures such as employment rates, incomes, job satisfaction, being a 'good citizen', etc.

v) *Research* indicators relate to universities' research efforts including research staff, bibliometrics (counting of publications and citations), academic quality of research, research awards, research budgets and number of doctoral and master's programs offered.

vi) *Reputation* and peer appraisal indicators are based on the assumption that the employers, academics and academic administrators surveyed have opinions of institutional quality that are informed, up-to-date and impartial.

vii) *Internationalisation* indicators place emphasis on institutional participation or membership in international research or institutional arrangements, the number of international students and professors at an institution.

viii) *Learning environments* relate to students' satisfaction with various aspects of institutional life, perceived difficulty of classes, coherence of material presented, relevance of material presented to the world of work and student engagement.

With ranking becoming a growing industry and with the varied reactions they are eliciting among various stakeholders, the issues of concern are: are they appropriate/inappropriate measure of quality in tertiary education? Are they relevant to all institutions? Can they be adapted to become relevant to the information needs of developing countries? Do they have any benefit for public policy, accountability and consumer information? (Salmi & Saroyan, 2007).

It is in light of the queries by Salmi & Saroyan (2007) that the implications of the rankings for developing countries and especially for Africa must be scrutinised more closely. Okebukola (2013) opines that for Africans, the global ranking schemes provide little help since over 90% of the higher education institutions are not covered by the top ranking schemes (usually considered as Webometrics, Times Higher Education (THE) World University Rankings and Academic Ranking of World Universities (ARWU)). Obasi (2008:214) also points out that the agenda of the rankings is not necessarily to highlight the providers of higher quality education among global universities. Rather, it is to satisfy business and profit forces and thus African universities should not worry about them since their agenda would potentially lead them away from their mission which is to provide higher education as a public good. This is echoed by Oyewole (2010:10) who asserts that many of these world rankings are suitable for well-developed higher education systems but do not cater for the needs of universities in developing countries, which need to focus on capacity-building, and relevance rather than status-building or prestige. On the other hand, however, a few studies have shown that the rankings have been positively received in Africa and that they have influenced various stakeholders namely: parents and potential students in their selection of institutions; labour employees have used them to select graduates from the best-ranked schools; and staff unions have used them to back their requests for improved working conditions (Okebukola, 2013:150). Obasi (2008) affirms that while African universities should not lose sleep over the ranking systems, they should use the lessons from the exercise as diagnostic tools for improving their teaching, research and learning environment.

In connection with the foregoing, the study sought to establish the extent of awareness of the ranking schemes among scholars in the universities in Kenya. Specific questions were: *Are you aware of the universities' ranking system and criteria used? Would you say they are applicable to our local universities?*

3.7.1 The Webometrics Ranking of World Universities

The Webometrics Ranking of World Universities (http://www.webometrics.info/) was launched in 2004 as an initiative of the Cybermetrics Lab, a research group belonging to the Consejo Superior de Investigaciones Científicas (CSIC), the largest public research body in Spain. The original aim of the ranking was to promote web publication, support Open Access initiatives, electronic access to scientific publications other academic material. Its objectives are to provide, every 6 months, reliable, multidimensional, updated and useful information

about the performance of universities from all over the world based on their web presence and impact (Cybermetrics Lab, 2013b). The Webometrics Ranking of World Universities is considered the largest global academic ranking of higher education institutions. Its increased coverage to include over 20,000 higher education institutions allows nearly all higher education institutions worldwide to compare themselves with others (Rauhvargers, 2013). For this reason, this ranking tool is the focus of this study since it has made it possible for most African universities, which are largely excluded by the other tools, to be ranked.

The Webometrics ranking considers any university with an independent web domain although the objective is not to evaluate websites, their design or usability or the popularity of their contents according to the number of visits or visitors. Rather, web indicators are very useful for ranking purposes as they are pointers to the global performance and visibility of the universities. The ranking is not only focused on research results but also in other indicators which may reflect better the global quality of the scholar and research institutions worldwide. (Cybermetrics Lab, 2013b).

The Cybermetrics' webometric ranking is based on a composite measure made up of four indicators (presence: 16.7%; impact: 50%; openness: 16.7%; excellence: 16.7%). Olsbo (2013) clarifies that the presence indicator is defined as the total number of webpages hosted in the main web domain of the university, which Google indexes. The impact indicator is evaluated through a "virtual referendum", counting all the external in-links that the University web domain receives from third parties. In the openness indicator the global effort to set up institutional research repositories is explicitly recognised and it takes into account the number of rich files published in dedicated websites according to Google Scholar. The excellence indicator analyses academic papers published in high impact international journals. The indicator is restricted to only those excellent publications being part of the 10% most cited papers in their respective scientific fields.

Apart from bibliometric indicators which have long been used to evaluate formal research activity (Moed & Visser, 2007; Okubo, 1997), webometric evaluation considers a wider range of scholarly activity reflected on web pages. These include teaching materials, raw data, drafts, slides, software, bibliographic or link lists which are also relevant and inform about the commitment of professors to their students. This information, made publicly available through the web, speaks of the high academic level of the university (Aguillo, Ortega & Fernandez, 2008). Aguillo et al. (2008:233) opine that websites are the most

efficient and cheapest way for boosting all three academic missions of a university namely teaching, research and transfer.

The evolution of the web has allowed the inclusion of a large volume of information reflecting academic and research activities (Aguillo, Granadino, Ortega & Prieto, 2006). It is therefore of paramount importance to take into consideration web publication not only as a primary tool for scholarly communication but as a true reflection of the overall organisation and performance of universities (Aguillo, Ortega & Fernandez, 2008:233). Cybermetrics Lab (2013c) contend that in the second decade of the 21st century, the web is key for the future of all the university missions, as it is already the most important scholarly communication tool, the future channel for the off-campus distance learning, the open forum for the community engagement and the universal showcase for attracting talent, funding and resources. Furthermore, web publication is cheaper, maintaining the high standards of quality of peer review processes. It could also reach much larger potential audiences, offering access to scientific knowledge to researchers and institutions located in developing countries and also to third parties (economic, industrial, political or cultural stakeholders) in their own community (Cybermetrics Lab, 2013b)

The benefit of webometrics notwithstanding, this ranking approach has been criticised since it is highly dependent on the functionality of search engine algorithms. The algorithms may not index all pages on a website although they contain useful information. This could be attributed to poorly written headers, titles or meta-tags, incorrect syntax and missing tags. Another challenge is that dynamic websites do not lend themselves to being well indexed because of heavy use of scripts. Simply put, scripts are small programs running within larger programs comprising a series of commands that can be executed as required by a user. Dynamic websites use these to generate pages as and when needed making them less friendly for indexing by search engines. A dynamic website contains information that changes, depending on the viewer of the site, the time of the day, the time zone, the native language of the country the viewer, and other factors. The problem with indexing dynamic websites is that, search engines cannot decipher, and are not trained to understand a dynamic website's URLs. These URL's contain special characters, that is (?;=;#;&;!) generated by scripting languages. Most of the search engines check the URL for these characters and then ignore them. Furthermore, the larger the website, the smaller its visibility owing to the limited time that most search engine crawlers can spend on a particular website. All these factors can

compromise the visibility of an institution's website and therefore its web rank (Nissom & Kulathuramaiyer, 2012; Wouters, Reddy & Aguillo, 2006).

In spite of the benefits that the web has offered the academic community for wider dissemination of its research output, Africa still faces problems in communicating its research findings which are rarely indexed in major international databases (Association of African Universities, 2014) now found mostly online. Mejabi & Babatunde (2010) note that, researchers' requests for information on research outputs from Africa, on the international scene, are difficult to meet because most of the reports are in the traditional printed form in library shelves and are therefore not visible or accessible. Mejabi & Babatunde recommend that African universities use their university websites more actively in facilitating access to their academic staff publications. Providing hyperlinks to the actual complete publications or abstracts on the website will achieve this. In addition, a regular summary of published research works by academic staff and students should be placed on the websites.

In the various ranking schemes, it is noteworthy that African universities perform poorly with few (mostly from South Africa) making it to the top (Obasi, n.d; Mohamedbhai, 2012). In the January 2013 webometric ranking, only two African universities reflected in the top 500, that is, Stellenbosch University (at position 400 globally) and University of Cape Town (ranked 456th globally), both in South Africa (Cybermetrics Lab, 2013a). In the same ranking, University of Nairobi is ranked best in Kenya but is positioned 1326th on the world rank and 10th in Sub-Saharan Africa. Kenyatta University on the other hand is second in Kenya, 17th in Sub-Saharan Africa and ranked 1706th globally. In a comparative study of South African and universities in Kenya performance on the World Wide Web, Onyancha & Ocholla (2007) found that South African universities were more prolific, producing on average 55,090 pages per university whereas universities in Kenya produced only 382 pages per university. The lack of web visibility of African universities, and specifically universities in Kenya, could be blamed for their poor performance in the ranking schemes. Onyancha & Ocholla recommend that for African universities to compete favourably with the rest of the world and perform better than they are currently performing on the Web there is an urgent need to invest in information technology and to popularise the Web within institutions whilst engaging the services of qualified webmasters in the design and construction of their websites. Other strategies could include: formulating minimum web development standards; revisiting link development and codification policies so as to increase links for visibility; and

placing/locating institutions' products on the web through tools such as Open Access and institutional repositories.

The key questions that this study undertook to address in terms of how Kenyan institutions are providing visibility for the research activities of their scholars were: *"To what extent do existing institutional facilities in the universities support scholars' research and communication needs?*"

3.8 Knowledge Management Processes in a University Setting

In the wake of the emergence of a 'knowledge society', and the 'knowledge economy', 'knowledge' and 'information' are considered public goods and essential ingredients of development. It is now widely accepted that value addition in organisations is in the form of knowledge and not 'objects' or 'things' and knowledge is now the central focus in institutional planning and management (Hoq & Akter, 2012:92-93; Sörlin & Vessuri, 2007). The Organisation for Economic Co-operation and Development (OECD) (2005) defines the knowledge based economy as "an expression coined to describe trends in advanced economies towards greater dependence on knowledge, information and high skill levels, and the increasing need for ready access to all of these by the business and public sectors". Ghosh & Ghosh (2009:188) point out two reasons for the development of knowledge-based societies: firstly, the explosive growth in knowledge, especially in science and technology and second, the people who are moving out of primary occupations, such as agriculture and industry, into the services sector, where their survival and success depend on their ability to deal with information and knowledge. According to Brinkley (2008:17-18), as firms and organisations rely increasingly on the exploitation of knowledge to secure competitive advantage and better performance, so they invest more in knowledge based and intellectual assets – in R&D, software, design new process innovation, and human and organisational capital.

Serbu & Pruteanu (2009) acknowledge that higher education, represented especially by universities incorporating research features, holds a central place in a knowledge-based economy. Expectations of such an economic system type are reflected by the active involvement of universities in promoting research, innovation and technological change, starting locally and continuing to regional and national level. To survive in the knowledge-based economy, the role of universities must change to focus more on the 'third mission'

activities, and where patenting, licence income, and cooperation with firms rank highly on the list of performance criteria (Sörlin & Vessuri, 2007:10). Third mission activities have been defined variously as those activities that go beyond the teaching and research missions of the university to include 'community engagement', 'technology transfer', 'socio-economic engagement' and 'entrepreneurial culture' (Zawdie, 2010; Nelles & Vorley, 2010; Business/Education Round Table, 2006).

Indeed, Sörlin & Vessuri (2007) confirm that worldwide, in the wake of liberalisation of economies, the global mobility of citizens, capital resources, knowledge, and the increasing demand of skilled labour, the landscape of higher education and the sectors of research and knowledge production are undergoing profound transformation. Some of these transformations have found expression in terms such as 'post-normal science', 'strategic research', 'innovation systems', 'academic capitalism', 'post-academic science', the Triple Helix, and the concept of 'Mode 2' knowledge production (Hessels & van Lente, 2008). These approaches study changes in the science system, acknowledging in various ways and levels that the relationship between science and society is changing with society becoming an active rather than passive partner and is 'speaking back to science'. In this transformation, researchers are more aware of the social consequences of their work; there is the spread of centres for excellence and relevance and a commitment by universities to both regionalism and academic excellence; increased interaction across disciplinary and organisational boundaries and increased interdependence between industry, university and government. Furthermore, there is an increase of market and market-like activities at universities including competition for external funding and various for-profit activities such as royalty and licensing agreements, spin-off companies and university-industry partnerships with a profit component. Additionally, knowledge production that was formerly located primarily at scientific institutions (universities, government institutes and industrial research labs) now has a heterogeneous face. Sites for knowledge generation now include research centres, government agencies, think-tanks, high-tech spin-off companies and consultancies.

It is a fact that knowledge is power but effective use of this power is possible only by managing it properly. This can be done by knowledge management (Mikulecký & Lodhi, 2009). Knowledge management in a university setting involves the three knowledge management processes carried out with the help of the Knowledge Management Technology Framework proposed by Botha et al. (2008). The processes are knowledge creation and

sensing, knowledge sharing and dissemination and knowledge organising and capture. Management of these is facilitated by technology enablers and applications including knowledge bases/repositories, communication infrastructure, collaboration systems, intelligent agents (such as automated information retrieval tools) and knowledge discovery, among others. Mikulecká & Mikulecký (2000) opine that a university environment seems to be by its nature, especially suitable for the application of knowledge management principles and methods because universities usually possess a modern information infrastructure; sharing knowledge with others is natural for professors and teachers in general; acquiring knowledge from accessible sources as fast as possible is a natural desire of students; and there is usually a trustful atmosphere at universities therefore no one is hesitant or afraid of publishing or otherwise disseminating his or her knowledge. In higher education institutions, knowledge management refers to the activities of acquiring, creating, storing, developing and organizing intellectual capital to achieve the objectives of the organisation (Ridzuan, Sam, & Adanan, 2008).

A number of authors (Hoq & Akter, 2012; Tian, Nakamori & Wierzbicki, 2009; Mohayidin, Azirawani, Kamaruddin & Margono, 2007) have analysed the various knowledge management processes in a university setting. Universities and research institutes constitute social academic communities that play a vital role in creating and transmitting scientific knowledge, which is the fundamental source and driver for societal progress and development. Specifically, universities are seen as 'knowledge hubs', where diverse activities are carried out for the generation, preservation, diffusion and application of knowledge. Teachers, students and researchers are integral parts of academic institutions and all of them are engaged in the above activities.

According to David & Foray (2002), knowledge creation is the ability to invent and innovate, that is, to create new knowledge and new ideas that are then embodied in products, processes and organisations. Universities remain at the centre of knowledge production in spite of the diversification of the sites of knowledge production (Godin & Gingras, 2000). McFadyen et al. (2009) observe that knowledge creation requires the combination and exchange of diverse and overlapping knowledge inputs as individuals interact with exchange partners to create new knowledge. In a university setting, this is a result of the professional ego networks that researchers engage in, that is, the collaborations they participate in for the purpose of creating new knowledge. As Botha et al. (2008:173) point out; individuals learn and grow their

knowledge in a stimulating environment for knowledge creation. Travaille & Hendriks (2010:431-433) assessed the factors and enabling conditions leading to successful knowledge creation in university research by studying success at individual, group and institutional levels. Their study revealed that these factors include the scientific and technical knowledge and creativity possessed by an individual; characteristics and talents of knowledge carriers at the individual, group and institute levels such as perseverance and ambition of individuals and skills such as communication and presentation skills needed for collaboration with other knowledge carriers; the manifestations of the produced knowledge such as published papers, citation indexes, granted proposals and invitations to international conferences; and the management context of knowledge which are factors concerned with adequacy of regulation at all possible levels and for all possible subjects. This includes responsibility for the entire institutions, supervision of students, the self-management of an individual, the skills of managers, their sphere of influence and the roles they play in an organisation.

Another knowledge management process in a university setting is knowledge sharing and dissemination. According to Botha et al. (2008:48-49), knowledge dissemination (also known as transfer or diffusion) is the process by which new knowledge is communicated through certain channels over time among members of a team or organisation. Without effective dissemination, even vast pools of high-quality knowledge would be worthless. Botha et al. reveal that communication of new knowledge can occur among people through education (from an expert to a novice); sharing (formal or informal sharing of ideas and knowledge); storytelling; writing and publishing; exposing people to high-quality sources of knowledge, and making knowledge and expertise easy to find.

According to Ridzuan et al. (2008:73), universities are expected to be places where knowledge is shared freely among academicians but the reality shows that knowledge sharing is barely present in universities these days. Academics prefer to share knowledge with colleagues who have shared knowledge with them before and feel more cohesive with peers in the same research topic rather than with people from unrelated departments or with the entire university. Bartol & Srivastava (2002:65) identify four major mechanisms for individuals to share their knowledge in organisations, which academics can borrow from (Ramayah, Yeap & Ignatius, 2013:133): contribution of knowledge to organisational databases; sharing knowledge in formal interactions within or across teams or work units;

sharing knowledge in informal interactions among individuals; and sharing knowledge within communities of practice (an ideal that is strongly supported by Botha et al., 2008).

Much has been written on knowledge sharing with the acknowledgment that it is a key aspect of knowledge management. Without it no effective knowledge management processes can take place and only when employees are willing to share knowledge with colleagues can organizations begin to manage knowledge resources effectively (Goh & Sandhu, 2013; Lin, 2007). Successful knowledge sharing has been found to be influenced by individual commitment to the organisation, interpersonal trust, communication between staff and the general communication climate in the organisation, information systems and computer mediated communication, reward systems based on group rather than individual performance, and organizational structures. Lack of these will hamper knowledge sharing (Buckley, 2012; Botha et al., 2008; Al-Alawi, Al-Marzooqi & Mohammed, 2007; van den Hooff & de Ridder, 2004). Knowledge sharing is also hindered by the fact that majority of employee knowledge is in people's brains, having been accumulated over time and making sharing a challenging task (Liebowitz & Chen, 2003). Buckley (2012) also identifies additional inhibitors in an academic setting namely time constraints, unwillingness among academics to share knowledge, and a lack of support or participation from management. Organisations, universities included, therefore need to explore and understand these factors in order to create an ideal environment that will facilitate knowledge sharing at appropriate levels.

Knowledge management also encompasses knowledge organising. In the Botha et al. (2008) model, organisation follows once knowledge exists and has been captured. Capturing knowledge entails activities that record and convert tacit knowledge to explicit knowledge thereby moving that knowledge from the personal domain into the public domain to be accessed by teams, communities and the organisation at large. According to Nonaka (1991) tacit knowledge is highly personal and experience based knowledge. It has a cognitive dimension consisting of mental models, beliefs and perspectives as well as technical skills and know-how that cannot easily be expressed in words, sentences, numbers or formulas so as to be conveyed to other people. On the other hand, explicit knowledge is formal, objective and systematic and can be expressed in words, sentences, numbers or formulae. It includes theoretical approaches, problem solving, manuals and databases that can be easily communicated and shared in product specifications, scientific formulae or computer programs.

Once knowledge has been captured, it needs to be organised. Botha et al. (2008:50) define this as those activities that classify, map, index and categorise knowledge to enable navigation, storage and retrieval. According to Lambe (2007:3) knowledge organisation is a fundamental precondition for managing knowledge effectively. The purpose of organisation includes efficient retrieval, but it goes beyond that and enables other interesting and useful tasks such as knowledge-building, identifying novel knowledge relationships, sense-making, managing complexity, diagnosis and decision-making, pushing knowledge assets in useful directions, and controlling the flow of knowledge and information. As Lambe puts it, knowledge is externalised and communicated most obviously via information and therefore information organisation is also, by extension, knowledge organisation. Malafsky & Newman (n.d.) explain that managing knowledge includes defining a structure to organise information into categories of main concepts and then by terms to group similar items. The concepts are defined in an ontology that maps the main ideas and their relationships. It also includes the creation of a set of terms that defines how to label items according to the concepts described in the conceptual map. This structured set of terms is a taxonomy.

Botha et al. (2008) advise that in the face of modern organisations which are experiencing an information explosion, knowledge organisation techniques must adopt new technologies to assist knowledge workers to integrate the large amounts of available information and locate it from the many sources and different locations. Modern technology presents several tools that enable capturing, storing and provision of wide access to information and/or knowledge. Such tools include communication infrastructure (such as internet-type technologies and intranets, interactive multimedia, intelligent agents, human-centred interfaces and collaboration tools); knowledge bases/repositories that employ various search methodologies to enable knowledge workers to access the knowledge they require; HTML publishing tools for producing web-type documents and/or preferably the ability to at least distribute knowledge in XML format and with XML extensions to incorporate taxonomies and ontologies; and online thesauri to facilitate search and retrieval of knowledge.

Hoq & Akter (2012:93) state that universities, as the highest centres of education, learning and research, need effective management of their intellectual and knowledge assets. Management of these assets is becoming more and more important as universities strive to ensure quality education and research within their limited budget. In their opinion, since universities are complex academic institutions which undertake research as the most

important activity setting them apart from other academic institutions, they require the presence of huge information repositories and accessibility to online and offline sources of information. Hoq & Akter emphasise that university knowledge management systems must take adequate measures to foster creation and sharing of knowledge among the researchers as well as the teaching and non-teaching staff, students, patrons and other stakeholders. The authors observe that in the university, although the knowledge acquired by teachers and researchers are regularly captured by scholarly journals, books, compilations, etc., this knowledge usually remains scattered without necessary links and correlations being made among them. Therefore, it is the task of the knowledge management team to establish these links and correlations and manage the knowledge in a coherent form.

This study undertook to address questions touching on aspects of knowledge management in universities in Kenya. Examples of specific questions were: '*How often do you spend time on personal interactions with colleagues so as to discuss ideas, solutions, and scientific proposals'; 'Please comment on some of the specific services you are providing as a department to support your academic staff and graduate students in promoting their research and scholarly communication'; 'Does your university have an institutional repository?';* and *'Please comment on the ability of the existing ICT infrastructure at your university to support your efforts in accessing research output by other scholars and disseminating your own'.*

3.9 Institutional Support for Communication and Research Needs of Scholars

Previous studies have found that research or scholarly productivity is a crucial area for scholars in a university setting (Hardré, Beesley, Miller & Pace, 2011; Harley et al., 2010). Scholars need to show evidence of publication especially in high impact refereed journals to gain tenure, promotion and recognition among peers. Scholarly productivity through refereed journal articles, books and book chapters is one of the indicators of the research activity and capacity of individuals, institutions, countries and regions as a whole (Wamala & Ssembatya, 2013). Other measures of research productivity include gaining grants, supervising research students both PhDs and others, serving as a peer-reviewer of grants and papers, examining PhDs and filing patents (Wooton, 2013). Further to that, Jonker & Hicks (2014) observe that scholars are also supposed to pay attention to teaching and service (which includes administrative and committee work and service on professional bodies, editorial boards and community involvement, among others) as part of their normal workload.

Freedenthal, Potter & Grinstein-Weiss (2008) state that to achieve the levels of productivity required especially for research and scholarly communication, institutions need a culture of scholarship where positive peer pressure lays emphasis on research and it is seen as an institutional and professional core value. Furthermore, there is the provision of adequate resources, both material and intangible for faculty to develop and sustain a research agenda. According to Freedenthal et al., these resources can be divided essentially into three categories namely time to pursue scholarship, funding to pursue scholarship and technical expertise, assistance and training. Lack of time dedicated to research has been shown to be a barrier to productivity. This is often linked to heavy workload most often as a result of teaching obligations. Levels of funding available for scholarship can affect the level of scholarly productivity. Finally, the availability of support from other people may also encourage scholarly productivity. This support includes grant preparation assistance, statistical consultation and training, and mentorship for junior faculty and other new investigators. The authors found a positive relationship between institutional support and faculty productivity. This has been corroborated by other studies (McGill & Settle, 2012; Fennewald, 2008; Gruppen, Frohna, Anderson & Lowe, 2003). Lynch et al. (2009) found that institutional support shows a significant effect on research activity. As institutional support for research increases, the amount of research activity increases as well.

In addition to these ways of supporting scholarship in universities, studies have found that the presence of other factors influence research productivity. Dundar & Lewis (1998), Hollingsworth (2004), and McGill & Settle (2012) recognise opportunities for collaboration and communication with colleagues both within and across disciplines and thematic borders; size of the department's faculty giving opportunity for collaboration and reinforcement; improvements to office and other spaces; increased funding to attend conferences; staff support (including support for teaching and research assistants); whether a university was public or private, with private universities having higher research productivity; and size of the institution, with larger institutions more likely to attract high-quality researchers and have more resources and freedom to decide how the resources will be utilised.

In considering research productivity, Weiler, Guri-Rosenblit & Sawyerr (2008) opine that it is a function of research capacity. According to McIntyre and McIntyre (1999), research capacity is conceived as the most and best research which could be done now if there were the political will and the necessary resources for it to be done. Research capacity is viewed as

being dependent on appropriate and adequate expertise, motivation and opportunity. Weiler, Guri-Rosenblit & Sawyerr (2008:16-17) describe the ingredients of research capacity. They include: *capable researchers* including faculty, research staff, and graduate students (these researchers have to be adequately selected and trained in research design, research methodology and research organisation); *time* for these researchers to achieve competent and significant research results; *functioning and adequate infrastructures* including laboratories, libraries and access to digital and computational resources (absence or inadequacy of these would frustrate otherwise capable researchers); *research climates* where research is valued, supported and autonomous (such support ought to come from both political leadership and public opinion); *predictable and sustained funding* both for research projects and indirect funding for research infrastructure; *optimal structural conditions* for research in terms of the institutional resources and facilities for research (the authors observe that in most cases these are unduly dispersed and duplicated rarely achieving economies of scale. They advise that these structures should be pooled, and shared across institutions or even across borders); *Research ethics* helps keep researchers resist the various temptations that result from outside research funding, conflicts of interest, or sheer pressures of work (these ethical standards are indispensable for maintaining the integrity, openness, and transparency of the research process, and to safeguard intellectual property); c*ritical perspectives* in terms of criticism and critique that helps to keep research from becoming self-serving and introvert (in preparing future researchers, these perspectives should be inculcated in the training so as to help them develop the ability to critically examine their own research and that of others).

As part of research capacity, modern scholars and researchers rely heavily on modern technological tools for their scholarly and research activities. As JISC (2014a) and Schmiede (2009) acknowledge, computation and ICTs in general, have become a key component to many research areas, massively reshaping scholarly work and its conditions. Provision of mid-level systems, the integration of appropriate applications and collaborative technologies sitting upon leading-edge network technology will enable researchers to fulfil research challenges they otherwise cannot meet. Several studies (Veletsianos & Kimmons, 2012; Ball, 2011; Ponte & Simon, 2011; Maron & Smith, 2008; Barjak, 2006) have analysed the role of technology in enhancing research and scholarship. According to Ball (2011:10), technology has given rise to E-science (short for Enhanced Science) in which information and knowledge technologies have facilitated, improved and intensified research processes. With local computers, virtual collaboration and Open Access, a new method of scientific work is

available for scientists. The studies show an increasing reliance on the internet and the participatory web, such tools as blogs and online social networks may enable scholars to remain current in their research field, explore new approaches to teaching via networking with colleagues, interact with individuals mentioning their research/work, and expose their work to larger audiences.

Numerous authors have written about the role of libraries in supporting scholarly communities which, according to Weiler, Guri-Rosenblit & Sawyerr (2008), are part of the infrastructure that will influence research productivity. This is echoed by Harle (2009) who states that good libraries are a critical part of any university's research and teaching, whether in physical or digital form. Brandt (2007:365) opines that long recognised as organisers, enrichers, and disseminators of information, librarians have often been pioneers in developing systems, process, and approaches to the delivery and use of information—from developing finding aids for archival materials, to cataloguing and classifying print sources, to developing indexes and taxonomies for databases. In the modern age of technology, the demand for their knowledge and ability to collect, organise, describe, curate, archive and disseminate data and information is increasing.

Research Information Network & Research Libraries UK (2011) found that libraries are evolving in their service to individual researchers and at the same time supporting the research performance of their host institutions. Access to high-quality content remains crucial to research and with the research environment continuously evolving, libraries' central and impartial position, together with their information and organisation expertise, puts them in a good position to play a wide institutional role and deliver new value. According to Maceviciute (2014), modern libraries are responding to change with new approaches and solutions including new library infrastructure which encompasses both physical and information infrastructure enabling patrons to use the library and its resources in more ways than one; acquisition, collection management and knowledge organisation especially for digital information resources including e-journals and e-books; and access provision where the modern research library has to deliver access anywhere, anytime. One way this has been achieved is through open access achieved by taking over the creation and maintenance of institutional repositories. Ball (2011:2) emphasises that scholarly communication and libraries are mutually dependent. That is why the new, emerging paradigm shift from the

communication via books to communicating digitally is of fundamental importance for both science and libraries.

In the African perspective, several authors have elaborated on the research capacity of Africa's research institutions. Sawyerr (2004) found that research is underfunded, a situation largely caused by difficult economic circumstances combined with policy bias against public financing of higher education. Over-reliance on external knowledge sources has rendered local knowledge generation increasingly uneconomic, directing resources away from support for the local production of modern knowledge. Additionally, weak graduate study programs and poor management of existing research have contributed to the poor state of Africa's research capacity. A study of medical schools in sub-Saharan Africa (Mullan et al., 2011:1118) found that researchers face challenges in accessing research grants such that less than 10% of faculty members are involved in sponsored research. Additionally, staff shortages at many schools increase the teaching load, restricting time available to pursue research. Harle (2009) notes that many African libraries have struggled to maintain good collections in the face of falling budgets, rising purchasing costs, and expanding student numbers. However, such is the diversity of institutions and their facilities and resources that continental generalisations are not possible. Harle, for example, found that South African universities are very different from their counterparts in other countries, but even within countries (and this is also true of South Africa) there is often substantial variation, with major national research universities enjoying better access and facilities, and with public and private institutions differing considerably.

On the whole however, Harle (2009) observes that ICT facilities are improving in many universities, underpinned by a greater awareness of the need to place ICT at the heart of university strategy. The African continent is benefitting from improved ICT broadband infrastructure brought about by various cable projects notably SEACOM (South East Asian Telecommunication Cable), EASSy (The Eastern Africa Submarine Cable System), WACS (West Africa Cable System), East African Backhaul System (EABS), TEAMS (The East African Marine System), and MainOne Submarine cable project. These projects will progressively improve the links between other parts of the continent and European and Asian networks, and will have great potential for substantially improving data communication for research and education when completed.

Already, several institutions in Africa are embracing modern approaches to information provision and management. A look at the Directory of Open Access Repositories (OpenDOAR) reveals that institutional repositories are spreading across Africa with 22 countries listed at the time of this study. Most of these are located within universities, both public and private (see: *http://www.opendoar.org/countrylist.php?cContinent=Africa*). The main driver for IRs in the African context has been similar to that of other countries in the west: rising costs of serials, limited library budgets, and visibility of Africa's research output (Moahi, 2009). Other strategies for supporting scholarly communication and building research capacity in African institutions include partnerships with universities in Europe, North America and elsewhere, disciplinary and interdisciplinary research networks, and regional collaborative programmes for research or postgraduate training (Harle, 2013). However, as Harle (2013) argues, supporting research requires an understanding not only of specific needs – greater numbers of PhD-qualified staff, or better resources for research – but also the ways in which research is undertaken; the institutional environments in which academics work; and the broader currents of national and international policy which advance or hinder scholarship, and which determine opportunities for collaboration within and across borders. In spite of the importance of external support and international collaboration, African universities need to define and pursue their own ambitions.

The literature review revealed few empirical studies addressing the institutional support for scholarly communication and research in African universities. This study sought to fill this gap by ascertaining the various types of support that scholars and researchers in universities in Kenya were receiving. Specific questions touched on *levels of mentorship existing among scholars; levels of collaboration between colleagues within departments and institutions both local and international; levels of funding available for research and research related activities such as conference attendance; availability of library resources; availability of training on the research process and issues of information management; availability of time for research* among others.

3.10 Curation, Archiving and Preservation of Scholarly Content

Peer reviewed scholarly literature is a vital element in the processes of research and scholarship. It is supported by a range of research documentation, which includes pre-prints, technical reports and records of research data (IFLA, 2014). A survey of the literature on preserving and archiving this documentation points to digital preservation of the same, since

modern ways of producing these documents are largely digital in nature. Price (2008) comments that it seems inevitable that an ever-increasing amount of scholarly work will take digital form. The Alliance for Permanent Access (n.d.) acknowledges that digital encoding has become the dominant way in which we create, shape and exchange information.

Digital preservation is the set of processes and activities that ensures long-term, sustained storage of, access to and interpretation of digital information. Curation is an applied form of preservation that focuses on interpretation and is often (though not exclusively) used in relation to working with scientific datasets. The ultimate objective of all digital preservation activity is to keep valuable and useful digital material (which is increasingly online) available for future generations of scholars, researchers and other user groups (JISC, 2014b). According to Brandt (2007:366), "in the Information Age, curation can be defined as essential activities and systems that facilitate access, dissemination, and archiving of e-research. At a practical level it can include protocols and tools that provide descriptive analyses of digital collections and objects to augment discovery, management, use, reuse, and preservation. These protocols can take the form of schemas to describe digital objects, systems to facilitate discovery of collections of objects, and middleware to resolve problems of interaction between systems and applications. On the one hand, curation is about policies and consultation, and on the other it is about tools and systems".

Lord, Macdonald & Giaretta (2004) observe that modern instruments and computing resources have enabled e-research and a new order of collaborating and inter-disciplinary research. In turn this has increased access to collections of primary research data and information. However, the same technology tools put the data created at risk, raising serious and complex issues of strategy, policy and practice regarding the creation, management, and long-term care of the data, that is, its curation. Lord et al. argue that much needs to be done at all levels to enable the data which this revolution has created to remain available and valid to future researchers. Lord et al. also note that e-Science curation entails three key activities: *curation* (managing and promoting the use of data from its point of creation, to ensuring it is fit for contemporary purpose, and, through continuous enrichment and updating, available for discovery and reuse); *archiving* (ensures that data is properly selected, stored, can be accessed and that its logical and physical integrity is maintained over time); and *preservation* (an activity within archiving in which specific items of data are maintained over time so that they can still be accessed and understood through changes in technology).

Much has been written on the data deluge that modern scientists are faced with. Bell, Hey & Szalay (2009) attribute this to the developments in science that have made it possible to generate and analyse hundred-to-thousand-fold increases in data volumes from satellites, telescopes, and supercomputers. Added to this are the data management challenges emanating from "born digital" data thriving in files, spreadsheets or databases stored on hard drives, digital notebooks, web sites, blogs and wikis. Bell et al. state that the management, curation, and archiving of these digital data are becoming increasingly burdensome for research scientists. As Jackson (2012) states, digital resources will not survive or remain accessible by accident: pro-active preservation is needed. Lord et al. (2004) found that awareness of long-term data curation was generally low among research workers, and researchers needed to be encouraged to engage more in the curation of their own data. Marshall, Bly & Brun-Cottan (n.d.) found that experienced home computer users are creating, receiving and finding an increasing number of digital belongings but they have already lost irreplaceable digital artefacts such as photos, creative efforts and records. Participants in their study reported strategies such as backup and file replication for digital safekeeping but they were unable to implement them consistently. From a study in South Africa, Groenewald & Breytenbach (n.d.) indicate a similar lack of knowledge on preservation strategies and the management of digital objects on personal computers, as well as a need for training in basic digital preservation methods.

The importance of data preservation in the digital age has been well covered in the literature. Western Libraries (2013b) state that digital preservation ensures the on-going management of digital resources over time with a view to retaining their intellectual content, authenticity, and accessibility for a variety of uses. Additionally, for universities, these include the protection of institutional memory, and the on-going vitality of research and scholarship. According to the Library of Congress (2010) traditional information sources such as books, photos and sculptures can easily survive for years, decades or even centuries but digital items are fragile and require special care to keep them useable. Rapid technological changes also affect digital preservation. As new technologies appear, older ones become obsolete, making it difficult to access older content. Li & Banach (2011) add that the rapid deterioration of digital storage media is a threat to today's digital information unlike paper that is a durable format when made properly and stored under the proper conditions. As Li & Banach explain, illuminated manuscripts have lasted for over 1000 years, but a CD will degrade in as little as 15 years. Chen (2001) refers to the paradox for digital preservation: On the one hand, we want to

maintain digital information intact as it was created; on the other, we want to access this information dynamically and with the most advanced tools.

For science, data preservation is as important as the research itself. According to the Digital Curation Centre (2013), digital data preservation should be a key aspect of all research projects because some research data are unique and cannot be replaced if destroyed or lost. Additionally, only by referring to verifiable data can research be judged as sound. Furthermore, it is recognised good practice for institutions and researchers to manage and retain their research data, and sometimes they are legally required to do so for many years after project funding has ceased. The DCC advocates that a data preservation programme suited to individual institutions must be used to safeguard this huge investment of time and resources. Without good practices in place, the scientific record and documentary heritage created in digital form will remain at risk from digital obsolescence and also from the fragilities inherent to digital media.

To ensure the long-term availability of research data to the scientific and academic communities, several measures have been undertaken. Among them is the use of data centres, which have been found to provide invaluable services and support to researchers including access to otherwise unavailable datasets via reciprocal sharing agreements, and curation preservation and long-term access for datasets, both for their own research and for datasets created by others (Research Information Network, 2011b). Research Information Network (2011b), in a study in the UK, found that usage of data centres is high with such centres supporting thousands of researchers and millions of downloads each year. Data from the centres is used for original research, for combination with other data and for reference. The study further established that users agreed that these centres make research quicker, easier and cheaper. Institutional repositories are another strategy that has been proposed to facilitate preservation of institutional research output to ensure that researchers, students, staff and institutions can be assured of the on-going availability and confidence in the future accessibility of the content (Hockx-Yu, 2006). Other authors support these views arguing that repositories have a role to play in preserving and disseminating knowledge (Decman & Vintar, 2013; Yiotis, 2008). Several universities and research institutions around the world have implemented institutional repositories.

Recently, there has been emphasis on the use of open formats to facilitate access to digital data in the long term. According to PC.net (2014), a file format describes the way data is

stored in a file. It defines the data structure (how the data is organised in the file) as well the type of data that the file contains. Some file formats are "open formats," meaning they are publicly available and all software developers can use them. Other file formats are proprietary or "closed formats," meaning that only specific applications can open them. There are specific formats for images (for example, JPEG, PNG, GIF, TIF, BMP), simple text (ASCII, often marked with the .txt extension), for formatted text (HTML, RTF, DOC) and for printer-ready documents (PDF, PS).

The National Information Standards Organization (2007) states that a good (digital) object exists in a form that supports its intended current and future use, and consequently, it should be exchangeable across platforms, broadly accessible and formatted according to a recognised standard or best practice. Park & Oh (2012:44) confirm that file format is one of the core issues in the fields of digital content management and digital preservation. As many different types of file formats are available for texts, images, graphs, audio recordings, videos, databases, and web applications, the selection of appropriate file formats poses an on-going challenge to libraries, archives, and other cultural heritage institutions. The authors cite Tagged Image File Format (TIFF), Portable Document Format (PDF), PDF/A, Office Open XML (OOXML), and Open Document Format (ODF) as some of the open file formats that appear to be more widely accepted. The National Information Standards Organization (2007:37) recommends that where an institution has any control over born-digital content, authors should be encouraged to create their works in specified formats that will enable long-term accessibility. In this connection for example, many universities compel students to submit electronic theses and dissertations in library-approved formats.

Arms & Fleischhauer (n.d.:3-5) suggest factors to consider when choosing formats namely sustainability factors and quality and functionality factors. Sustainability factors include *Disclosure* which is the degree to which complete specifications and tools for validating technical integrity exist and are accessible to those creating and sustaining digital content; *Adoption* which is the degree to which the primary creators, disseminators, or users of information resources already use the format. A format that is widely adopted is less likely to become obsolete rapidly, and tools for migration and emulation are more likely to emerge from industry without archival institutions specifically investing in them; *Transparency*, which is the degree to which the digital representation is open to direct analysis with basic tools, such as human readability using a text-only editor; *Self-documentation* where self-

documenting digital objects contain basic descriptive, technical, and other administrative metadata; *External dependencies* which is the degree to which a particular format depends on particular hardware, operating system, or software for rendering or use and the predicted complexity of dealing with those dependencies in future technical environments; *Impact of patents* which is the degree to which patents will inhibit the ability of archival institutions to sustain content in a particular format; and *Technical protection mechanisms* which is the implementation of mechanisms such as encryption that prevent the preservation of content by a trusted repository.

On the other hand, quality and functionality factors pertain to the ability of a format to represent the significant characteristics required or expected by current and future users of a given content item. These include normal rendering, support for high image resolution, support for colour management, support for graphic effects and typography and functionality beyond normal image rendering which would include support for 3-D models, layers, or special treatment for regions of interest.

Several standards have been developed and initiatives are on-going around the world to prepare for and implement digital preservation. Caplan (2008) samples some major national digital preservation initiatives in the United States, Europe and the Pacific. In the US, the Library of Congress's National Digital Information Infrastructure and Preservation Programme (NDIIPP) is a major undertaking to develop standards and a nationwide collection strategy to build a national repository of digital materials. In the United Kingdom, the Joint Information Steering Committee is mandated to ensure long-term availability of scholarly and educational resources. Its funding supports the Digital Curation Centre (DCC), the Digital Preservation Coalition (DPC), and other United Kingdom-wide initiatives aimed at curating and preserving digital resources in different spheres. In Europe, other initiatives are spearheaded by the National Library of the Netherlands, the Koninklijke Bibiiotheek (KB), Nestor (Network of Expertise in Long-Term Storage of Digital Resources) of Germany, the European Commission whose preservation programs include Digital Preservation Europe (DPE), Preservation and Long-Term Access through Networked Services (PLANETS) and Cultural, Artistic and Scientific Knowledge for Preservation, Access and Retrieval (CASPAR). Australia and New Zealand are served by the National Library of Australia; Australasian Digital Recordkeeping Initiative (ADRI) is a collaboration between the National Archives of Australia, Archives New Zealand, and Australia's state and

territory archives to ensure a common approach to digital recordkeeping and archiving; and the Australian Partnership for Sustainable Repositories (APSR).

Keakopa (2010) asserts that in Africa, little progress has been made in addressing the long-term preservation of digital information. Keakopa acknowledges that African countries have made great strides in co-ordination and implementation of ICT initiatives despite limited resources. However, several challenges hinder the management and preservation of digitised information to ensure long-term access to such information. Just like the developed countries, Africa has to deal with the high rate of hardware and software obsolescence and the lack of infrastructure for managing electronically generated records. Questions still abound on issues of access to electronic records and protection of the individual's rights to privacy. Legislation protecting these individual rights is still lacking in many African countries. In addition to these, most African countries have limited electricity distribution networks resulting in power cuts and disruptions which in turn lead to loss of valuable information. There is a need for systems and infrastructure that will maintain quality power supply and protect electronic systems. Kanyengo (2009) echoes these views arguing that African institutions are still struggling to come to terms with the digital environment and are therefore ill prepared to facilitate long-term access to digital information. Kanyengo cites lack of policies, poor infrastructure, financial constraints, lack of technical knowledge and preservation training, legal barriers and digital technology challenges such as varying formats and costs as being barriers to achieving success in preservation of digital information resources. According to Kanyengo, it is imperative that universities and research institutions in Africa provide leadership in seeking solutions that will ensure preservation and permanent access to Africa's digital information resources. The author proposes that the cited challenges should be addressed so as to achieve permanent access to digital resources.

In view of the foregoing issues on data curation and preservation discussed in this section, this study sought to examine the strategies universities in Kenya utilise to ensure long-term access to digital information so as to support the communication and research needs of their scholars and researchers. Specifically, the study addressed the following questions: "*How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use?"; "To what extent do existing institutional facilities in the universities support scholars' research and communication needs?"*

3.11 Summary of the Literature Review

This chapter has reviewed the various empirical and theoretical literatures pertinent to the subject under study namely scholarly content management. Findings from previous studies have been used to set the foundation for the current study. The literature reviewed the research questions, key variables from the theoretical framework and concepts from the broader issues around the research topic.

The literature reviewed identified gaps that this study in part seeks to address. The review revealed evidence of several studies that have investigated types of scholarly content, scholarly content generation and acquisition; scholarly conversation and communication; researcher behaviour; scientific social networks and collaborative research; open access to scholarly communication; ranking of world universities; knowledge management processes in a university setting; institutional support for communication and research needs of scholars; curation, archiving and preservation of scholarly content. A majority of the documented studies were carried out in the developed countries thus presenting a skewed status of scholarly content management by excluding the status in developing countries especially in Africa. Some of the studies adopted survey questionnaires that were administered electronically to participants locking out would-be participants from developing countries most of who have limited access to these electronic avenues. Additionally, most of these studies were limited in their scope as they covered only a few aspects of the issues in scholarly content management such as scholarly collaboration or access and preservation of scholarly content. The need therefore to conduct a country specific study to understand the peculiar differences and experiences of scholars and researchers in the universities in Kenya as regards scholarly content management in terms of the scholarly communication process and the content that is output thereof genuinely exists. The study considered scholars and researchers from six public and private universities in Kenya for better understanding of their awareness, usage, attitudes, and perceptions of the concepts in scholarly content management.

The empirical part of the study will explore and ascertain the actual experiences of the respondents to answer these questions.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

Rajasekar, Philominathan & Chinnathambi (2006) state that research methodology refers to the procedures by which researchers go about their work of describing, explaining and predicting phenomena. Its aim is to give the work plan of research. Kothari (2004) describes it as a way to systematically solve the research question including the logic behind the steps adopted by a researcher in studying the research problem. Research methodology seeks to explain why particular methods or techniques are used and why others are not used so that the research results are capable of being evaluated either by the researcher himself or by others. According to Willis (2007:14), the term methodology is used to describe several aspects of a study: the design, procedures for data collection, methods for data analysis, selection of subjects and details of the specific treatments, if any.

The aim of this study is to examine the strategies used by universities in Kenya in managing their scholarly content. Various research questions are addressed namely: what kinds of scholarly content are generated and used in universities in Kenya? How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use? How do Kenyan scholars communicate amongst themselves in the various stages of their research work? To what extent do Kenyan scholars participate in local and/or international professional social networks? To what extent do existing institutional facilities in the universities support scholars' research and communication needs?

This chapter presents the research approach used in the study to answer the research questions outlined above. The discussion is based on the modified research hierarchy model proposed by Pickard & Dixon (2004). The model describes the relationships between different parts of the research starting from the overall philosophy (paradigm) that defines the researcher's world view, activity and outputs of the research as shown in Figure 4.1 below.

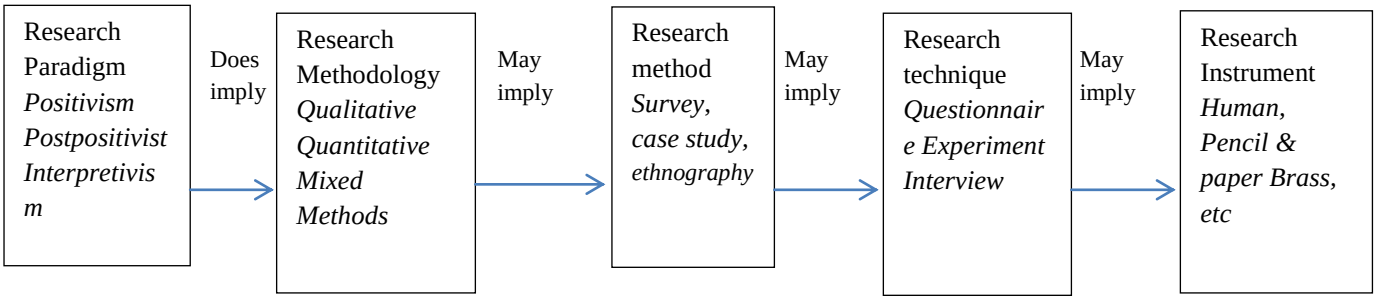


Figure 4.1: The modified research hierarchy

Source: Pickard & Dixon, 2004:xv (Adapted from "The Research Hierarchy")

The chapter describes the research paradigm; methodology and methods; research techniques; population of the study; pre-testing procedure; sampling procedure; data collection techniques; data analysis; reliability and validity; the ethical considerations and summary.

4.2 Research Paradigm

According to Kuhn (1970:175), the term paradigm refers to the entire constellation of beliefs, values, and techniques shared by the members of a given scientific community. Chalmers (1999:108) views a paradigm as "made up of the general theoretical assumptions and the techniques for their application that the members of a particular scientific community adopt". Chalmers (1999:109) outlines some of the typical components that make up a paradigm namely: explicitly stated fundamental laws and theoretical assumptions; standard ways of applying the fundamental laws to a variety of types of situation; instrumentation and instrumental techniques necessary for bringing the laws of the paradigm to bear on the real world; general, metaphysical principles that guide work within the paradigm; and general methodological prescriptions about how to conduct work within the paradigm. Willis (2007:8) sums it up thus: A paradigm is a comprehensive belief system, world view, or framework that guides research and practice in a field. Different paradigms lead researchers to ask different questions, use different methods to study those questions, analyse data in different ways and draw different types of conclusions from the data.

This study adopted a post-positivism paradigm which is a middle ground approach between positivism (predominantly quantitative) and interpretivism (qualitative in nature) (Edmonds & Kennedy, 2013:146; Pickard, 2007). According to Greenfield, Greene & Johanson (2007), positivists believe that researchers can control their biases sufficiently and adequately control the environment enough to identify an objective truth that can be generalised into universal

law or principles. Interpretivism on the other hand advocates that it is necessary for the researcher to understand differences between humans in our role as social actors. As social actors, we interpret our roles and those of others according to the meaning we give to those roles. The challenge in the interpretivist philosophy is to enter the social world of research subjects and understand their world from their point of view (Saunders et al., 2012:137). However, this study was predominantly quantitative in nature in that much of the data collected werequantitative. The data were collected through the use of the survey questionnaires. This is in line with Leech & Onwuegbuzie (2009) and Creswell & Plano Clark (2007) who acknowledge that mixed methods research may use both qualitative and quantitative approaches either equally or unequally. One of the two methods may be given more weight or priority over the other.

Pickard (2007) explains that the post-positivism paradigm believes in a social reality that will always be inhibited by imperfections in detecting its nature. It acknowledges that independence between investigators and investigated is not possible but seeks objectivity by external verification. Greenfield et al. (2007) state that post-positivism is ultimately concerned with understanding the meaning of human experience while recognising the contextual and temporal influences of these experiences. Furthermore, unlike positivism, post-positivism embraces the interpretative element of knowledge and the contextually bound nature of research findings. Knowledge found under post-positivist techniques is not universally generalisable; rather, findings are inductively produced and applied with reference to probability of similar cases. In support of post-positivism, Jensen (1989:493) alludes to modern-day theorists' criticism of the natural science approach based on logical positivism, preferring instead post-positivist research in which multiple methods can be used. According to Jensen, the researcher, given a thorough understanding of the research methodology, should have free choice to select whatever method or combination of methods is best suited to addressing the identified problem situation. These views are echoed by Rossman & Wilson (1991) who call for researchers to be 'shamelessly eclectic' in the use of methods to better understand complex social phenomena. Hussein (2009) emphasises that both qualitative and quantitative paradigms are designed towards understanding about a particular subject area of interest and both of them have strengths and weaknesses. Thus when combined together, there is a great possibility of neutralising the flaws of one method and strengthening the benefits of the other for the better research results.

The choice of paradigm was influenced by the fact that the subjects of content management and scholarly communication exist within a larger socio-economic and technological context whose exploration would require an understanding from both the positivist and interpretivist perspectives. Some of the concepts in the study are based on unique opinions, personal experiences and expectations, traditions and cultures all experienced within certain social contexts that could differ from individual to individual or from group to group. These may not necessarily be able to be quantified or analysed quantitatively and each scenario needs to be described in its unique context. On the other hand, some of the concepts are purely quantitative or numerical and need to be handled as such to answer the research questions effectively. In conducting the study, the researcher sought to gain an in-depth description of experiences based on the post-positivist assumption that meaning is embedded in experiences, and therefore, in order to uncover meaning, one has to uncover experience (Greenfield et al., 2007). In this study, some of the questions in the questionnaire (See Appendices 1 and 2) were closed-item questions (therefore quantitative) such as '*Please indicate the importance of the following means of communication to your research work*', and *'How much do you know about data curation?'* where respondents were asked to select answers from a given list. Other questions were open ended (therefore qualitative) such as *'Please comment on the mentoring culture amongst scholars at your institution'* and *'In your opinion, is your institution making any visible efforts towards digital preservation of research data and research findings?'* These questions required the respondents to give their personal experience and opinions in answer to the questions.

The researcher is in agreement with Bronowski (in Clark, 1998:1245) who opines that science requires precision, logical reasoning and attention to evidence but this is not confined to that which can be directly perceived. Evidence can be in inferable forms such as the self-reports inherent in interviews or questionnaires. Furthermore, the use of mixed methods in this study served to test consistency of findings from both quantitative and qualitative methods (i.e. corroboration). Mixing methods also enriched the study by revealing details that would otherwise be left out if just one method was employed. This is in line with the purposes of mixing methods in research, namely corroboration and elaboration, as proposed by Rossman & Wilson (1991) and Greene, Caracelli & Graham (1989).

Various studies in the broader discipline of Library and Information Studies have employed a mixed methods research approach involving the integration of quantitative and qualitative

components in varying degrees. An example is a study by the Research Information Network and Research Libraries UK (2011) who examined the value of the services that libraries in the UK provide to researchers and the contributions that libraries make to institutional research performance. The study combined quantitative analysis of statistics as well as gathering and analysing a large amount of qualitative information collected through interviews and focus groups from stakeholders in nine institutions. Some of the findings indicate that libraries provide increased visibility of research, improved institutional understanding of information assets, better research management and good reputation of institutions for research. These benefits in turn lead to more research income, higher quality research, recruitment and retention of higher quality researchers and greater research output for the institutions.

4.3 Research Methodology and Methods – Case Study

Choice of a particular research paradigm in turn implies a choice of methodology, which is the theoretical perspective of the research and is either qualitative or quantitative (or mixed methods) (Pickard, 2007:xvi). The post-positivist approach in this study accomodated a mixed methods approach to the research design whereby the use of both quantitative and qualitative methods are concurrently triangulated within a single phase of data collection and analysis. This allows both sets of results to be interpreted together to provide a richer and more comprehensive response to the research question as compared to the use of a mono-method design (Saunders et al., 2012:167). Johnson, Onwuegbuzie & Turner (2007:113) further explains that mixed methods research is an approach to knowledge (theory and practice) that attempts to consider multiple viewpoints, perspectives, positions, and standpoints (always including the standpoints of qualitative and quantitative research).

Campbell and Fiske (1959) are credited with the introduction of triangulation whereby more than one method is used as part of a validation process that ensures that the explained variance is the result of the underlying phenomenon or trait and not of the method whether quantitative or qualitative (Johnson et al., 2007). There are various types of triangulation namely ‘between or across methods’ where multiple methods are used to examine the same dimension of a research problem. This type is largely used for cross validation when the distinct methods are found to be congruent and yield comparable data. Another kind of triangulation is the ‘within-method’ which uses multiple techniques within a given method to

collect and interpret data. This type essentially involves cross-checking for internal consistency or reliability (Denzin in Jick, 1979).

Several authors (Yeasmin & Rahman, 2012; Guion, Diehl, & McDonald, 2011; Hussein, 2009; Patton, 2002) describe the various ways in which triangulation can be implemented in a study. These include *data (or data sources) triangulation*, which is the use of multiple data sources in the same study for validation purposes. These can vary in terms of the time data are collected, the place or setting where data was collected and the people from whom data were obtained; *theoretical triangulation* where multiple theories are used in the same study for the purpose of supporting or refuting findings by viewing the problem at hand through multiple theoretical lenses; *investigator triangulation* in which more than two researchers (observers, interviewers or data analysts) are used in any of the research stages in the same study; *methodological triangulation* where more than two methods are used in studying the same phenomenon under investigation; and *data-analysis triangulation*, described as the use of more than two methods of analysing the same set of data for validation and completeness purposes.

In this study on the strategies for management of scholarly content in universities in Kenya, data, theoretical, methodological, and data-analysis triangulation were used for validation, completeness and corroboration purposes. Data was collected from six different universities so that the contextual experiences of people in the different settings could be captured for the same variables of the study. This enabled the researcher to capture a more complete, holistic and contextual portrayal of the units under study (Jick, 1979). Three theories were used in the study namely the Conversation Theory, the Social Network Theory and the Knowledge Management Process Model to enable a wholesome understanding of the problem being studied. The dominant theory for this study was the Knowledge Management Process Model that addressed the creation of scholarly content, how the content ought to be preserved and archived for current and long-term use, the dissemination of scholarly content and how universities ought to support their scholars so that their scholarly content is made visible to anyone who may need to refer to it. In addition, a mixed method was adapted whereby both quantitative and qualitative methods were used to collect and analyse data in the study. The data collected was both qualitative (arising from interviews) and quantitative (arising from questionnaires). The use of both qualitative and quantitative methods enabled collection of information that could otherwise have remained undiscovered with the use of only one

approach or data collection technique. This approach enabled confirmation of findings, helped in overcoming bias and provided depth of understanding of the findings (Casey & Murphy 2009; Thurmond, 2001).

Referring to the research hierarchy (Figure 4.1 above) by Pickard & Dixon (2004), a methodology does not imply an individual research method, although there are methods which have been traditionally associated with each overlying methodology. A research method is the overall approach used to co-ordinate data concerning the focus of the research study. This study therefore employed the case study as its research method.

Several authors have attempted to define the case study. Kothari (2004) and Gerring (2004) aver that a case study involves a careful in-depth analysis of a social unit, be it a person, family, institution, cultural group, or the entire community. Thereafter, data generalisations and inferences are drawn for the purpose of understanding a larger class of (similar) units. Yin (2003) defines a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. Yin further explains that the case study is a research strategy comprising an all-encompassing method, covering the logic of design, data collection techniques, and specific approaches to data analysis. According to Stake (2000), the best use of case studies is adding to existing experience, understanding and increasing conviction about a subject. Other than being viewed as beneficial to research because of providing in-depth information about a given unit of analysis, some authors (Yin, 2003; Voss, Tsikriktsis & Frohlich, 2002) indicate that the case study method has some challenges namely that it is time consuming and expensive, needs skilled interviewers, and care must be taken to ensure rigour and objectivity of findings.

The case study method has traditionally been associated with qualitative methodology with several authors (Baxter & Jack, 2008; Creswell, Hanson, Plano Clark & Morales, 2007; Kothari, 2004) defining it as a qualitative approach. However, some other authors (Yin, 2003; Gilham, 2000) acknowledge that case studies can include and even be limited to quantitative evidence. Case studies can be based on any mix of quantitative and qualitative evidence (Yin, 2003), which may include interviews, observation, documentary analysis and questionnaires (Saunders et al., 2012).

Yin (2003) describes four types of case study designs based on a 2x2 matrix namely:

1) Single case holistic designs – where a single unit of analysis is selected where it represents a unique or critical case. One can also select a single case as a representative or typical case or one which has not been considered before; 2) single-case (embedded) designs – this involves more than one unit of analysis within a single case. The sub-units have been found to add significant opportunities for extensive analysis, enhancing the insights into the single case; 3) multiple-case (holistic) designs – this is where a study contains more than a single case 4) multiple-case (embedded) designs – this involves several units of analysis within the multiple cases.

This study adopted the multiple-case (holistic) design whereby each of the six universities was treated as an independent unit of analysis within the global study. Moore et al. (2012) explain that a multiple-case design includes several cases of the same phenomenon conducted at multiple sites, in this case at the six universities identified for the study. The multiple case study design was selected with literal replication in mind, whereby the cases selected were similar and the predicted results were also similar (Yin, 2003; Bengtsson, 1999). The multiple-case approach here provided a rich understanding of the contexts of the universities and the interactions between the various actors and variables within the confines of the study. Since all the selected institutions were universities in Kenya, with generally similar academic objectives, environments, and working cultures, the results from the study were also expected to be generally similar. The objective of the case studies was to comparatively investigate how the variables, outlined in the research questions, play out in the different universities in the study. According to Bengtsson (1999:2), the usage of multiple cases should be regarded similarly to the replication of an experiment or study. This means that the conclusions from one case should be compared and contrasted with the results from the other case(s). The study sought to find out how each of the six universities preserves and archives the scholarly content they generate, how the institutions support their scholars' communication and research needs and the extent of the scholars' participation in professional social networks. The findings from each university were then analysed in comparison with findings from all the other universities.

The case study research method was beneficial for this study because it enabled a comprehensive and comparative investigation of the different facets of the topic at each of the universities being studied thus deepening the researcher's understanding not only of each unit, but also of the general situation in all universities in Kenya by inference (Kothari, 2004).

Additionally, the researcher was privileged to interact directly with the people involved in the 'events' being studied and was therefore able to obtain first-hand information in relation to the variables of the study (Yin, 2003).

The criterion for selection included those universities in Kenya that have been ranked competitively in the Webometrics Ranking of World Universities. This ranking model was selected because unlike the other models (such as ARWU and Times Higher Education World University Rankings) it is global in nature and includes a more comprehensive list of world universities. The ranking is based on the performance of universities from all over the world based on their web presence and impact. The assessment is based on teaching and economic relevance of the technology transfer to industry, community engagement and research output including formal and informal scholarly communication as can be ascertained via an institution's web visibility and web activity.

The case study sites were:

1. University of Nairobi located along University Way in Nairobi central business district
2. Kenyatta University located in Kahawa, about 20 kilometres from Nairobi's city centre, along the Nairobi-Thika highway
3. Maseno University based in Maseno, near Kisumu city
4. Jomo Kenyatta University of Agriculture and Technology located in Juja along the Nairobi-Thika highway
5. Strathmore University situated off Langata Road, in Madaraka Estate, Nairobi
6. Egerton University located in Njoro, near Nakuru city.

Similar studies have employed the case study approach. An example is the study by Harley et al. (2010) which explored faculty values and needs in seven disciplines in relation to traditional and emerging forms of scholarly communication. The case studies were conducted through formal interviews and respondents for the study were drawn from more than 45 institutions in the US, most of which were research universities, but also included publishing houses and elite research centres and laboratories. Specifically, the study examined the new forms of scholarly communication that support researchers' needs in their work; how scholars want to disseminate and receive input on their work at various stages of the scholarly communication lifecycle; emerging trends in research and publication practices; the scope

and depth of demand for new models of communication in various sectors/disciplines; and how institutions and other stakeholders support faculty needs, if at all. The study found that there is low uptake of new forms of scholarly communication such as Web 2.0 among the researchers. Researchers currently have access to multiple dissemination models including discipline-specific repositories, personal websites, commercial journals, and lately, the open access journals. Respondents indicated a need for a wide variety of specialised technical support in areas such as GIS, various forms of computational data analysis, visualisation, and multimedia publishing. Scientists also cited the need for support for new ways to store, manage, process, visualise, and reuse massive amounts of data.

Other case studies worth mentioning include the study by Utter & Holley (2009) that explored the current and possible uses of open access publishing, institutional repositories and digitised monographs and journals by Michigan's three largest universities: Michigan State University, the University of Michigan, and Wayne State University. The authors examined their usefulness in fostering collaboration within the University Research Corridor (URC), an alliance of the three universities. The study found that the libraries within the research corridor have a major role to play in meeting the needs and furthering the goals of the URC. Furthermore, increased publishing in an open access environment will further research, give authors more control over their work, and make finding information easier with data harvesting tools such as OAIster. Another related case study is one that was done by Malenfant (2010) that examined how liaison librarians at the University of Minnesota incorporated reform of the scholarly communication system among their core responsibilities. By mainstreaming scholarly communication duties, the university is declaring these issues central to librarianship.

In addition to the case study research strategy, the study also employed the survey research design within the case studies. The OECD Glossary of Statistical Terms (2005) states that a survey "is an investigation about the characteristics of a given population by means of collecting data from a sample of that population and estimating their characteristics through the systematic use of statistical methodology". According to Creswell (2003:153) a survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population. Marshall & Rossman in Andres (2012) assert that the goal of survey research may be to generalise to larger populations or it may be intended to be transferable – that is, the 'findings will be useful to others in similar situations,

with similar research questions or questions of practice'. Saunders et al. (2012) observe that surveys tend to be used for exploratory studies (used to ask open questions to discover what is happening and gain insights about a topic of interest) and descriptive studies (used to gain an accurate profile of events, persons or situations). Surveys have generally been associated with quantitative techniques where standardised quantitative data is collected usually using a questionnaire, structured observation or structured interviews (Saunders et al., 2012). However, some authors (Andres, 2012; Trochim, 2006; Kelley et al., 2003) observe that open-ended interviews can also be used in a survey. Andres (2012:3) particularly stresses that survey research can and should be conducted from both quantitative and qualitative perspectives.

Surveys can be either cross-sectional, confined to a specific point in time, thus giving a snapshot of a sample of a population at a single point in time or longitudinal, measuring social characteristics over time in a single study (Weerasekera, n.d.). The surveys were carried out as a cross-sectional study lasting approximately two months. They sought to examine the status of scholarly communication and content management strategies at each of the case study sites within the data collection period of two months.

The survey strategy was preferred for this study since it produced large amounts of empirical data in a relatively short time and at a fairly low cost (Kelley et al., 2003:262). The researcher was able to cover a larger number of scholars from select universities in Kenya, whose experiences and opinions would be generalisable to the larger population of the Kenyan scholars thus giving an idea of how they would be affected by or react to the same variables.

Several empirical studies in the field of scholarly communication have successfully relied on the survey research design. A survey by Rowlands, Nicholas & Huntingdon (2004) examined the views and attitudes of nearly 4000 senior researchers from 97 countries in relation to scholarly communication in the digital environment. The study found that in such an environment, researchers want the ability to target a very specific group of key readers, especially those working on similar problems, official approval of quality and integrity offered by recognised peer-reviewed journals and reasonable levels of publisher service. The authors portrayed a generally positive attitude to open access. A study by Lawal (2002) surveyed a randomly chosen sample from a population of 240,000 scholars in nine scientific disciplines from private and public colleges and universities across the United States and Canada. The survey sought to determine use and non-use of e-print archives in the different

disciplines. Results showed that 18 % of the researchers use at least one archive while 82% do not use any. Scholars in physics use e-print archives the most and those in chemistry the least. ArXiv receives the most use and authors' web sites the least use. Reasons for use include dissemination of research results, visibility, and exposure of authors. Reasons for non-use include publishers' policies and technology constraints. A study by Jantz & Wilson (2008) surveyed 113 institutions that are members of the Association of Research Libraries (ARL). The study examined faculty deposits in institutional repositories within selected disciplines and identified the diverse navigational paths to IR sites from library website homepages. Both qualitative and quantitative approaches were used and the findings of this study corroborated earlier studies that clearly indicate that individual faculty participation is either low or non-existent in one third of current university IRs at ARL libraries. The study also found that IR deposits differ greatly by disciplinary area with humanities faculty depositing the least number of their works. Contrary to the belief that an IR is a way to intervene in the traditional ways of disseminating research information, the study demonstrated that there is no statistical relationship between the development of an IR and the discussion of scholarly communication on the library Web site.

4.4 Research Techniques

As shown in the research hierarchy in Figure 4.1 above a research method is the overall approach used to co-ordinate data concerning the focus of the research study and may imply the use of particular research techniques, or data collection tools (Pickard & Dixon, 2004). According to Kothari (2004), research techniques refer to the behaviour and instruments we use in performing research operations such as making observations, recording data, techniques of processing data and the like. Since this study was a mixed-method study that employed methodological triangulation, both quantitative and qualitative research techniques were used. These were employed in the form of the questionnaire and the interview data collection tools.

4.4.1 Population of the Study and Sampling Procedure

The term ‘population’ refers to the full set of cases from which a sample is taken (Saunders et al., 2012). In this study, the 31 public and private universities in Kenya were the target population of the study. The study was interested in establishing how scholarly content is managed in these universities. However, since it was not possible to collect data from all the

31 universities, sampling had to be done. Saunders et al. (2012) state that sampling provides a valid alternative when it is impractical to survey the entire population, and budget and time constraints prevent surveying the entire population. Therefore, six (6) universities were purposively selected (from both public and private sectors) for inclusion in the study. The number was determined by limitations of time and financial resources that dictated selecting a manageable portion from the entire population.

The universities in Kenya selected (in order of their 2013 Webometrics ranking) are: University of Nairobi, Kenyatta University, Maseno University, Jomo Kenyatta University of Agriculture and Technology, Strathmore University, and Egerton University. Of these six universities, only Strathmore is a private university (Cybermetrics Lab, 2013a). The assumption is that these are the top six universities in Kenya that have been visibly active on the web thus meeting the criteria set out by the Webometrics ranking system.

Table 4.1 below shows the selected universities along with their populations of academic staff and postgraduate students from which the sample for the study was taken.

Table 4.1: The six universities in the study in order of the 2013 Webometric ranking

S/No.	University	No. of Academic Staff	No. of Postgraduate Students
1.	University of Nairobi	1708	13000
2.	Kenyatta University	950	4000
3.	Maseno University	390	1728
4.	Jomo Kenyatta University of Agriculture & Technology	640	2073
5.	Strathmore University	150	500
6.	Egerton University	406	2163
	TOTAL	**4244**	**23464**

These statistics were obtained through communication with relevant officers in the different universities after they were satisfied that the researcher had obtained the necessary permission to collect data from the National Council of Science Technology and Innovation and from the research officers at each university.

The population comprised academic staff and postgraduate students (at Masters and PhD levels only) at each of the selected institutions. Both academic staff and postgraduate students were considered the major producers and consumers of scholarly knowledge and were therefore considered pertinent to the study. Postgraduate diploma students, despite being at an advanced level of study at the universities were excluded from the study because their work does not involve much research. In addition, the population of the study also included University Librarians (1 in each university) and the head of the research unit at each of the selected institutions. In effect, a census of the university librarians and heads of research was carried out (see Table 4.2 below). The university librarians and the heads of research units were considered important as key decision makers in issues of scholarly content management. They were interviewed while the academic staff and postgraduate students filled in questionnaires.

Table 4.2: Sample Sizes for University Librarians and Research Office Representatives

University	**No. of University Librarians**	**No. of Research Office Rep.**
University of Nairobi	1	1
Kenyatta University	1	1
Maseno University	1	1
Jomo Kenyatta University of Agriculture & Technology	1	1
Strathmore University	1	1
Egerton University	1	1
Total	**6**	**6**

Sampling was guided by the table for determining sample size in Saunders et al. (2012:266) based on 5% error margin as shown in figure 4.2 below. Two other models (Israel, 1992; and Krejcie & Morgan, 1970) were considered. However, Krejcie & Morgan were found to be similar to Saunders et al. (2012) whereas Israel differed only marginally by taking slightly larger sample sizes for each population size. Therefore Saunders et al. sampling table was used for sampling since it was considered a more modern sampling tool when compared to the other two.

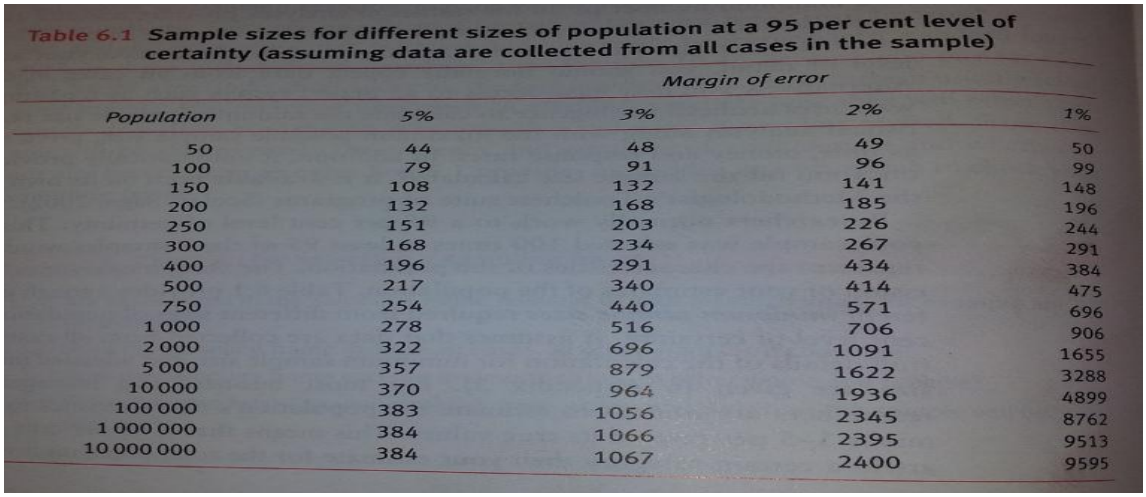


Table 6.1 Sample sizes for different sizes of population at a 95 per cent level of certainty (assuming data are collected from all cases in the sample)

	Margin of error			
Population	5%	3%	2%	1%
50	44	48	49	50
100	79	91	96	99
150	108	132	141	148
200	132	168	185	196
250	151	203	226	244
300	168	234	267	291
400	196	291	434	384
500	217	340	414	475
750	254	440	571	696
1 000	278	516	706	906
2 000	322	696	1091	1655
5 000	357	879	1622	3288
10 000	370	964	1936	4899
100 000	383	1056	2345	8762
1 000 000	384	1066	2395	9513
10 000 000	384	1067	2400	9595

Figure 4.2 Sample size

Source: Saunders, Lewis & Thornhill, 2012:266

Sample sizes were calculated based on the population of each university. For example for a population of 23464 postgraduate students, a sample of 370 was arrived at based on the Saunders et al. model. For the University of Nairobi the sample for postgraduate students is calculated as follows: 13000/23464*370 =205. The table below shows the sample sizes for each of the select universities.

Table 4.3: Sample sizes for postgraduate students

University	**Postgraduate students population (PGSP)**	**Sample (PGSP/23464)*370**
University of Nairobi	13000	205
Kenyatta University	4000	63
Maseno University	1728	27
Jomo Kenyatta University of Agriculture & Technology	2073	33
Strathmore University	500	8
Egerton University	2163	34
TOTAL	**23464**	**370**

For academic staff sample sizes were calculated based on total population. From 4244 academic staff, a sample of 350 was arrived at based on the Saunders et al. model. Thereafter,

proportionate sampling was done for each university. For example the University of Nairobi with 1708 academic staff, the sample size is calculated as follows: 1708/4244*350 = 141. The rest of the samples are shown below:

Table 4.4: Sample sizes for academic staff

University	**Academic staff population (ASP)**	**Sample (ASP/4244)*350**
University of Nairobi	1708	141
Kenyatta University	950	78
Maseno University	390	32
Jomo Kenyatta University of Agriculture & Technology	640	53
Strathmore University	150	12
Egerton University	406	34
TOTAL	**4244**	**350**

Convenience sampling was used to select members of academic staff and postgraduate students who would participate in the study. This sampling technique was preferred because it was not possible to obtain and construct a sampling frame from the universities beforehand that would allow probability sampling techniques to be applied to the study. In addition, convenience sampling allowed the researcher to include those participants who were readily available at the time of conducting the survey. This was especially because academic staff and postgraduate students were not all always available in their offices or classrooms when the questionnaires were being distributed. However, this method introduced a number of biases in the sample that was used for the study. For example, it led to inclusion of more students and academic staff from the natural sciences leaving out those from social sciences. This impacted on the generalizability of the results to the general population although the results gave information that was relevant to the aim of the research (Saunders et al., 2012:291). However, the characteristics of the individuals in the sample were generally comparable to those of the entire population in the universities in the study and universities in Kenya as a whole and therefore to some extent, the findings of the study could be used to describe the larger population.

4.4.2 Pilot study

The term 'pilot study' refers to mini-versions of a full-scale study as well as the specific pre-testing of a particular research instrument such as a questionnaire or interview schedule (van Teijlingen & Hundley, 2001). Van Teijlingen & Hundley aver that pilot studies are a crucial element of a good study design and even though they do not guarantee success in the main study, they increase the likelihood. The authors cite several advantages of conducting a pilot study before the main study is carried out. The pilot study might give advance warning about where the main research project could fail, where research protocols may not be followed, or whether proposed methods or instruments are inappropriate or too complicated. Collins (2003) argues that pre-testing data collection instruments enables one to establish whether respondents can understand the questions concept or task consistently and in a way the researcher intended. Bowden, Fox-Rushby, Nyandieka & Wanjau (2002) opine that pre-testing allows the researcher to gauge the meaning attributed to survey questions before a substantial investment is made in the wrong questions or in ambiguous questions. Furthermore, piloting enables the researcher to estimate how much time would be needed by respondents to answer the questions in an interview or the questionnaire. This would help in planning for the actual data collection.

Various methods exist for pre-testing data collection instruments. They can be divided into pre-field and field techniques. Pre-field techniques are generally used during the preliminary stages of questionnaire development and include respondent focus groups, exploratory/feasibility company/site visits, cognitive interviews, usability techniques, and expert reviews. Field techniques are those used to evaluate questionnaires tested under field conditions, in conjunction with a field test, or they may be used in conjunction with production data collection, particularly for on-going or recurring surveys. These include behaviour coding of interviewer/respondent interactions, interviewer debriefings, analysts' feedback, respondent debriefings, split sample tests, and analysis of item nonresponse rates, imputation rates (how missing data will be dealt with), edit failures, or response distributions (US Census Bureau, 2011; Presser, Couper, Lessler, Martin, Martin, Rothgeb & Singer, 2004).

Pre-testing of the data collections instruments was carried out at Moi University which was not part of the study. This was done to prevent contamination which would occur if pilot participants are included in the main study (van Teijlingen & Hundley, 2001). Moi University

was selected because it is very similar to the other universities in the study in terms of academic objectives, work practices and scholarly communication environment. Check & Schutt (2012) advise that for the actual pre-test, the sample should be drawn from a population very similar to the one being studied. The sample included in the pre-test involved postgraduate students (at Masters and PhD levels), academic staff, the university librarian and a representative from the research office at Moi University. In total, thirty respondents were included in the pilot study comprising eight Masters students, eight PhD students, twelve academic staff, the university librarian and the head of the research unit in Moi University. This number was informed by Johanson & Brooks (2010) who suggested that 30 representative participants is a reasonable minimum recommendation for a pilot study whose purpose is preliminary survey or scale development as was the purpose of this particular pilot study.

The pilot study employed both pre-field and field techniques to pre-test both the questionnaires and the interview schedules. Cognitive interviews were conducted one-on-one using the draft questionnaire and interview schedules, in which respondents described their thoughts while answering the survey questions. Methodological expert reviews involving questionnaire design experts were conducted for evaluation of the questionnaires and interview schedules for potential interviewer and respondent task difficulty according to the recommendation of the US Census Bureau (2011). Consultations were also held with scholars with experience in scholarly communication and scholarly content management to ascertain whether the questions included in the data collection tools were relevant in answering the research questions and whether they would elicit the required information. Respondent debriefing was also used in the pre-testing to gain a better understanding of how respondents interpreted the questions they were asked. This way, the researcher determined whether concepts and questions had been understood in the same way as the researcher intended, which questions were unnecessary or were missing or which ones needed rephrasing. Once the pilot study was completed, the data was analysed and the comments that were obtained from experts and the respondents were used to make changes to the content and length of the questionnaires and interview schedules.

The pilot test also revealed that it would be necessary to employ research assistants for the actual study drawn from within the institutions. It was found that these should preferably be at the level of Masters students or junior members of staff who were not too busy in their

work stations such as laboratory technicians or library asistants. These were found to be mature enough to handle the data collection responsibly and would also be confident enough to approach the respondents for their participation.

4.4.3 Data Collection Techniques

In line with the mixed methods research methodology and the case study and survey research methods that this study employed, both qualitative and quantitative research techniques were used following from the research hierarchy by Pickard & Dixon (2004) in Figure 4.1 above. These were the questionnaire and interview data collection tools and were used to collect both quantitative and qualitative data. Questionnaires were directed to postgraduate students while interview schedules were used to collect data from the university librarians and the research office representatives.

The questions in the data collection instruments were divided into different sections reflecting the thematic areas captured in the research questions, theoretical framework and literature review. These included questions drawing on the types of scholarly content generated and used in universities in Kenya; preservation and archiving of scholarly content for current and future use; communication amongst Kenyan scholars; participation by Kenyan scholars in local and/or international professional social networks; and the extent to which institutional facilities support the research and communication needs of Kenyan scholars.

Self-administered questionnaires were designed to enable collection of facts, attitudes and opinions and establish the respondents' experiences and knowledge about different concepts of importance to the study, such as open access and data curation. Closed-ended type questions were used in the questionnaire to enable standardised data to be collected (for example*: "In your view, to what extent is your institution concerned about your personal success as a researcher and author?"* For this question, respondents were provided with a limited set of responses and they were required to pick one from: *Very concerned; Concerned a little bit; Not concerned*). Closed-ended questions enabled collection of quantitative data that was easily coded and analysed thereafter. Open-ended questions were also included in the questionnaire to allow respondents to answer them as they saw fit and provide their own opinions and observations on certain aspects of the research questions (for example "*Please comment on the ability of the existing ICT infrastructure at your university to support your efforts in accessing research output by other scholars and disseminating your own"*). Open-

ended questions allowed gleaning of information in rich details that were hitherto unknown to the researcher and which the researcher had not thought of beforehand. These type of questions gathered qualitative data. The self-administered questionnaires were advantageous for the study as they enabled the researcher to collect data cost-effectively from a large group of people who would otherwise not have been reached by face-to-face encounters. They were also convenient for the respondents who could complete them at their own convenience.

Separate questionnaires were developed for the academic staff and postgraduate students (see Appendices 1 and 2). The questionnaires were adapted from questionnaires used in various related studies namely Lynch, Zhang, & Korr, (2009); McGill & Settle (2012); Rowlands & Nicholas (2005); and The European Alliance for Permanent Access (PARSE.insight survey) (2009). These were redesigned to relate the questions to the objectives of the current study.

Once the participants in the survey were identified, access to the institutions and respondents was negotiated before the actual data collection commenced. Letters were written to the officers in charge of research at the various institutions requesting permission to conduct research therein by way of administering questionnaires and conducting personal interviews. Once this was granted, respondents were then contacted either in person or via email as was appropriate for the different individuals to obtain their permission and willingness to participate in the study. Each respondent was requested to sign the 'informed consent' form which informed them of the aim of the study, how their responses would be handled and allowed them to expressly state their voluntary willingness to participate. Thereafter, they were issued with the questionnaires or engaged in the interviews. For this exercise, research assistants were identified in each university and after preliminary meetings and briefing sessions, they were engaged to deliver the questionnaires and follow up with respondents to ensure as many of the questionnaires as possible were completed.

Personal interviews were used to collect data from the university librarians and the representatives of research units in each university. Separate interview schedules were developed for these two groups of respondents (See Appendices 3 and 4). This is in line with their different job descriptions and interactions and perceptions of the concepts in the study. The researcher approached each of the interviewees beforehand to arrange for an appropriate time and duration for the interviews. Once this was granted, the researcher then supplied each respondent with a list of themes that would be explored during the actual interviews with a request that the interviewees use it to prepare beforehand for the interviews. Subsequently,

the researcher personally carried out an individual face-to-face interview with each of the respondents. During the interviews, the researcher was able to clarify questions, correct misunderstandings and probe responses for more information that all added to the collection of in-depth information from the respondents. Using open-ended questions in the interviews enabled collection of a variety of information in detail that provided a lot of information for the study. Examples of such questions were: "*Your institution is highly ranked (by Webometric Ranking System) among universities in Kenya. In your view, what is contributing to your university's visibility and high ranking?*" and "*What challenges are you facing in supporting your academic staff in their research activities?*" As the interviews progressed, notes were taken by hand as well as recording of the conversations using an audio-recording device. Permission to record the conversations was obtained via the informed consent letter.

4.5 Data Analysis and Presentation

The study collected both quantitative and qualitative data using the mixed methods research methodology. Table 4.5 below provides a summary of the research questions, respondents and data analysis strategy for each research question.

Table 4.5: Data sources and data analysis strategy

Research questions	Respondents	Data sources	Data analysis strategy
What kinds of scholarly content are generated and used in universities in Kenya?	Academic staff and graduate students	Survey questionnaire	SPSS (descriptive and inferential statistics)
How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use?	Librarians, academic staff and graduate students	Interview and survey questionnaire	Thematic analysis/SPSS (descriptive and inferential statistics)
How do Kenyan scholars communicate amongst themselves in the various stages of their research work?	Academic staff and graduate students	Survey questionnaire	SPSS (descriptive and inferential statistics)
To what extent do Kenyan scholars participate in local and/or international professional social networks?	Academic staff and graduate students	Survey questionnaire	SPSS (descriptive and inferential statistics) /Gephi
To what extent do existing institutional facilities in the universities support scholars' research and communication needs?	Librarians, research officer, academic staff , and graduate students	Interview and survey questionnaire	Thematic analysis/SPSS (descriptive and inferential statistics)

Before data analysis was carried out, the data was examined for accuracy in terms of legibility, consistency and completeness of responses. Additionally, the questionnaires were checked to eliminate those where instructions were not followed. The IBM SPSS Statistics software and the Gephi Social Network Analysis software were used for statistical analysis of the quantitative data and the data was coded to enable use of these packages. The IBM SPSS Statistics package was suitable for the kind of quantitative analysis that was required for this

study as it produced descriptive statistics and charts which were necessary to analyse the data effectively. In the analysis, both descriptive and inferential statistics were used to describe the distribution and relationship among variables in the study and also estimate the degree of confidence that can be placed in generalizations from the samples to the population from which the samples were selected (Chambliss & Schutt, 2013).

The Gephi SNA software on the other hand provided features that allowed drawing and analysis of network data arising from the questionnaires used in the study. Social network analysis (SNA) is the mapping and measuring of relationships and flows between people, groups, organizations, computers, and other connected information/knowledge entities. The interacting entities form a network. A network consists of two components: a list of the actors composing the network, for example, a group of academic staff in a university and a list of the relations (the interactions between actors), for instance, research collaboration between the academic staff. The actors are referred to as vertices or nodes whereas the relations are denoted as tiles or edges. SNA provides both visual and a mathematical analysis of human relationships (Thorp, 2013). The chief duty of social network analysis is to evaluate the location of actors in a network, that is, the centrality of a node, which provide insight into the various roles and groupings in the network, for instance, who are the leaders, connectors or peripheral players (Waltman et al., 2010). There are several software programs that can implement SNA, for instance, Gephi, NetLogo, Pajek, UiNet, NodeXL, and NetworkX. This study used Gephi to analyse social networks within university research communities because it is versatile, allows for the visualization of the network and displays on the graph the computed statistical values of centrality (Bastian et al., 2009).

There are three basic types of centrality measures: degree, closeness, and betweenness centralities (Bastian et al., 2009). Degrees is the term used to refer to the number of connections flowing into (or away from) a node, as well as to the number of connections required to connect to another node via the shortest possible path. Thus, a node connected to many neighbouring nodes, will have the highest degree centrality. Nodes located at the geographic centre of the network will have more closeness centrality while nodes with the highest betweenness centrality are those in which a lot of transit happens (Bastian et al., 2009). Thus, this study adopted the concept of degree and betweenness centrality as they could indicate the most influential nodes in the network. To run SNA in Gephi, two separate files of nodes and edges were created in Excel and imported into Gephi. The nodes file

contained the initials of the collaborating respondents, their unique identification numbers, their gender, name of the university and department. The edges file contained the unique identification numbers and the nature of the collaboration. The Gephi Program then drew the graph of the network interaction using the Force Atlas alogarithm, which forces nodes that are closely connected to be together while forcing apart those that are connected.

The study also collected qualitative data. Before the actual interviews were conducted, the researcher ensured that the quality of the audio-recording device was cross-checked in the pilot test to ensure that it was working well and would produce high quality sound in the real interviews. Once each interview was conducted, the researcher transferred the audio recording to a back-up device and thereafter prepared the data for analysis. This was done by transcribing it, a process that involved reproducing each of the audio recorded interviews verbatim as word documents (Saunders et al., 2012). Notes that had been taken by hand during the interviews were used to supplement the audio files and ensure completeness and correctness of the data. Data from interviews was analysed manually since there were only 12 interviews in total. This included data, for example, on the techniques of preservation and archiving of scholarly content, extent of universities' support of communication needs of Kenyan scholars, and the extent of participation of Kenyan scholars in professional social networks. The actual qualitative data analysis was carried out in a series of steps including categorising and coding data into analytical units (thematic units) based on the aim of the study as expressed in the research questions and objectives. Thereafter, relevant chunks of the data were then attached to the appropriate category or categories. This organisation of the data helped the researcher identify key themes, patterns and relationships emerging from the data (Saunders et al., 2012).

In line with Onwuegbuzie & Leech (2006:490-492) and Caracelli & Greene (1993), data analysis was conducted within the mixed method framework which presents a seven step model for analysis namely: *data reduction* (which involves reducing the dimensionality of the qualitative data for example via exploratory thematic analysis and memoing) and quantitative data (such as via descriptive statistics, exploratory factor analysis, cluster analysis); *data display* (involves describing the qualitative data pictorially using matrices, charts, graphs, networks, lists; and describing quantitative data using tables and graphs); *data transformation* (wherein quantitative data are converted into narrative data that can be analysed qualitatively and/or qualitative data are converted into numerical codes that can be represented

statistically); *data correlation* (this involves quantitative data being correlated with qualitised data or qualitative data being correlated with quantitised data); *data consolidation* (wherein both quantitative and qualitative data are combined to create new or consolidated variables or data sets.); *data comparison* (involves comparing data from the qualitative and quantitative data sources); and *data integration* (whereby both quantitative and qualitative data are integrated into either a coherent whole or two separate sets (i.e., qualitative and quantitative) of coherent wholes). The authors emphasise that researchers undergo some and not necessarily all the seven stages. This study employed data reduction, data display, data transformation, data correlation and data comparison.

Additionally, the study design relied on triangulation whereby methods and data analysis techniques were triangulated to ensure completeness of the data and a comprehensive understanding of the problem under study. Triangulation allowed qualitative and quantitative results to be interpreted together to provide a richer and more comprehensive response to the research questions as compared to the use of a mono-method design (Saunders et al., 2012:167).

Presenting the data was done using the research questions as the structure that guided the discussion and reporting of themes, patterns and relationships emerging from the both quantitative and qualitative data. In continuing with the mixed method strategy, an integrated approach was used in data presentation. Sandelowski (2003) admits that mixed studies present researchers with many challenges, including presenting mixed methods studies for mixed audiences. The author concludes that writing in mixed method studies entails having crafting skills and motivation to permit both qualitative and quantitative readers 'access' to their work. Thus, crafting convincing mixed methods studies texts requires using words in ways that will be accessible and appealing to the mixed audiences. Greene (2008) advocates for an intentional incorporation of different forms of writing and displaying of inquiry results—including such quantitative forms as graphs, tables, and figures; and such qualitative forms as stories, poems, and performances. Therefore, in this study, both quantitative and qualitative data presentation techniques were used including numbers, graphs, tables, pie-charts, and quotes.

4.6 Reliability and Validity in Mixed Methods

According to Boaz & Ashby (2003), the growing interest in using research evidence to inform policy and practice, with emphasis on identifying, synthesising and applying reputable knowledge to the solution of problems has focused attention on the quality of research itself. Several authors (Boaz & Ashby, 2003; Golafshani, 2003) note that there is a wide variety of quality criteria, the most established of which were designed for quantitative research. These include reliability and validity measures. Reliability involves demonstrating that the operations of a study (such as data collection techniques and analytic procedures) would produce consistent findings if repeated on another occasion or by a different researcher (Saunders et al., 2012; Yin, 2003). Validity has been defined as the extent to which data collection method(s) accurately measure what they were intended to measure or the extent to which research findings are really about what they profess to be about (Saunders et al., 2012). According to Yin (2003) and Saunders et al. (2012), there are various types of validity, the most common being: *Construct validity* (establishing correct operational measures for the concepts being studied); *internal validity* (involves establishing a causal relationship between two variables, that is, certain conditions are shown to lead to other conditions); *external validity* (involves establishing the domain to which a study's findings can be generalised. It is concerned with the question: can a study's research findings be generalised to other relevant settings or groups?

Questions have been raised as to whether qualitative studies can also benefit from such measures and qualitative researchers have opted to rely on measures parallel to the traditional criteria. These measures include credibility (parallels with internal validity); transferability (parallels with external validity); dependability (parallels with reliability) and confirmability (parallels with objectivity) (Rolfe, 2006; Bryman in Boaz & Ashby, 2003). However, Long and Johnson (2000) argue that there is nothing to be gained from the use of alternative terms which, on analysis, often prove to be identical to the traditional terms of reliability and validity.

In the mixed method arena, Onwuegbuzie & Johnson (2006) observe that wherein quantitative and qualitative approaches are combined, discussions about "validity" issues are in their infancy. They acknowledge the on-going debate between quantitative and qualitative researchers on the suitability and applicability of the use of '*validity*' as a measure of the reality of a given situation. They conclude that use of the word validity in mixed research can

be counterproductive given the arguments against the concept raised by qualitative researchers (Onwuegbuzie & Johnson (2006:54). They suggest that an attractive solution to this problem is for mixed researchers to use the alternative word '*legitimation*' that could be more acceptable to both quantitative and qualitative researchers. The Free Dictionary (2014) describes the word '*legitimation*' as a noun arising from the word 'legitimate' which means 'being in accordance with established or accepted patterns and standards; or based on logical reasoning; reasonable; authentic or genuine'. Legitimation itself means 'the act of making lawful'. The use of the term legitimation thus suggests that the research process and outcomes are therefore authentic and reasonable, being based on established and accepted patterns and standards and is therefore lawful and recognised within scientific circles. Onwuegbuzie & Johnson (2006:52) observe that mixed research is plagued by the problem of legitimation which is the difficulty in obtaining findings and/or making inferences that are credible, trustworthy, dependable, transferable and/or confirmable.

Onwuegbuzie & Johnson (2006) propose nine different types of legitimation that would be applicable in mixed research. These are: *sample integration legitimation* (the extent to which the relationship between the quantitative and qualitative sampling designs yields quality meta-inferences)*; inside-outside legitimation* (the extent to which the researcher accurately presents and appropriately utilises the insider's view and the observer's views for purposes such as description and explanation)*; weakness minimisation* (The extent to which the weakness from one approach is compensated by the strengths from the other approach); *sequential legitimation* (The extent to which one has minimised the potential problem wherein the meta-inferences could be affected by reversing the sequence of the quantitative and qualitative phases)*; conversion legitimation* (the extent to which the quantitising or qualitising yields quality meta-inferences)*; paradigmatic mixing* (the extent to which the researcher's epistemological, ontological, axiological, methodological, and rhetorical beliefs that underlie the quantitative and qualitative approaches are successfully (a) combined or (b) blended into a usable package)*; commensurability* (the extent to which the meta-inferences made reflect a mixed worldview based on the cognitive process of Gestalt switching and integration)*; multiple validities* (the extent to which addressing legitimation of the quantitative and qualitative components of the study result from the use of quantitative, qualitative, and mixed validity types, yielding high quality meta-inferences)*;* and *political legitimation* (the extent to which the consumers of mixed methods research value the meta-inferences stemming from both the quantitative and qualitative components of a study.

For purposes of this study, the researcher opted to work with the concept of 'multiple validities legitimation' meaning that validity types from the quantitative, qualitative and mixed methods methodologies were employed. The rationale was in line with Onwuegbuzie & Johnson (2006) proposal to use it to yield high-quality meta-inferences.

Validity of the data collection instruments was assessed in various ways. One was to circulate the draft data collection tools to experts in content management and scholarly communication for their comments and feedback on the representativeness and suitability of questions, structure of questionnaire and interview schedule and content validity (Saunders et al., 2012). These experts included five academic staff and three librarians at various universities in Kenya and at the University of KwaZulu-Natal. Their comments were incorporated into the final draft of the data collection tools. Pre-testing and piloting of the data collection tools was done to ascertain their suitability for the study.

The study also adapted questions from survey tools that have been used in previous related studies. Since these tools have already been validated and used in actual studies, it was assumed that their validity had already been pre-tested and therefore they could be used for the current study. The questions were adapted from questionnaires used in various related studies namely Lynch, Zhang & Korr (2009); McGill & Settle (2012); Rowlands & Nicholas (2005); and the European Alliance for Permanent Access (2009) (PARSE.insight survey). Some aspects of these studies were replicated in the current study and comparing the study's findings to the previous studies allowed reliability to be assessed (Saunders et al., 2012).

Other strategies that were used to ascertain validity included triangulation of different data sources such as questionnaires and interviews to corroborate the data and therefore validate the data collection tools. This is supported by several authors (Yeasmin & Rahman, 2012; Tobin & Begley, 2004; Thurmond, 2001; Creswell & Miller, 2000) who acknowledge that triangulation can be used to validate data collection instruments and confirm research findings while also broadening the scope of inquiry and increasing understanding of the problem under investigation. Additionally, the weaknesses from one approach are compensated by the strengths from the other approach.

The study employed an audit trail (Creswell & Miller, 2000) to establish credibility of the study. This was achieved by engaging readers to examine the narrative account and attest to its credibility. The researcher endeavoured to provide clear documentation of all research

decisions and activities which the readers examined and determined the trustworthiness of the findings. Related to this was the use of peer debriefing or review where the researcher relied on peer reviewers familiar with research and the phenomenon of the study to provide critiques that enabled the researcher to critically think about the research process and methods in relation to the overall credibility of the study (Creswell & Miller, 2000).

Reliability in the study was also achieved by documenting the operations carried out in different stages of the study. As Yin (2003) observes, a different researcher should be able, by conducting the same case study all over again and following the same procedures, to arrive at the same findings and conclusions. Additionally, Cronbach's alpha, a statistical test, was used to measure the internal consistency of responses for individual questions with multiple items in the questionnaire after the pre-test. This indicated the reliability of the questionnaire that was then used in the actual study after sufficient revision to improve the tool.

4.7 Ethical Considerations

The ethical considerations in this study included adherence to the University of KwaZulu-Natal Research Ethics Code (University of Kwa-Zulu Natal, 2014). In order to comply, the researcher obtained ethical clearance from the Humanities and Social Sciences Research Ethics Committee. Additionally, the researcher obtained official authorisation from the National Council for Science and Technology (NCST) to conduct research in Kenya, as well as from respective universities in Kenya to collect data from their members. During the actual data collection, informed consent of the respondents was obtained before they could take part in the study. They were required to sign a participation declaration indicating that they understood the nature of the research and their willingness to participate in it. Respondents were free to withdraw from the study at any time if they so wished. The reporting of results ensured that no individuals were mentioned by name.

4.8 Summary

This chapter presented the research methodology that was applied in the study. The research paradigm, methodology, methods and techniques were discussed and justified. The researcher used mixed methods to perform research operations within the case study research design. The population of the study and sampling techniques were also described. Data was analysed using IBM SPSS statistical analysis software, Gephi Social Network Analysis software and

thematic analysis. Reliability and validity of data collection tools and findings was ensured within the mixed methods perspective using various strategies including peer debriefing, pre-testing and pilot study, triangulation and appropriate documentation.

CHAPTER FIVE

DATA ANALYSIS AND PRESENTATION OF FINDINGS

5.1 Introduction

The analysis of data is a crucial part of a research project. Analysis is about organizing data and breaking it down into easily understandable parts, which can then be ordered and presented in a form that allows the researcher to answer the initial research questions. The essential component of data analysis involves explanations, comparisons, predictions and exploration of inter-relationships between variables (Loughborough University, n.d.). According to Shamoo & Resnik (2003:32), analysis of data through various techniques "provide a way of drawing inductive references from the data and distinguishing the signal (the phenomenon of interest) from the noise (statistical fluctuations) present in the data". The aim of this study was to investigate the strategies used by universities in Kenya in managing scholarly content. The study addressed specifically the following research questions: What kinds of scholarly content are generated and used in universities in Kenya? How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use? How do Kenyan scholars communicate amongst themselves in the various stages of their research work? To what extent do Kenyan scholars participate in local and/or international professional social networks? To what extent do existing institutional facilities in the universities support scholars' research and communication needs?

This study collected both quantitative and qualitative data in line with the mixed-methods approach. Quantitative data were obtained from the questionnaires (see Appendices 1 and 2) while qualitative data were obtained mainly from interviews (see Appendices 3 and 4). The questionnaire contained both closed-ended questions (which yielded quantitative data) and open-ended questions (which yielded qualitative data). Before data analysis was done, the data were prepared for analysis (Saunders et al., 2012; Kothari, 2004) through coding where each item in the questionnaire was identified by a unique numerical code. Missing data were also identified and coded appropriately. Thereafter analysis was carried out using IBM SPSS to generate tables, graphs and statistics that were used to present, describe and examine trends and relationships in the data. Katz (2006:38) posits that a good way to begin organizing results is to put them into a table as the starting point for all scientific analyses, from qualitative discussions to sophisticated statistical and graphic presentations. Well-presented

tables and graphs can concisely summarise information which would be difficult to describe in words alone (Statistical Services Centre, The University of Reading, 2000). Analysis of the social networks existing among scholars in the universities in Kenya was carried out using Gephi Social Network Analysis software.

Qualitative data arising from the interviews was also prepared first by transcribing verbatim the audio-recorded interviews into word-processed text. From the transcripts of the interviews, summaries were made that presented the main ideas and themes emerging from each interview. The responses from the open-ended questions were also categorised using themes that emerged from the responses. Together, these were used to complement the findings from the quantitative data analysis.

This chapter is organised using the research questions as the framework. The following themes preceded by the response rate and biographical data are covered in this chapter: scholarly content generation and use; scholarly content preservation and archiving; communication amongst scholars in the various stages of their research work; research participation of scholars in local and/or international professional social networks; and institutional facilities for supporting research and communication needs of scholars.

5.2 Response Rate

Response rate is the number of eligible sample units that cooperate in a survey (American Association for Public Opinion Research (AAPOR), n.d.). It is calculated as the total number of responses divided by the total number in the sample after ineligible respondents have been excluded (Saunders et al., 2012) usually expressed as a percentage. According to Groves & Peytcheva (2008), high response rates are preferable to reduce the risk of non-response bias and ensure the sample is representative. Polit & Beck (2004:366) affirm that a response rate greater than 65% is probably sufficient for most purposes, but lower response rates are common. Baruch & Holtom (2008) examined the response rates for surveys used in organisational research. They analysed 1607 studies published between the years 2000-2005 in 17 refereed academic journals and found that the average response rate for studies that utilised data collected from individuals was 52.7% with a standard deviation of 20.4, while the average response rate for studies that utilised data collected from organisations was 35.7 % with a standard deviation of 18.8.

Overall, of the 350 and 370 copies of the questionnaires administered to academic staff and postgraduate students of six universities in Kenya, 273 (78%) and 332 (89.7%), were returned, respectively. Table 5.1 below presents the actual number of copies of the questionnaires given out to each of the six universities and the number returned. The universities names have been coded for anonymity to protect the identity of the respondents. These universities were selected because in the 2013 Webometric ranking they were the best six tertiary institutions in research in Kenya.

Table 5.1 Response rate in the study

Respondent type	University	Number of copies of questionnaires given	Number of useful questionnaires returned	Response rate (%)
Academic staff	University A	141	108	76.6
	University B	32	28	87.5
	University C	78	57	73.1
	University D	53	41	77.4
	University E	12	12	100.0
	University F	34	27	79.4
	Total	**350**	**273**	**78.0**
Postgraduate students	University A	205	181	88.3
	University B	27	27	100.0
	University C	63	55	87.3
	University D	33	31	93.9
	University E	8	8	100.0
	University F	34	30	88.2
	Total	**370**	**332**	**89.7**

Source: Computed from survey data, 2014

The response rate from questionnaires for both types of respondents in all the universities was relatively high, ranging from 73% to 100%. This was achieved through vigorous follow-ups on the respondents by research assistants. Previous similar studies in the field of scholarly communication achieved varying response rates. In the study by Dulle (2010) analysing open access scholarly communication in Tanzanian public universities that utilised self-administered questionnaires, the response rate was 73%. Tabasum & Jan (2011) conducted a

study of the vision, experiences and opinions about publishing in scholarly communication of scholars at Kashmir University. The study utilised self-administered questionnaires and received an 87% response rate. Khan & Ahmed (2013) analysed the impact of digital library resources on scholarly communication among research scholars of MS/MPhil and PhD from 14 public sector universities of Khyber Pakhtunkhwa, Pakistan. Using a structured questionnaire distributed among the respondents through mail, email and personal visits, a response rate of 95.2% was achieved.

The current study also utilised interviews involving university librarians and representatives from the research offices of the six universities. From the 12 interviews that were intended to be conducted 10 respondents were reached giving a response rate of 83.3%. Two interviews with research office representatives from 2 universities failed as a result of the respondents being too busy to allocate time to the researcher. Thus, 6 university librarians and 4 research office representatives were actually interviewed. The high response rates in this and similar studies on scholarly communication can be attributed to the methods of data collection that were used and how the data collection tools were administered. Self-administered questionnaires were distributed by hand either by the principal investigators or by research assistants who were members of the institutions where the data was being collected. Intensive follow-up of respondents was done by these investigators to encourage respondents to complete and return the questionnaires.

5.3 Demographic Profile of Respondents

The data from this section gives biographical information of the respondents from the six universities in the study namely: University A, University B, University C, University D, University E, and University F. The respondents were the academic staff (who included assistant lecturers, lecturers, senior lecturers, associate professors and full professors) and postgraduate students (masters and PhD students) and the study collected demographic data from them in order to understand their profile. The information sought included: the respondent's university; whether their university was public or private; their department; gender; age; and academic qualification. In addition, the study obtained the lecturer's rank and length of service at the university and the student's mode of study and the period spent in study. Descriptive results (Table 5.2a) show that the study sampled a majority of academic staff (108, 40%) and students (181, 55%) from University A, followed by University C

(academic staff, 57, 21%; students, 55, 17%), and University D (academic staff 41, 15%; students 31, 9%) based on strength of relative populations.

Table 5.2a Biographical information

Bio-graphical information	Respondent type	Categories	Frequency	Percent
University	Academic staff	University A	108	39.6
		University B	28	10.3
		University C	57	20.9
		University D	41	15
		University E	12	4.4
		University F	27	9.9
		Total	**273**	**100**
	Postgraduate student	University A	181	54.5
		University B	27	8.1
		University C	55	16.6
		University D	31	9.3
		University E	8	2.4
		University F	30	9
		Total	**332**	**100**
Respondent's gender	Academic staff	Male	175	66
		Female	90	34
		Total	**265**	**100**
	Student	Male	195	59.8
		Female	131	40.2
		Total	**326**	**100**
Respondent's age	Academic staff	20 - 30 years	53	19.9
		31- 40 years	104	39
		41 – 50 years	78	29.2
		51 – 60 years	22	8.2
		61 years or above	10	3.7
		Total	**267**	**100**
	Student	20 - 30 years	207	63.5
		31- 40 years	94	28.8
		41 – 50 years	22	6.7
		51 – 60 years	3	0.9
		Total	**326**	**100**

Table 5.2b Biographical information

Bio-graphical information	Respondent type	Categories	Frequency	Percent
Respondent's highest academic qualification	Academic staff	Bachelor's	26	9.6
		Master's	130	48
		PhD	115	42.4
		Total	**271**	**100**
	Student	Bachelor's	232	72
		Master's	87	27
		PhD	3	0.9
		Total	**322**	**100**
Academic staff's rank	Academic staff	Assistant lecturer	111	42.4
		Lecturer	85	32.4
		Senior lecturer	50	19.1
		Assoc. professor	12	4.6
		Professor	4	1.5
		Total	**262**	**100**
Academic staff's service length	Academic staff	5 years or less	146	55.5
		6 – 10 years	44	16.7
		11 – 15 years	36	13.7
		16 – 20 years	20	7.6
		> 20 years	17	6.5
		Total	**263**	**100**
Student's mode of study	Student	Fulltime	199	62.6
		Part-time	119	37.4
		Total	**318**	**100**

Source: Survey data, 2014

Data presented in Table 5.2a above indicate that male academic staff were in a majority (175, 66%) relative to female academic staff (90, 34%). The study also sampled comparatively more male students (195, 60%) than female students (131, 40%). Eight academic staff and six students did not indicate their gender.

Most academic staff were aged between 31 to 40 years (104, 39%), followed by those aged between 41 to 50 years (78, 29%), and 20 to 30 years (53, 20%). Only (32, 12%) of the academics were over 50 years, suggesting that a relatively youthful workforce is represented in the universities. There was a progressive decrease in the number of postgraduate students

as age increased, with (207,64%), (94, 29%), and (22, 7%) of the students aged between 20 to 30 years, 31 to 40 years, and 41 to 50 years, respectively. Only (3, 0.9%) students were over the age of 50.

The majority of the university academic staff (130, 48%) had master's degrees whereas only (115, 42%) of them had PhDs (Table 5.2b). A few of the academic staff (26, 10%) had bachelor's degrees as their highest academic qualification. Since the minimum qualification to teach at a university in Kenya is a Master's degree, the academic staff with a bachelor's degree are likely to be Graduate Assistants who are expected to pursue further training to attain masters and later PhDs in their respective areas of specialisation. The graduate assistants work under the mentorship of senior academics. Most of the academic staff sampled in the study were assistant lecturers/tutorial fellows (111, 42%), with only (85, 32%) and (50, 19%) of them being lecturers and senior lecturers respectively. Associate professors and professors constituted only (12, 5%) and (4, 2%,) respectively of the sample. Of those students studying for masters degrees, (232, 72%) of them had bachelor's degrees as their highest academic qualification. In contrast, only (90, 28%) of the postgraduate students were studying for PhD. The students studying for PhD had masters qualifications as their highest qualification. Among the students, studying for postgraduate degrees three students already had PhDs, probably indicating they were studying for completely different degrees, away from their line of specialisation. The majority of the postgraduate students (199, 63%) were fulltime compared to (119, 37%) who studied on part-time basis.

With regard to length of service, the findings revealed that most academic staff had taught for five years or less (146, 56%), followed by those who had taught for between 6 and 10 years (44, 17%) and between 11 and 15 years (36, 14%). Given the fact that most academic staff were youthful, this suggested that a majority of them lacked lengthy experience of university teaching.

Table 5.2c: Demographic Data for University Librarians and Research Office Representatives (N=10)

University	Public/Private	Gender	Position
A	Public	Female	Deputy University Librarian
B	Public	Male	University Librarian
		Male	Director of Research
C	Public	Male	University Librarian
D	Public	Male	Deputy University Librarian
		Male	Director of Research
E	Private	Male	Deputy University Librarian
		Male	Representative of Research Office
F	Public	Female	University Librarian
		Male	Director of Research

Source: Survey data, 2014

Table 5.2c describes the demographic data for the key informants of the study namely the university librarians and representatives from the research offices in the different universities. From the table, 10 interviews materialised out of the proposed 12 interviews. In many cases, the researcher was able to interview the head of the unit, for example, the University Librarian and the Director of Research. Where this was not possible, a representative of the unit was interviewed, for example, the Deputy University Librarian.

5.4 Departments under Study

The academic staff and students sampled in this study belonged to over 40 academic departments. To increase sample size for each department and simplify the analysis, these departments were collapsed into nine major disciplines shown in Table 5.3. The bulk of the respondents came from the disciplines of science (academic staff 57, 21% and students 113, 35%), followed by the social sciences (academic staff 48, 18% and students 48, 15%), education (academic staff 32, 12% and students 49, 15%), and computer and IT (academic staff 47, 18% and students 33, 10%).

Table 5.3 Academic disciplines of the respondents

Respondent type	Discipline	Frequency	Percentage
Academic staff	Sciences	57	21.4
	Mathematics & Engineering	21	7.9
	Agriculture	27	10.2
	Computer & IT	47	17.7
	Library & Info. science	1	0.4
	Medical sciences	18	6.8
	Social sciences	48	18.0
	Business & Management	15	5.6
	Education	32	12.0
	Total	**266**	**100.0**
Postgraduate	Sciences	113	35.1
students	Mathematics & Engineering	16	5.0
	Agriculture	10	3.1
	Computer & IT	33	10.2
	Library & Info. science	9	2.8
	Medical sciences	20	6.2
	Social sciences	48	14.9
	Business & Management	24	7.5
	Education	49	15.2
	Total	**322**	**100.0**

Source: Computed from survey data, 2014

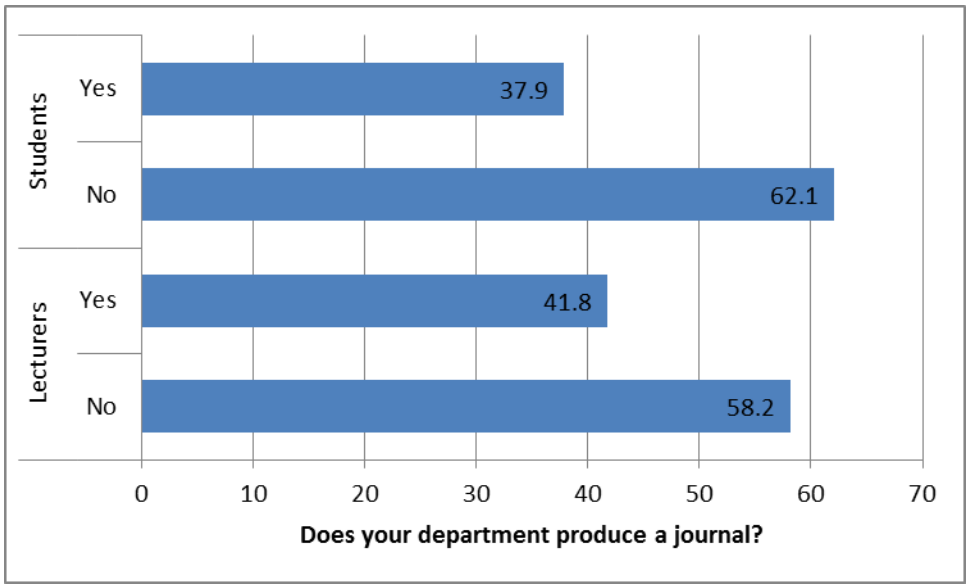
The smallest discipline, by respondent size, was Library and Information Science, which contributed only (1, 0.4%) and (9, 2.8%) of academic staff and students, respectively. This was attributed to the convenience sampling method that was used such that unfortunately some groups of respondents were under-represented.

5.5 Types of Scholarly Content Generated and Used in universities in Kenya

This section addresses the research question: *What kinds of scholarly content are generated and used in universities in Kenya?*

5.5.1 Departmental Journals

In response to the question *"Does your department produce any scholarly journals?"* the findings revealed that close to two thirds of departments in universities in Kenya do not publish a departmental scholarly journals (110, 42% academic staff and 118, 38% students said their department has a journal compared to 153, 58% academic staff and 193, 62% students who answered in the negative) (Figure 5.1).



Lecturers N= 263 Students N=311

Figure 5.1 Percentage of respondents with scholarly journals in their department

Source: Survey data, 2014

The results show a discrepancy in the responses from students and academic staff on this question pointing to possible ignorance on the part of respondents as to whether the journals actually exist or not.

Chi – square (χ^2) cross tabulations were computed to determine if publication of journals was dependent upon the university or department. The computation was done on combined data of both academic staff and postgraduate students, since they both belonged to the same universities and they were answering the same question. There was a statistically significant correlation between the university and publication of journals output, χ^2 (5) = 30.21, $p < 0.001$. The results suggested that the university with the highest number of departments that did not produce any journal was University E (16, 80% of respondents said their departments did not publish any journals), University C (76, 73%) and University B (38, 70%) (Table 5.4). Of the universities investigated, University A had the highest number of departments with journals (roughly a half of them, as (141, 51%) of respondents said yes their departments produced publications).

Table 5.4 Journals produced by departments at the different universities

University	**Does your department produce any journal?**		**Total (N)**
	No	Yes	
University A	135 (48.9%)	141 (51.1%)	276 (100%)
University B	38 (70.4%)	16 (29.6%)	54 (100%)
University C	76 (73.1%)	28 (26.9%)	104 (100%)
University D	44 (66.7%)	22 (33.3%)	66 (100 %)
University E	16 (80.0%)	4 (20.0%)	20 (100%)
University F	37 (68.5%)	17 (31.5%)	54 (100)
Total	**346 (60.3%)**	**228 (39.7%)**	**574 (100)**

Source: Computed from survey data, 2014

A statistically significant influence of discipline on the publication of journals was also found, χ^2 (8) = 41.21, $p < 0.001$. The results indicated that disciplines with the lowest departmental publications were Agriculture (32, 87% of the respondents answered in the

negative), Mathematics and Engineering (31, 86%), and Medical sciences (26, 72%) (see Table 5.5 below). Library and Information Science was ignored since there was only 1 respondent included in the study from this discipline. Computer and IT had the highest number of publications (at roughly a half of the departments constituting it), followed by Education (38, 49% of the respondents said there was a journal), and Sciences (78, 48%). These variations in responses about existence of departmental publications were not verified in this study. A survey of the university websites seems not to reveal much information that would corroborate the information on the actual existence of these journals. Further investigation is required to explain why some respondents answered in the affirmative while others answered in the negative which seems to point to differences in level of awareness among the respondents. This may indicate that if these journals actually exist, they may not be visible to all their intended audience. It may also imply that respondents who indicated that no journals exist in their departments have never published in these journals therefore they are not aware of their existence.

Table 5.5 Journal production in the different disciplines

Discipline	**Does your department produce any journal?**		**Total (N)**
	No	Yes	
Sciences	84 (51.9%)	78 (48.1%)	162 (100%)
Maths and Engineering	31 (86.1%)	5 (13.9%)	36 (100%)
Agriculture	32 (86.5%)	5 (13.5%)	37 (100%)
Computer and IT	35 (48.6%)	37 (51.4%)	72 (100%)
Library and Info. Science	8 (100.0%)	0 (0%)	8 (100%)
Medical sciences	26 (72.2%)	10 (27.8%)	36 (100%)
Social sciences	51 (56.7%)	39 (43.3%)	90 (100%)
Business and management	27 (69.2%)	12 (30.8%)	39 (100%)
Education	40 (51.3%)	38 (48.7%)	78 (100%)
Total	**334 (59.9%)**	**224 (40.1%)**	**558 (100%)**

Source: Computed from survey data, 2014

Interviews with the Directors of Research in the different universities confirmed that some of the universities produced peer-reviewed journals where members of staff could publish their scholarly work. The universities also used these journals to publish papers presented at the annual university conferences. Some of the universities produced journals managed centrally by the research units while other universities had departmental journals managed at departmental levels. A few of the universities had formal procedures whereby papers presented at the conferences were collected, scanned and uploaded into the institutional repositories.

5.5.2 Types of Scholarly Content Generated in the Universities

In response to the question *"What types of scholarly content have you generated or participated in generating?"* the study found that 12 types of scholarly content were generated by both academic staff and postgraduate students in the universities (Table 5.6). The number of responses to this question was 908 for academic staff and 790 for students, which was more than the number of academic staff (273) and students (332) in the sample study. This was because most respondents generated more than one type of scholarly content, that is, the question was a multiple response type. The Cronbach's Alpha values were relatively high (0.78 and 0.71 for items in the academic staff's and students' questionnaires, respectively) suggesting a high inter-item reliability.

Table 5.6 Types of scholarly content generated in the universities

	Academic staff			Students		
	Responses			Responses		
Scholarly content generated	N	%	% of cases	N	%	% of cases
Preprints	34	3.7	13.7	48	6.1	17.3
Journal article	159	17.5	64.1	117	14.8	42.1
Working paper	70	7.7	28.2	78	9.9	28.1
Technical report	53	5.8	21.4	65	8.2	23.4
Book chapter	68	7.5	27.4	32	4.1	11.5
Book	41	4.5	16.5	41	5.2	14.7
Book review	66	7.3	26.6	47	5.9	16.9
Thesis	188	20.7	75.8	160	20.3	57.6
Conference paper	163	18.0	65.7	100	12.7	36.0
Datasets	28	3.1	11.3	39	4.9	14.0
Software	22	2.4	8.9	34	4.3	12.2
Multimedia	16	1.8	6.5	29	3.7	10.4
Total	908	100	366.1	790	100	284.2

Cronbach's Alpha: Academic staff's items: 0.78; Student's items: 0.71
N= 273 for academic staff and 332 for students (Multiple responses possible)

Source: Computed from survey data, 2014

On average, each academic staff member generated about four types (366.1/100) of scholarly content compared to a student's three (284.2/100). This suggested that scholarly content generation by academic staff is greater than that of postgraduate students.

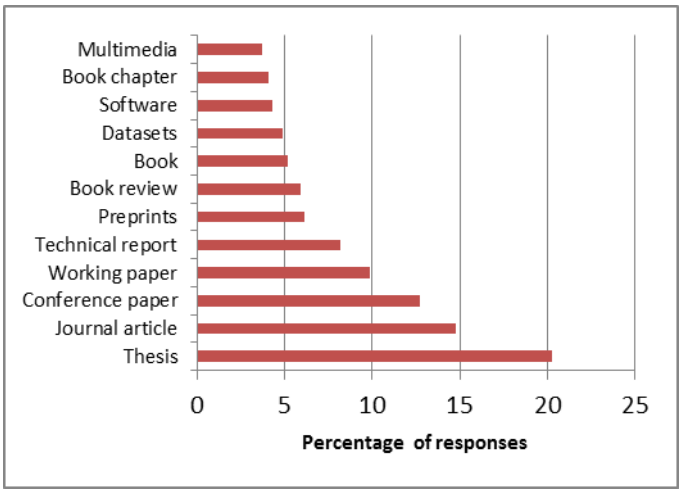


Figure 5.2(a) Academic staff's scholarly output (N=908)

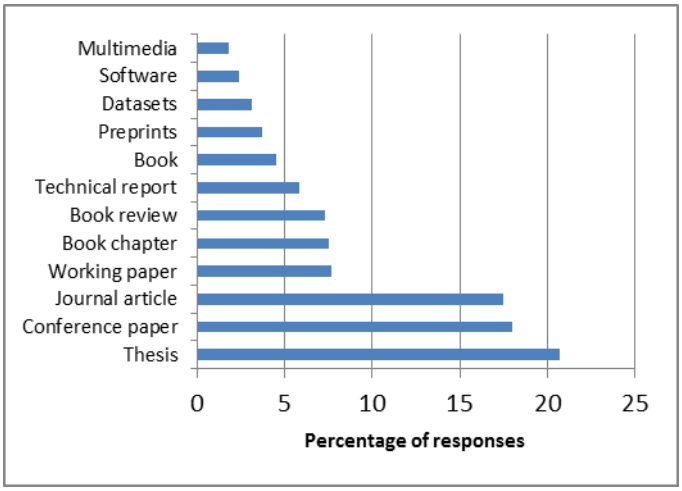


Figure 5.2 (b) Students' scholarly output (N=790)

The scholarly content generated by academic staff was mostly theses (possibly both as authors or supervisors), followed by journal articles, conference papers, working papers, and technical reports (Figure 5.2a). On the other hand, postgraduate students generated mainly theses, followed by conference papers, journal articles, working papers and book chapters (Figure 5.2b). The least generated type of content by academic staff was multimedia, book chapters, and software. In contrast, postgraduate students generated more of multimedia, software and datasets.

5.5.3 Scholarly Output in the Last Five Years

When asked to indicate the quantity of different scholarly output(s) respondents had generated in the last five years (2010-2014) most of the academic staff (154, 70%), had produced between 1–3 theses (again assuming this was done either as authors or supervisors); conference presentations (121, 52%), and journal articles (91, 42%) in the last five years. However, the majority of them had not authored a book (92, 63%), book chapter (73, 46%), book review (77, 50%), technical reports (70, 52%), and working papers (71, 43%) in the same period (Table 5.7).

Table 5.7 Frequencies of academic staff's scholarly output in the last five years (2010-2014)

	Quantity of scholarly output in last five years (N=273)									
Type of scholarly output	None		1 – 3		4 – 6		7 – 9		10 or <	
	Fq	%	Fq	%	Fq	%	Fq	%	Fq	%
Conference presentation	27	11.7	121	52.4	40	17.3	17	7.4	26	11.3
Journal article	51	23.5	91	41.9	44	20.3	16	7.4	15	6.9
Book	92	62.6	40	27.2	13	8.8	1	0.7	1	0.7
Book chapter	73	45.9	60	37.7	21	13.2	5	3.1	0	0.0
Book review	77	49.7	57	36.8	15	9.7	2	1.3	4	2.6
Abstract	51	32.5	48	30.6	35	22.3	6	3.8	17	10.8
Thesis	22	10.0	154	70.0	14	6.4	15	6.8	15	6.8
Technical report	70	51.9	34	25.2	12	8.9	7	5.2	12	8.9
Working paper	71	43.0	45	27.3	29	17.6	13	7.9	7	4.2

Key: Fq=frequency
Cronbach's Alpha: 0.81

Source: Survey data, 2014

With the exception of theses and conference presentations, most of the postgraduate students in the universities had not produced a book (166, 83%), book chapter (162, 81%), book review (141, 69%), technical reports (127, 58%), working paper (120, 57%) and journal article (130, 56%) in the last five years (Table 5.8). These findings are in line with authors (Gabbidon, Higgins & Martin, 2011; Johnstone, 2007) who have found that researchers are expected to publish in peer-reviewed journals that are the most important for tenure and promotion as opposed to other forms of publishing.

Table 5.8 Frequencies of student's scholarly output in last five years

	Quantity of scholarly output in last five years (N=332)									
Type of scholarly output	None		1 – 3		4 – 6		7 – 9		10 or <	
	Fq	%	Fq	%	Fq	%	Fq	%	Fq	%
Conference presentation	114	45.6	113	45.2	20	8.0	1	0.4	2	0.8
Journal article	130	55.8	86	36.9	12	5.2	2	0.9	3	1.3
Book	166	83.4	20	10.1	11	5.5	0	0.0	2	1.0
Book chapter	162	81.4	22	11.1	14	7.0	1	0.5	0	0.0
Book review	141	68.8	50	24.4	13	6.3	1	0.5	0	0.0
Abstract	122	53.3	87	38.0	13	5.7	3	1.3	4	1.7
Thesis	100	40.3	128	51.6	15	6.0	2	0.8	3	1.2
Technical report	127	57.5	71	32.1	16	7.2	3	1.4	4	1.8
Working paper	120	56.9	71	33.6	16	7.6	1	0.5	3	1.4

Key: Fq=frequency
Cronbach's Alpha: 0.84

Source: Survey data, 2014

The Cronbach's Alpha values for this question were 0.81 and 0.84 for items in the academic staff and postgraduate students' questionnaires, respectively. This suggested a high internal validity of the test items.

5.5.4 Perception about Levels of Research Outputs in the Departments

Responses to the question *"How would you rate the level of research in your department in terms of quantity of output?"* are shown in Table 5.9 below.

Table 5.9 Quantity of research output in the universities

Level of research in department	Frequency	Percentage
not sure	58	9.8
Low	156	26.4
Medium	242	41.0
High	134	22.7
Total	**590**	**100.0**

Source: Computed from survey data (2014) (N=590)

Compared to students, academic staff generally rated quantity of research output in their universities as being higher (Figure 5.3). This may be attributed to the fact that academic staff are usually more involved in research activities as compared to students so in their view, much research was going on. Students on the other hand would be more preoccupied with completing their studies than conducting research.

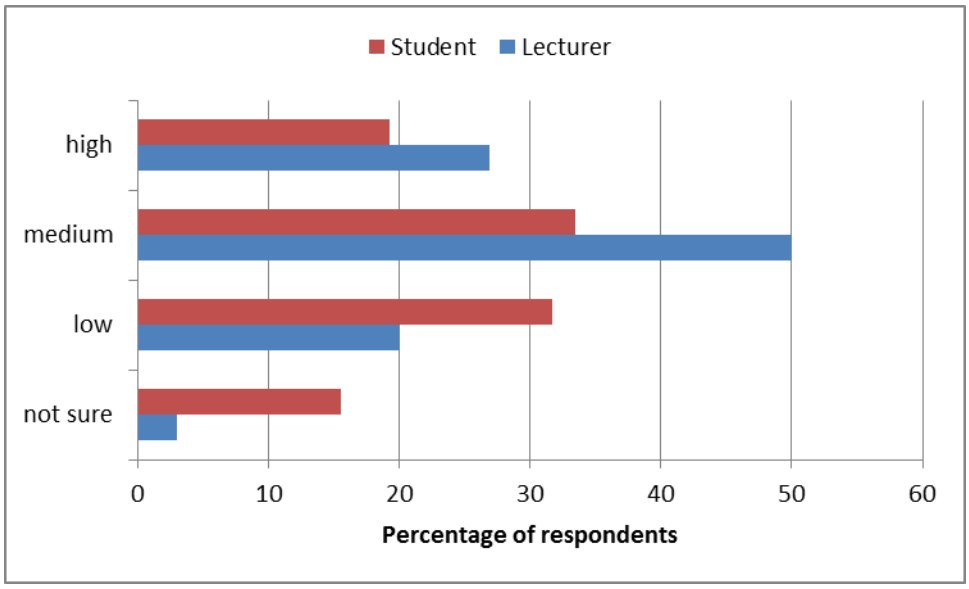


Figure 5.3 Respondents' rating of quantity of research output in the universities

Source: Survey data, 2014

A Chi – square cross tabulation was computed to determine if the quantity of research output was dependent upon the individual universities. A statistically significant influence of the university on the level of research output was found, χ^2 (15) = 61.57, $p < 0.001$. The results suggested that most of the academic staff and postgraduate students are likely to rate the quantity of research output as being medium in University B (33, 60%), University C (58, 53%), and University D (41, 58%) (see Table 5.10). In University F, most of the respondents perceived the quantity of research output as low (21, 38%) or average (22, 40%). On the other hand, academic staff and postgraduate students of University A were split amongst those who felt the research level was high (71, 25%), medium (81, 29%), and low (89, 32%).

Table 5.10 Perception of respondents about quantity of research output in the universities

University	Not sure	Low	Medium	High	Total
University A	39 (13.9%)	89 (31.8%)	81 (28.9%)	71 (25.4%)	280 (100%)
University B	2 (3.6%)	7 (12.7%)	33 (60.0%)	13 (23.6%)	55 (100%)
University C	9 (8.3%)	18 (16.5%)	58 (53.2%)	24 (22.0%)	109 (100%)
University D	7 (9.9%)	11 (15.5%)	41 (57.7%)	12 (16.9%)	71 (100%)
University E	1 (5.0%)	10 (50.0%)	7 (35.0%)	2 (10.0%)	20 (100%)
University F	0 (0.0%)	21 (38.2%)	22 (40.0%)	12 (21.8%)	55 (100%)
Total	**58 (9.8%)**	**156 (26.4%)**	**242 (41.0%)**	**134 (22.7%)**	**590 (100%)**

(N=590)

Source: Computed from survey data, 2014

5.6 Preservation and Archiving of Scholarly Content

This section was aimed at gaining insight into how the scholarly content that is generated in universities is preserved and archived to ensure that it can be accessible immediately and also in the future. The research question being addressed is: *How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use?*

5.6.1 Knowledge of Data Curation

Respondents were asked to assess their knowledge of data curation through the question: "*How much do you know about data curation?"* The results are presented in Table 5.11 below.

Table 5.11 Knowledge about data curation

Respondent type	Curation knowledge	Frequency	Percentage
Academic staff	Nothing at all	50	18.9
	Know a little	99	37.5
	Know quite a lot	52	19.7
	Know a lot	63	23.9
	Total	**264**	**100**
Postgraduate students	Nothing at all	79	24.5
	Know a little	102	31.7
	Know quite a lot	98	30.4
	Know a lot	43	13.4
	Total	**322**	**100**

(N=264 for academic staff; 322 for postgraduate students)

Source: Computed from survey data, 2014

A Chi – square (χ^2) cross tabulation was computed to determine if knowledge about data curation was dependent upon the university or department. There was a statistically significant influence of university on the knowledge about data curation, χ^2 (15) = 38.91, p = 0.001. University B and University E had the highest number of academic staff and postgraduate students with either little or no knowledge about data curation (University B: 40, 74%; University E: 14, 74%), followed by University D (48, 69%), University C (57, 53%), and University A (144, 52%) (Table 5.12). Only University F had more respondents who knew either quite a lot or a lot (29, 52%) compared to those who knew a little or nothing (27, 48%). Some of these findings were corroborated by findings through interviews which revealed that the librarians at most of the institutions had little or no knowledge of this concept. This was the case at University B, University D, and University A. Only the librarians at University F, University E and University C could describe the concept 'data curation' with confidence and discuss some of the initiatives they are already undertaking in this regard. At University E, the institutional repository is currently the avenue for preservation of all digital information that is considered to be important to the institution especially research information. Anyone involved with research has to deposit his/her outputs in the IR as per policy, thus ensuring that it can be retrieved at any time. At University C, a librarian has been assigned to work with the university management to digitise records at the

administration block to ensure such records can be accessible over time. The lack of knowledge about data curation in most universities could be attributed to lack of awareness about current techniques of data preservation. The librarians confirmed that data curation was hardly discussed in their universities or departments.

Table 5.12 Extent of knowledge about data curation in each university

University	Nothing at all	A little	Quite a lot	A lot	Total
University A	44 (15.8%)	100 (35.8%)	70 (25.1%)	65 (23.3%)	279 (100%)
University B	15 (27.8%)	25 (46.3%)	7 (13.0%)	7 (13.0%)	54 (100%)
University C	31 (28.7%)	26 (24.1%)	34 (31.5%)	17 (15.7%)	108 (100%)
University D	24 (34.3%)	24 (34.3%)	16 (22.9%)	6 (8.6%)	70 (100%)
University E	6 (31.6%)	8 (42.1%)	5 (26.3%)	0 (0%)	19 (100%)
University F	9 (16.1%)	18 (32.1%)	18 (32.1%)	11 (19.6%)	56 (100%)
Total	**129 (22.0%)**	**201 (34.3%)**	**150 (25.6%)**	**106 (18.1%)**	**586 (100%)**

(N=586)

Source: Survey data, 2014

A statistically significant influence of discipline on knowledge about curation of data was also found, χ^2 (24) = 47.53, p = 0.003. The results suggested that Library and Information Science had the highest number of students and academic staff with the least knowledge of data curation (8, 80% of the respondents had either little or no knowledge), followed by Business and Management (26, 68%), Medical Sciences (23, 66%), and Agriculture (24, 65%). The discipline with academic staff and postgraduate students with adequate knowledge on data curation was Mathematics and Engineering with 24, (65%) of the respondents having quite a lot or a lot of knowledge), followed by Sciences (76, 46%) and Computer and IT (36, 46%).

Table 5.13 Relationship between knowledge about data curation and discipline

Department	Nothing at all	A little	Quite a lot	A lot	Total
Sciences	29 (17.7%)	59 (36.0%)	50 (30.5%)	26 (15.9%)	164 (100%)
Maths and engineering	9 (24.3%)	4 (10.8%)	18 (48.6%)	6 (16.2%)	37 (100%)
Agriculture	5 (13.5%)	19 (51.4%)	4 (10.8%)	9 (24.3%)	37 (100%)
Computer and IT	16 (20.3%)	27 (34.2%)	16 (20.3%)	20 (25.3%)	79 (100%)
Library and Info. Science	4 (40.0%)	4 (40.0%)	1 (10.0%)	1 (10.0%)	10 (100%)
Medical sciences	13 (37.1%)	10 (28.6%)	9 (25.7%)	3 (8.6%)	35 (100%)
Social sciences	25 (27.2%)	25 (27.2%)	21 (22.8%)	21 (22.8%)	92 (100%)
Business and management	11 (28.9%)	15 (39.5%)	6 (15.8%)	6 (15.8%)	38 (100%)
Education	11 (14.1%)	32 (41%)	22 (28.2%)	13 (16.7%)	78 (100%)
Total	**123 (21.6%)**	**195 (34.2%)**	**147 (25.8%)**	**105 (18.4%)**	**570 (100%)**

(N=570)
Source: Survey data (2014)

5.6.2 Backup and Storage of Research Information

Respondents were required to assess their practices during and after research. The results outlined in Table 5.14 below indicate that respondents are conscious about long-term accessibility of their research information. As the results indicate, the majority of the respondents document their research procedures, backup their information, move files to newer computers and print hard copies of files they would like to keep. The Cronbach's Alpha value for this question was 0.74 for both academic staffs and students, suggesting a high inter-item reliability.

Table 5.14 Respondents' methods of backup

Research activity	Respondent type	Backup of research information							
		SD		Disagree		Agree		SA	
		Fq	%	Fq	%	Fq	%	Fq	%
I document research procedures	Academic staff	7	2.7	13	4.9	150	57.0	93	35.4
	Student	12	3.8	39	12.5	175	56.1	86	27.6
I back-up information	Academic staff	7	2.6	7	2.6	127	47.4	127	47.4
	Student	4	1.2	13	4.0	133	40.1	177	54.1
I move files to newer	Academic staff	9	3.4	31	11.7	115	43.2	111	41.7
computers	Student	33	10.2	55	17.0	150	46.3	86	26.5
I print hard copies	Academic staff	17	6.3	31	11.6	119	44.4	101	37.7
	Student	33	10.2	39	12.0	147	45.2	106	32.6
I review files in order	Academic staff	10	3.7	20	7.5	145	54.1	93	34.7
to keep or destroy	Student	17	5.3	57	17.8	141	43.9	106	33.0

Key: S.D=strongly disagree, S.A=strongly agree, Fq=frequency. (Percentages quoted in the text were obtained by summing up percentages in the columns of agree and strongly agree.) Academic staff (N=273) Students (N=332)
Cronbach's Alpha: Academic staff's items: 0.74; Students' items: 0.74

Source: Survey data, 2014

5.6.3 Mode of Preserving Scholarly Content

Respondents were asked to state their preferred mode of preserving scholarly content such as datasets or any other scholarly output. The study found that academic staff and students use nine modes for preserving scholarly content, shown in Table 5.15 below.

Table 5.15 Mode of preserving scholarly content

	Academic staff			Students		
Mode of preserving scholarly content	Responses			Responses		
	N	%	% of cases	N	%	% of cases
Computer at work	150	19.1	56.2	120	14.4	36.9
University server	36	4.6	13.5	40	4.8	12.3
University digital archive	36	4.6	13.5	22	2.6	6.8
External web server	66	8.4	24.7	65	7.8	20.0
Hard copy	97	12.3	36.3	156	18.7	48.0
Portable storage	173	22.0	64.8	209	25.1	64.3
Computer at home	178	22.6	66.7	193	23.1	59.4
Discipline's digital archive	35	4.4	13.1	29	3.5	8.9
My blog	16	2.0	6.0	0	0.0	0.0
Total	787	100	294.8	834	100	256.6

N=273 for academic staff; N=332 for students (Multiple responses possible)
Cronbach's Alpha: Academic staff's items: 0.69; Students' items: 0.71

Source: Computed from survey data, 2014

The number of responses by academic staff (787) and students (834) exceeded the number of academic staff (273) and students (332) in the study sample because respondents used more than one mode for preserving scholarly content. On average, each academic staff used about three types (294.8/100) of content preservation modes compared to a student's two (256.6/100). The major modes of scholarly preservation were home computers, portable storage, computer at work and hard copies. The least common mode of preservation were blogs, discipline's digital archive, university's digital archive and university servers. Comparatively, slightly more academic staff (150, 19%) than students (120, 14%) preserved their scholarly content in computers at work and university's digital archives (36, 5% academic staff, 22, 3% students), (Figure 5.4). On the other hand, more students maintained their scholarly content in hard copies (156, 19% students; 97, 12% academic staff), and portable storage (209, 25% students; 173, 22% academic staff). Inter-item reliability as measured by the Cronbach's Alpha was relatively high (0.69 and 0.71, for academic staffs'

and students' items, respectively), which showed a high internal consistency.

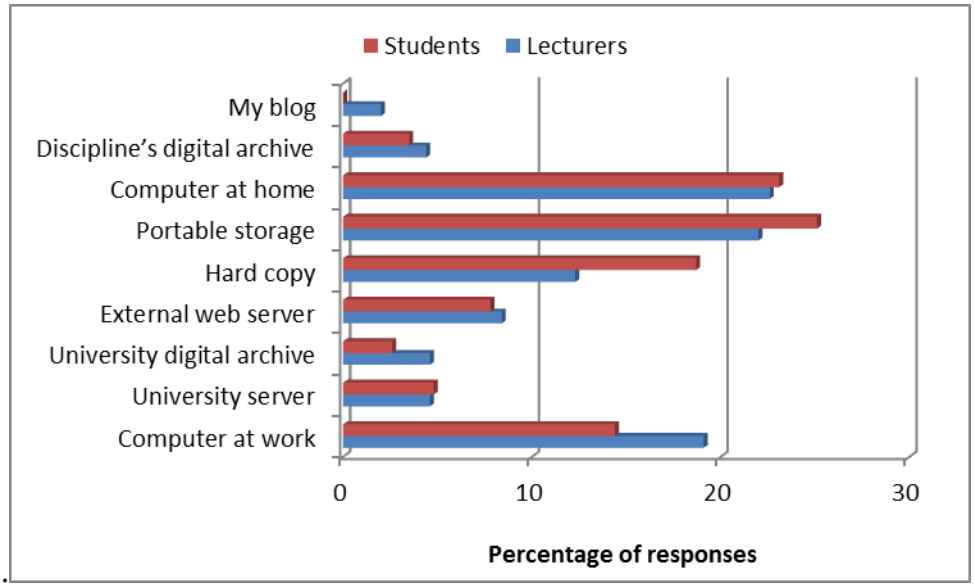


Figure 5.4 Respondents' mode of preserving scholarly content

A cross tabulation of the mode of preserving scholarly content and university on combined data showed that little content was preserved in university servers, and digital archives in all the universities (with < 10% of the respondents in any university using any of them) (Table 5.16). However, University D (13, 7%), University A (34, 4%) and University C (10, 4%) used more of the discipline's digital archives compared with University B (1, 1%), University E (1, 2%), and University F (5, 3%) respectively. University F (1, 1%) and University B (1, 1%) also had the poorest utilisation of university servers compared to University E (6, 9%), University A (53, 7%), and University C (9, 4%) respectively. On the other hand, university's digital archives were mostly used at University E (5, 8%), University C (13, 5%) and University F (6, 4%) but less in University B (2, 2%). Information from interviews with the university librarians at University E and University C confirmed that at these institutions, it was a requirement that scholars must deposit all their journal articles in the institutional repositories. University F had implemented the IR policy and was creating awareness about it among scholars. University A was in the process of creating awareness about the IR as a vehicle for preservation and access of scholarly content among academic staff and students. In the current study, interviews with University librarians revealed that people are still not very comfortable with depositing material in the IRs. According to one of the librarians, 'someone will tell you: "*Sorry, you are not going to put my document there, I don't care what the policy says; you cannot have that document!"* The librarians attributed this reluctance and apathy to lack of awareness and distrust of the intentions of the IR with regard to their

scholarly output. Another librarian commented: "*the only challenges we face as a library is the fact that our researchers are not aware of the importance of the IR... sometimes they complain about the fact that their work might be plagiarized*," indicating that the concerns raised by Kenyan researchers about acceptance and use of the IR are more or less the same as scholars from other parts of the world (Rowlands &Nicholas, 2005; Krevit & Crays, 2007).

The table below indicates the predominant storage formats used in the universities in the study.

Table 5.16 Mode of preserving scholarly content at the universities

University	Mode of preserving data								Total
	Computer at work	**University server**	**University digital archive**	**External web server**	**Hard copy**	**Portable storage**	**Computer at home**	**Digital archive of discipline**	
A	140 (17.1%)	53 (6.5%)	26 (3.2%)	65 (7.9%)	135 (16.5%)	194 (23.7%)	172 (21.0%)	34 (4.2%)	819
B	25 (18.4%)	1 (0.7%)	2 (1.5%)	11 (8.1%)	27 (19.9%)	38 (27.9%)	31 (22.8%)	1 (0.7%)	136
C	40 (16.3%)	9 (3.7%)	13 (5.3%)	13 (5.3%)	38 (15.5%)	57 (23.3%)	65 (26.5%)	10 (4.1%)	245
D	21 (10.8%)	6 (3.1%)	6 (3.1%)	24 (12.4%)	26 (13.4%)	47 (24.2%)	51 (26.3%)	13 (6.7%)	194
E	11 (16.7%)	6 (9.1%)	5 (7.6%)	8 (12.1%)	9 (13.6%)	14 (21.2%)	12 (18.2%)	1 (1.5%)	66
F	33 (22.8%)	1 (0.7%)	6 (4.1%)	10 (6.9%)	18 (12.4%)	32 (22.1%)	40 (27.6%)	5 (3.4%)	145
Total	270	76	58	131	253	382	371	64	1605

N/B: Multiple responses possible (N=273 for academic staff; N=332 for postgraduate students)

Source: Survey data, 2014

5.6.4 Requirements for Preservation of Research Data

The study asked respondents to state what they thought is needed (apart from buildings and computer hardware) to guarantee that valuable research data is preserved for continued access and use now and in the future. For this question, there were 692 and 728 responses for academic staff and students respectively, which were more than the number of academic staff (273) and students (332) in the study sample (Table 5.17) because most respondents stated more than one intervention. The Cronbach's Alpha values for this question were 0.71 and 0.72 for items in the academic staff and students' questionnaires, respectively. This suggested a high internal validity of the test items.

Table 5.17 Requirements for preservation of research data

	Academic staff		Students	
	Number of responses	%	Number of responses	%
Training	206	29.8	226	31.0
More knowledge/Expertise	150	21.7	152	20.9
More resources (financial and operational)	158	22.8	166	22.8
More digital repositories/archives	175	25.3	182	25.0
Nothing else	3	0.4	2	0.3
Total	**692**	**100**	**728**	**100.0**

N/B: Multiple responses possible (N=273 for academic staff; N=332 for postgraduate students) Cronbach's Alpha: Academic staff's items: 0.71; Students' items: 0.72

Source: Computed from survey data, 2014

Only three out of the 692 (0.4%) responses and two out of 728 (0.3%) responses from academic staff and students, respectively, indicated that nothing further was required to guarantee the preservation of research data.

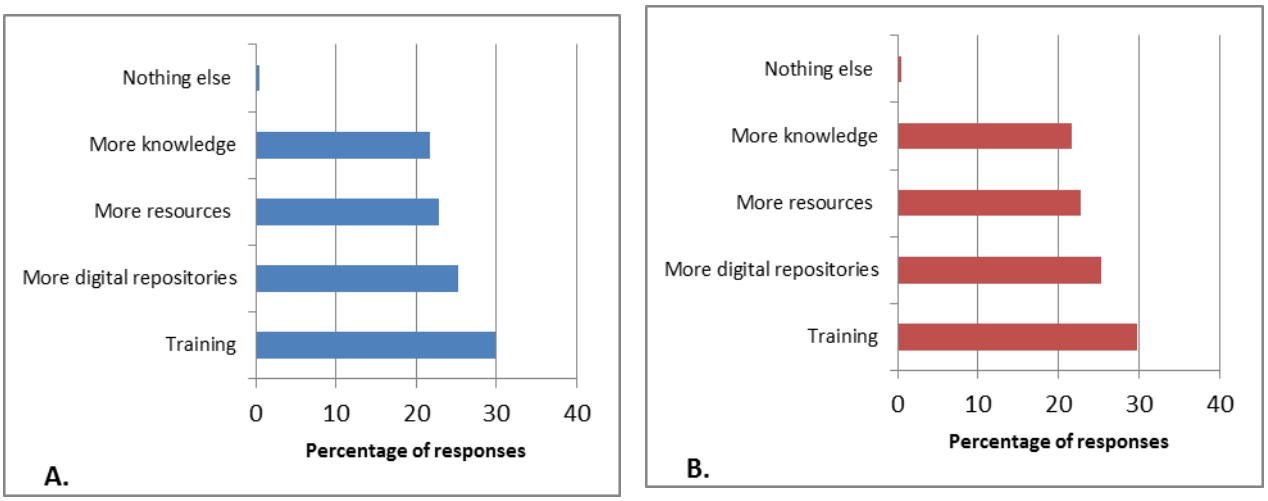


Figure 5.5 Opinions of (a) Academic staff and (b) Students on what is required to preserve research data

Most academic staff and postgraduate students perceived training to be the most important intervention needed to guarantee the preservation of research data (206, 30% and 226, 31% of the academic staff' and students' responses, respectively). This was followed by establishment of more digital repositories/archives, more financial and operational resources, and lastly, increased knowledge/expertise (Figure 5.5 and Table 5.17 respectively). The librarians interviewed from universities A, B, D, and F in particular, also indicated that they would benefit from more resource allocations in terms of staffing and finances to enable them manage their repositories more effectively to achieve their objectives.

5.6.5 Institutional Efforts in Digital Preservation of Data

The study sought opinions from respondents on whether their institutions were making any visible efforts towards digital preservation of research data and research findings. The results are shown in Table 5.18 below.

Table 5.18 University's effort in data preservation

Respondent type	University making effort	Frequency	Percentage
Academic staff	No	38	20.2
	Yes	150	79.8
	Total	**188**	**100**
Postgraduate students	No	146	52.3
	Yes	133	47.7
	Total	**279**	**100**

Source: Computed from survey data, 2014 (N=188 for academic staff; 279 for postgraduate students)

A Chi – square (χ^2) cross tabulation was computed to determine if interventions to preserve digital data were dependent upon the respondent's university. There was a statistically significant influence of the respondent's university on efforts towards digital preservation of research data and findings, χ^2 (5) = 29.87, $p < 0.001$. Results in Table 5.19 indicated that universities which were perceived to be making the greatest efforts to digitally preserve research data were University E (15, 88% of the respondents said it was), followed by University D (37, 77%), University F (31, 76%), and University C (50, 73%). University A and University B were perceived to be making the least effort, with only (124, 50%) and (26, 57%) of the respondents having the opinion that their institutions were making efforts to digitally preserve data.

Table 5.19 Cross tabulation of respondent's university and efforts to preserve data

		Respondent's University						
University		A	B	C	D	E	F	Total
Visible efforts	**No**	122 (49.6%)	20 (43.5%)	19 (27.5%)	11 (22.9%)	2 (11.8%)	10 (24.4%)	184 (39.4%)
	Yes	124 (50.4%)	26 (56.5%)	50 (72.5%)	37 (77.1%)	15 (88.2%)	31 (75.6%)	283 (60.6%)
Total		246 (100%)	46 (100%)	69 (100%)	48 (100%)	17 (100%)	41 (100%)	467 (100%)

(N=467)

Source: Computed from survey data, 2014

The study required respondents to expand on their answers as to whether their university was making sufficient efforts to preserve research data digitally. For respondents who answered in the affirmative, the analysis identified six broad themes from the answers to the open-ended question, with regard to what their universities were doing and/or ought to do to preserve data. Most respondents (107, 34%) were of the opinion their university had repositories. However, a significant proportion of respondents suggested that universities should intensify training of users in strategies for digital preservation (79, 25%) and provide more computers and servers (57, 18%) (Table 5.20).

Table 5.20 Proposed strategies to improve digital preservation of data (N=319)

Respondent type	**Frequency**	**Percentage**
Provide more computers/servers	57	17.9
University has repositories/archives	107	33.5
Establish policy to upload data into websites	21	6.6
Offer more training/conferences	79	24.8
Encourage students to publish	36	11.3
Encourage more sharing of data/findings	19	5.9
Total	**319**	**100**

Source: Computed from survey data, 2014

Respondents also suggested that students should be encouraged to publish (36, 11%), and upload their work into university websites (21, 7%) and researchers should be encouraged to share their research data (19, 6%). Some stated that they were not aware of any effort by

their university to preserve data, even though their universities had repositories (for instance University A), suggesting that marketing of the digital facilities and their function was needed. For respondents who said their universities were not doing enough to preserve data, they cited lack of resources, fewer computers and servers, obsolete repositories or non-existent repositories.

5.7 Communication amongst Kenyan Scholars

The study sought to address the *"How do Kenyan scholars communicate amongst themselves in the various stages of their research work?"*

5.7.1 Important Means of Communication in Research

The study required respondents to indicate on a three-point scale (ranging from not important, moderately important to very important) how important different means of communication were in their research work (Table 5.21).

Table 5.21 Respondents' means of communication

Means of communication	Respondent type	How important is the communication type?					
		Not important		M. important		Very important	
		Fq	%	Fq	%	Fq	%
Phone (landline & mobile)	Academic staff	11	4.2	73	27.7	180	68.2
	Student	18	5.5	75	23.1	232	71.4
E – mail	Academic staff	2	0.7	27	10	241	89.3
	Student	1	0.3	42	12.9	283	86.8
Web forums/blogs	Academic staff	47	19.1	87	35.4	112	45.5
	Student	44	14.1	101	32.3	168	53.7
IMS/Chat	Academic staff	59	23.6	103	41.2	88	35.2
	Student	68	21.3	132	41.4	119	37.3
VOIP	Academic staff	57	23.4	98	40.2	89	36.5
	Student	73	24.3	125	41.5	103	34.2
Social networks	Academic staff	90	35.7	83	32.9	79	31.3
	Student	80	25	161	50.3	79	24.7
LinkedIn	Academic staff	94	38.2	92	37.4	60	24.4
	Student	123	40.5	108	35.5	73	24
Fax	Academic staff	147	60	77	31.4	21	8.6
	Student	204	65.6	74	23.8	33	10.6
Postal mail	Academic staff	98	39.8	89	36.2	59	24
	Student	164	53.2	102	33.1	42	13.6
Face to face	Academic staff	13	4.9	43	16.2	210	78.9
	Student	12	3.8	38	11.9	267	83.7

Key: M= moderately, Fq=frequency; IMS- Instant Messaging Service; VOIP- Voice Over Internet Protocol (N=273 for academic staff; N=332 for postgraduate students)
Cronbach's Alpha: Academic staff's items: 0.76; Students' items: 0.76

Source: Survey data, 2014

The results indicated that the most commonly used means of communication amongst Kenyan scholars (both academic staff and postgraduate students) were emails. This was followed by face-to-face interactions and phones. Also influential as a communication means were web forums and to a lesser extent, IMS (Instant Messaging Services) and VOIP (Voice Over Internet Protocol). The least commonly used means of communication were fax and postal mail. Inter-item reliability as measured by the Cronbach's Alpha was relatively high (0.76 for both academic staff's and students' items, respectively), which showed a high internal consistency.

5.7.2 Preferred Outlets for Publishing Scholarly Content

The study required the respondents to state the preferred outlets for publishing their scholarly content and to indicate the reasons for their preference. For this question, there were 813 and 819 responses for academic staff and students, respectively, which were more than the number of academic staff (273) and students (332) in the study sample (Table 5.22) because respondents were free to choose more than one outlet.

Table 5.22 Preferred outlets for publishing scholarly content

	Academic staff		**Students**	
	Number of responses	%	Number of responses	%
Personal websites	101	12.4	131	16.0
Subject journals	150	18.5	115	14.0
Fee-based open access journals	132	16.2	155	18.9
Free open access journals	125	15.4	108	13.2
Institutional repositories	94	11.6	106	12.9
Institutional websites	82	10.1	89	10.9
Conference proceedings	129	15.9	115	14.0
Total	**813**	**100.0**	**819**	**100.0**

N/B: Multiple responses possible (N=273 for academic staff; 332 for postgraduate students): Cronbach's Alpha: Academic staff's items: 0.70; Students' items: 0.69

Source: Computed from survey data, 2014

These findings suggested that while both academic staff and postgraduate students preferred to publish their work in journals and conference proceedings, more students (131, 16%) preferred to publish their work on personal websites as compared to academic staff (101, 12%). The results also suggested that the least preferred modes for publishing scholarly output by both academic staff and students were institutional websites (82, 10% and 89, 11% of the academic staff' and students' responses, respectively) and institutional repositories (94, 12% and 106, 13% of the academic staff' and students' responses, respectively). Inter-item reliability as measured by the Cronbach's Alpha was relatively high (0.70 and 0.69, for academic staff's and students' items, respectively), which showed a high internal consistency.

Both academic staff and students gave similar reasons for preference or non-preference for various modes for publishing scholarly content. Personal websites were favoured because respondents considered them private and personally accessible. However, those who did not use them considered them as being expensive to maintain, not readily accessible/limited access or simply, they did not own them. Respondents used traditional subject based journals and fee-based journals because of habit and that they were scholarly. However, according to the respondents, the downside to traditional subject journals was that there were few journals in their fields, it was time consuming to get published in these journals and for fee-based journals, they were expensive. The popularity of free-open access journals resulted from their wider accessibility (because they were free) and ability to allow information sharing amongst scholars. Conference proceedings were preferred because they were readily available/accessible, easy to use, allowed wider audiences, encouraged interactivity, and enabled immediate critique of the presentations. Respondents indicated they used institutional repositories and institutional websites because their universities required them to do so and they were easily accessible. However, some respondents were not aware of institutional repositories while other respondents simply did not like institutional websites.

5.7.3 Preferred Sources of Scholarly Content

The study also required respondents to indicate their preferred sources of scholarly content and the reasons for use or non-use. There were 881 and 794 responses for academic staff and students, respectively, for this question, which was more than the number of academic staff (273) and students (332) in the study sample (Table 5.23) because respondents preferred more than one source of scholarly content. The most important sources of scholarly content for academic staff were found to be traditional subject-based journals (148, 17%), followed by open-access journals (137, 16%) and conference proceedings (138, 16% of the responses). For students, the most preferred sources were Google scholar (139, 18%), followed by open access journals (122, 15%) and traditional subject-based journals (118, 15% of the responses).

Table 5.23 Preferred sources of scholarly content

	Academic staff		**Students**	
	Number of responses	%	Number of responses	%
Subject journals	148	16.8	118	14.9
Google scholar	122	13.8	139	17.5
Open access journals	137	15.6	122	15.4
Books	128	14.5	115	14.5
Institutional repositories	116	13.2	104	13.1
Institutional/personal websites	92	10.4	88	11.1
Conference proceedings	138	15.7	108	13.6
Total	**881**	**100.0**	**794**	**100.0**

N/B: Multiple responses possible **(N=273 for academic staff; 332 for postgraduate students); Cronbach's Alpha**: Academic staff's items: 0.70; Students' items: 0.76

Source: Computed from survey data, 2014

The results also indicated that the least preferred sources for scholarly content for both academic staff and students were institutional websites/personal websites (92, 10% and 88, 11% of the academic staff and students' responses, respectively) and institutional repositories (116, 13% the academic staff and 104, 13% students' responses). The Cronbach's Alpha values for this question were 0.70 and 0.76 for items in the academic staff's and students' questionnaires, respectively. This suggested a high inter-item reliability.

Both academic staff and students gave similar reasons for using or not using various sources of scholarly content. Subject-based traditional journals were preferred because they provided detailed information on particular subjects, were detailed and scholarly. However, although they could easily be accessed by employees of the university (for instance, academic staff), some students said they did not use them because they could not access them. This is surprising because interviews with the University Librarians at each of the six universities surveyed revealed that all the universities subscribe to electronic journals on various disciplines and these are accessible to library users via the Local Area Network. This alleged inaccessibility by students seems to point to a need for the institutions to market the use of the electronic journals more aggressively. This is beacause such limited use of library resources is likely to impact negatively on overall research productivity of scholars and quality of output since they did not use other scholars' research output to inform their own

research. Additionally, the libraries should monitor the actual uses of these journals and understand issues of non-use. Google Scholar was preferred because it was quick, reliable, and easily accessible from anywhere 24/7. However, respondents felt that it does not contain all the information. The popularity of open access journals was attributed to its accessibility at no cost to the consumer. While both institutional repositories and institutional/personal websites were accessible and could contain current information, respondents regarded their information as too narrow.

5.7.4 Institutional Repositories

This section provides results on the existence and functioning of institutional repositories at the six universities.

5.7.4.1 Existence of an Institutional Repository

The study required the respondents to indicate if their universities had an institutional repository. The results indicated that the universities in the study possessed institutional repositories as indicated by (194, 72%) of the academic staff and (150, 47%) of postgraduate students (Table 5.24). However, a substantial proportion of postgraduate students (142, 44%) did not know whether their institution had an institutional repository. Interviews with the University Librarians at the six universities indicated that all the six universities had implemented the Institutional Repositories. However, most of these institutional repositories were not more than two to three years old at the time of the study, except the IR at University E, which was about six years old. However, the fact that some academic staff (74, 28%) and students (170, 53%) answered 'I don't know' or 'No' to the question of whether their universities had an IR, indicates that the awareness about the repositories is low.

Table 5.24 Existence of a university repository

Respondent type	Does your university have a repository?	Frequency	Percentage
Academic staff	I don't know	54	20.1
	No	20	7.5
	Yes	194	72.4
	Total	268	100.0
Postgraduate students	I don't know	142	44.4
	No	28	8.8
	Yes	150	46.9
	Total	320	100.0

(N=268 for academic staff; 320 for postgraduate students)

Source: Computed from survey data, 2014

Interviews with the university librarians indicated that the library was responsible for management of the repositories in all the universities sampled. However, very few respondents were aware of this fact. The question *"who runs the repository?"* was correctly answered by 72 (26%) of the academic staff and 27 (8%) of postgraduate students.

5.7.4.2 Depositing of Research Output in Institutional Repositories

In response to the question *'Have you ever deposited any of your research output in your institutional repository?'* the study established that more academic staff (80, 34%) than students (45, 18%) had voluntarily deposited some of their research output in the institutional repository (Table 5.25).

From the table, only (18, 8%) academic staff and (8, 3%) students had neither deposited nor intended to deposit any of their work in institutional repositories. However, (149, 61%) of the students who had not deposited their work in repositories, said they were willing to do so when opportunities arose.

Table 5.25 Depositing of research output in university repository

Respondent type	Ever deposited research output in repository?	Frequency	Percentage
Academic staff	Yes, I did voluntarily	80	34.2
	Yes, I was required to do so	68	29.1
	No, but I would do so willingly if there was an opportunity	68	29.1
	No, and I don't intend to	18	7.7
	Total	**234**	**100.0**
Postgraduate students	Yes, I did voluntarily	45	18.4
	Yes, I was required to do so	42	17.2
	No, but I would do so willingly if there was an opportunity	149	61.1
	No, and I don't intend to	8	3.3
	Total	**244**	**100.0**

(N=234 for academic staff; 244 for postgraduate students)

Source: Computed from survey data, 2014

5.7.4.3 Types of Research Output Deposited in Institutional Repositories

For the respondents who had deposited their research output in institutional repositories, they were further asked to state the type of output that they had uploaded. There were 407 and 206 responses for academic staff and students, respectively which was more than the number of academic staff (148) and students (87), who had uploaded their work in repositories (Table 5.25 above) because they had uploaded more than one type of output. The dominant form of outputs deposited in repositories by both academic staff and postgraduate students were theses, dissertations and conference papers as shown in Table 5.26 below.

Table 5.26 Research outputs deposited in institutional repositories

	Academic staff		Students	
Types of research output	**Number of responses**	**%**	**Number of responses**	**%**
Pre-prints & works in progress	35	8.6	23	11.2
Monographs	22	5.4	4	1.9
Datasets	27	6.6	18	8.7
Theses & dissertations	91	22.4	46	22.3
Grey literature	39	9.6	27	13.1
Peer reviewed articles	58	14.3	31	15.0
Teaching materials	49	12.0	18	8.7
Conference papers	86	21.1	39	18.9
Total	**407**	**100.0**	**206**	**100.0**

N/B: Multiple responses possible **(N=148 for academic staff; 87 for postgraduate students); Cronbach's Alpha**: Academic staff's items: 0.75; Students' items: 0.70

Source: Computed from survey data, 2014

Also frequently deposited were peer-reviewed articles, grey literature and teaching materials. The least deposited research output was monographs. The Cronbach's Alpha values for this question were 0.75 and 0.70 for items in the academic staffs and students' questionnaires, respectively. This suggested a high internal validity of the test items. Lynch & Lippincott (2005) surveyed institutions in the US and found that they are including a diverse array of formats and types of materials in their repositories, such as e-prints, electronic theses and dissertations, digitised special collections materials, multimedia, course materials, and datasets.

Results from interviews with the university librarians revealed that for those institutions that have implemented the IR for example at University E, University C, and University A, policies required staff to deposit all their scholarly output in the IR. However, generally, university staff had not fully complied with these requirements except at University E and University C. At University C, an academic staff will not get promotion if his/her work does not appear in the IR. At University E, scholars must deposit all journal articles in the IR before they make presentations in any conference and/or before the author(s) can get any financial assistance from the university regarding the presentation, such as travelling to the

venue. University F had just implemented the IR in 2013 and was still creating awareness among its scholars. At University F, the library captured and stored grey literature in the special collection area from where users could access it. In University D, the university policy required the deposit of locally produced content in the library. In the words of the librarian "*for all the publications within the university, by policy, a copy must land into the library; however, compliance is still an issue."* University B had just implemented their IR in 2014 and were in the process of developing the policies that would govern its function. The librarian confirmed that they had not done much about grey literature, and commented that it was difficult to capture this information. In his experience, the library could only capture the content if departments or faculties brought the research output to them.

5.7.4.4 Depositing of Theses in University Libraries

The study required postgraduate students to indicate whether their universities expressly required them to deposit copies of their theses in soft copy or in any other form to the library. Most of the respondents (126, 41%) said that their university required them to deposit their theses whereas (75, 24%) answered in the negative (Figure 5.6).

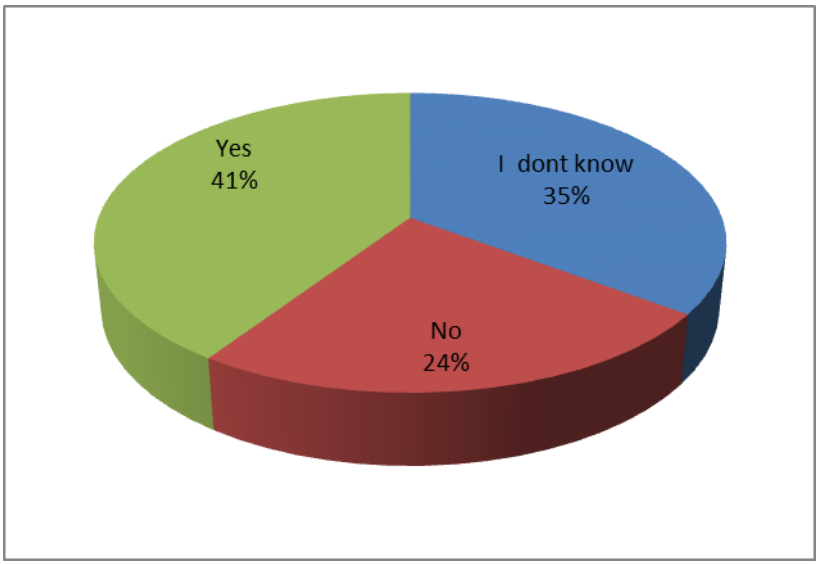


Figure 5.6 Percentage of respondents who deposit/don't deposit electronic theses (N=310)

However, a significant proportion of respondents (109, 35%) were not aware whether their university required them to upload their electronic theses, suggesting that the policy might not be clear to all members of the university community or the policy was not being enforced. Besides, the students who participated in this study were possibly still in the process of

conducting their postgraduate studies and had not completed their theses to understand the implication of the IR policy to them. Interviews with University Librarians confirmed that all universities required postgraduate students to submit a PDF full-text soft copy of their thesis directly to the library or to the Board of Postgraduate Studies (who then would pass it to the Library) for uploading into the IR. In the IR, the theses were then displayed in PDF full-text format. However, University B had just launched the IR in 2014 and they were still in the process of putting in place the policy that would require submission of full-text soft copies of students' theses to the library.

Most of the respondents whose universities required them to deposit their theses in university libraries appeared to have accepted this requirement. They stated that such deposited theses enabled future scholars to reference the works, it also enhanced proper research, minimised plagiarism, entrenched technology use, and minimised errors in research work.

5.8 Participation by Kenyan Scholars in Local and/or International Professional Social Networks

This section presents results on the degree and nature of the participation by Kenyan scholars in local or international professional social networks. The research questions this study sought to address was *"To what extent do Kenyan scholars participate in local and/or international professional social networks?"* Specifically, the researcher's intention was to identify the extent of scholars' participation in professional societies and scholarly networks.

5.8.1 Membership of Professional Societies

The study required respondents to state if they were members of any professional society in their fields. Roughly a half of the academic staff were found to be members of professional societies (Table 5.27).

Membership in professional societies was found to be lower among postgraduate students, with only 42% having membership in professional bodies. Eight academic staff and 17 students did not answer this question.

Table 5.27 Membership of professional societies

Respondent type	Are you a member of a professional society?	Frequency	Percentage
Academic staff	No	130	49.1
	Yes	135	50.9
	Total	**265**	**100.0**
Postgraduate students	No	184	58.4
	Yes	131	41.6
	Total	**315**	**100.0**

(N=265 for academic staff; 315 for postgraduate students)

Source: Computed from survey data, 2014

Chi – square (χ^2) cross tabulations were computed to determine if membership in professional societies were dependent upon the respondents' university, gender, or the academic staff's academic rank. There was a statistically significant influence of the respondents' university on membership of professional society, χ^2 (5) = 18.71, p = 0.002. University B (20, 36%), University C (38, 36%), and University D (21, 32%) universities had fewer of its scholars having membership in professional societies. Membership in professional societies was found to be highest in University E (12, 60% of respondents were members). However, professional membership at University A and University F accounted for 50% members in either institution (147, 53%; and 28, 50%, respectively) (Table 5.28).

Table 5.28 Cross tabulation of respondents' university and membership of a professional society (N=580)

	Membership of professional society		
Respondent's university	**No**	**Yes**	**Total**
A	131 (47.1%)	147 (52.9%)	278 (100%)
B	35(63.6%)	20 (36.4%)	55 (100%)
C	67 (63.8%)	38 (36.2%)	105(100%)
D	45 (68.2%)	21 (31.8%)	66 (100%)
E	8 (40.0%)	12 (60.0%)	20 (100%)
F	28 (50.0%)	28 (50.0%)	56 (100%)
Total	**314 (54.1%)**	**266 (45.9%)**	**580 (100%)**

Source: Computed from survey data, 2014

A statistically significant influence of the respondents' gender on membership of professional society was also found, χ^2 (1) = 5.99, p = 0.014. Fewer females (82, 39%) in the study belonged to professional societies compared with males (178, 50%) (see Table 5.29).

Table 5.29 Cross tabulation of respondents' gender and membership of professional societies

	Membership of professional society		
Respondent's gender	**No**	**Yes**	**Total**
Male	179 (50.1%)	178 (49.9%)	357 (100%)
Female	127 (60.8%)	82 (39.2%)	209 (100%)
Total	**306 (54.1%)**	**260 (45.9%)**	**566 (100%)**

(N=566)

Source: Computed from survey data, 2014

However, no statistically significant influence of the academic staff' academic rank on membership of professional society was found, χ^2 (3) = 7.24, p = 0.065. Because only four professors answered this question, they were combined with associate professors to prevent some cells in the cross tabulation from having too few cases. Results in Table 5.30 suggested that membership or non-membership of professional societies was not dependent on whether an individual was an assistant lecturer, lecturer, senior lecturer or associate professor/professor.

Table 5.30 Cross tabulation of respondents' academic rank and membership

	Membership of a professional society		
Academic staff's rank	**No**	**Yes**	**Total**
Assistant lecturer/tutorial fellow	62 (57.4%)	46 (42.6%)	108 (10%)
Lecturer	33 (39.8%)	50 (60.2%)	83 (100%)
Senior lecturer	20 (41.7%)	28 (58.3%)	48 (100%)
Associate professor/professor	6 (40%)	9 (60%)	15 (100%)
Total	**121 (47.6%)**	**133 (52.4%)**	**254 (100%)**

(N=254)

Source: Computed from survey data, 2014

For postgraduate students, some of the societies they belonged to were clearly student associations, for instance, Students Conference on Conservation Science, Medicine Students Association, Electrical Engineering Student Association, and Masters Political Science Students Association. However, other societies, especially those that academic staff belonged to, were patently related to the fields of the academic staff. These included Computer Society of Kenya, National Nurses of Kenya, Kenya Mathematical Society, Kenya Chemical Society, Institute of Economic Affairs, Institute of Certified Public Accountants of Kenya, and African Association of Agricultural Economics. Other professional societies were international in nature, for example, International Society for Antivirus Research, American Society of Public Health, London Mathematical Society, and CISCO. Generally, benefits of membership included opportunities to exchange knowledge and research through seminars, workshops and conferences, access to resource materials, regular updates on disciplines, and professional tips. Respondents who were not members to any professional societies asserted that there were no tangible benefits to belonging to a professional society, which implied that benefits from membership might not be uniform across all societies.

5.8.2 Mentorship Programs

Respondents were asked if they were mentoring (or were being mentored by) anybody academically at the time of the survey. The results are shown in Table 5.31. A sizeable proportion of postgraduate students (150, 47%) was neither being mentored nor were mentoring others.

Table 5.31 Mentorship programs

Respondent type	Are mentoring or being mentored?	Frequency	Percentage
Academic staff	No	102	38.2
	Yes	165	61.8
	Total	**267**	**100.0**
Postgraduate students	No	150	46.6
	Yes	172	53.4
	Total	**322**	**100.0**

(N=267 for academic staff; 322 for postgraduate students)

Source: Computed from survey data, 2014

A Chi – square (χ^2) cross tabulation was computed to determine if mentoring/being mentored was dependent upon the respondents' university. There was a statistically significant influence of the respondents' university on proclivity to mentoring or on being mentored, χ^2 (5) = 27.45, $p < 0.001$. University B, University E and University F were the strongest universities with regard to mentorship programs (of the respondents, 46, 85%; 14, 70% and 38, 68% respectively said they were involved in mentoring someone or were being mentored (Table 5.32). University C and University A appeared to be universities with the weakest mentorship culture (55, 51% and 136, 48% of the respondents respectively answered that mentorship was not happening).

Table 5.32 Cross tabulation of the respondent's university and mentoring

	Mentoring or being mentored		
Respondent's university	**No**	**Yes**	**Total**
A	136 (47.9%)	148 (52.1%)	284 (100%)
B	8 (14.8%)	46 (85.2%)	54 (100%)
C	55 (51.4%)	52 (48.6%)	107 (100%)
D	29 (42.6%)	39 (57.4%)	68 (100%)
E	6 (30%)	14 (70%)	20 (100%)
F	18 (32.1%)	38 (67.9%)	56 (100%)
Total	**252 (42.8%)**	**337 (57.2%)**	**589 (100%)**

(N=589)

Source: Computed from survey data, 2014

The respondents were asked to comment further on the mentoring culture in their institution and any barriers to the success of the mentorship programs. Whereas there was near unanimity on the essential role of mentoring on building up future scholars, most respondents, especially the students, felt that the mentoring culture was poor. The study established that mentoring students was a requirement at University B, which might explain the greater proportion of respondents from this university who said there was mentoring. However, most respondents at this university reported a lack of a structured mentoring program in their departments. Most mentorship programs extant in the universities were between the supervisor and his/her student (either Masters or PhD candidate). The study found that the barriers to successful mentorship were lack of time as the mentors were too busy dealing with bloated workloads, too many students to be mentored, lack of mentors, bureaucratic rigidity, lack of resources, and shortage of materials. Others were poor attitudes of both the mentors and the mentees, laziness of mentors, poor communication because of lack of internet, lack of facilities, poor motivation, and unwilling scholars. These findings concur with earlier studies (Myall, Levett-Jones & Lathlean, 2008; Nettleton & Bray, 2008) which found that effective mentorship was hindered by increased workload on the part of the mentors, having too many mentees, and inadequate institutional support for mentorship.

5.8.3 Scholarly Interaction with Colleagues

The study required academic staff to describe the nature of their interaction with colleagues on scholarly matters. The study found that most academic staff were willing to share knowledge with colleagues (91, 36% and 52, 21% rated the willingness as being often and always, respectively) and assist others in learning scientific issues (94, 37% and 42, 16% rated the willingness as being often and always, respectively) (Table 5.33).

Table 5.33 Nature and frequency of scholarly interaction amongst academic staff

Activity	**Nature of interaction**									
	Never		**Rarely**		**Sometimes**		**Often**		**Always**	
	Fq	%	Fq	%	Fq	%	Fq	%	Fq	%
How often you spend time on personal interactions?	4	1.5	38	14.7	95	36.7	107	41.3	15	5.8
How often you hold intradepartmental meetings?	9	3.4	39	14.9	101	38.5	96	36.6	17	6.5
How often you hold interdepartmental meetings?	22	8.7	71	28.1	89	35.2	54	21.3	17	6.7
More qualified colleagues willing to assist others	15	5.8	38	14.8	68	26.5	94	36.6	42	16.3
Willingness of colleagues to share knowledge	7	2.8	40	15.9	62	24.6	91	36.1	52	20.6

Key: M= moderately, Fq=frequency. **(N=273 for academic staff; 332 for postgraduate students); Cronbach's Alpha**: 0.81

Source: Survey data, 2014

More respondents also stated that they often spent time on personal interactions with colleagues to discuss ideas, solutions, and scientific proposals (107, 41% and 15, 6% spend time on personal interactions often and always, respectively) and often held professional departmental meetings based on a pre-planned schedule (96, 37% and 17, 7% stated that the meetings occurred often and always, respectively). However, a substantial proportion of the academic staff stated that interdepartmental meetings based on a pre-planned schedule rarely occurred (71, 28%) or never occurred (22, 9%). Inter-item reliability as measured by the Cronbach's Alpha was relatively high at 0.81 for the items, which showed a high internal consistency.

5.8.4 Scholarly Collaboration amongst Departmental Colleagues

In response to the question "*Are you engaged in any collaboration with members of your department in research and/or publication?"* slightly over a half of the academic staff (143, 55%) were found to be collaborating with their departmental colleagues (Table 5.34).

Table 5.34 Scholarly collaboration amongst departmental colleagues

Respondent type	**Are you collaborating with departmental colleagues?**	**Frequency**	**Percentage**
Academic staff	No	119	45.4
	Yes	143	54.6
	Total	**262**	**100.0**
Postgraduate students	No	169	56.7
	Yes	129	43.3
	Total	**298**	**100.0**

(N=262 for academic staff; 298 for postgraduate students)

Source: Computed from survey data, 2014

Collaboration amongst departmental colleagues was found to be slightly lower among postgraduate students, with only (129, 43%) collaborating.

The respondents were asked about the nature of their collaboration. The results indicated that the bulk of the cooperation consisted of publishing/writing articles (academic staff: 90, 67% and students: 58, 60%) and data collection (academic staff: 32, 24% and students: 27, 28%) (Table 5.35).

Table 5.35 Nature of scholarly collaboration amongst departmental colleagues

Respondent type	Nature of collaboration	Frequency	Percentage
Academic staff	Publishing/writing articles	90	67.2
	Data collection	32	23.9
	Sharing data	6	4.5
	Data analysis	4	3.0
	Supervision	2	1.5
	Total	**134**	**100.0**
Postgraduate students	Publishing/writing articles	58	59.8
	Data collection	27	27.8
	Sharing data	9	9.3
	Data analysis	3	3.1
	Supervision	0	0.0
	Total	**97**	**100.0**

(N=134 for academic staff; 97 for postgraduate students)

Source: Computed from survey data, 2014

Lesser activities for collaboration in the departments included sharing data (academic staff: 6, 5% and students: 9, 9%), data analysis (academic staff: 4, 3% and students: 3, 3%) and for academic staff, supervision (2, 2%).

Respondents were requested to provide the names (or initials of the names) of members in their department that they were collaborating with. Using this information and the Gephi Social Network Analysis software, a network of collaborations within departments was built. Figure 5.7 below shows the different networks comprising each respondent and the other person(s) he/she is collaborating with in the department. Each of the six universities were represented in the network, which implied that at least one member who was surveyed in every university collaborated with at least one other member of the same department. The average degree of the network (that is, the number of connections each node has) was 1.297, which indicated that one member collaborated with just one other member in the department. Although the network depicted intradepartmental collaboration, there were instances in which one university was connected to another university, which indicated that some departmental members could be teaching or researching collaboratively with members in more than one university.

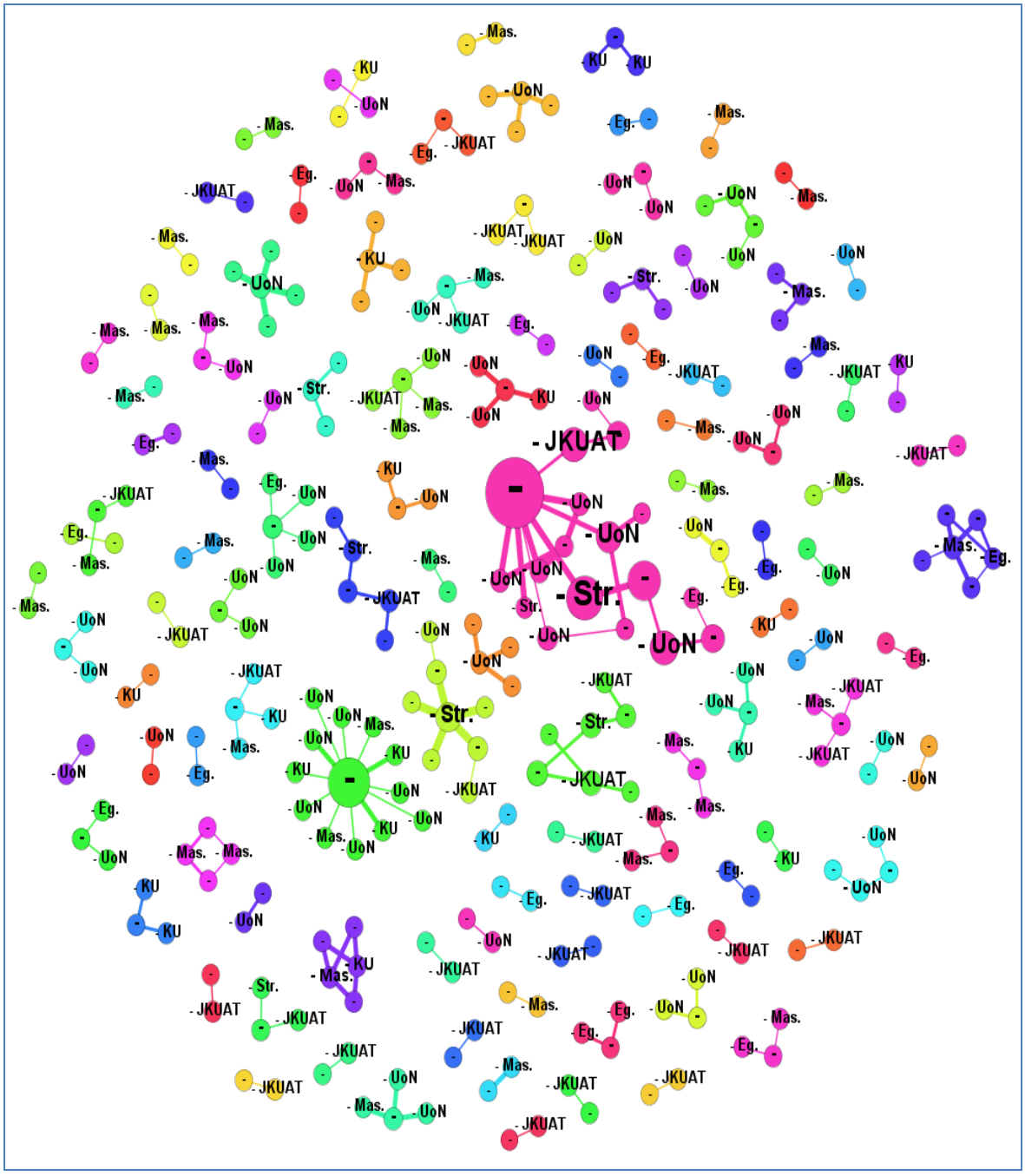


Figure 5.7 Network of intradepartmental collaborations in the sampled universities (N=272)

Key: JKUAT - Jomo Kenyatta University of Agriculture and Technology; KU - Kenyatta University; UoN - University of Nairobi; Mas - Maseno University; Eg – Egerton University; Str – Strathmore University

Source: Drawn from Survey data, 2014

The network consisted of two large communities: one centred on members in UoN, JKUAT and Strathmore (the node had eight degrees and was coloured pink) and another one involving KU, UoN and Maseno members (the node has 12 degrees and is coloured light

green). This suggested that this part of the network was where collaboration with the highest number of respondents took place. However, other communities (coloured differently) consisted of 2 – 4 members (dyads, triads, or tetrads) indicating that collaboration amongst fewer members occurred.The node at the centre of the largest community had the highest betweenness centrality of 113.5 while that of the second largest community was 66 (Figure 5.8). Betweeness centrality measures how often a node appears on shortest paths between nodes in the network. The normalized values (minimum of zero and maximum=1) for these centralities were 0.002 and 0.001, respectively (not shown in Figure 5.9). The betweenness centrality of most of the other nodes in the network was zero. This implied that most nodes in the network did not act as transit hubs for collaboration with other nodes, that is, most nodes were not between other nodes, suggesting that overall centralization of the network was relatively low.

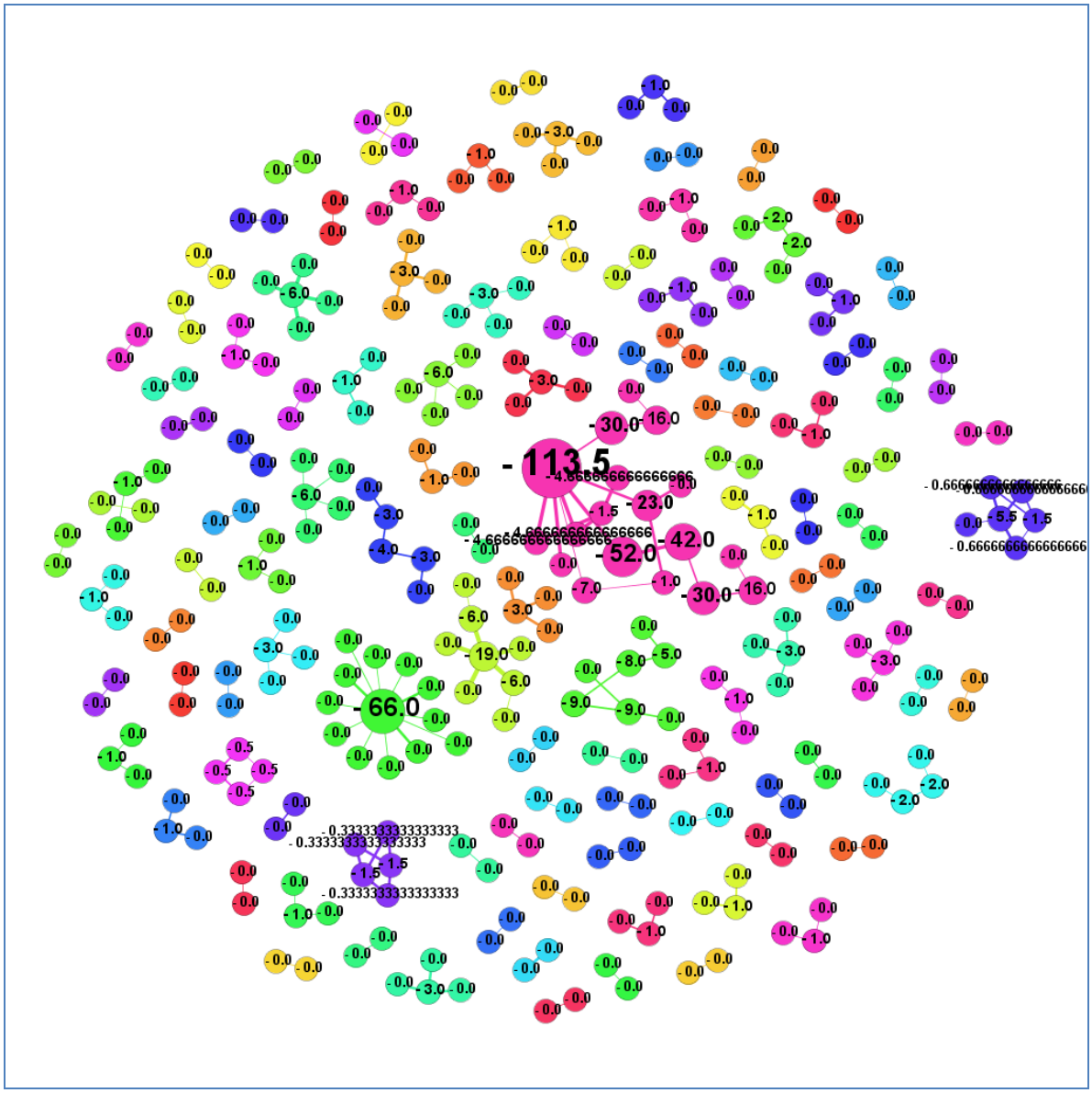


Figure 5.8 Non-normalized betweenness centralities of intradepartmental collaborations in the sampled universities; (N=272)

Source: Drawn from Survey data, 2014

5.8.5 Scholarly Collaboration with Other Departments/Research Groups

The respondents were also asked whether they were collaborating with members from other departments in the university or with other research groups in the country. Most of the academic staff (176, 69%) and postgraduate students (181, 60%) were found not to collaborate with members from other departments or research groups in the country (Table 5.36).

Table 5.36 Scholarly collaboration amongst interdepartmental colleagues

Respondent type	Are you collaborating with colleagues from other departments?	Frequency	Percentage
Academic staff	No	176	69.0
	Yes	79	31.0
	Total	**255**	**100.0**
Postgraduate students	No	181	60.1
	Yes	120	39.9
	Total	**301**	**100.0**

(N=255 for academic staff; 301 for postgraduate students)

Source: Computed from survey data, 2014

Those who were collaborating were asked to state the nature of the collaboration. The results indicated that the bulk of the cooperation consisted of publishing/writing articles (academic staff: 32, 51% and students: 28, 48%) and data collection (academic staff: 19, 30% and students: 19, 32%) (Table 5.37). These frequencies are lower relative to those presented in Table 5.36 above for intradepartmental collaboration (for instance, 90 and 58 for academic staff and students, respectively who publish articles), which indicated that there was more intense intradepartmental collaboration compared to interdepartmental cooperation.

Table 5.37 Nature of scholarly collaboration amongst interdepartmental colleagues

Respondent type	Nature of collaboration	Frequency	Percentage
Academic staff	Publishing/writing articles	32	50.8
	Data collection	19	30.2
	Sharing data	6	9.5
	Data analysis	6	9.5
	Total	**63**	**100.0**
Postgraduate students	Publishing/writing articles	28	47.5
	Data collection	19	32.2
	Sharing data	12	20.3
	Data analysis	0	0.0
	Total	**59**	**100.0**

Source: Computed from survey data, 2014

Lesser activities for collaboration in the departments included sharing data (academic staff: 6, 10% and students: 12, 20%) and data analysis for academic staff (6, 10%).

A network of collaborations between departments was built up using names or initials of members of other departments with which the respondents collaborated (Figure 5.9).

The resulting network consisted of only 75 communities, for a total of 605 respondents in the study. Given that the average degree of the network was 1.22 (that is, one node was connected to just one other node), the results suggested that research communities in the universities studied and other research groups in the whole country involved roughly a paltry 150 people. Thus, the results suggest that research collaboration level in the country may be very low. Some of the departments represented in the network included agriculture, sciences (zoology, physics, chemistry, environment, geology, and biochemistry), business (commerce and economics) and medicine. However, social sciences and education were absent on the network, a situation that may be attributed to the bias towards sciences introduced by convenience sampling that was used in this study. However, this situation seems to suggest that low levels of collaboration between humanities and sciences in the country occurred. These findings corroborate studies that have found that collaboration among researchers in the sciences are quite extensive (Belcher, 2009a; Lariviére, Gingras & Archambault, 2006).

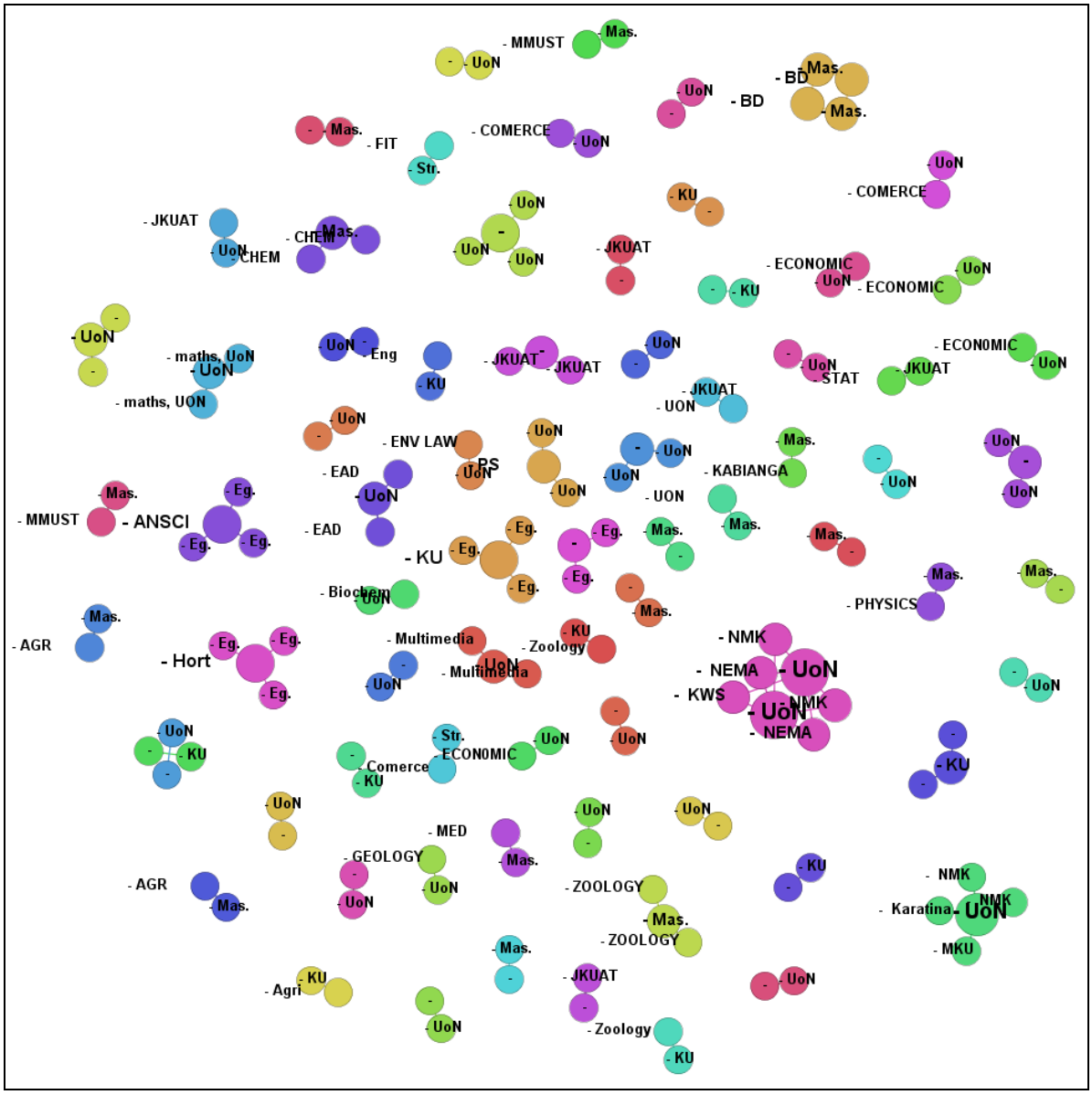


Figure 5.9 Network of intradepartmental collaborations in the sampled universities (N=199)

Key: JKUAT - Jomo Kenyatta University of Agriculture and Technology; KU - Kenyatta University; UoN - University of Nairobi; Mas - Maseno University; Eg – Egerton University; Str – Strathmore University, MKU – Mount Kenya University, NEMA – National Environmental Management Agency, Agri – Agriculture, NMK – National Museums of Kenya, MED – Medicine, Biochem – Biochemistry, MMUST – Masinde Muliro University of Science and Technology, STAT – Statistics, Hort – Horticulture, CHEM - Chemistry

Source: Drawn from Survey data, 2014

The highest normalized betweenness centrality in the network was 0.000314 whereas the others were mostly zero (Figure 5.10), which indicated that most of the communities in the network operated as discrete dyad, triad or tetrad units, with almost non-existent collaboration between them.

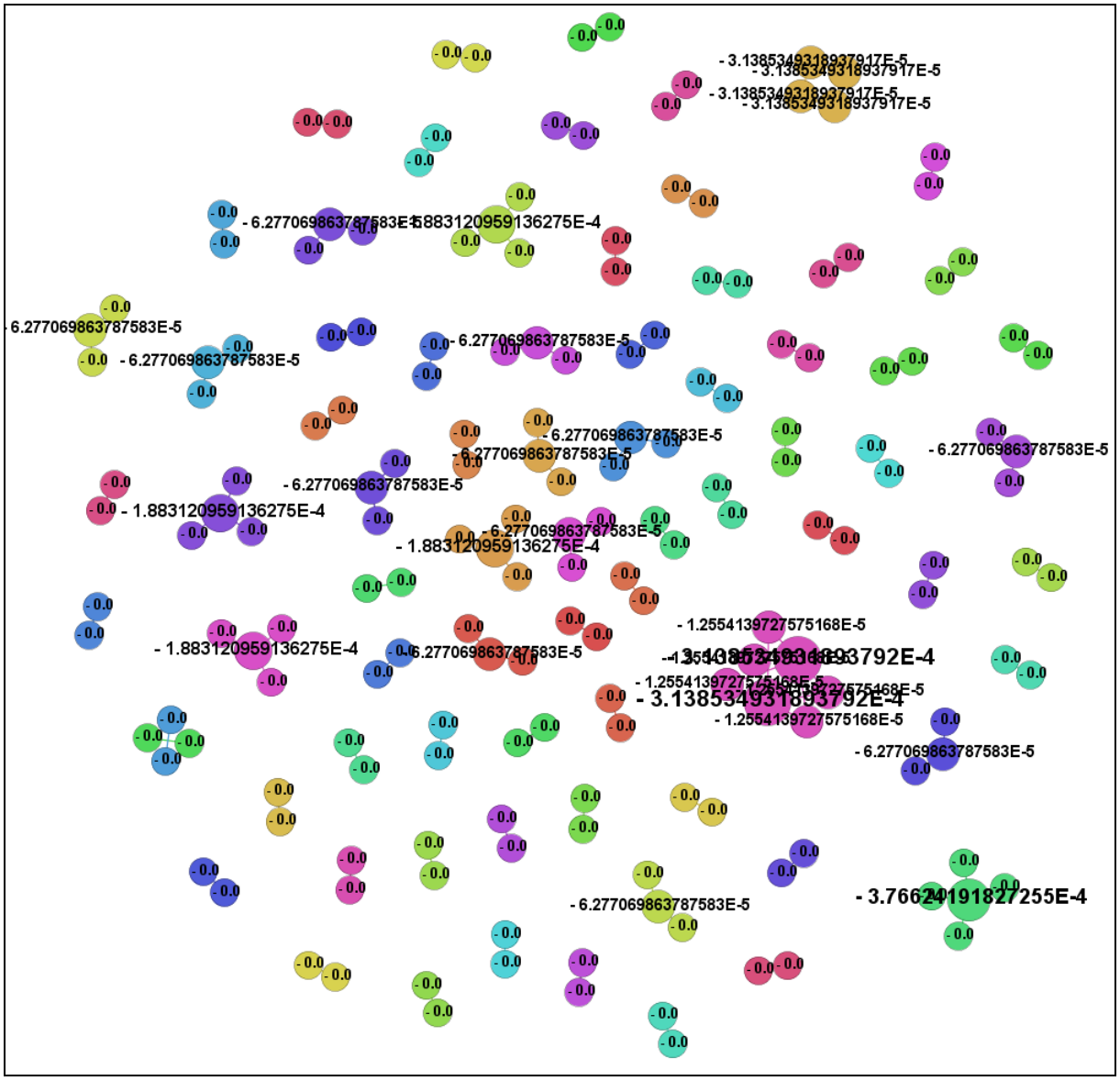


Figure 5.10 Normalized betweenness centralities of interdepartmental collaborations in the sampled universities (N=199)

Source: Drawn from Survey data, 2014

5.8.6 Scholarly Collaboration with International Peers

The respondents were asked whether they were collaborating with international peers. Majority of the academic staff (190, 75%) and postgraduate students (176, 63%) were found not to collaborate with international peers (Table 5.38).

Table 5.38 Respondents' collaboration with international peers

Respondent type	Are you collaborating with international colleagues?	Frequency	Percentage
Academic staff	No	190	74.8
	Yes	64	25.2
	Total	**254**	**100.0**
Postgraduate students	No	176	63.3
	Yes	102	36.7
	Total	**278**	**100.0**

(N=254 for academic staff; 278 for postgraduate students)

Source: Computed from survey data, 2014

The respondents were further asked to state the nature of this collaboration. The results indicated that the bulk of the collaboration consisted of publishing/writing articles (academic staff: 27, 57% and students: 5, 36%) and data collection for academic staff (11, 23%) and sharing data for students (6, 43%) (Table 5.39).

Table 5.39 Nature of scholarly collaboration with international peers

Respondent type	Nature of collaboration	Frequency	Percentage
Academic staff	Publishing/writing articles	27	57.4
	Data collection	11	23.4
	Sharing data	5	10.6
	Data analysis	4	8.5
	Total	**47**	**100.0**
Postgraduate students	Publishing/writing articles	5	35.7
	Data collection	3	21.4
	Sharing data	6	42.9
	Data analysis	0	0.0
	Total	**14**	**100.0**

Source: Computed from survey data, 2014

A network of collaborations between the respondents and international peers was built up using names or initials of members of the departments with which the respondents collaborated (Figure 5.11).

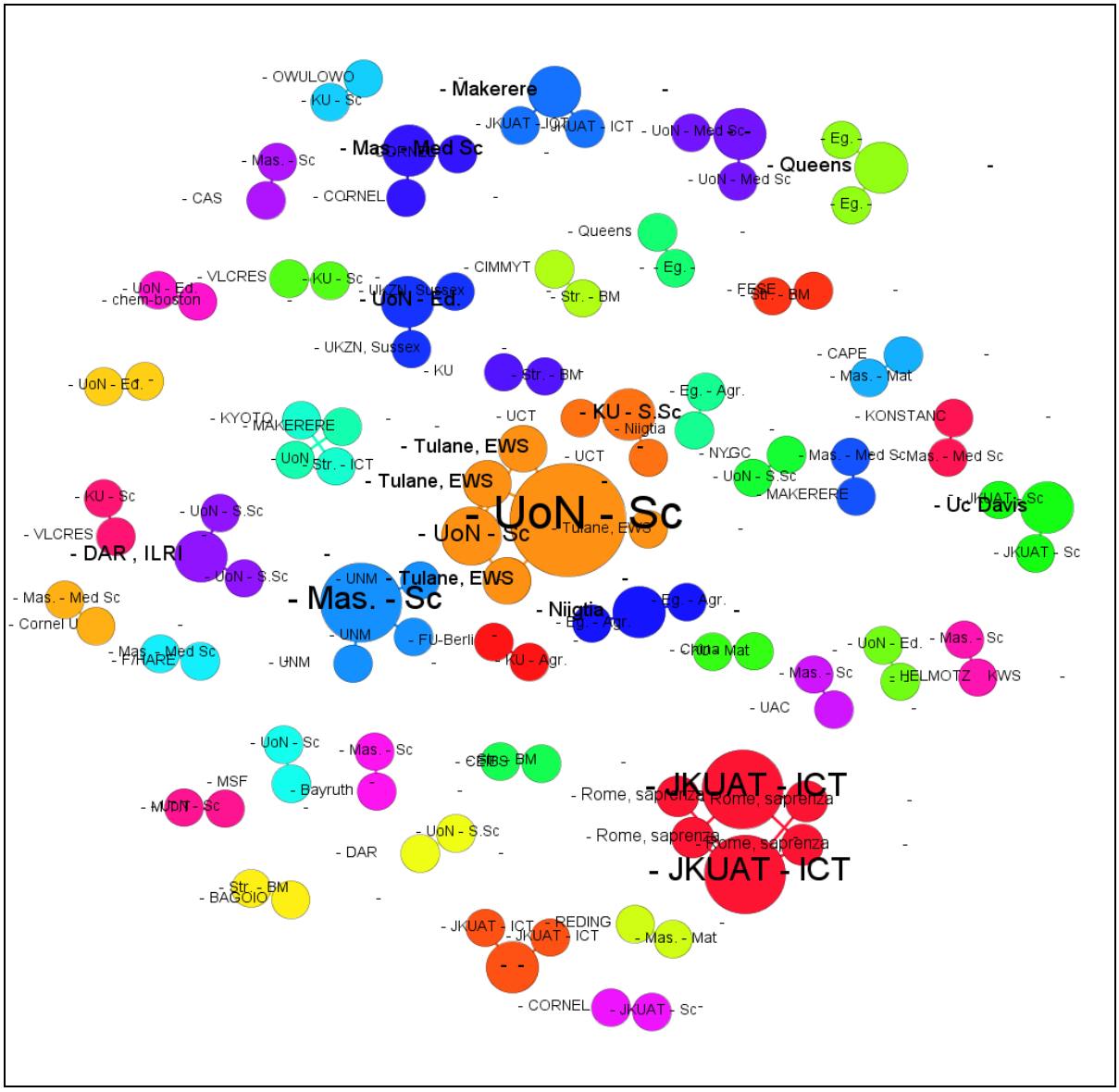


Figure 5.11 Network of international collaborations in the sampled universities (N=245)

Key: JKUAT - Jomo Kenyatta University of Agriculture and Technology; KU - Kenyatta University; UoN - University of Nairobi; Mas - Maseno University; Eg – Egerton University; Str – Strathmore University, MKU – Mount Kenya University, NEMA – National Environmental Management Agency, Agri – Agriculture, NMK – National Museums of Kenya, MED – Medicine, Biochem – Biochemistry, Sc – Science, ICT – Information communication technology, ILRI – International Livestock Research Institute, BM- Business management, S.Sc – social science

Source: Drawn from Survey data, 2014

The network consisted of only 45 communities, although the total number of respondents in the study was 605. The average degree of the network was 1.273, which suggested that research communities in the universities studied and the international peers they collaborated

with involved roughly 100 people. The largest nodes in the study involved the discipline of science in UoN (four degrees), ICT in JKUAT (four degrees) and science in Maseno University (three degrees), suggesting that more collaboration occurred in sciences compared to other disciplines. The highest normalized betweenness centrality in the network was 0.000934 whereas the others were mostly zero (Figure 5.12), which indicated that most of the communities in the network operated as discrete units, with almost non-existent collaboration amongst them. Thus, overall network centralization was quite low, suggesting that the few research communities extant operated generally independently of each other.

The network analysis revealed that Kenyan scholars are collaborating with partners within Africa and others in Europe and America. However, comparing the number of local communities with the international communities that exist, the findings suggest that Kenyan scholars are more involved in local collaborations than international collaborations. In contrast, Sooryamoorthy (2009) found that scientists in South Africa, the leading research country in Africa, preferred international collaborations. Onyancha & Maluleka (2011) found that knowledge production through collaborative research among sub-Saharan countries is minimal and contributes only a small percentage when compared to collaboration between sub-Saharan African countries and their foreign counterparts.

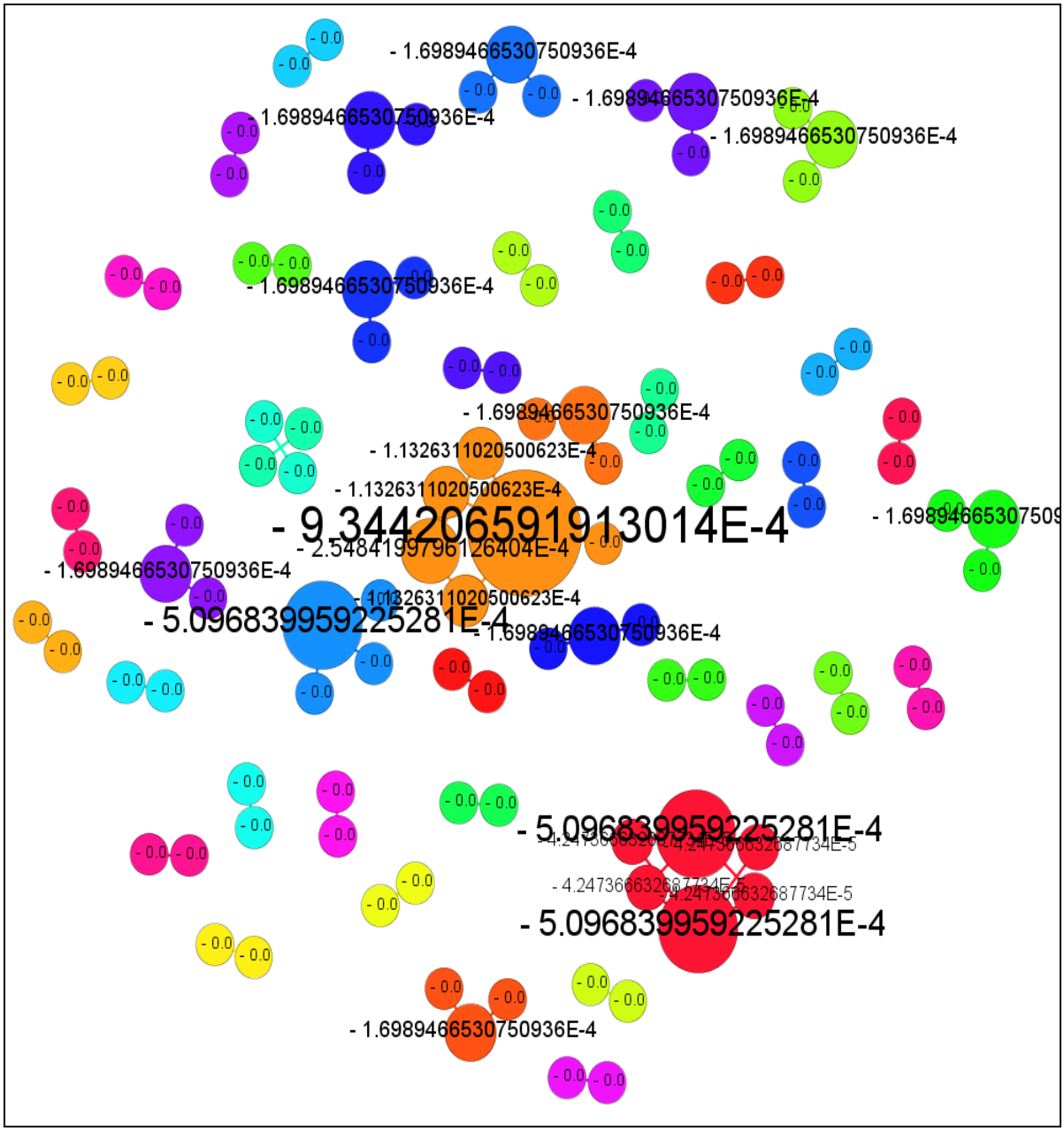


Figure 5.12 Normalized betweenness centralities of collaborations with international peers (N=245)

Source: Drawn from Survey data, 2014

5.8.7 Benefits from Collaboration

The respondents were asked whether they derived any benefits from collaboration. The results are outlined in Table 5.40 below.

Table 5.40 Benefits from collaboration

Respondent type	Do you benefit from collaboration?	Frequency	Percentage
Academic staff	No	60	42.3
	Yes	82	57.7
	Total	**142**	**100.0**
Postgraduate students	No	84	52.8
	Yes	75	47.2
	Total	**159**	**100.0**

(N=142 for academic staff; 159 for postgraduate students)

Source: Computed from survey data, 2014

The benefits of collaboration was found to include sharing of ideas, data, and information, building of CVs, improvement of research skills and an opportunity to engage with renowned professionals in the discipline. However, challenges to collaboration included lack of time, finance, great distances, different areas of interest, problems with language/communication (for instance, with French speaking researchers), and different levels of excellence in the universities involved.

5.9 Institutional Support Available to Enhance Scholarly Communication of Kenyan Scholars

This section presents results on the institutional support available for scholarly communication. The study sought to address the research question: "*To what extent do existing institutional facilities in the universities support scholars' research and communication needs?*

5.9.1 Institutional ICT Infrastructure

The study required respondents to comment on the ability of the existing ICT infrastructure in their institutions to support their efforts in accessing research output and also in disseminating their own research output. Of those who answered the question, most of them (73, 42%) noted that the infrastructure was not able to effectively support research activities. However, those who found the infrastructure good were (54, 31%) and medium (47, 27%) respectively (Table 5.41).

Table 5.41 Institutional ICT infrastructure ability to support research

Theme	Frequency	Percentage
Extremely low	73	41.95
Medium	47	27.01
Good	54	31.04
Total	**174**	**100**

(N=174)

Source: Computed from survey data, 2014

The respondents who found the ICT infrastructure support to be poor complained that it sometimes it did not work, the internet was too slow or the infrastructure was altogether lacking. On the other hand, those who reported good ICT support pointed out that it was easy to access the internet and international journals.

5.9.2 Scholars' Perceptions of Their Institution's Concern about Their Success as Researchers and Authors

The study sought to determine the extent to which the universities cared about scholars' personal success as researchers or/and authors. Table 5.42 below displays the results. Overall, substantial proportions of the respondents perceived their university as not caring (academic staff: 69, 27%, students: 100, 32%) or only cared a little (academic staff: 79, 31%, students: 110, 36%).

Table 5.42 Perceptions of scholars of how their institutions care about their success

Respondent type	Extent of institution concern	Frequency	Percentage
Academic staff	Not concerned	69	27.4
	Concerned a bit	79	31.3
	Very concerned	104	41.3
	Total	**252**	**100.0**
Postgraduate students	Not concerned	100	32.3
	Concerned a bit	110	35.5
	Very concerned	100	32.3
	Total	**310**	**100.0**

(N=252 for academic staff; 310 for postgraduate students)

Source: Computed from survey data, 2014

5.9.3 Familiarity with Global Universities Ranking Systems

The respondents were asked whether they were familiar with global university ranking systems, for instance, the Webometric Ranking of World universities. Roughly, a half of the respondents were aware of the ranking systems (academic staff: 129, 55%, students: 152, 49%) (Table 5.43).

Table 5.43 Familiarity with global universities ranking systems

Respondent type	Familiar with global ranking	Frequency	Percentage
Academic staff	No	107	45.3
	Yes	129	54.7
	Total	**236**	**100.0**
Postgraduate students	No	160	51.3
	Yes	152	48.7
	Total	**312**	**100.0**

(N=236 for academic staff; 312 for postgraduate students)

Source: Computed from survey data, 2014

Interviews with the university librarians and research office representatives revealed that although the criteria for these ranking systems were not well understood, the majority of the respondents welcomed the rankings. They felt that universities in Kenya should continue to pay attention to the rankings since such rankings provided impetus for them to continue to pursue excellence relative to highly ranked global institutions In the words of one of the librarians: *"when you want to buy a good dress, you don't look at the poorly dressed ladies, isn't it? You look at the best so that you can be able to buy a dress that will make you look like them! In the same way, I think African universities must take up the challenge of benchmarking with the best. We may have few or limited resources but with good management, I think we can get there!"* Some of the respondents indicated that paying attention to the rankings would challenge the universities to realize that they are still a long way from carrying out innovative research that would spur development, particularly industrial development that will raise the standard of living for Kenyans. Respondents attributed their high ranking to their use of IRs and to uploading their institutional content on the Web.

However, for some of the respondents, their opinion was that universities in Kenya should not be perturbed by the rankings, which they viewed as being subjective. Instead, the universities should be more concerned with the quality of education they offered to their students, the quality of knowledge they created, and how to disseminate it to the public. Some of the librarians and research office representatives indicated that sound management of scholarly content in their institutions was not merely to achieve high ranking in the Webometric Ranking scheme or any other scheme but also to make research findings more accessible to various stakeholders for improved decision-making. For the agriculture and technology oriented universities like University D and University F, respondents were more interested in the extent to which research findings influenced society or improved livelihoods. According to one of the Research office representatives, "*the original intention when you do research is that research should be transformed into tangible benefit to society; knowledge is beneficial but for it to make the universities visible, obviously we have to transform this information from research findings into products, processes and goods*." In pursuit of this goal, these institutions are funding innovation in addition to research and have achieved innovations in areas such as plant (for example bananas, rice, beans, chick peas, and fruits) and animal breeding (for example dairy cattle, dairy goats, indigenous chickens). Specifically, University F has invested heavily in providing agricultural extension services to farmers in various parts of the country.

Furthermore, some respondents felt the rankings were only applicable to a certain extent because they unfairly matched the institutions. According to one Director of Research: *"…You find it is a big disadvantage for example when our local universities are ranked together with Harvard, MIT or Stanford, the big fellows! These are well-established universities, they have been there for so long, and not only that, their governments have invested very heavily in them. You cannot compare African universities with the western world universities. Last year I went to Technical University of Berlin and I spent some time… I actually was shocked; those people are in another world! There is one item of equipment they were using for research which we were interested in because we do a lot of bio-prospecting here and it costs 500,000 Euros, just 1! So then you come to University F, for example, we have a small HPLC of 44,000 Euros worth! It cannot compare! Because for them you just need a small sample, put it through that equipment it does all the analysis including structural elucidation so you get all the results you want ...so within 6 hours, work which would have been done for 6 months is completed! So the only thing that is required is*

interpretation... you interpret...you publish...period! Therefore, while we are struggling here, people are just getting results in 6 hours ... so there is a very big disparity in comparing universities in the developed world and those in developing countries particularly in Kenya."

5.9.4 Institutional Support Available to Facilitate Research and Scholarly Communication Needs of Kenyan Scholars

The study required respondents to indicate the extent of support they received from their university in the last five academic years (2010-2014) to facilitate their research and communication needs. The results indicated that apart from receiving alerts about new grant opportunities and accessing library resources (considered as sufficient by 147, 57% and 156, 62%, academic staff respectively) the respondents considered support as inadequate or non-existent as revealed in Table 5.44 below.

Table 5.44 Academic staff's assessment of the support they have received from their institution

Activity	Amount of help received from institution					
	None		Insufficient		Sufficient	
	Fq	%	Fq	%	Fq	%
Funds to attend professional meetings	93	36.5	81	31.8	81	31.8
Alerts about new grant opportunities	36	14.1	73	28.5	147	57.4
Time at job to perform research tasks	46	18.3	98	38.9	108	42.9
Sabbaticals	101	40.7	67	27.0	80	32.3
Improvement to office space and facilities	65	25.9	99	39.4	87	34.7
Computer purchase or upgrade	73	29.1	93	37.1	85	33.9
Mentorship	59	23.8	91	36.7	98	39.5
Staff support (research assistants, clerical)	100	39.8	65	25.9	86	34.3
Workshops/training on academic research	33	12.9	103	40.4	119	46.7
Workshops/training on financial management and administration	59	23.8	90	36.3	99	39.9
Library resources e.ge journals and books	14	5.5	83	32.8	156	61.7
Help to locate potential research or publication collaborators	64	25.7	99	39.8	86	34.5
Collaborative management of research documents and data	51	20.5	117	47.0	81	32.5
Tools for analysis of large data	71	27.8	102	40.0	82	32.2
Training of information handling skills	42	16.5	105	41.3	107	42.1
Help to disseminate and publish research	68	26.9	94	37.2	91	36.0
Advice on protecting intellectual property rights	43	17.4	83	33.6	121	49.0

Key: Fq=frequency **(N=273 for academic staff)**
Cronbach's Alpha: 0.92
Source: Survey data, 2014

On a given list, postgraduate students were asked to indicate the extent of institutional/departmental support they had received since they enrolled for their studies. The findings revealed that most postgraduate students felt that library resources (215, 69%) and

computer laboratories were sufficient (164, 53%) (Table 5.45). However, the students felt that other types of support were insufficient or non-existent.

Table 5.45 Postgraduates' assessment of the support they have received from their institution

Activity	**Amount of help received from institution**					
	None		**Insufficient**		**Sufficient**	
	Fq	%	Fq	%	Fq	%
Funds to attend professional meetings	178	59.5	76	25.4	45	15.1
Improvement to office space and facilities	74	23.9	104	33.5	132	42.6
Computer lab	20	6.5	126	40.6	164	52.9
Mentorship (informal or formal)	50	17.0	118	40.1	126	42.9
Workshops/training on academic research	53	17.5	115	38.0	135	44.6
Student supplies and equipment grants	128	42.4	112	37.1	62	20.5
Library resources e.ge journals and books	7	2.2	92	29.3	215	68.5

Key: Fq=frequency. **(N=332 for postgraduate students); Cronbach's Alpha**: 0.80

Source: Survey data, 2014

The Cronbach's Alpha values for this question were 0.92 and 0.80 for items in the academic staff's and students' questionnaires, respectively. This suggested a high internal reliability of the test items.

On provision of funds, all the interviewees acknowledged that levels of funding for research activities to scholars in their institutions was insufficient since their personal sources were limited. Some of the funding was from internal sources while a large chunk was obtained through collaborations with external bodies to fund research and make local research output visible globally. These funding bodies included the NACOSTI (National Council for Science, Technology and Innovation) run by the Kenyan government to fund local scientists and innovators (although one of the research office representatives complained that NACOSTI does not consider private universities for this funding). Other partners funding research and innovation at the universities in the study are the German Academic Exchange Service (DAAD), Ericson, Samsung, Ford Foundation, Clinton Health Access Initiative, USAID,

Safaricom, IDRC (International Development Research Centre), Hewlett Packard, Bill and Melinda Gates Foundation, among others.

Scholars accessed funding from these organisations based on the merit of their research proposals and the competition was therefore very high for the limited resources. The interviews also revealed that some of the universities were members of the Association of African Universities (AAU) although their membership was not very active. One director of research confirmed that they are yet to receive any tangible benefit from being members of the AAU. One director of research opined that if the Kenyan government paid more attention to research and provided more funding, then levels of research output in the institutions would rise. Specifically, the director suggested that the government needed to establish centres of excellence in different disciplines within the different universities and also invest resources for these centres. This would raise the quality and quantity of research in the different disciplines.

It is significant that the director of research at University D observed that although scholars in local universities are expected to do a lot of research and produce tangible outputs, which would put them on comparable levels with other countries, this has not been possible. According to this director, pressure for university education in Kenya is very high, and scholars are therefore more engaged in teaching than in research owing to high student numbers and few teaching staff. As a result, academic staff are overstretched and find it very difficult to put aside the requisite 20% of their time for research. Because of the pressure of work also, local scholars find it difficult to put in the required effort to access funding for research, which is very expensive. The Director pointed out the need to roll out more PhDs to equip the universities with teaching staff and therefore reduce the academic staff-student ratio to allow teaching staff to have more time to spend on research.

Interviews with the representatives of the research offices confirmed that the research offices are responsible for coordinating research activities in the universities. They support their scholars by holding workshops and seminars aimed at educating the scholars on different issues in research and publication. These include assisting scholars to appreciate the importance of research for societal development; writing fundable research and innovation proposals; seeking funding for research; copyright and protection of intellectual property; writing articles for publication; and understanding different publication modes such as the Open Access. Specifically, it was established that majority of the universities were currently

creating more awareness of OA among its scholars. The study found that the most active institutions in this respect were University C, University E and University A who carried out seminars and workshops to educate their staff on the function and benefits of the OA model.

Other ways that the universities were supported in their research were by seeking and facilitating collaborations between their scholars and private and public companies. Such collaborations usually yielded funding and networking opportunities for researchers after which the universities played an intermediary role between the parties involved such that each party could benefit from the collaboration. In some of the universities, the research offices arranged for payment of author fees for scholars to publish their articles in peer-reviewed journals. The research departments were also responsible for managing internal and external research funds so that they are equitably distributed and used effectively for the right purposes. The research offices in the various universities coordinated the universities' annual conferences to ensure that they were funded. Additionally, some of the research departments coordinated consultancies for their scholars whereby they assisted them in bidding for consultancy projects by providing funds to enable them to successfully defend their bids. The interviews revealed that all the universities surveyed had research policies that guided the research departments in their activities in support of reseach as well as the researchers themselves in conducting research and communicating their research output.

In supporting their scholars, interviews with the research office representatives revealed that the universities faced various challenges related to limited funding available from internal and external sources. Administering these funds was quite difficult since there are many people who expect to benefit from the limited funding available. Another major challenge faced was the poor research culture among Kenyan scholars. A majority of them only preferred to teach and not engage in research. As one director of research commented, *"there are people who just want to come and teach 2-3 hours and go home… give them all the opportunities, provide the funds… they are not interested! So, when you look at the number of academic staff who are active in research compared to the total, it's about 20%, which to me is bad!"* Some of the surveyed institutions were actively involved in changing this mind-set by incentivising researchers and creating awareness of the important role they could play in research as well as collaborations for research.

The interviews also revealed that the universities had increasingly invested in ICT to ensure that their students and staff communicated effectively with their peers and accessed research

output produced outside their institutions. In all the universities surveyed, students and staff were provided with computers and related accessories in offices and laboratories, which although insufficient, met some of their needs. To reduce the gap in the student: computer ratio, most universities were encouraging their students to buy their own laptops and in some universities, it was now a policy for students to buy personal laptops. The institutions had also invested in internet connectivity with most of them providing wireless hotspots in several places within the universities where users could access the internet in comfort. The institutions had also employed qualified staff to manage their ICT resources.

5.10 Summary

This chapter presented and analysed the findings of the study. The findings indicate that various forms of scholarly content are generated in universities in Kenya. The institutions, mainly led by their libraries, are actively involved in capturing scholarly content to facilitate access and use and preservation of such content for long term availability. Kenyan scholars were found to be participating in local and international scholarly networks although to a limited extent. Although institutions are making considerable effort to meet the needs of their scholars, the scholars are not content with the level of institutional support they receive to facilitate their communication and research needs. The next chapter discusses the findings presented above.

CHAPTER SIX

INTERPRETATION AND DISCUSSION OF RESULTS

6.1 Introduction

This chapter interprets and discusses the results of the research that were analysed and presented in the preceding chapter. According to Saunders et al. (2012:606), the results chapter should state the relation of the results to the goals, questions and hypotheses stated in the introductory chapter. Additionally, the discussion chapter is expected to benefit from a consideration of the implications of the research for the relevant theories detailed in the literature review. Further, the chapter discusses unanticipated results and possible alternative explanations of results (Neuman, 2007). Polit & Beck (2003:610-611) explain that the discussion chapter is devoted to a thoughtful and insightful analysis of the results leading to a discussion of their practical and theoretical utility. Thus, the chapter should give meaning to the main results of the study. Polit & Beck assert that interpretation of results is a global process, encompassing knowledge of the results, methods, sample characteristics, related research results, and theoretical issues. Neuman (2007) points out that the discussion chapter is separated from the results chapter so that a reader can examine the data and arrive at objective interpretations.

The aim of this study was to investigate the strategies for the management of scholarly content in universities in Kenya. The study addressed the following research questions: What kinds of scholarly content are generated and used in universities in Kenya? How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use? How do Kenyan scholars communicate amongst themselves in the various stages of their research work? To what extent do Kenyan scholars participate in local and/or international professional social networks? To what extent do existing institutional facilities in the universities support scholars' research and communication needs?

The respondents were academics and postgraduate students drawn from the University of Nairobi, Kenyatta University, Maseno University, Jomo Kenyatta University of Agriculture & Technology, Strathmore University and Egerton University. Except for Strathmore University which is private the other universities are public. These universities were selected because of the fact that they were the six best ranked universities in Kenya in the 2013

Webometric global academic ranking of universities. The Webometric ranking considers among other factors web visibility and quality of the research output. This study was underpinned by the Conversation Theory, the Social Network Theory, and the Knowledge Management Process Model. The study attracted a high response rate of between 73-100%. The high response rate was attributed to rigorous repeat visits and follow-ups of the respondents by the research assistants to ensure they responded and returned as many questionnaires as possible.

The sections 6.2 - 6.7 below provide discussion and interpretation of the results.

6.2 Profile of the Respondents in Universities in Kenya

Respondents were required to provide their biographical data in the survey questionnaire. This question was aimed at soliciting information on the demographic and other characteristics of the respondents so that their current status and the context within which their experiences would be examined could be understood.

The study achieved a relatively high response rate from all the universities surveyed ranging from 73% to 100%. This response rate was regarded as high when compared to response rates from similar studies in the literature such as Dulle (2010) which realised a 73% return rate from university researchers in Tanzanian public universities. The study by Dulle was aimed at investigating factors affecting adoption of open access by researchers within public universities in Tanzania. Similarly, Tabasum & Jan (2011) received an 87% response rate in their study of Kashmir University scholars' opinions and experiences about scholarly publishing.

The current study sampled more male (175, 66%) than female academic staff (90, 34%) on the one hand and more male students than their female counterparts (195, 60%) and (131, 40%) respectively). Most academic staff (104, 39%) were aged 31-40 years. In comparison 207, 64%) of students were aged 20-30 years. A majority of the academic staff (130, 48%)) had Master's degrees while only (115, 42%) had PhDs. Thus, the majority of the academic staff (111, 42%)) held the rank of assistant lecturer/tutorial fellow, followed by (85, 32%) and (50, 19%) being lecturer and senior lecturers respectively. Associate professors and full professors constituted only (12, 5%) and (4, 2%) of the sample respectively. A majority (146, 56%) of the academic staff had taught for five years or less suggesting limited teaching (and possibly research) experience. For the postgraduate students who were studying for master's

degrees (232, 72%) had bachelor's degrees as their highest academic qualification) with only (87, 27%) of them studying for PhD (refer to results in Tables 5.2a and 5.2b in Chapter 5).

The results revealed a largely youthful population of academics and postgraduate students in the universities in Kenya. Among the academics in universities in Kenya, the typical staff was likely to hold a master's degree and be at the assistant lecturer/tutorial fellow rank. This would seem as contrary to the generally accepted international practice of hiring staff as academic staff when they hold a PhD or are in the process of obtaining such PhD (Some in Nganga, 2013a). Respondents with a PhD in this study numbered (115, 42%) and associate professors and full professors constituted (12, 5%) and (4, 2%) of the sample respectively. This context explains why most academics occupied the rank of lecturer/tutorial fellow. A study by Duque et al. (2005) on scientific productivity, the internet and problems of research in developing areas (India, Kenya and Ghana) found that only 42% of scientists in Kenya had PhDs. This situation seems not to have changed significantly because in 2014, only (115, 42%) of the academics surveyed were in possession of PhDs. Ngome (2007:855) writing on the higher education sector in Kenya found that the supply of academic staff to universities, especially with PhDs had rapidly diminished over the years due to reduced opportunities for scholarships to pursue PhDs and the high cost of postgraduate training in Kenya. Consequently the number of academic staff who hold PhD degrees has declined throughout the country. Research has shown that there is a high correlation between staff with doctorates and research (Cloete, Bailey, Pillay, Bunting & Maasen, 2011:28). This suggests that the smaller number of teaching staff with PhD qualifications in universities in Kenya is likely to impact negatively on the overall research productivity in the universities.

The results from the universities studied confirm the observations that many universities are hiring under-qualified staff in academic positions. Because of the rapid expansion of university education universities in Kenya are unable to train enough staff at the required levels of qualification to teach in these universities (currently there are 31 chartered universities in Kenya) (Nganga, 2013b; Nyaigotti-Chacha, 2004). In 2008, the Commission for Higher Education in Kenya announced that all university academic staff would be required to hold a PhD by 2015 (Harle, 2009); however, this target seems far from being achieved.

The gender status of the respondents reflects a disparity in universities in Kenya that exists between male and female (Onsongo, 2009:72; Ngome, 2007:847-8; Nyaigotti-Chacha,

2004:8). These authors found that females were underrepresented in Kenyan higher education as either students or staff. They found that female students constitute less than 37% of the total enrolments in the public universities. Moreover, women academics were concentrated in the lower ranks of the academic positions and also in the traditional 'female' social science and education disciplines. These disparities are in part caused by traditional cultural values and religious beliefs that emphasise women's roles as wife and mother, and also depict women as less competent than their male counterparts. These prejudices and beliefs influence family investment decisions and place a higher premium on boys' education than that of girls. Girls also attend poor quality secondary schools in disproportionately higher numbers, and therefore have restricted access to a broad range of curriculum (particularly in the sciences) thus limiting their access to university education (Ngome, 2007:848).

6.3 Types of Scholarly Content Generated in Universities in Kenya

The results revealed that both academic staff and postgraduate students generated twelve types of scholarly content. These were pre-prints, journal articles, working papers, technical reports, book chapters and book reviews, theses, conference papers, datasets, software and multimedia. Of these, the most common were theses, journal articles and conference papers. Less common were multimedia, software and datasets. In a span of five years (2010-2014), (154, 70%) of the academic staff had produced between 1-3 theses (assumed to be authored either as supervisors or as students), (121, 52%) had made 1-3 conference presentations, and 91 (42%) had published 1-3 journal articles, while (51, 24%) had not published any journal articles (refer to Table 5.7 in Chapter 5). For students, (100, 40%) had written theses, (113, 45%) had produced 1-3 conference presentations and (86, 37%) had published 1-3 journal articles between 2011 and 2014 (refer to Table 5.8 in Chapter 5).

The results of the current study bear some similarities to the results of the study by Lindholm, Szelényi, Hurtado & Korn (2005). Lindholm et al. carried out a national survey of American college and university faculty examining how they spent their time, interacted with their students, and methods of teaching among others. The study covered a two-year period and revealed that 26% of faculty spent zero hours per week on research and scholarly writing, with only 15% spending more than 12 hours on researching and scholarly writing. Approximately 40% of faculty spent more than 12 hours a week preparing for teaching. The study further revealed that only 24% had conducted research or writing on international or global issues; 27% had not published articles in academic or professional journals; 57% had

no chapters in edited volumes; 62% had not published any books, manuals or monographs; and 86% had not produced any patents or computer software products. The results of the current study seem to indicate that the scholarly productivity of Kenyan scholars surveyed was somewhat similar to their American counterparts although the time periods covered by the two studies differ. Referring to Table 5.7 in Chapter 5, the results of the current study show that in the period 2010-2014, 24% of the respondents had not published any journal article, 63% had authored no books, and 46% no book chapters. Although the study by Lindholm et al. did not investigate reasons for the status of scholarly productivity, it may be inferred from the results that the faculty spent more of their time teaching and preparing for teaching compared to time spent on research and scholarly writing. This situation is similar to that facing the Kenyan faculty as discussed in section 6.6 below.

A related study by Wamala & Ssembatya (2013) which analysed levels and patterns of scholarly productivity among doctoral holders in Uganda based on a sample of 534 PhD holders indicated that 27.9% had published articles, 20.2% had (co)authored books, book chapters and/or monographs. Furthermore, about 71% of the doctoral holders had neither authored nor co-authored journal articles nor books (or book chapters and monographs). The findings pointed to low scholarly productivity by PhD holders in the country. Wamala & Ssembatya attributed this situation to low levels of research activity caused by heavy teaching and supervisory workloads experienced by the academics, and poor remuneration. These factors were responsible for driving the academics into consultancy to the detriment of research. In the study by Duque et al. (2005) that assessed scientific productivity, the internet and problems of research in three developing countries (Kerala (India), Ghana and Kenya), Kenyan scientists were found to lag behind those from India and Ghana on all measures of research productivity except reports. The study found that in a span of five years ending 2005, the mean number of total articles (published in foreign or local journals) ranged from seven articles in India to 3.6 in Ghana and 2.5 in Kenya respectively. The cited studies are similar to the current study in that they focus on the scholarly productivity of university faculty in research and publication. However, these studies were carried out in different geographical areas and in areas with different levels of social, political and economic development. These factors are likely to contribute to the differences in results evident in the different studies.

In a comparative study by Lee & Bozeman in Duque et al. (2005) of US academicians, it was revealed that an average of 14.40 papers for assistant professors to 25.75 papers for full

professors in five years was published. It is evident from these studies that disparities in quantity of publications exist between scholarly productivity of academics in developing countries compared to those from the developed countries. As Ondari-Okemwa (2007) showed in an evaluation of scholarly publishing in sub-Saharan Africa between 1997 and 2007, developed countries such as the US and the UK each produced more publications in a year than those produced in the whole of sub-Saharan Africa in the 10 year period. The US had more than 100,000 records of scholarly publications in 2006 alone while the United Kingdom had 97,904 scholarly publications in the same year. The evaluation revealed that the period stretching between 1997 and 2007, South Africa was leading in scholarly publication in sub-Saharan Africa with 51,738 publications while Nigeria and Kenya had 9,540 and 6,661 publications respectively.

Of the content generated by the respondents, the current study revealed that a sizeable quantity existed as grey literature, which is non-published, and non-peer reviewed such as theses, datasets, technical reports, working papers and multimedia. The study results concur with Kanyengo (2009:36) and Omekwu (2003:132) who found that much of Africa's scholarly output is grey literature, and is difficult to track and acquire. In particular, Kanyengo (2009) observes that the number of papers presented at conferences and workshops are huge, and not well organised. More often such literature is usually found scattered in people's homes and offices, and more recently is self-published on the internet. As interviews with the university librarians revealed in the current study, the libraries and their institutions in general have so far been unable to account for content produced in workshops, conferences, meetings, learning sessions and the like. The libraries are depending on the goodwill of scholars to deposit this kind of content with them or are benefiting from directives instructing content creators to deposit the content with the library. Increasingly the universities in Kenya now have some structures in place such as the IR to trace and capture the grey literature. The IR model however faces challenges because most of the universities surveyed have not developed ways of convincing scholars to deposit all their outputs in these repositories. The results reflected in Table 5.22 in Chapter 5 reveal that only a few academic staff and students (12%) prefer IR as an avenue for scholarly communication. This could be attributed to the novelty of IRs at the universities surveyed (all the IRs were less than three years old, except the one at University E which was six years old at the time of this study).

A study by Davis & Connolly (2007) that evaluated reasons for non-use of Cornell University's IR found that five years after its inception, faculty, who were the intended key users of the IR had little knowledge of the IR. Watson (2007) investigated authors' publishing behaviors, attitudes, concerns, and their awareness and use of their IR (Cranfield QUEprints) at Cranfield University in the UK and found that after being in existence since 2003 and despite a reasonable amount of advocacy many authors had not heard of QUEprints and were not aware of its purpose. In the same vein, Abrizah (2009) carried out a study on awareness and attitudes towards IR at the University of Malaysia, Kuala Lumpur and established that only 36% of academics were aware of the IR initiative at the university.

The Knowledge Management Process Model by Botha et al. (2008) posits that the knowledge created within organisations in the form of journal articles, conference proceedings and electronic documents of various types (Rowley, 2000) needs to be captured, organised and made accessible to knowledge workers. Botha et al. (2008:146) further noted that the capture, organisation and accessibility of this knowledge are made possible by knowledge management technology infrastructure such as knowledge bases and repositories. The results of the study indicated that the universities surveyed had deployed the IRs with the aim of capturing the scholarly output generated by its scholars in the form of peer-reviewed content or grey literature to make it more accessible.

The study results also confirmed that research and scholarly work is being conducted in universities in Kenya producing various forms of scholarly content. Deitering (2011) explains that for academic writers, journal articles, books and presentations between them function as a continuous conversation that allows scholars to exchange, build on and generate new ideas. The Conversation Theory posits that it is conversations among peers in a given domain and within specific theoretical frameworks that create new knowledge (Lankes, Silverstein & Nicholson, 2007). According to Pask (1976) the basic conversation involves two parties (in this case two scientists) interested in answering a question by exchanging information. In the process, theories are exchanged and justified and the accompanying models and procedures are elaborated between the participants. During a conversation, the "how" and the "why" of different topics are explained and justified in terms of the understanding of each participant thereby clearing misunderstandings and providing solutions to stated problems. It is this process that generates new knowledge and is essentially what goes on in science (Scott, 2001).

According to Klemm (2002) these conversations are manifested in written or oral forms, digital or traditional formats, presented in public or private and as formal or informal communication. Essentially, the purpose of these conversations is to contribute towards learning and broader understanding of concepts, generating ideas and assisting in decision making (Klemm, 2002). Klemm further observes that it is the participatory interactions between individuals that enable the formulation of tangible results in the form of new ideas. This position is also acknowledged by the Knowledge Management Process Model by Botha et al. (2008:48) who postulated that all knowledge creation, whether individual, team, community and organisation, is constructed from other knowledge gathered from classes and formal training, experts, seminars, social networking, literature or a combination of these. Thus, the study results suggest that new knowledge is being created by the interactions between scholars in the universities and from their participation in research, conferences, and interactions with scholarly literature.

The study results revealed that close to two thirds of departments in universities in Kenya did not have any departmental journals (see results in Figure 5.1 in Chapter 5). As the results in the figure indicates, over half of the academic staff and two-thirds of students surveyed indicated that their departments did not produce journals. However, the interviews with Research Office representatives revealed that the universities produced a few centrally managed journals which published articles presented at the universities' conferences by individual staff and postgraduate students beside other internally maintained journal articles.

In contrast, Tijssen (2007) who examined the perspectives, trends and performance indicators of Africa's contribution to the worldwide research literature found that South Africa had 253 journals accredited by the Department of Education. Smart (2005) observed that INASP estimated that there were about 400 journals published in South Africa, 300-400 in Nigeria and 400 in the rest of sub-Saharan Africa. However, these figures could not be confirmed because there is no definite index of these journals. In 1998, African Journals Online (AJOL) was started as a non-profit organisation whose mandate was to promote and increase online access to African research output and to support African scholarly publishing (Murray, 2008). In 2014, the AJOL website indicates that it is currently hosting 483 journals (AJOL, 2014). Current statistics on journal production in specific African countries or universities is not available possibly because most of these journals are local with low coverage and intermittent

production (Tijssen, 2007). The findings of the current study indicate that universities in Kenya produce few journals compared to their counterparts in South Africa and Nigeria.

Ware & Mabe (2012) assert that journals form a core part of the process of scholarly communication and are an integral part of scientific research. Journals disseminate information; provide a mechanism for the registration of the author's precedence; maintain quality through peer review; provide a fixed archival version for future reference; and also provide an important way for scientists to navigate the ever-increasing volume of published material. Kidane, in Teferra (2003:55) opines that: "the existence of professional journals is an indicator of the presence of highly trained manpower in several institutions that are capable of generating research output in sufficient quantity to warrant the regular production of a journal." It is evident from the results of the current study that the quantity of scholarly content especially of journal articles is not sufficient to sustain regular production of scholarly journals in the different disciplines or subject specialisations in the universities surveyed. This situation propagates a vicious cycle where locally produced articles are few therefore production of local journals which depend on these for survival is unsustainable. On the other hand, there are then few local outlets for publication of locally produced articles. With the few local journals in existence in the universities in Kenya surveyed, it is evident that scholarly communication in these institutions is deficient to the extent that local research findings are not being disseminated effectively and research visibility is not effectively enhanced. Additionally, the visibility of researchers is also compromised.

Tijssen, Mouton, van Leeuwen, & Boshoff (2006) opine that domestic journals and other local publication outlets are often the main vehicles for disseminating relevant results of indigenous research activities dealing with issues of predominantly local relevance. Kanyengo (2009) and Ondari-Okemwa (2007) have lamented the lack of diversity and plurality of periodicals published in African universities. Salager-Meyer (2008) showed that local publications from developing countries are few and of low quality hence do not attract high impact factors and citation frequencies. Additionally, the readership of such publications is very small and confined to the national boundary. Moreover, their production, publication and distribution are irregular owing to financial constraints. Faced with these challenges, these publications do not survive for long, and thus do not contribute to the cultivation of a research culture in the parent institutions. This view is echoed by Tijssen (2007) who observed that for Africa most of her journals are predominantly meant for local purposes,

they tend to have relatively low circulation rates, and many are published irregularly. The results of the current study corroborate Salager-Meyer (2008) and Tijssen (2007) on the few journals currently being published in the universities in Kenya surveyed. Furthermore, as Salager-Meyer (2008) observed, lack of stable local journals in sufficient numbers has a negative impact on the development of a research culture in local institutions. Kanyengo (2009) also opines that diversity and plurality of journals can encourage and strengthen the research output in Africa's universities. It is possible therefore that the low volume of journal articles produced by a relatively small number of academic staff at the Kenyan institutions surveyed can be attributed in part to absence of prolific local journals.

Ondari-Okemwa (2007) points out that scholarly publishing in Africa is hindered by economic, technological and environmental challenges. For example, many scholars work in financially challenged institutions in which research facilities such as laboratories, by international standards, are inadequate and out-dated. Equally, funding for libraries in such institutions is insufficient and continues to dwindle every year, impacting negatively on the library collections. Additionally, research funding and incentives for academics to publish are almost non-existent. On the technological front, most countries in the region lack the technological capabilities to support electronic knowledge transfer and scholarly publishing. Although the situation is expected to change after the completion of the African undersea cable projects (Song, 2014), ICT infrastructure in sub-Saharan Africa is still under-developed and may not adequately support the use of electronic journals and electronic publishing. Scholarly publishing in sub-Saharan Africa also faces environmental challenges characterised by absence of freedom of expression in a majority of the countries in this region. Moreover most universities do not enjoy autonomy therefore freedom of expression and scholarly creativity is stifled.

Studies have also shown that African scholars tend to prefer publishing their articles in international journals which have high impact factors, than in local journals (PLOS guest blogger, 2012; Hofman, Kanyengo & Kotzin in Kanyengo, 2009; Hofman, Kanyengo, Rapp & Kotzin, 2009). It is possible that of the majority or 42% of the Kenyan scholars who had published 1-3 journal articles in the last five years, perhaps a sizeable quantity of their research output was published in international publication outlets. The preference for international journals may be attributed to the dearth of local journals. Teferra (2003) conducted a study to explore, analyse, and critically examine the state of scientific

communication in Africa universities. Among other things, respondents were asked if they had access to international scientific journals in their fields and their opinions about their importance and relevance in comparison to regional journals. The study found that more than 70% of the respondents considered regional journals to be as important and relevant as other similar or related international scientific journals. An interesting opinion by one of the respondents was: "*they are important if they are able to keep up regular publication*". Those respondents who had a contrary opinion expressed reservations based on the irregularity, lack of professional significance, generalist content and absence of subject specific journals. This current study did not however probe scholars' preferences in terms of international or local journals for publishing their research. This aspect may be pursued in subsequent researches.

The results showed that in a span of five years (2010-2014), most of the scholars at the universities under study were mainly involved in generating mainstream publications such as theses, conference presentations and journal articles (154, 70%). Of these academics who had produced scholarly content, 121(52%) had conference presentations, and 91 (42%) had journal articles. In the same period, the majority of respondents had not authored any books (92, 63%), book chapters (73, 46%), book reviews (77, 50%), technical reports (70, 52%) or working papers (71, 43%). The results suggest that the majority of academic staff are concentrating on producing theses (either as supervisors or as students) with less attention paid to generating conference presentations; journal articles; books, book chapters or technical reports. This result may be attributed to the fact that they have many students to supervise hence are mainly engaged with thesis work leaving little time for research that would result in production of other scholarly works. The result may also be linked to what other researchers have alluded to namely that faculty the world over are increasingly expected to publish only in journals with high impact factors rather than in other forms of publishing (including books and book chapters) that do not attract impact factor rankings (Bagatin & Gontijo, 2011; Johnstone, 2007). Besides, publication of peer-reviewed journal articles has long been rated as the most important element for tenure and promotion decisions in universities (Gabbidon, Higgins & Martin, 2011; Dennis, Valacich, Fuller & Schneider, 2006; Seipel, 2003). Miller, Taylor & Bedeian (2011) surveyed faculty in 104 management departments of AACSB accredited, research-oriented US business schools to explore the prevalence, sources, and effects of pressure to publish. The authors reported that 94% of respondents in their study were under pressure to publish in peer-reviewed journals. On the other hand, fewer reported being under pressure to publish articles in editorially reviewed

journals (16.6%), scholarly books (8.5%), chapters in books (7.4%), case studies (3.0%), and textbooks (1.6%). In contrast the results of this current study suggest that the faculty surveyed is concentrating on publishing scholarly products that meet their job specifications (theses) and those that enable them to get recognition for tenure and promotion (refereed journal articles). These results may also be attributed to the fact that most of the academic staff participating in the study were at the beginning of their careers and would be studying for higher qualifications therefore would be engaged predominantly in producing theses and dissertations.

A majority of postgraduate students had not authored any books (166, 83%), book chapters (162, 81%), book reviews (141, 69%), technical reports (127, 58%), working papers (120, 57%) or journal articles (130, 56%) in the period 2010-2014. This result seems to suggest that postgraduate students in the universities studied are hardly involved in producing scholarly work except theses. Belcher (2009b) found that most graduate students do not write much because they lacked adequate writing skills and mentors to help them develop these skills. Producing research publications is also not a strong requirement for postgraduate education and this would also explain the results that majority had therefore not authored any books. The results further indicated that a significant proportion (150, 47%) of postgraduate students were not involved in any mentorship programs and cited barriers such as lack of time due to heavy teaching workload, few mentors, and unwillingness of the more established scholars to provide mentorship. This low level of participation of graduate students in the scholarly writing and publication activities seems to corroborate Garbati & Samuels (2013) who examined eighteen issues of six peer-reviewed journals in the field of education to determine the extent to which graduate students were participating in publication in these journals through co-authorship. Their study revealed that graduate students made up less than 9% of all authors published in these journals with the most common collaborative relationship involving a single graduate student and a professor. There were no instances of students publishing with other students. This study illustrated the low participation in collaborative research and writing that affects graduate students and is similar to the situation facing Kenyan graduate students.

These results indicate weak social ties between the students surveyed and their supervisors and between students themselves. This may imply that only formal course information is shared between these actors as opposed to information that would lead to creation of new

knowledge. The results of this study corroborate those of McFadyen et al. (2009) who conducted a bibliometric analysis of over 7,300 scientific publications by 177 research scientists working with more than 14,000 others over an 11-year period (1989-1999). Information about their publications was obtained from the Community of Science Database and verified through the Science Citation Index, PubMed, the National Library of Medicine search service and the Institute for Scientific Information's search services. The study showed that in a social network, strong ties are necessary for creation of knowledge. These ties are characterised by close and frequent interactions between a person and his/her exchange partners. This promotes the transfer of tacit knowledge which is crucial in mentorship, where the mentor provides an environment of growth characterised by visibility of the mentee, connection to other researchers within the academic environment, moral support, guidance of the mentee in self-reflection, vision-building and goal-setting (Sambunjak et al., 2010; Jackson, Palepu, Szalacha, Caswell, Carr, & Inui, 2003). Researchers who maintain mostly strong ties with research collaborators tend to have the highest levels of new knowledge creation (McFadyen et al., 2009). Similar observations were made by Dyer & Nobeoka (1998) who researched the Toyota case as an example of creating and managing a high performance knowledge-sharing network. The authors noted that sharing know-how (tacit knowledge) is difficult and therefore requires 'thick' or dense ties among members of a network. Furthermore, sharing tacit knowledge results in more sustainable advantages compared to information sharing and gives competitive advantage to networks that are able to transfer such knowledge. In the current study, the ties between the students and their supervisors in the universities surveyed seem not to promote sufficient transfer of tacit knowledge to enable generation of new knowledge.

The role of mentorship in cultivating successful scholars (whether graduate students or faculty) cannot be overemphasised. Mentoring is defined by Healy & Welchert (1990:17) as "a dynamic, reciprocal relationship in a work environment between an advanced career incumbent (the mentor) and a beginner (the protégé) aimed at promoting the career development of both". Several studies have shown that mentoring has an important influence on personal development, career guidance, career choice and research productivity of the mentees. Mentors also provide emotional support and encouragement and in the process also benefit themselves through greater productivity, career satisfaction, and personal gratification (Sambunjak et al., 2010; Rose, Rukstalis & Schuckit, 2005; Boyle & Boice, 1998). To succeed in academia, all faculty need super-ordinates in their networks and as mentors (Carr,

Bickel & Inui, 2003; Jackson et al., 2003). This goes hand in hand with the Social Network Theory whose main postulate in an academic setting is the sharing of knowledge and passing on of skills from one node to another. In a social network, the nodes are tied to each other by one or more specific interdependencies such as values, ideas or friendships (Cahill, 2009). Serrat (2009) explains that the structure of the relationships between the nodes is the focus of social network analysis and can range from casual acquaintance to close bonds. Further, social network analysis maps and measures formal and informal relationships to understand what facilitates or impedes knowledge flows between interacting units for example who knows whom, who shares what information and knowledge with whom and by what communication media. The results of the current study suggest that scientists and students in the universities surveyed had limited interdependencies tying them to each other and this resulted in limited sharing of knowledge and skills between them.

The results from this study also show that only 91 (42%) of academic staff surveyed had written 1-3 journal articles in the last five years, with (51, 24%) of the rest producing no journal articles. This is in spite of the expectation that they would be more productive especially because it is a requirement for promotion and tenure (Gabbidon, Higgins & Martin, 2011; Dennis et al., 2006; Seipel, 2003). Although this study did not directly link mentorship to research productivity, the studies cited above have shown that mentorship does influence research productivity. Therefore, it is possible that lack of effective mentoring programs in the universities between junior and senior academic staff and between postgraduate students and academic staff is contributing to low research productivity. It may also be inferred that lack of quality local journals as outlets for local research output has impacted negatively on the research productivity of local scholars. As was seen previously, local high quality journals are few (Kanyengo, 2009; Salager-Meyer, 2008; Tijssen, 2007). In this connection it is worth noting that a majority of the respondents (398, 67%) rated the research output from their departments as low or medium although academic staff generally rated research levels in their universities higher than the students did (refer to results in figure 5.3 in Chapter 5). This difference may be explained by the apparent dissociation of postgraduate students from the general research community of the universities surveyed. Since the results indicated that these students generally did not produce much scholarly content other than their theses, it may be assumed then that they were not active participants in research activity and were therefore not in a position to accurately judge what went on in research in their institutions.

6.4 Preservation and Archiving of Scholarly Content for Current and Future Use

As far as preservation and archiving of scholarly content is concerned, the study revealed that more than half of the respondents (academic staff: 149, 57%; students: 181, 56%) had little or no knowledge of the concept 'data curation' (refer to results in Table 5.11 in Chapter 5). However, a majority of the academic staff (more than 85%) and students (more than 73%) documented their research procedures, backed up information on computers by storing multiple copies of their files, moved files from older to newer computers and also printed out hard copies of the files as shown by results in Table 5.14 in Chapter five. The most commonly used modes of scholarly preservation were home computers: (178, 23%) for academic staff and for students 193 or 23%; portable storage (academic staff 173, 22%; students 209, 25%); computer at work (academic staff 150, 19%; students 120, 14%), and hard copies (academic staff 97, 12% and students (156, 19%). The results also showed that a university digital archive as a mode of scholarly preservation for (36, 5%) academic staff and for (22, 3%) of students, and university servers were least popular as avenues for preservation of scholarly content for academic staff (36, 5%) and for students (40, 5%). University E had the highest use of the institutional digital archive followed by University C and University F (see Tables 5.15 and 5.16 in Chapter 5)

The results above (from Table 5.14 in Chapter 5) revealed that although more than half of the respondents indicated that they had little or no knowledge of data curation, their activities with regard to preservation and archiving of scholarly content could be regarded to be of a curative nature. A majority of the respondents indicated that they documented their research procedures, backed up information on computers by storing multiple copies of their files in different locations, moved files from older to newer computers and also printed out hard copies of the files. The universities also required their students to deposit their theses in PDF format, an open file format currently used to guarantee long term availability and portability of the document across different computer platforms.

These results suggest that both the universities and individual researchers were aware of the need to maintain the long-term accessibility of their research data and other information and took measures to guard against loss or inaccessibility of the information. In enforcing this requirement for their students to submit theses in PDF format, the universities were also complying with the National Information Standards Organization (2007:37) recommendation

that encourages authors to create born-digital content in specific formats that would facilitate long-term accessibility.

These results seem somewhat divergent with results from previous studies (Groenwald & Breytenbach, 2011; Lord et al., 2004; Marshall, Bly & Brun-Cottan, n.d.). Lord et al., (2004) reported on a study that examined the status at the time of the provision and future needs of curation of primary research data in the UK, within the e-Science context. Marshall et al. (n.d.) conducted a field study to examine the current state of personal digital archiving in practice. The participants in the study had each owned multiple computers, and other digital recording devices such as digital cameras, camera phones, digital video recorders, and CD or DVD burners. Groenwald & Breytenbach (2011) investigated the awareness about digital preservation and what must be done to preserve valuable original digital materials. The participants in the study were mostly from South Africa. These studies revealed that researchers and home computer users in general lacked knowledge, general awareness and consistent usage of preservation strategies and management of the digital objects they had created on their personal computers.

Results from the current study indicate instead that computer users were increasingly becoming aware of the need to undertake personal initiatives that would ensure that their digital data and information remained consistently accessible and available for their use in the long-term. Respondents used diverse preservation modes ranging from home and work-place computers, portable storage, and university digital archives and servers. Some respondents still relied on hard-copy printouts for back up purposes. The results showed that respondents were using measures that worked best for their personal situations including relying on hard-copy for back up purposes. This result seems to suggest that in spite of the proliferation of ICT and digital information products among researchers, the traditional hard-copy format is still an important avenue of information access and preservation among Kenyan scholars. These results complement Tenopir, King, Boyce, Grayson & Paulson (2005) who studied the electronic journals reading patterns of astronomers who were members of the American Astronomical Society. The study revealed that even though astronomers accessed about 80% of their readings from electronic sources, they often downloaded and printed out articles on paper before reading. In the digital age, paper is no longer such an attractive medium for preservation of information although its durability and usefulness compared to electronic formats continues to be debated. According to Wu (2005), though paper does not suffer from the technological instability of online data, it does age. Pages become brittle; text fades; and

acids, temperatures, humidity, and various environmental factors lead to deterioration of physical forms.

Although the current study results suggest increasing awareness among computer users about digital preservation, still it is important that they continually be exposed to more knowledge and training to cement their knowledge and expose them to new strategies and new knowledge. This is critical especially since the technology environment in which they live is quite dynamic. As the Library of Congress (2013b:3) argues, "one of the still unfolding impacts of the computer age is that everyone now must be their own digital archivist".

The results also revealed that university digital archives and university servers were the least popular avenues for preservation of scholarly content, favored by just 5% of both academic staff and students. A related study in Europe by PARSE.Insight (2010:19) found that only 20% of the researchers submitted data to a digital archive and concluded that "researchers were not familiar with data archives and when they were, there was still a lot of distrust in the capability of digital archives to properly handle research data".

Similarly, other studies in university settings such as Lawal (2002); Pelizzari (2004); Rowlands & Nicholas (2005); van Westrienen & Lynch (2005); Davis & Connolly (2007); and Krevit & Crays (2007) found challenges with the acceptance and use of digital archives (Johnson 2002). These studies were carried out in universities and targeted academic staff in America, Canada and Europe although the Rowlands & Nicholas (2005) study was a global survey. In these studies, challenges with use of the digital archives was attributed to distrust, lack of awareness, fear of plagiarism, confusion about copyright, concerns about quality of the material in the IR, and questions of who would use the material deposited and how. Further, the time and effort required to deposit material into digital repositories was acknowledged as a challenge. The current study is similar to these studies in that it was carried out in universities and also targeted academic staff.

In the current study, interviews with university librarians revealed that scholars were still not very comfortable with depositing material in the IR. Some of the scholars outrightly refused to deposit content in spite of being aware of the policies requiring them to do this, saying "*I don't care what the policy says! You cannot have this document!"* This revealed that scholars seemed to have a negative attitude towards the IR and also seemed not to agree with what the policy requires about depositing of content as well as what they perceive to be the objectives and functions of the IR. Another librarian also observed that "*sometimes they (the scholars)*

complain that their work might be plagiarized". The librarians interviewed attributed these attitudes to lack of awareness and distrust of the intentions of the IR and intended use of their scholarly output. The studies cited above also found similar fears among the scholars they surveyed, indicating that the concerns raised by Kenyan researchers about acceptance and use of the IR are largely similar to those of scholars from other parts of the world.

The results also revealed that management of the repositories in the universities in Kenya is experiencing similar challenges such as getting scholars to deposit their content in IR. Davis & Connolly (2007) found that a majority of the faculty at Cornell University were not depositing content into the repository and the only collections exhibiting steady growth were largely supported by active policies or guidelines such as those guiding submission of theses and dissertations. Similarly, Swan & Carr (2008) surveyed European repositories and stated that over 60% of repository managers reported that recruiting content to their repository had been possible but not easy, while a third of the managers stated they had found it difficult or very difficult to recruit content. Covey (2011) examined self-archiving at Carnegie Mellon University and found that faculty were not flooding the university libraries with requests to deposit their work. These findings echo those of Salo (2008) who assessed IRs in the US and observed that most academics were ignoring and even shunning the existence of the IRs in their institutions and most were not likely to voluntarily deposit content into it.

In order to capture content and populate their collections, libraries in most of the universities surveyed in the current study were actively engaged in harvesting or otherwise mediating deposits of various types of scholarly content although with much difficulty. In some instances, the repositories were being populated by academic staff and students were obliged to do so in terms of stringent measures that were put in place to ensure they complied with the requirements for depositing the content in the repositories. As Swan & Carr (2008:32) found out, advocacy and mediated deposit by library/repository staff can be effective tools in recruiting content, but only with the support of senior management. Similarly, a study of academic institutional repositories in selected countries in Europe, US, Australia and Canada (van Westrienen & Lynch, 2005) found that in some countries there was an emerging trend to directly link the use of IRs to research funding and research evaluation (at individual or institutional level) as a result faculty were under obligation to deposit their publications into the institutional repositories.

Cochrane & Callan (2007) in their study examining the impact of a university-wide deposit mandate on self-archiving practices of academics at Queensland University of Technology, Australia, found that the mandate definitely increased the self-archiving rates. Nevertheless, success of the mandate was attributed to the fact that there were no penalties for non-compliance. The library reached out to faculty, marketed the IR and educated them on the benefits of using the IR. Bankier & Smith (2010a) opine that mandates may help libraries to address the scholarly communication crisis (resulting from high cost and inaccessibility of peer reviewed journals) and access issues but they also represent the continuation of the narrow focus on post-print collections and therefore do little to increase the value of the IR to faculty and other stakeholders. Furthermore, Bankier & Smith state that mandates also imply limited reach and scope of the library. Royster (2009), recounting the University of Nebraska Lincoln experience with their IR, noted that they did not use mandates to recruit content. Reasons given were that mandates were in conflict with their intellectual property policy which allowed authors complete control and ownership of their output; it would put the library in a futile rule-enforcement role; in the end it would not be worth the cost in political capital and goodwill; and it would not necessarily produce more deposits since most mandates had opt-out provisions allowing authors to withdraw. Additionally, enforcing the mandate would increase the staff workload. For the University of Nebraska Lincoln, the secret to successful usage of the IR is to creatively make content and its usage dynamic, attractive, open and to include works of relevance to the larger Nebraska community.

Results of this study revealed that respondents were willing to deposit scholarly outputs into the digital repositories owned by their universities. Additionally, a majority of the respondents appreciated the efforts made by their universities towards preserving scholarly content, especially in universities that had established IRs. However, it remains to be seen whether this willingness will ultimately translate into action for voluntary self-deposit of content into the repositories. With proper marketing of the IR and education of researchers, it is hoped they will on their own volition deposit research outputs into the IR making such content accessible in the long term. Cochrane & Callan (2007) found out that with implementation of the IR at Queensland University of Technology, researchers responded by asking for more information, others agreed it was a great idea and most promised to deposit their papers into the IR. Unfortunately for the IR management, very few researchers subsequently followed through with their promise and actually deposited their papers in the IR. Faced with this situation, the library enforced the policy to compel researchers to deposit

publications into the IR. This saw a steady but unsatisfactory rise in deposit of content into the IR. This result shows that willingness to deposit content into IR does not always translate into action of the same. Therefore the universities in Kenya ought to actively motivate researchers to deposit content into the IRs.

The results of the study revealed that the majority of academic staff (150, 80%) felt their universities were making significant efforts towards preserving research data compared to students (133, 48%). This difference in opinion may be attributed to lack of awareness on the part of students caused by their minimal participation in research in the universities surveyed. Further, it was found that respondents from University E perceived their university to be making the greatest efforts in digital preservation of research data (15, 88%), followed by University D (37, 77%), University F (31,76%) and University C (50, 73%) respectively. Respondents in University A and University B felt these universities were making the least effort in digital preservation of research data (124, 50% and 26, 57%) respectively). Some respondents reported that there were no efforts by their universities to preserve data despite there being IRs in their universities. This result seems to imply that there existed a disconnect between the IR and the users and therefore IR managers needed to address this challenge. Furthermore, the results seemed to indicate that users did not understand the functions of the IR and the libraries therefore needed to educate users more clearly on these matters.

Studies have shown that for the objectives of the IR to be realised, IR managers need to engage and educate users showing them the purpose and functions of the IR and the value of the content in the IR to their scholarly activities. Cochrane & Callan (2007) found that constant communication with faculty to inform and remind them of the requirements of the IR and identifying the best strategies that would work for recruiting their scholarly content into the IR (along with institutional mandate) was the best approach for achieving successful implementation of the IR. In their experience, the focus of the message should be about how self-archiving is beneficial to scholars' research projects and to them personally and professionally. Similarly, Covey (2011) advocates for aggressive marketing of the IR characterised by comprehensive campaign and targeted sale strategies. Every opportunity for contact with faculty, formal presentations at departmental meetings, articles and advertisements in campus publications must be utilised for success to be achieved. Additionally, the libraries need to help faculty address whatever concerns they may have concerning quality of content deposited in OA repositories, and the time needed outside their normal working time to prepare work and deposit it into the repository.

The results of the current study showed that in order to guarantee preservation of research data, respondents indicated that training on preservation strategies needed to be offered (academic staff 206, 30%; students 226, 31%); establishment of more digital repositories (25% of both academic staff and students); more financial and operational resources (23% of both academic staff and students); and increased knowledge/expertise (academic staff 150, 22%; students 152, 21%). A related study was carried out by PARSE.Insight (2010) on the digital preservation of research output in Europe. The study established that general awareness on the importance of long-term preservation of research output was lacking and it needed to be created. The study made several recommendations concerning long term preservation. According to PARSE.Insight, it is not enough to have research output archived in accessible repositories. Arrangements for its access in any form over the long term must be carefully thought out before it research output is archived. Additionally, institutions need to promote storage of data by creating awareness among scholars. The study also recommended that although awareness about value of IRs is rising, organisations should develop training courses to teach researchers how to manage digital data, how to work with data sets and how to archive and share them. Additionally, organisations need to be aware that digital preservation is not only a technical challenge but also requires adjustments to their policies and procedures for such preservation to be realised and to be of benefit to its researchers. The Alliance for Permanent Access to the Records of Science Network (APARSEN) (2013) studied some current data governance structures and policies in Europe and beyond. The study revealed that generally funding for digital preservation is usually short-term and project-based, which creates risk for effective long-term preservation of digital objects. To protect data persistence, APARSEN recommends that solutions of more permanent funding are required.

The need for more knowledge and expertise on matters of preservation is evident since a sizeable proportion of the respondents (academic staff 206, 30%; students 226, 31%) indicated that to guarantee preservation of research data, more training on how to preserve such data was needed. Additionally, to guarantee preservation of their universities' research data, there was need for the establishment of more digital repositories and also making available more financial and operational resources. This view was shared by the librarians. These views concurred with those of Kanyengo (2009) who observed that African institutions were unprepared to facilitate long-term access to digital information owing to poor infrastructure, financial constraints, lack of technical knowledge and preservation training.

Kanyengo proposed that universities and research institutions should provide the necessary leadership to ensure permanent access to Africa's digital information.

The Knowledge Management Process Model advocates for the institutional adoption of knowledge repositories as part of their knowledge management technology infrastructure (Botha et al., 2008:145). The universities surveyed are making strides towards establishment and use of knowledge repositories. The IRs that have so far been implemented in the universities are repositories for the knowledge generated within the universities. Such knowledge exists in codified formats (Karlsen, 2005) as journals, conference proceedings, and electronic documents (Rowley, 2000). According to Botha et al. (2008), the purpose of IRs is to enable online access to knowledge and to solve the problems created by the current problems of information overload whereby enormous amounts of digital information are created but thereafter are increasingly difficult to find, access, present and maintain. Institutional repositories can be considered as intellectual capital repositories which according to Botha et al. (2008:166) are tools that augment the body of knowledge by bringing relevant data or expertise to people who need them when they need them. With the growing awareness and acceptance of IRs it is hoped that Kenyan research output will increasingly become visible and accessible both locally and globally.

6.5 Scholarly Communication amongst Kenyan Scholars

The results presented in Table 5.21 show that the most important means of scholarly communication in universities in Kenya were emails (valued by 241, 89% of academic staff and 283, 87% of students); face-to-face interactions (valued by 210, 79% of academic staff and (267, 84%) of students); phones (180, 68% for academic staff and 232, 71%) for students); and web forums (112, 46% for academic staff and 168, 54% for students. Scholarly communication is lauded as the essence of science because scientific research is heavily dependent on such communication and collaboration (Garvey, 1979). Furthermore, scientific work must be communicated and discussed among the scientific community before it can be added to the body of knowledge (Warden, 2010; Barjak, 2006). The results from the study revealed that in the course of their research work, Kenyan scholars relied heavily on emails, face-to-face interactions, phones, web forums, IMS (instant messaging services) and VOIP (Voice Over Internet Protocol). The results further showed that the scholars relied on a mix of modern and traditional channels, and that traditional channels were still considered important for scholarly communication. Koku et al. (2001) studying the impact of the internet on the

ways in which people communicate, investigated scholarly and interpersonal communication in two scholarly networks (one in a large university and the other in a multidisciplinary research institute dispersed across North America). Their study showed that although the internet helps scholars to maintain ties over great geographical distances, physical proximity was still important. Further, Koku et al. found that not only were collaborative and friendship ties associated with high levels of face-to-face interaction, such physical contacts could develop collaborative and friendship relations. Additionally, the study suggested that the closer two members of scholarly pairs were, the more they communicated. The study concluded that although technology helps scholars without strong ties to stay in contact, it would be more beneficial to scholars who are already collaborators or friends. A study by Roberts (2000) examined the role of ICT in knowledge transfer and found that ICTs favor the transfer of codified knowledge as opposed to tacit knowledge which requires co-location and co-presence. Additionally, transfer of know-how also requires show-how which is best achieved through face-to-face demonstration and social instruction.

The results of the current study differ somewhat from a related study by Muriithi (2013) who found that researchers in four major universities in Kenya mainly relied on email (91%), phone (61%), and face-to-face meetings (41%) with VOIP and web forums being the least important (6.8% and 4.2% respectively). The results of the present study indicate that usage of the internet as a mode of scholarly communication appears to have improved considerably and this could be attributed to possible improvements in internet connectivity within the universities. In December 2013, the Government of Kenya through the ICT Authority launched a network to connect 136 university campuses across the country (ICT Authority, 2013). The government gave funding to universities (worth $22.5 million), through the Kenya Education Network Trust (KENET). The funding was aimed at building a network to provide access to affordable internet connectivity for students and staff in universities in Kenya.

Other than improved internet access in universities in Kenya, the institutions have generally benefitted from improved internet access owing to completion of various African undersea cable projects namely: The East African Marine System (TEAMS), SEACOM, East African Submarine Cable System (EASSy) and Lower Indian Ocean Network2 (LION2) (Song, 2014). Although the full benefit of these cable connections will take time to be fully realised in Kenya, they have made it possible for broadband services that until recently were common

in more developed regions of the world (Hayes, 2013) to be provided. According to Liquid Telecom (2014), following the connection of the continent's most concentrated cluster of undersea cables, Kenya currently leads in African connectivity with the highest bandwidth per person on the continent, the fastest speeds, and some of the lowest internet costs. It may be safely assumed therefore that Kenyan researchers are benefitting from this connectivity not only on their campuses but also away from their workplaces, making it possible for them to access and share information at all times. Further research on the specific internet services that Kenyan researchers are using in their scholarly communications and the impact this is making is needed.

The results from this study indicate a more favorable environment for scholars in Kenya to carry out their conversations effectively. The Conversation Theory posits that it is by participating in conversations with peers in a domain that an individual learns, shares knowledge, refines his/her understanding of concepts and in the process creates new knowledge. By being technologically facilitated to converse with their peers privately or publicly, in written formats or orally, in real-time or otherwise, Kenyan scholars are well positioned to access knowledge, share it, learn from it and create more of it. They are also facilitated to participate better in professional social networks in which they can benefit and share their own knowledge and expertise. Al-Hawamdeh (2003:65) points out that people and culture hold the keys for any knowledge sharing activity and not the technologies available to them. Technology is just an enabler that facilitates the information or knowledge dissemination process, connecting people and systems and thereby enhancing access to repositories of information and knowledge. According to Davenport & Prusak (2005:14) information technology "does not create knowledge and cannot guarantee or even promote knowledge generation or knowledge sharing in a corporate culture that doesn't favor those activities". According to Botha et al. (2008:132), technology alone is not the answer; rather it is an enabler that supports knowledge activities as well as facilitating accomplishment of key business processes. In the case of the Kenyan scholars, they need to cultivate the knowledge sharing culture for them to benefit from the technology that is now available to them. Kenyan scholars must make the conscious and deliberate decisions to become part of the global scientific conversations using ubiquitous internet connectivity. As Koku et al. (2001) argue technology will only benefit scholars who are already collaborating or are friends.

Tenopir & King (2008) in their longitudinal study of thousands of scientists in the US found that the presence of digital technologies for information searching and publication had vastly improved their capabilities and availed broader information resources including access to older articles. Cohen in Veletsianos & Kimmons (2012) observes that technology has given rise to social scholarship which uses social technology tools as an integral part of research and publishing. This scholarship is characterised by openness, conversation, collaboration, access, sharing and transparent revision. Veletsianos & Kimmons (2012) examined the relationship between scholarly practice and technology. They proposed that technology has mediated the emergence of a new form of scholarship that they referred to as Networked Participatory Scholarship. Veletsianos & Kimmons define it as the practice of scholars' use of participatory technologies and online social networks to share, reflect upon, critique, improve, validate, and further their scholarship. An example is the presence of scholars on public online networks through which they share digital information and feedback, lectures, works in progress, shared manuscripts, and scholarly interests.

As far as the preferred modes of publishing outlets were concerned, academic staff preferred traditional subject-based journals (150, 19%); fee-based Open Access journals (132, 16%) and conference proceedings (129, 16%). Students preferred fee-based OA journals (155, 19%; personal websites (131, 16%); traditional subject-based journals (115, 14%) and conference proceedings (115, 14%). The least preferred modes of publication by both academic staff and students were institutional websites and repositories (favored by roughly 12% of both students and academic staff). Respondents based their preferences on accessibility/availability, level of detail they offered, force of habit, free of cost (OA journals), ease of use and the level of interactivity they allowed. These results confirm the earlier results that revealed that Kenyan academics prefer to disseminate their research findings mainly through journals as opposed to conference proceedings which are given less weight in promotion and tenure decisions. On the other hand, postgraduate students disseminate their findings equally through subject-based journals and conference proceedings. For these students, it may be assumed that conference proceedings may be attractive as they provide a forum for them to hone their scholarly writing and presentation skills. As Utah State University (2014) argues:

> Presentation skills are critical to the success of graduate students, and conference presentations represent the best opportunity for developing those skills. Professional presentations build professional skills-the nuts

> and bolts of communicating results to professional audiences-and provide outstanding career-building opportunities.

The results further revealed that preferred sources of scholarly content for academic staff were traditional subject-based journals (148, 17%) followed by OA journals (137, 16%) and conference proceedings (138, 16%). Students preferred Google Scholar (139, 18%) followed by OA journals (122, 15%) and traditional subject-based journals (118, 15%). The least preferred sources were institutional and personal websites and institutional repositories (preferred by not more than 13% of both academic staff and students). The results revealed that traditional subject-based journals, fee-based OA journals and conference proceedings (in that order) were among the most preferred avenues for scholarly communication by academic staff. The same sources were consulted as sources of scholarly content by postgraduate students with the addition of Google Scholar as a more important source than either OA journals or traditional subject journals. Respondents indicated their choices were based on accessibility and availability of these different avenues. The results also indicate that Kenyan scholars preferred to publish and source scholarly content from the traditional subject-based journals as opposed to the newer OA model journals, although they have an inclination towards the OA journals. These results confirm the importance of the traditional scholarly journal and indicate that Kenyan scholars continue in the global tradition of relying on journals for up-to-date scholarly information and knowledge. The results of this study indicating the importance of Google Scholar for postgraduate students is similar to Cothran (2011) who surveyed 1141 graduate students at the University of Minnesota exploring their perceptions of Google Scholar as a source of information for their research process. The study revealed that the graduate students generally found Google Scholar easy to use, and perceived it as useful for research since it enhanced their searching effectiveness. They indicated it was their favorite starting point for information searches for their academic work. Similar results were reported by Wu & Chen (2014) who surveyed 32 graduate students from the National Taiwan University to examine how they perceive and use Google Scholar. The study showed that the students preferred the usability of Google Scholar over library databases although they appreciated the quality of documents retrieved from library databases. Additionally, science and technology students favored Google Scholar more than those from humanities and social sciences.

Several authors (Xia, 2010; Dulle, 2011; Guardado & Borges, 2011) have shown that the OA business model, enabled by technology, is gaining increasing acceptance and use across the

globe as an alternative way of distributing scientific literature. Xia (2010) applied a statistical time-series analysis of studies that had investigated attitudes and behaviors regarding OA in the period 1991-2008. The analysis discovered a steady increase in the awareness of OA scholarly communication as well as an increase in number of scholars participating in it. Guardado & Borges (2011) conducted a study examining trends in OA in Portuguese history journals and found that universities and history R&D Units were increasingly embracing the free electronic access to historians' research results. Dulle (2011) examined the acceptance and use of OA scholarly communication by postgraduate students at the Sokoine University of Agriculture and the University of Dar es Salaam, Tanzania and found that the respondents' attitudes towards OA were generally positive. The fact that the OA model allows unrestricted, unlimited, free online access to scholarly content seems to be driving this acceptance globally. The results demonstrate an increased awareness about OA within the universities. Interviews with librarians especially at University E, University C and University A respectively indicated that discussions and awareness campaigns have been (and continue to be) conducted vigorously to educate scholars about OA. This implies scholars at these universities are aware of these avenues for disseminating and accessing scholarly content. These results concur with Matheka, Nderitu, Mutonga, Otiti, Siegel & Demaio (2014) who confirm that several initiatives in Kenya are raising the awareness and use of OA journals. These initiatives are spearheaded by libraries through the Kenya Library and Information Services Consortium (KLISC). Others are OA research journals run by universities in Kenya and research institutes as well as the adoption of OA policies by these institutions.

The results revealed that though all the universities surveyed had IRs, a sizeable proportion of academic staff (74, 28%) and students (170, 53%) were not aware of their existence. For those who were aware of the existence of IRs only (72, 26%) of academic staff and (27, 8%) of students knew that the library was responsible for their management. Again, the least preferred models for publishing and accessing scholarly content by both groups in the current study were the institutional websites and repositories, preferred by roughly 12-13% of both groups. Furthermore, postgraduate students at the universities in the study were required by policy to submit PDF full-text soft copies of their theses to the library for uploading to the IR. A majority of the students (184, 59%) were either not aware of this policy or did not know that it existed. This may suggest that the libraries have not communicated the policy well to students. Moreover, results could be attributed to the fact that the IRs were still a relatively

new concept in the universities. The respondents proposed the need for the library and concerned stakeholders to market their institutional repositories more aggressively.

These results on lack of awareness about the existence of the IR by postgraduate students are similar to the results of the study by Stanton & Liew (2011) which examined the awareness and attitudes towards OA forms of publication by doctoral students at Massey University, New Zealand. The university had implemented mandatory deposit of theses for all doctoral students enrolled since 1st January 2007. The study found that 48% of the respondents were not aware of the existence of the university's IR. Those who were aware of its existence lacked deeper knowledge of its purpose and function. Stanton and Liew recommend that the mandatory submission policies for theses and benefits of repositories ought to be communicated to students through various channels such as academic supervisors, official graduate school communications, library workshops and other outreach avenues to ensure students understand the purposes and benefits of archiving theses. Further, Stanton & Liew observe that use of IR as a source of information in the research and literature review processes is rarely mentioned in the literature despite scholars being both producers and consumers of research. Their study found that approximately 50% of their survey respondents had used repositories to access research but of these only 31% had used the IR directly implying the rest had used it through existing research services and tools that included the contents of the IR in their search results.

From interviews with the university librarians and directors of research at the universities, the results confirmed that at the moment a lot of the other content produced in the universities other than peer-reviewed articles, theses and conference proceedings is not deposited in the IR. Content currently excluded from the IR in the universities in Kenya surveyed includes multimedia, course material, technical reports, magazines, departmental reports, and others. In a study of IR deployment in the US, Lynch & Lippincott (2005) found that the contents of IR were not only e-prints and electronic theses and dissertations, but digitised special collection materials, multimedia, course materials and datasets, conference proceedings and presentations, technical reports and working papers, e-books and university publications and many other forms of institutional records. A similar situation exists at the California Polytechnic State University whose IR (DigitalCommons@CalPoly) captures a broad range of content including architectural plans, master plans, master's and undergraduate essays, eBooks, campus periodicals, annual reports, press releases, power point presentations, abstracts, alumni publications and conference proceedings (CalPoly, 2009). This goes to

show that the IR can effectively be an avenue for preserving an institution's memory by storing and managing its relevant information both formal and informal. The results revealed that most of the institutions surveyed faced difficulties recruiting the conventional content such as journals, theses and conference proceedings and had therefore not ventured into the broader variety that other institutions were recruiting for their IRs.

The results of the current study also revealed that the libraries were focusing on harvesting content from postgraduate students and teaching staff, leaving out other content (such as datasets, student publications, departmental reports, course material, multimedia among others) from departments and from undergraduate students. This is in direct contrast with Bankier & Smith (2010b) who advocate for development and deployment of inclusive IR collection policies that would enable inclusion of a variety of content (such as faculty journals, research findings, research reports, administrative reports and others) in the IR based on its scholarly nature and source of scholarship. This is reflected in Figure 6.1 below.

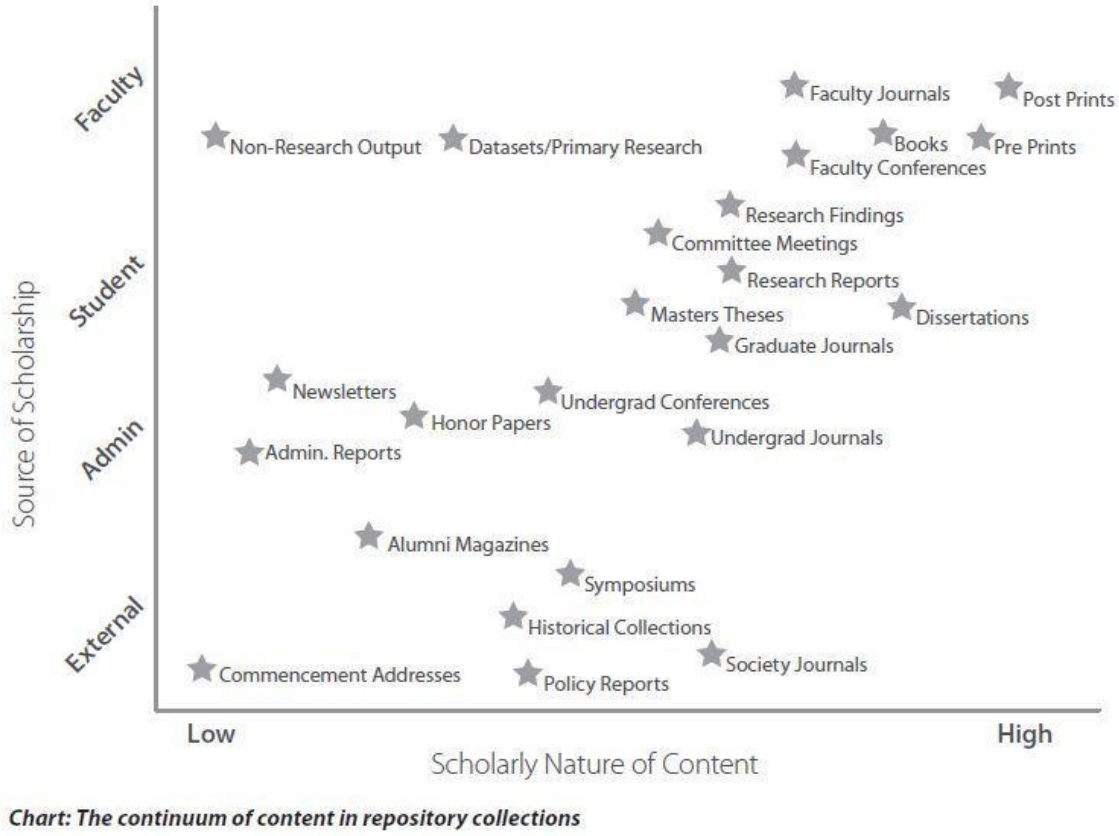


Figure 6.1: The diversity of content in repository collections

Source: Bankier & Smith, 2010b:248

In Figure 6.1 above, the x-axis represents the scholarly nature of the content whose vetted quality allows it to be included in the IR. Vetting is done in the traditional peer-review process that gives rise to high quality faculty journals, books, pre-prints and post-prints. Alternative vetting of quality can be carried out by faculty or student review processes resulting in works written by faculty and graduate students being included in the repository. Other content of 'low' scholarly nature comes further down on the left of the grid and include speeches, lectures, magazines, policy reports and other content that is not reviewed prior to its production. According to Bankier & Smith (2010b), the content on the left half of the graph is generally not reviewed and can be considered to be the historical record of the institution. The authors opine that this content is important since it supports the business of the university. However, most institutions disregard this content since it is considered to be outside their scope.

In Figure 6.1 above, the y-axis represents the sources of scholarship that can be targeted to populate the IR from both external and internal parties who include faculty, students and administrators. Bankier & Smith explain that external parties are those not employed by or attending the institution as students. The works by external parties will however be captured in the IR because they are produced by these external parties on campus or under campus sponsorship, and include lectures, speeches, symposia and commencement addresses. These works are archived as part of the historical record of the institution. External sources of content can also include small society journals that seek sponsorship or hosting by institutions and may find a home in the IR. Additionally, the IR can host material on behalf of other institutions or departments outside the university. In such a situation, faculty stands to benefit from the ease of access of materials that would otherwise be outside their reach and use.

Further, Bankier & Smith propose that the university's administrative units are also a source of documents for the IR, to fulfil the mission of archiving the historical record of the institution. These documents include annual reports, donor reports, and alumni magazines. Recruiting these collections in the IR enables the library to develop new relationships with the administrative units within the campus and can be a bridge to administrative support for the IR and to reach faculty and further content in the future.

Student work is another source of content for the IR and includes postgraduate dissertations, masters-level work, student journals, undergraduate research conferences and honors papers.

These works can be faculty or student reviewed to make them suitable for inclusion in the IR from where they will serve faculty, students and other users outside academia. In most cases, student works such as OA theses and dissertations have been found to be downloaded more frequently than any other type of content within the repository.

Finally, Bankier & Smith propose that the contents of the IR should include a wide array of faculty work that extends beyond the typical post-print collection to include faculty productions outside the journal article scope. These could include technical and research reports, newsletters and others produced by expert scholars at the university. By repeatedly interacting with faculty through these publications, visibility and awareness of the IR is increased across campus. Additionally, these collections may find use outside academia and can be a way for the university to return to the society in which it exists.

Bankier & Smith (2010b) observe that if libraries were to take this approach on IR collection development, they would give greater visibility and access to scholarly content that would never be published and used. The authors show that universities that have implemented this approach (such as California Polytechnic State University, Illinois-Wesleyan University, and University of Nebraska-Lincoln) have seen growth of their IR collections and have found acceptance and use among faculty and the wider communities. The researcher proposes that since Kenyan university IRs are still in the formative stages, they could use these success stories as benchmarks for improved awareness, acceptance, use and overall performance of their IRs.

The Knowledge Management Process Model (KMPM) asserts that organisations must invest in knowledge bases or repositories to facilitate access to knowledge required by its knowledge workers. The study results showed that the universities in Kenya surveyed had implemented institutional repositories which were playing a crucial role in ensuring that the knowledge created by researchers in the universities in Kenya was captured and properly organized so that both local and international scholars could access it now and in the future. KMPM advises that the scope of the content of knowledge repositories should include knowledge assets that provide information on the organisation's products, services, customers and business processes such as best practices, white papers, user manuals, multimedia objects, text files, learning material, and others (Botha et al., 2008:147-8). According to Botha et al., the main function of the knowledge repository is the inclusion of data and information from sources such as newspapers, journals, analyst reports, other databases, field

reports, the internet and presentations. Therefore, as the study results showed, the knowledge repositories at the universities surveyed fall short of this scope. Within the literature, institutional repositories are described as repositories of institutional knowledge, intellectual capital or an organisation's knowledge assets (Eden & Doctor, 2008; Branin, 2003).

Given that the implementation of the IRs are still in the formative stages in universities in Kenya, it is important that collection development for the IR is done more inclusively right from the initial stages to avoid losing out on important and relevant information. This means that the libraries should widen their coverage to include content from a wider variety of sources and formats as described in Bankier & Smith (2010b) continuum. This would also help enhance the visibility of locally generated content as advocated for by the Knowledge Management Process Model. For those universities whose IRs are more established, such as University E and University C, the libraries ought to redefine their collection development policies to capture a wider variety of institutional information. This content would include undergraduate and graduate student works, non-research output, datasets, administrative reports, historical collections, speeches, policy reports and others documents of interest to the university and the wider community produced by internal and external content creators.

6.6 Participation by Kenyan Scholars in Local and/or International Professional Social Networks

As presented in section 5.8.1 of Chapter five the study found that participation by Kenyan scholars in either local or international professional networks was limited. Approximately 135 (51%) of academic staff and 131, (42%) of postgraduate students were members of professional societies. University B, University C and University D had fewer members in professional societies (20, 36%; 38, 36%; and 21, 32% respectively) compared to University E (12, 60%), University A (147, 53%) and University F (28, 50%). Fewer female respondents (82, 39%) belonged to professional societies compared to male respondents (178, 50%). Membership or non-membership in professional bodies was not dependent on whether an individual was an assistant lecturer, lecturer, senior lecturer or associate professor/professor. Students tended to belong to student associations while academic staff were in professional societies related to their areas of specialisation. Respondents cited benefits of membership to include opportunities to exchange knowledge and research through seminars, workshops and conferences, access to resource materials, regular updates on disciplines, and professional tips.

These results suggest that the majority of respondents were not taking advantage of the benefits offered by professional societies such as knowledge exchange and dissemination, professional development, intra- and inter-disciplinary collaboration, skill-building, networking and mentorship as indicated by several authors. Hopkins (2011) studied the development of learned societies through history with a focus on the Regional Studies Association. The author showed that learned societies throughout history have emphasised knowledge and the challenge of dispersing it. To achieve this learned societies have used publication of journals, reports and book series as well as conferences and meetings. Furgeson et al. (2008) examined the role of the Student American Dental Hygienists' Association (SADHA) in mentoring future dental hygiene students. The authors found that this is achieved through networking between practitioners and students to provide role-modeling, information and guidance to prepare and equip dental students for future careers. Mata, Latham & Ransome (2010) recounted their personal experiences as members of the Society for Public Health Education (SOPHE). They cited benefits of joining the society and attending the conferences which had allowed them access to a broad network of health educators and professional giving them more exposure and deeper understanding of their profession and the opportunities available to them. In their opinion, professional societies bring together members from the academy, students, practitioners and researchers (both senior and junior) who bring their unique perspectives, training and experiences to the interaction for professional development. The results of the current study showing that about 135 or 51% of academic staff and 131 or 42% of postgraduate students were members of professional societies seem therefore to suggest that limited conversations and networking occurred between members of the academy, practitioners and researchers in the universities in Kenya surveyed. These results concur with an earlier study by Duque et al. (2005) which showed that in comparing scientists in Kerala (India), Kenya and Ghana, Kenyan scientists were the least likely to hold an office in a professional association and generally attended fewer professional meetings. Such limitations ultimately impacted on the levels of knowledge creation and sharing among scholars.

In section 5.8.2 of Chapter five the results revealed that the majority of respondents (165, 62%) academic staff and 172, 53% students) were either mentoring others or being mentored although a significant proportion of the respondents surveyed were not involved in mentorship, either as mentors or mentees. Moreover, respondents generally felt that mentorship in their universities was inadequate. The results revealed further that University

B, University E and University F were the strongest in mentorship programs (46, 85%; 14, 70%; and 38, 68%) respectively, followed by University D (39, 57%); University A (148, 52%); and University C (52, 49%). It was established that mentoring of students was a requirement in University B although students reported the mentorship programs were not structured.

These results strengthen the argument that was made earlier that a weak mentoring culture in the universities in Kenya was impacting negatively on the productivity of scholars, resulting in low scholarly output. Studies have shown that mentoring is important in scholarly networks and directly influences professional development and productivity of scholars Sambunjak et al. (2010) reviewed qualitative literature from studies conducted in North America to establish the meaning and characteristics of the mentoring relationship in academic medicine. The review revealed that mentors were an important part of career development as they offered mentees emotional and moral support in building their personal and professional abilities. Belcher (2009b) reported on her 10-year experience in teaching writing for publication to graduate students and junior faculty. In the course of the workshops, it emerged that most participants were not productive scholarly writers since they lacked the skills for it and this was largely because they lacked mentors in their academic lives. Studies have also shown that institutions need to be formally involved in the mentoring relationships of their members for them to be beneficial. Myall et al. (2008) conducted a study on the mentorship experiences of nursing students and practice mentors in the UK. The results of the study found the need to provide mentors with adequate preparation and support. Hutchings et al. (2005) examined the capacity issues required for supporting learners in clinical practice at an English acute sector hospital. The results showed that formalised institutional mentorship programs were the most effective to enhance scholarship and vitality of faculty. From these results, it can be deduced that expertise and knowledge are not being shared effectively between researchers thus impacting on the levels of new knowledge creation in the universities. It also implies limited knowledge transfer between the more experienced researchers and their junior counterparts. As several authors have shown, knowledge creation is a function of the levels of knowledge sharing facilitated by conversations between individuals and teams (Botha et al., 2008; McFadyen et al., 2009; Travaille & Hendriks, 2010).

Respondents cited barriers to successful mentorship as lack of time due to heavy teaching workloads, large student numbers and few mentors, lack of resources, bureaucratic rigidity

and unwilling scholars to provide mentorship. These results suggest that scholars and students at the universities in Kenya surveyed were facing similar challenges of mentorship to scholars in other parts of the world. For example, the results of this study corroborates studies that have shown that successful mentoring was hindered by lack of protected time for the mentoring programs, challenges of balancing work demands and being a mentor, few mentors and lack of structured mentorship programs (Veeramah, 2011; Straus, Chatur & Taylor, 2009; Myall et al., 2008; Nettleton & Bray, 2008).

The results of the study also revealed that a little more than half of the academic staff 143 or 57% said their colleagues were often or always willing to share knowledge while 136, (or 53% indicated their more qualified colleagues were often or always willing to assist others in learning scientific issues (refer to Table 5.33). About 122 or 47% of respondents often or always spent time on personal interactions to discuss ideas, solutions and scientific proposals with colleagues while 113 or 44% of respondents confirmed they often or always held professional departmental meetings. A sizeable proportion (93, 37%) of the respondents affirmed that interdepartmental professional meetings on a pre-planned schedule rarely or never occurred. Slightly over half (143, 55%) of the academic staff were collaborating with departmental colleagues while only 129 or 43% of students were collaborating. The results point to moderate levels of scholarly conversations within departments and few or non-existent conversations across departments or disciplines. This may indicate a moderate knowledge sharing culture existing among the scholars in the universities surveyed which is also likely to hamper effective creation of new knowledge by the scholars.

These results appear to concur with Ridzuan et al. (2008) who examined knowledge management practices in higher learning institutions in Sarawak. The study showed that although universities were places where knowledge sharing occurred freely, knowledge sharing and dissemination was only happening moderately. The study by Ridzuan et al. also found that academics were hesitant to share knowledge with people outside their research areas or in other departments of the university since they did not attach much importance to the various aspects of knowledge management such as knowledge sharing. This scenario seems to be prevalent in the universities in Kenya surveyed. Generally, the results of this study give the impression that Kenyan scholars' knowledge sharing behavior is moderate. Ramayah et al. (2013) point out that sharing knowledge occurs through written documentation such as publishing books or scholarly articles, sharing knowledge through formal interactions within or across teams or work units during meetings and workshops,

sharing knowledge in informal interactions, and sharing knowledge within communities of practice. The results of this study suggest that, the conversations and networking going on between individuals and groups within the universities surveyed do not seem to be resulting in significant levels of publication. For example, during 2010-2014, a majority (91, 42%) of academic staff had authored 1-3 journal articles, (51, 24% had no articles, and (121, 52% of them had made conference presentations. Abramo, D'Angelo & Di Costa (2009), assert that networking and collaboration help disseminate knowledge and research results more rapidly and pervasively between researchers.

The results revealed that most collaborations between departments were aimed at publishing/writing articles and data collection (122, 91% of academic staff and 85, 88% of students). Data sharing and data analysis was minimal (10, 8% of academic staff; 12, 12% of students). These results suggest that researchers collaborated in collection of data and use of the dataset for publication of articles after which the dataset was not accessed and used by other researchers. Mayernik (2011) explored the everyday data and metadata management practices of researchers at the Center for Embedded Networked Sensing (CENS) in the US and found that little dataset sharing goes on outside the projects that produced them. The study showed that sharing of data if any was usually restricted to person-to-person contact and communication. Borgman, Wallis & Enyedy (2007) assert that few scientists see a need to use others' data, so they do not request data, and they have no need to share their own data. Reasons for not sharing data were varied and included fears about misuse of their data, and that others could "scoop" their research findings; lack of expertise, resources and incentives for sharing of data by the researchers; lack of clarity about which 'data' was associated with a research project, how it could be shared and who had the authority to share it. Additionally, data often did not exist in transferable forms while some data were not sharable for ethical or epistemological reasons (Mayernik, 2011; Borgman, 2012; Borgman, Wallis & Enyedy, 2007).

Borgman (2010) analysed the benefits of shared data as well as the motivations for sharing such data. According to the author, both data producers and data users stand to benefit from sharing their data, as would the public and science in general. Motivations for sharing research data included making the results of publicly funded data available to the public; enabling others to ask new questions of publicly available research data; advancing the state of science by providing a resource for the empirical, theoretical, simulatory and computational paradigms; and enabling other researchers to reproduce research. Researchers

in Kenya could also experience similar benefits of sharing research data and this should be encouraged.

Social Network Analysis (SNA) provides a rich and systematic means of assessing informal networks by mapping and analysing relationships among people, teams, departments or even entire organisations (Cross, Parker, Prusak & Borgatti, 2001). In this study, SNA revealed minimal collaborations within departments with each member collaborating with just one other member in dyadic relationships, although a few triadic and tetradic communities existed (see results in Figure 5.7 in Chapter five). Interdepartmental collaboration was also minimal and occurred to a lesser degree than intradepartmental collaborations (see Figure 5.9 in Chapter five). Two large communities existed amongst the respondents: one involving members at the University of Nairobi, JKUAT, and Strathmore, and another community comprising members at KU, UoN, and Maseno University. The network consisted of only 75 communities suggesting that research collaborations in the surveyed universities were few. The results indicated that most of the communities in the network operated as discrete units, with almost no collaboration between them. The SNA further revealed that the betweeness centrality of most nodes in the network was zero implying that these nodes were not on the shortest paths of other nodes and therefore were not transit hubs for knowledge to other nodes. These results are similar to the findings of Kwanya (2011) who examined the social networks among users of research libraries in Kenya. The study revealed that most of these researchers also participate in simple dyadic and triadic relationships and are therefore loosely-knit and not maximizing the potential benefits of the interactions within the social network.

This low level of inter and intra-departmental collaboration has several implications for the researchers and their universities. It has been shown that the level of collaboration among scholars and researchers has an impact on the levels of research, knowledge creation and scholarly productivity (Woo, Kang & Martin, 2013; Olmeda-Gomez et al., 2009; Belcher, 2009a; Barjak & Robinson, 2007). In an earlier study, Duque et al. (2005) associated greater collaboration with improved productivity for academic scientists in Kenya. MacFadyen et al. (2008) provide evidence that the relationship between a research scientist's professional network and knowledge creation depends on both ego network density and average tie strength. According to MacFadyen et al., dense ego networks are characterised by members with many connecting ties. For knowledge workers (similar to the scholars in this study) a dense ego network would be one in which many of the person's direct exchange partners

have direct ties to each other. The results in the current study revealed that most scholars surveyed had just one link with the collaborating partner who was not thereafter linked to other scholars, indicating a sparse ego network. Dense networks impact knowledge creation and sharing by facilitating communication and cooperation among members and by providing better access to overlapping knowledge which, in scientific research, is critical for creation of new knowledge (MacFadyen et al., 2008). The results therefore seem to explain the low level of scholarly productivity that is evident from the number of publications and presentations made in the last five years by the Kenyan scholars surveyed. That is, there are few disciplinary and interdisciplinary collaborations among scholars and therefore, low scholarly productivity. Africa is reported as contributing little to the 'global knowledge basket' (Worldmapper, 2006; Teferra, 2004).

Another impact of limited collaborations on researchers is that there is limited knowledge sharing and transfer between individuals and the scholarly networks they participate in. The results pointed to discrete dyads, triads and tetrads amongst scholars in the universities surveyed. Moreover, there are low levels of mentorship in such networks. De Janasz & Sullivan (2004:264) examined academic mentoring and proposed that changes and challenges in the current workplace have resulted in complexities that require individuals to rely on multiple, diverse individuals to provide needed mentorship to succeed in their careers. According to de Janasz & Sullivan, ''Having a network of mentors can provide a protégé with a variety of developers with different perspectives, knowledge, and skills and who can serve different mentoring functions such as being a role model or providing career-related or emotional support''. Connecting with other academics who have the skills and resources needed to successfully acquire and complete research projects, is of increasing importance (Ansmann et al., 2014). The results of the current study suggest that scholars are still relying on traditional single mentor-protégé relationships that may not equip or expose mentees to more dynamic growth and development in the modern workplace. All these factors have negative implications for the academic global ranking of universities in Kenya. Since rankings are largely based on quantity and quality of research output, universities in Kenya may continue to lag behind due to their low scholarly research output.

Some of the departments reflected in the SNA included agriculture, sciences (zoology, physics, chemistry, environment, geology, and biochemistry), business (commerce and economics) and medicine. Social sciences and education were not represented in the network suggesting low levels of collaboration amongst these departments and research groups. These

results corroborate results of previous studies that have found that researchers in the sciences tend to work more collaboratively than in the social sciences and humanities (Franceschet & Constantini, 2010; Belcher, 2009a; Lariviére, Gingras & Archambault, 2006).

On the international scale, a majority of the respondents (190, 75% academic staff and 176, 63% students) had no collaborations with international peers (section 5.8.6 of Chapter five). The SNA of international collaborations revealed only 45 communities out of the total number of 605 respondents suggesting that international collaborations were also few (refer to results in Figure 5.11 in Chapter five). The largest nodes were science (in UoN), ICT (in JKUAT) and science (in Maseno) implying that these were the niche research areas for these universities and indicating the areas where more scholars in these universities were likely to be collaborating and interacting with international peers. These results further implied that more international collaborations occurred in sciences. The results revealed collaborations with partners in Africa, Europe and America. Again, these communities existed as discrete units, with almost no collaboration among them. The results of the study indicate more local collaborations as compared to international collaborations (75 local communities viz-a-viz 45 international communities). Sooryamoorthy (2009) found that collaborative research in South Africa (Africa's research leader) has been growing steadily and the scientists are highly oriented towards collaborative rather than individualistic research. Additionally, South African scientists preferred international collaboration to domestic collaboration. The results concur with Ocholla & Ocholla (2007) and Onyancha (2009) who, through bibliometric counts of publications, found limited collaborations between researchers and universities in Africa. Olmeda-Gomez et al. (2008) found that greater visibility of research was attained with international collaborations than with any other type of collaboration they studied. The current study results revealed limited visibility of Kenyan research because of limited international collaborations.

The results in this study do not seem to correlate with the surge in collaborative research that has been reported in other studies (Sonnenwald, 2007; Duque et al., 2005). Rather, the results point to low interdisciplinary, inter-institutional and international collaborations. The results, especially from interviews with research directors, revealed that presently Kenyan scholars worked in a challenging environment characterised by heavy teaching workloads which prevented them from actively engaging in research activities. One director of research affirmed that "*pressure for university education is very high…scholars are more engaged in teaching than research… lecturers are overstretched…they find it very difficult to put aside*

20% of their time into research". This observation echoes Atuahene (2011) who observed that "professors and lecturers in Africa are overburdened with large teaching loads, a condition that is worsening due to increasing enrollment and participation in the midst of struggling economies". Franceschet & Constantini (2010) pointed out that collaborations take time, effort and patience to build and nurture. With the current tight schedules that academics in Kenya were faced with, it would be difficult for them to not only be active in research but also seek and build collaborative research partnerships.

The results further revealed that about half of the respondents benefited from their research collaborations in such areas as sharing of ideas, data, building of CVs, improvement of research skills and networking with renowned professionals. Challenges to the collaborations included lack of time, finance, great distances, different areas of interest, problems with language/communication (for instance, with French speaking researchers), and different levels of excellence in the universities involved. These results seemed to agree with the results of Cummings & Kiesler (2008) that studied multidisciplinary collaborations and found that although these collaborations promoted innovation because of the juxtaposition of ideas, tools, and people from different domains, they also faced serious obstacles which needed to be overcome if the collaborations were to succeed. These included different teaching schedules, work procedures, levels and types of knowledge of participants, and physical distance between participants.

6.7 Institutional Support Available to Enhance Research and Scholarly Communication

As a broader issue to the study, the study sought to establish how respondents viewed the global university rankings in relation to how university support for research and scholarly communication would improve their rankings. The study revealed that roughly half of the respondents (129, 55% of academic staff and 152, 49% of students) were aware of the university ranking systems and the criteria that were used in such rankings. They felt such rankings were important for universities in Kenya as a tool for benchmarking purposes. However, some respondents felt the rankings were subjective and unfair and should not be overly emphasised. Interviews with the directors of research and librarians at the universities surveyed revealed that in response to their rankings over the years, the universities were seeking ways of making their research output more visible on the Web. Some of the strategies employed have been to use the IRs and making their content searchable by search engines such as Google. Others have been to use the institutional websites for marketing their

institutional events, especially those related to research and teaching, such that the universities are visible on the Web. In this way, they hoped to be rated more favorably by ranking systems. Hou, Morse & Chiang' (2012) acknowledged that the range of movement up and down ranks within a half year is extremely large in the Webometrics ranking. Consequently, universities are likely to move into the top 100 within one year if they continue to increase publication rates and to share academic knowledge and research output through the internet. The results suggest that the universities in Kenya surveyed are responding more to the Webometric ranking system as opposed to other ranking tools, possibly because it is the only ranking tool that includes them.

The results further revealed that the respondents who felt the rankings were unfair based their arguments on the fact that universities in Kenya were ranked on the same criteria as their more established and better endowed counterparts in Europe and North America. Their concern with these ranking tools is that western governments and private partners invested large sums of money in their universities for research and innovation compared to governments in the developing world. They felt it was therefore not morally right to rank all universities on the same criteria. Furthermore, these respondents felt that the focus of their universities should not be only on research output that may never be read but rather they should focus on transforming these results into tangible products that would impact on the livelihoods of the communities in which these universities exist.

These views correspond with Oyewole (2010:10) who opines that

> the world-ranking systems rarely give recognition to universities that are meeting regional and national developmental needs such as access, poverty-reduction, gender, etc. Moreover, world ranking systems metrics failed to address issues that were critical for developing countries, such as community engagements, access to higher education, freedom, political empowerment, skills acquisition, etc.

Furthermore, Oyewole observes that

> because global ranking systems favor certain types of universities and certain aspects of higher education (e.g. science and research), there is the fear that if Africa continues to support the development of the global ranking systems in the way it is currently being done, it may lead to higher education institutions in Africa modifying their missions, and focus areas to maximize their ranking performances.

Partly in response to this situation, the African Union Commission (AUC) spearheaded the development of an African Quality Rating Mechanism (AQRM), which is a self-assessment

tool based on criteria unique to Africa and its institutions of higher learning. The AUC recognises that although quality assurance issues are important for all African universities, quality has been adversely affected in recent years by harsh economic, social, political and conflict situations on the continent (Association of African Universities, 2004). The AQRM tool covers several aspects such as staff and student profiles and numbers, sufficiency of facilities and infrastructure, funding, institutional governance and management, teaching and learning processes, linkages with the industry sector, research and community outreach and others (African Union, Department of Human Resources, Science and Technology, n.d.). It is not a ranking tool but is aimed at enabling African institutions to rate themselves in their own contexts and improve their quality (Oyewole, 2010).

In relation to institutional support for research and communication among Kenyan scholars, the results revealed that the majority of respondents (73, 42%) felt that ICT infrastructure to support research was inadequate. They explained that sometimes the internet was slow. For those who reported good ICT support, they cited ease of access to internet and international journals. This seems to imply that the full benefits of improved internet connectivity as envisioned after completion of the African undersea cable projects was yet to be felt in the universities.

The majority of academic staff and students (148, 59% and 210, 68% respectively) felt that their universities cared less about their personal success as a researchers or/and authors. The results indicated that the majority of the respondents considered their institution's support for research insufficient or non-existent (refer to results in Table 5.44 in Chapter five). They noted that funds to attend professional meetings, provision of office space and facilities, computer purchases or upgrades, mentorship, collaborative management of research documents and data, tools for analysis of large aggregations of data, and student supplies and equipment mini-grants were inadequate. They also pointed out that time available to conduct research was inadequate owing to the heavy teaching and supervision workload that the scholars were faced with. Academic staff however considered alerts about new grant opportunities (147, 57%) and library resources (156, 62%) as sufficient whereas 215 or 69% of students considered library resources to be sufficient.

Interviews with librarians and research office representatives confirmed that their universities could not provide the various types of research and communication facilities in sufficient quantities due to insufficient funding available to them. They acknowledged though that the

universities had made substantial efforts to supplement internal sources of funding by collaborating with various public and private organisations to fund local research. These efforts were bearing fruit in a few of the universities such as University E, University C and University A respectively which had established research centers in various disciplines. However, an interesting observation was made by one director of research saying *"there are people who just want to come and teach 2-3 hours and go home… give them all the opportunities, provide the funds… they are not interested! So, when you look at the number of academic staff who are active in research compared to the total, it's about 20%".* This seems to imply that in spite of the academics blaming their institutions for insufficient support, some of the blame actually ought to be placed on the scholars themselves who were not taking up the opportunities for research funding offered in the institutions. This category of scholars was only involved in teaching activities and ignored the research activities they were supposed to undertake as part of their role in the universities. Boyer in Schneider, Immendorf, Johll & Linfield (2009:2) said that "scholarship includes teaching, research, outreach or integration". The small number of scholars estimated to be involved in research (20%) was also an indicator of the overall poor research culture and low scholarly output levels at the institutions involved.

Nevertheless, the results of the study indicate that key challenges still remain for universities in providing more support for research and scholarly communication especially financial and material support. As one director of research pointed out, the global institutions of higher learning that local universities are being comparatively ranked with are well supported financially by their governments and private research partners and they can therefore afford to conduct cutting-edge research and publish the results in a much shorter time than what local universities can do. As the director observed,

> I went to the Technical University of Berlin … … those people are in another world! …within 6 hours, work which would have been done for 6 months is completed! *(for the full quotation, refer to section 5.9.3 in chapter 5)*

This implies that the amount of resources that would support cutting edge research in universities in Kenya was not available and these institutions were severely limited in the quality and quantity of research they could carry out.

Studies conducted in several parts of the world have linked public financial spending on Research and Development (R&D) to scholarly productivity and quality of research

undertaken. Europa.eu (n.d.:1) defines R&D intensity (which is R&D expenditure expressed as a percentage of GDP) as the "extent of research and innovation activities undertaken in a given country in terms of resources input". Halpenny, Burke, McNeill, Snow & Torreggiani (2010) carried out a study to examine the geographic origin of publications in the highest impacting radiology journals and the link between percentage of GDP spent by a country on research and the output of radiology publications. Their study established that the percentage of GDP spent on research was positively correlated with the number of publications in high-ranking radiology journals ($r = 0.603$, $P<.001$). Meo, Al Masri, Usmani & Halepoto (2013) conducted a study to assess among other things, the impact of the Gross Domestic Product (GDP) spending on R&D on the published research documents, citable documents, citations per document and H-index in environmental sciences in the Middle East countries. Their study found that publication outcomes in research did not depend on a country's GDP but on what percentage of that GDP was spent on R&D. Middle East countries were found to spend 0.63+/- 0.28 US$ of their GDP per capita on R&D. A similar study with similar results was carried out by Meo, et al. to assess the impact of GDP spending on R&D, number of universities and scientific journals on research publications among Asian countries. The Asian study found that the yearly per capita spending on R&D was 0.6+/- 0.16 US$. In contrast, most countries in Africa spend no more than 0.5% of their GDP on R&D except South Africa whose expenditure is currently estimated at 1% of its GDP (UNESCO Institute for Statistics, 2012).

Bernanke (2011) argues that without government intervention in R&D, the private market would not adequately supply certain types of research. Bernanke opines that the government has several tools at its disposal with which to foster R&D including directly funding government research facilities, offering grants to university or private sector researchers, availing contracts for specific projects as well as through tax incentives. Several authors (Zuniga & Wunsch-Vincent, 2012; Hall, Mairesse & Mohnen, 2009) have shown that is it economically and socially beneficial for governments to invest more resources in R&D. Benefits arise through knowledge transfer, innovation resulting in new products and processes, business development through incubators, science parks and university spin-offs, employment opportunities, training opportunities for scientists, managers and personnel among others. These studies indicate that the Kenyan government would do well to increase GDP spending on R&D since the universities, their researchers and society as a whole stands to benefit from the returns on such investments.

The results from this study add to several studies that have considered the role played by institutional resources and support on research productivity, as well as levels of satisfaction with such support by members of faculty. McGill & Settle (2012) in the US found that faculty were not satisfied with their level of institutional support and that the three areas in which additional support was needed to increase their research productivity included staff support, release time, and funding for attending conferences. These sentiments were also echoed by Lynch et al. (2009) whose study of 300 members of the National Association of Social Workers (NASW) revealed that a high percentage of the social workers felt that institutional support was not evident. Mullan et al. (2012) found that in medical schools in sub-Saharan Africa, researchers faced challenges accessing research grants and had restricted time for research. Sawyerr (2004) observed that in Africa, research was underfunded, graduate study programs were weak and poor management of existing research had impacted negatively on research capacity.

The results revealed that despite dwindling financial resources and rising student numbers, the universities in Kenya surveyed have found ways of mitigating these challenges to satisfy the research and communication needs of their clients. As revealed by interviews with librarians, electronic journals were now easily accessible by users who could use them to access research information. Additionally, increasing improvement in internet connectivity and deployment of such applications as IR and OA, social networking, and others, there was increasing hope for Kenyan scholars to enhance their research output. For effective knowledge management, the Knowledge Management Process Model, proposes the deployment and use of knowledge management technology frameworks such as fast, cheap and wide bandwidth communications, internet-type technologies and intranets, interactive multimedia, human-centred interfaces, intelligent agents, and collaboration tools. This will enable an organisation's knowledge workers to easily access the knowledge they require. The results suggest that the universities in Kenya surveyed have made visible strides in implementing strategies to manage the knowledge acquired and generated from both within and outside. For example, the implementation of the institutional repositories has impacted positively on the access to research information and knowledge.

6.8 Summary

The purpose of this chapter was to discuss and interpret the results of the study that were presented in Chapter 5. This discussion and interpretation was guided by the research questions and related to similar studies in the extant literature.

Overall, the results of this study revealed a youthful population in the universities that is under-qualified and inexperienced with research. The majority of the academic staff had master's qualification (130, 48%) whereas there were only 115 or 42% PhD holders. The results also showed a poor research and publication culture in the universities evidenced by the low research output. Among academics, only 91 or 42% of them had produced between 1-3 journals articles and 51 or 24% had not produced any journal articles in the period 2010-2014, a performance which was found to be moderate when compared to scholars in other parts of the world (Duque et al., 2005; Lee & Bozeman in Duque et al., 2005). This was attributed to the stated inexperience with research and their under-qualification, as well as little time available for research activities, poor research culture in the universities and poor mentorship. Additionally, over two-thirds of the departments published no journals, a situation which, as Salager-Meyer (2008) observes, contributes to a poor research culture in the institutions. The results showed that much of the scholarly content generated by scholars in the universities surveyed were grey literature which unfortunately was still not tracked and captured within the universities' IRs. From the study, it was established that all the universities surveyed had implemented IR to facilitate access to locally produced scholarly content and to preserve it but use of such IRs among academic staff and postgraduate students was minimal (not more than 10% of both categories reported they had used the repositories). Lack of use was attributed to among other factors, lack of awareness about value of IRs, distrust of its intention with regard to use of the content, fear of plagiarism and concerns about quality of the content. These fears were similar to those raised by scholars in other parts of the world (Davis & Connolly, 2007; Krevit & Crays, 2007; Rowlands & Nicholas, 2005; van Westrienen & Lynch, 2005; Pelizzari, 2004). Furthermore, the results revealed that currently the collection policies of the repositories were focussed more on student theses and dissertations and peer-reviewed articles leaving out other types and formats of content that were produced by other staff and from other sources. Bankier & Smith (2010b) advocate for inclusive policies to guide collection of a wider variety of content and from more diverse sources to add value to the collections in the IR.

The study also revealed that universities in Kenya were currently experiencing improvements to ICT infrastructure most notably internet connectivity as a result of government efforts to improve connectivity through such projects as the African undersea cable projects (Song, 2014; Liquid Telecom, 2014). These projects had significantly improved broadband services in many parts of the country and had the potential to improve the scholarly experiences of Kenyan scholars to communicate better and share information and knowledge more effectively and efficiently with their peers.

The results of the study revealed that participation by Kenyan scholars in local and/or international professional social networks was limited. About half of the respondents were members of professional societies, slightly over half of the respondents were in mentoring relationships either as mentors or as mentees. Furthermore, the results showed that mentorship programs in the universities were viewed by respondents to be inadequate. The results indicated that departmental professional meetings were often held while intradepartmental professional meetings rarely or never occurred. Slightly over half of the academic staff (143, 55%) participated in departmental collaborations which were mostly involved in writing articles and data collection with minimal data sharing. SNA was carried out and confirmed minimal departmental, interdepartmental and international collaborations. The import of all these is that knowledge sharing and transfer was minimal between scholars, which meant that there was also little new knowledge created amongst these scholars. Additionally, little mentorship was occurring between these scholars to pass on tacit knowledge and skills to the less experienced scholars. All this impacted negatively on scholarly productivity of the researchers and their institutions.

The results further revealed that respondents considered support for research such as funding, facilities, computer resources, mentorship, supplies and equipment to be inadequate or in some cases non-existent. However, library resources were regarded as sufficient. Interviews with librarians and research office representatives confirmed that the institutions were financially constrained and could not therefore provide sufficient levels of budgetary support. Collaboration with public and private research partners had alleviated albeit minimally, some of the challenges although much still needed to be done to support the researchers. Government support for research and development was viewed as minimal by the respondents. The low levels of research support meant that scholars at the institutions were

not enabled or motivated to carry out adequate levels of research and this could in part be contributing to the low scholarly productivity in the universities surveyed.

The next chapter provides the summary of the results, conclusions, recommendations, and implications of the study. Additionally, areas for further research are identified.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This chapter presents the summary, conclusions and recommendations of the study based on the interpretation given of the results in Chapter six. According to the University of Southern California LibGuides (2014), the purpose of the conclusion is to help the readers to understand why the research should matter to them once they complete reading it. It is a synthesis of the key points that serve to convey the larger implications of the study and in so doing answer the 'so what' question.

The aim of this study was to investigate the strategies for managing scholarly content in universities in Kenya. The study sought to answer the following research questions: What kinds of scholarly content are generated and used in universities in Kenya? How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use? How do Kenyan scholars communicate amongst themselves in the various stages of their research work? To what extent do Kenyan scholars participate in local and/or international professional social networks? To what extent do existing institutional facilities in the universities support scholars' research and communication needs?

The study was guided by the Conversation Theory, the Social Network Theory, and the Knowledge Management Process Model. The post-positivism paradigm was found suited for the research problem as it would capture the human experiences of the respondents while recognising the contextual and temporal influences of these experiences (Greenfield et al. 2007). The study employed the mixed-method approach where quantitative and qualitative research methods were triangulated. The study also utilised the multiple-case design involving six universities namely: University of Nairobi, Kenyatta University, Maseno University, Jomo Kenyatta University of Agriculture and Technology, Strathmore University and Egerton University. Within each case, the survey method was used where 370 postgraduate students (masters and doctoral) and 350 academics (at the level of tutorial fellows, teaching assistants, lecturers, senior lecturers, associate professors and full professors) were sampled respectively. Data was collected using questionnaires and interviews. Thereafter quantitative data was analysed using SPSS statistical analysis software

and Gephi Social Network Analysis software while qualitative data was analysed thematically.

This chapter therefore presents a summary of the major results from the study and conclusions therein organised according to the research questions. The chapter also provides key recommendations for practical and policy interventions to enhance management of scholarly content in the universities surveyed. Areas for further research are identified based on results and gaps that were identified in literature that this study did not address.

7.2 Summary of Results

This section provides a summary of results from the study.

7.2.1 Characteristics of the Respondents

The study required respondents to provide biographical data to enable a better understanding of who these respondents were. The study revealed that a majority of the respondents in the study were male academic staff and students (175, 66% and 195, 60% respectively) compared to female academic staff and students (90, 34% and 131, 40% respectively). The study established that a substantial proportion of the population in the universities was youthful (104, 39% of academic staff were 31-40 years while 207, 64% of postgraduate students were 20-30 years). The majority of the academic staff (130, 48%) had master's qualifications while 115, 42% had PhDs. This low number of PhDs is explained by Ngome (2007) who found that the supply of PhDs in Kenya is low owing to declining scholarship opportunities and the high cost of postgraduate training. Thus a majority of academic staff (42%) were assistant lecturers or tutorial fellows and had 5 years or less experience in university teaching and research. A majority of postgraduate students (232, 72%) were studying for master's degree. Cloete, Bailey, Pillay, Bunting & Maasen (2011:28) found a correlation between research output and the number of staff with PhD qualifications. This result may explain low levels of research productivity in the universities in Kenya as reflected in their poor performance in the academic global ranking of universities.

7.2.2 Types of Scholarly Content Generated in Universities in Kenya

The study sought to investigate the types of scholarly content generated and used in universities in Kenya. The results of the study revealed that both academic staff and

postgraduate students surveyed generated 12 types of scholarly content namely pre-prints, journal articles, working papers, technical reports, books, book chapters, book reviews, theses, conference papers, datasets, software and multimedia as shown in Table 5.6 of Chapter 5. Of this scholarly content, the most common were theses, journal articles and conference papers. The study found that in a span of five years (2010-2014) the majority (91, 42%) of academic staff on average produced only 1-3 journal articles. More than (40%) did not produce any books, book chapters, book reviews, technical reports or working papers (refer to Table 5.7 in Chapter 5). A majority of postgraduate students (more than 55%) did not author any journal articles, books, book chapters, book reviews, technical reports or working papers as shown in Table 5.8 in Chapter 5. The results suggest that scholars in the universities in Kenya were concentrating on scholarly works that were directly related to their work either as supervisors or students (theses) or those that were required for promotion and tenure (journal articles). Johnstone (2007); Bagatin & Gontijo (2011); and Miller, Taylor & Bedeian (2011) found that faculty were being pressurised to publish in peer-reviewed journals with high impact factors and abandon all other forms of publishing. Further, the results showed that over two-thirds of academic departments in the universities in Kenya surveyed did not produce any scholarly journals in which their scholars could publish their work, a situation which, according to Salager-Meyer (2008), contributed to a poor research culture among scholars.

The results also suggested that postgraduate students were hardly involved in scholarly publishing beyond their theses. Belcher (2009b) found that a lack of adequate writing skills and mentorship prevented postgraduate students from engaging in academic writing. The results of the current study implied weak social ties and limited knowledge sharing between students and their supervisors or other academics and between students themselves. McFadyen et al. (2009) and Dyer & Nobeoka (1998) argued that strong social ties that promote exchange of tacit knowledge are necessary for knowledge creation. Additionally, the Conversation Theory posits that it is through conversation that scholars share knowledge and thereby create new knowledge. The results of the current study suggested limited scholarly conversations amongst scholars that could result in creation of new knowledge.

7.2.3 Preservation and Archiving of Scholarly Content for Current and Future Use

The study sought to answer the research question: *"How is the scholarly content generated and/or acquired in universities in Kenya preserved and archived for current and future use?"*

The study revealed that although more than half of the respondents indicated little or no knowledge of the concept 'data curation', they were engaged in activities that could be considered as curation. For example, they documented their research procedures, backed-up digital information, moved files from older to newer computers, and printed out information as hard copies (refer to Table 5.14 in Chapter 5). In addition, the respective universities expected postgraduate students to deposit theses as PDF files into the IR. The National Information Standards Organization (NISO) (2007) encourages creation of born-digital content in formats that facilitate long-term accessibility. The results were somewhat divergent from previous studies (Groenwald & Breytenbach, 2011; Lord et al., 2004; Marshall, Bly & Brun-Cottan, n.d) that found researchers and home computer users lacked knowledge and awareness on how to preserve their digital information. The results of the current study however, suggest an increasing number of users who were aware of the importance of preserving digital information.

The results suggested minimal use of university digital archives and servers as avenues for preservation of scholarly content. Table 5.15 in Chapter 5 shows that only 36 or 5% of academic staff and 22 or 3% of students used digital archives as means of preserving scholarly content. Studies such as PARSE.Insight (2010), Lawal (2002), Pelizzari (2004), Davis & Connolly (2007) that were carried out in university settings revealed challenges with the acceptance and use of digital archives by scholars. These studies found that distrust, lack of awareness, fear of plagiarism, confusion about copyright, concerns of quality and use of the content affected academics' use of digital archives for scholarly content preservation. These same challenges were at play in the universities in Kenya surveyed. These challenges have also been reported as affecting content recruitment for institutional repositories in many universities around the world (Covey, 2011; Swan & Carr, 2008; Davis & Connolly, 2007) and were also being experienced by the universities in Kenya surveyed. The top management in some universities in Kenya has resorted to putting in place strict measures to compel content creators to deposit content into the IR to enhance access, use and visibility. In the Knowledge Management Process Model, Botha et al. (2008) advocated for the use of knowledge repositories to enable online access of the otherwise invisible and inaccessible knowledge. The results of the current study indicate that universities in Kenya are yet to appreciate fully the importance of such repositories in management of locally generated knowledge to facilitate its long-term access, use and visibility.

To guarantee preservation of research data, the study respondents voiced the need for more training on preservation techniques; establishment of more digital repositories and more financial and operational resources. Kanyengo (2009) proposed that African universities and institutions must provide the necessary leadership to ensure permanent access to Africa's digital information.

7.2.4 Scholarly Communication in Universities in Kenya

Scholarly communication is the essence of science (Barjak, 2006; Garvey, 1997) and scholarly communication is the most important means of sharing and exchanging knowledge among scientists. The study therefore investigated how Kenyan scholars communicate amongst themselves in the various stages of their research work. According to results presented in Table 5.21 in Chapter 5, the study found that emails were valued by more than 87% of academic staff and students as means of communication; followed by face-to-face interactions (valued by more than 79% of academic staff and students); phones (valued by more 68% of academic staff and students); and web forums (valued by more than 46% of academic staff and students). These results suggest heavy reliance on face-to-face interactions and technology enabled communication for scholarly communication. The results differed though from those of Muriithi (2013) that revealed researchers preferred emails (91%), phones (61%) and face-to-face meetings (41%) with VOIP and web forums being less important at 6.8% and 4.2% respectively. These results imply considerable access to technology especially the internet and mobile phones by postgraduate students and academic staff. These results were attributed to the improved internet access in Kenya as a result of completion of the African undersea cable projects (TEAMS, SEACOM, EASSy, and LION2) (Song, 2014).

With regard to publishing outlets, respondents preferred traditional journals, fee-based OA journals and conference proceedings (refer to Table 5.22 in Chapter 5). Again institutional websites and repositories were the least preferred (only 12% of both students and academic staff showed a preference for them). The results seemed to indicate a preference for traditional avenues of publication such as print journals and conference proceedings although there was evidence of a growing inclination towards publishing in OA avenues. The results indicated increasing awareness among scholars of the value of OA because of vigorous campaigns by university libraries. These results corroborate Matheka et al. (2014) who found

that several OA initiatives in Kenya were raising awareness among scholarly about self-archiving of their works in IR.

The results overall revealed low awareness among scholars about the existence, purpose and function of the IR especially among postgraduate students. Although the IRs were a relatively new phenomenon in the universities surveyed, the lack of awareness suggested an urgent need for the librarians and university management to educate users and improve appreciation of their function, purpose and scope.

7.2.5 Participation by Kenyan Scholars in Local and/or International Professional social Networks

The study sought to answer the research question: *"To what extent do Kenyan scholars participate in local and/or international professional social networks?"* The study established that there was limited participation by the respondents in either local or international professional networks (approximately 135, 51% of academic staff and 131, 42% of students surveyed belonged to professional networks). Fewer female respondents (82, 39%) belonged to professional societies compared to male respondents (178, 50%). These results suggest that scholars at the universities surveyed were not gaining from benefits offered by professional networks in such areas as professional growth through knowledge exchange, collaborative partnerships and mentorship (Hopkins, 2011; Mata, Latham & Ransome, 2010). The results implied limited conversations and networking between the Kenyan scholars and their counterparts within the country and around the world. In line with the Conversation Theory, new knowledge is created through the conversations that peers engage in. Therefore, the limited participation by scholars in Kenya was likely to limit the extent of new knowledge that they could generate.

The results also revealed that a significant proportion of academic staff (102, 38%) and students (150, 47%) were not involved in mentorship, and respondents generally felt mentorship programs were inadequate in their universities. Studies have shown that mentorship is important in scholarly networks and directly influences professional development and scholarly productivity (Sambunjak et al., 2010; Belcher, 2009b). The results therefore implied weak social ties, limited interactions, and limited knowledge sharing and transfer between the scholars and this could impede scholarly productivity in the universities surveyed. Absence of effective mentorship was blamed on lack of time due to heavy teaching

workloads, large student numbers, few mentors, lack of resources, bureaucratic rigidity and unwillingness of the scholars. In the Social Network Theory, ties between nodes in the network facilitate knowledge and resource flows between the nodes in a network. Carrillo et al. (2008) showed the presence of increasing returns in scientific production due to social interactions between scientists.

Although over half of the respondents (143, 57%) said colleagues were willing to share knowledge, a sizeable proportion (93, 37%) indicated interdepartmental professional meetings rarely or never occurred. Only 143, 55% of academic staff and 129, 43% of students were collaborating with colleagues in the same departments, pointing to moderate levels of scholarly conversations and a few or non-existent interdisciplinary conversations. The results seemed to concur with Ridzuan et al. (2008) who found that knowledge sharing and dissemination in universities was only moderate because academics were not keen on knowledge management practices.

The study found that scholars largely collaborated on article publication and data collection (121, 91% of academic staff and 85, 88% of students) with minimal data sharing and analysis (10, 8% academic staff and 12, 12% students). This result seems to agree with Mayernik (2011) who found that researchers rarely shared data outside their projects. Borgman, Wallis & Enyedy (2007) also found that that few scientists feel the need or ability to use other people's data and consequently they neither requested for it nor shared their own data.

Social Network Analysis of the interaction among scholars in the universities in Kenya confirmed minimal interdepartmental, intradepartmental and international collaborations, with most collaborations existing as distinct dyads, triads and tetrads, and minimal links between these as well. However, two large communities of collaborators existed involving members in UoN, JKUAT and Strathmore University (the node had 8 degrees) and the other comprised members in KU, UoN and Maseno University (the node had 12 degrees). Scholarly collaborative partnerships have been shown to impact on levels of research, knowledge creation, and scholarly productivity (Woo, Kang & Martin, 2013; Olmeda-Gomez et al., 2009; Belcher, 2009a; Barjak & Robinson, 2007). MacFadyen et al. (2008) showed that the greater a scientist's ego network density, the more knowledge is created in the network arising from better communication and cooperation and access to overlapping knowledge. The results of the current study imply that most scholars surveyed had low ego network densities, thus would have less knowledge sharing, mentorship relationships and limited in

creation of new knowledge. This fact is evidenced by the low levels of scholarly publication emanating from the scholars surveyed.

The results also revealed that more collaborative networks existed in the natural and physical sciences than in the social sciences. Similar results have been found in related studies that researchers in the sciences tend to work more collaboratively (Franceschet & Constantini, 2010; Lariviére, Gingras & Archambault, 2006) than in other disciplines.

7.2.6 Institutional Facilities Available to Support Scholarly Communication and Research Needs of Kenyan Scholars

The study sought to establish the extent to which existing institutional facilities in the universities supported scholars' research and communication needs. The results of the study revealed that a majority of Kenyan scholars surveyed: 148 or 59% of academic staff and 210 or 68% students felt their universities did not care or cared less and did not provide adequate facilities and resources for research. Tables 5.44 and 5.45 in Chapter 5 reveal that in many cases, more than 65% of all respondents considered their institutional support for research insufficient or non-existent including funds to attend professional meetings, office space and facilities, ICT services, computer purchase or upgrades, mentorship, student supplies and mini-grants, management of research data, and data analysis tools. However, respondents considered alerts for grant opportunities and library resources as sufficient (147, 57% and 156, 62% for academic staff and postgraduate students respectively).

Interviews with librarians and research office representatives confirmed that institutional support was minimal due to insufficient funding available. However, the universities surveyed had made significant efforts to supplement internal funding by collaborating with various public and private organisations to fund research and innovation. Private funders generally contributed more to the universities research activities than did the national government. Interviews also revealed that sometimes scholars did not take up financial opportunities available for research perhaps suggesting they were not interested or were not aware of such opportunities.

Respondents noted that with research support from their universities, their scholarly productivity would be improved. The respondents suggested the need for government to set up and fund centers of excellence in the various disciplines to promote research, innovation and entrepreneurship in the country.

7.3 Conclusion

The conclusions of this study are informed by results and the interpretations attached to them by the researcher.

7.3.1 Characteristics of the Respondents

The study established that a substantial population of academic staff and post graduate students in universities in Kenya were youthful: from 31-40 years for academic staff and 20-30 years for students. A majority of academic staff had master's qualifications with a few holding PhDs. A majority of respondents had five years of university teaching and research experience. The researcher concluded that there was likely to be low research productivity among the Kenyan researchers owing to the small number of researchers with PhDs among those surveyed and the limited research experience among them.

7.3.2 Types of Scholarly Content Generated in universities in Kenya

The results revealed that the most common types of scholarly content generated in universities in Kenya by academics and postgraduate students were theses, journal articles and conference papers. Other forms of publications such as books, book chapters, book reviews, technical reports or working papers were rarely produced. In the past five years (2010-2014), less than half of academic staff and less than one third of post graduate students had produced journal articles. The results revealed that this situation was attributed to low qualifications and research inexperience of the respondents; little time allocated to research activities due to the heavy teaching workloads of scholars; less participation in research especially by postgraduate students; and a poor mentoring culture among academics and graduate students. As Belcher (2009b) observed, many graduate students do not actively engage in scholarly writing since they lacked relevant skills and were rarely mentored to develop the skills. Carr et al. (2003) asserted that to succeed academically, all faculty need the assistance of senior and more experienced colleagues. Strong mentorship relationships are characterised by strong ties between participants which foster exchange of tacit knowledge that is necessary for creation of new knowledge. The results indicated that there are weak ties between scholars and therefore little tacit knowledge is shared among them leading to little new knowledge generated in the universities in Kenya surveyed. This is shown by the minimal number and types of scholarly works currently generated. The researcher concludes therefore that low qualifications and research inexperience of scholars, little time allocated

for research, poor mentorship, and weak ties between scholars are impacting negatively on scholarly productivity of scholars in universities in Kenya

The results revealed that scholarly journals were produced by less than a third of the academic departments in the universities surveyed. Salager-Meyer (2008) observed that journals contributed to the development of a research culture in the universities in which they existed. Absence of these journals coupled with few scholarly works produced by researchers in the universities surveyed seemed to indicate a weak research culture among the scholars. It is therefore concluded that the low levels of scholarly productivity in the universities in Kenya are in part caused by absence of local scholarly journals through which scholars in Kenya can communicate their research findings.

7.3.3 Preservation and Archiving of Scholarly Content for Current and Future Use

The results of the study showed that scholars in the universities surveyed were aware of the importance of preservation of content and engaged in preservation of the scholarly content they generated using various techniques such as: documentation of research procedures, back-up of digital information, migration of files to newer computers, generating hard copies, and storage of files in PDF format. However, despite the existence of university digital archives and servers the results revealed that these were rarely used due to distrust, lack of awareness, fear of plagiarism and concerns about the use to the content therein would be put. Self-archiving of content was therefore hardly undertaken. The concerns raised by Kenyan scholars were not unique, as similar studies conducted in other jurisdictions have arrived at the same conclusion (Davis & Connolly, 2007; Krevit & Crays, 2007).

The researcher concludes that although Kenyan scholars were aware of the importance of preservation of scholarly content, they seemed to prefer implementing preservation strategies at a personal level rather than collectively at departmental or institutional levels. Such strategies seemed to be fragmented and in the long-term were not likely to contribute to the preservation of institutional memory since information would easily be lost, say in the event that a person moved away from the institution or passed on. Such strategies also limited the visibility of local content. The study further concludes that modern techniques of content preservation such as digital archives were rarely used by Kenyan scholars mainly due to lack of awareness and ineffective marketing techniques as well as selective and non-exhaustive

collection development policies in the library that overlooked content generated by non-academics, and non-scholarly but valuable content that would preserve institutional memory.

7.3.4 Scholarly Communication in Universities in Kenya

The study established that the internet, mobile phones and face-to-face interactions were the most important channels of communication used by Kenyan scholars for scholarly communications. The preference for these modes of communications could be attributed to the improved internet connectivity in universities in Kenya as a result of the completion of the African undersea cables that has enhanced connectivity. With prevalence of face to face communication, physical distance and time constraints could impact negatively on scholarly collaborations and interactions among Kenyan scholars. The results showed that traditional journals, fee-based OA journals and conference proceedings were the most preferred publishing outlets with repositories being the least preferred. The study also found that although there was increased awareness about OA, understanding the purpose and function of the IRs was still low among scholars. The researcher concluded that Kenyan researchers rely considerably on the traditional methods of accessing and disseminating scholarly content and that acceptance and use of modern techniques such as OA is still minimal.

7.3.5 Participation in Local and/or International Professional Social Networks

The study revealed that there was limited participation by scholars in professional societies with fewer females than males participating. The study concluded that there are limited conversations and networking taking place between the academy within universities, in the country and abroad. The results showed that mentorship between senior academics with their junior counterparts including postgraduate students was low. Moreover, collaborations between scholars were also limited to publications and data collection with minimal data sharing. The study concludes that due to limited collaboration between scholarly was impacting negatively on creation of new knowledge and thus lowering research productivity of the universities surveyed.

7.3.6 Institutional Support Available to Facilitate Scholarly Communication and Research Needs of Kenyan Scholars

The majority of scholars were dissatisfied with institutional support provided by the universities for research in the form of funding, material and physical infrastructure, ICT

facilities, mentorship programs, student grants and data analysis and management tools. The library services provided by the universities were however generally viewed as being sufficiently. It is concluded that limited support from the universities and from government towards scholarly communication was impacting negatively on the scholarly productivity of academic staff and postgraduate students.

7.3.7 Overall Conclusion

The researcher concluded that the strategies for managing scholarly content within universities in Kenya are weak thereby impacting negatively on the quality, and quantity of scholarly content generated in the universities as well as its visibility to local and global stakeholders. The scholarly productivity was therefore low in the universities in Kenya surveyed. Additionally, few scholarly networks existed among scholars within the universities as well as those that link them with other external researchers. There was also limited mentorship, knowledge sharing and transfer between researchers leading to limited creation of new knowledge. Visibility of the content generated was also low owing to the reliance on more traditional avenues for publication such as print journals, theses, conference proceedings and others. Finally, the institutional support for scholarly communication and research in terms of funding, ICT services, mentorship of scholars at the universities surveyed was generally low. Moreover research productivity was low as reflected in their poor performance in the academic global ranking of universities.

7.4 Recommendations

From the results of the empirical study, theory and literature reviewed, the researcher proposes several recommendations on the following aspects: Use of library resources by researchers; the promotion of institutional repositories; collection development policies within the university libraries; mentorship amongst scholars; scholarly collaboration and participation in professional networks; research funding in the universities in Kenya; and research niches in the universities in Kenya.

7.4.1 Recommendation One – Use of Library Resources by Researchers

In relation to the question on preferred sources of scholarly content by postgraduate students, the results revealed that some of these students indicated that they did not use subject journals because they could not access them. This was despite confirmation from the university

librarians in all the universities surveyed that these journals were actually available via the universities' LANs. This seemed to point to lack of awareness on the part of the students about the availability of the journals and how they can be accessed by users. In addition, respondents were asked to indicate if their universities had an IR (refer to Table 5.24 in Chapter 5). The findings revealed that a substantial proportion of the respondents (74, 28% of academics and 170, 53% of students) answered "I don't know" or "No" to this question. This was despite confirmation from all the university librarians that the universities surveyed had implemented the IRs. This again seemed to point to lack of awareness among this segment of the respondents indicating a need for more and improved marketing strategies by the library to increase awareness. Such limited use of library resources was likely to impact negatively on overall research productivity of scholars since they did not use other scholars' research output to inform their own research.

The researcher therefore recommends that the libraries work more closely with researchers to inform and educate them on the services they have to offer scholars especially as regards the electronic journals and the newly introduced IRs. Harle (2014) and Harle (2010) observe that although African universities have had access to large collections of peer-reviewed electronic journals for quite some time now, their usage has been minimal owing to a multiplicity of reasons such as lack of awareness of what the collections have to offer for each individual researcher; feeling overwhelmed with the over-abundance of resources available and lacking the right search skills to quickly locate relevant resources. This suggests that the libraries, as well as academic supervisors and academic staff in general have a great task of imparting this awareness and skills to enable students and other users to experience tangible benefits from availability of these resources.

7.4.2 Recommendation Two – The Promotion of Institutional Repositories

On the question of the respondents' preferred mode of preserving scholarly content, the study revealed that the least common mode of preservation was digital archives (preferred by 36, 5% of academic staff and 22, 3% of students). Furthermore, some respondents reported that their universities were not making any efforts to preserve scholarly data despite their universities having implemented IRs. Additionally, respondents were asked to indicate their preferred models for publishing their scholarly output as well as sources of scholarly content (refer to Tables 5.22 and 5.23 in Chapter 5). The results suggested that institutional repositories were the least preferred publishing outlets as well as sources of scholarly content

(preferred by 12-13% of both academic staff and graduate students). Interviews with university librarians confirmed that scholars seemed to have a negative attitude towards the IRs indicated by the outright refusal by some scholars to deposit content into the IR. This attitude was attributed to distrust, fear of plagiarism, lack of awareness and understanding among users of the functions and purposes of the IRs. The implication of this was that the libraries and other stakeholders had not done enough to educate and motivate scholars to use the IR.

IRs have been recognised as one of the strategies through which universities can enhance the access and visibility of research and institutional outputs (Bankier & Smith, 2010a; Royster, 2009; Amaral, 2008; Swan & Carr, 2008). Therefore the researcher recommends that university libraries must seek ways of improving acceptance and usage of their IRs in order to achieve access and visibility of institutional research output. The universities must therefore address the concerns of scholars associated with distrust, fear of plagiarism, and quality of the IR content. These can be addressed by designing awareness campaigns that facilitate discussions with users about the role of IR in scholarly communication. Krevit & Crays (2007) proposed that IR managers needed to understand the publishing process, its political and philosophical aspects and its role in academic circles. Similarly, Cochrane & Callan (2007) recommend aligning advocacy initiatives for creating awareness about IR for better acceptance of the IR by scholars. The study further recommends that the libraries should develop strategies that will enhance the implementation and marketing of the IR based on a mix of bottom-up and top-down strategies rather than an exclusively top-down approach. This means that rather than imposing the IR on the academics and compelling them only by policy to deposit content into the IR, the libraries should develop approaches that motivate and convince the scholars to deposit content into the IR. Bankier & Smith (2010a) suggested that the interaction of the IR with faculty should be one of 'serving' rather than one of 'policing' and 'requiring'. With this in mind, the university libraries should endeavor to change the negative perception of scholars about the IR.

7.4.3 Recommendation Three - Collection Development Policies within the University Libraries

In response to the question on how the IRs were currently being run, interviews with the university librarians confirmed that the libraries were currently concerned with harvesting only peer-reviewed articles, theses and conference proceedings from graduate students and

academic staff and excluding other types of content created by these groups as well as content created by non-academics and other groups within and outside the immediate university communities. This seems to be in contrast with the practice in other parts of the world such as the US where the contents of IR also include publications from other sources such as non-academic departments as well as other digital material that is not necessarily academic but that may serve to preserve institutional memory. The collections have therefore been broadened to include multi-media, departmental reports, magazines, e-books, annual reports, undergraduate essays, alumni publications and the likes (Bankier & Smith, 2010b; CalPoly, 2009; Lynch & Lippincott, 2005).

The researcher therefore recommends that university libraries should develop policies that govern collection development for the IR to make the collections more inclusive in terms of sources and types of content. This will broaden the scope of the collections, diversify usage of the content, enable the library to open new relationships with other units such as the administration and generally add value to the IR. Bankier & Smith (2010b) suggested that including content from a broader continuum of sources and types would demonstrate the value of IR services provided to the variety of stakeholders on campus and beyond. This would motivate and attract users to the IR. Bankier & Smith (2010a:15) also found that "the most successful IRs are those that strive to engage a diverse set of groups across campus, specifically liaising and serving both academic and non-academic units, accepting a wide scope of content, aligning repository services with the mission of the university, and facilitating new opportunities for knowledge production and publication".

7.4.4 Recommendation Four – Mentorship amongst scholars

The study sought to establish whether respondents were currently involved in mentorship relationships as mentors or mentees. The results revealed that 102, 38% of academic staff and 150, 47% of students were not in any mentorship relationships (refer to Table 5.31 in Chapter 5). Most respondents felt that the mentoring culture in their universities was poor with weak, non-existent and/or unstructured programs in all the universities that were surveyed. Effective mentorship was hindered by bloated workloads for mentors, too many mentees, bureaucracy, poor attitudes of both mentors and mentees, and unwilling scholars among others. Lack of mentorship particularly for graduate students was blamed for low scholarly productivity especially because those who lacked mentorship failed to develop the right research, scholarly writing and publication skills, in line with Belcher (2009b). Mentorship allows

transfer of tacit knowledge between the mentor and mentee allowing professional growth and scholarly productivity for both parties (Sambunjak et al., 2010; McFadyen et al., 2009; Rose, Rukstalis & Schuckit, 2005). The poor mentoring culture in universities in Kenya may be contributing to the low scholarly productivity of both students and academic staff.

The researcher therefore recommends that universities in Kenya should take a fresh look at the role and multiple benefits of mentorship to researchers' professional development and research productivity. For effectiveness in mentorship, it is recommended that the universities should set up formal structures that would create and nurture the mentorship relationships for both students and academic staff. This will entrench scholarship among academic staff and graduate students by facilitating transfer of relevant skills from the more experienced to the less experienced scholars as well as develop relevant research, academic writing and publication skills within academia. Jackson et al. (2003) proposed that mentoring should be recognised and formalised within institutions like any other academic activity. By so doing, the work of mentors would be encouraged, valued, rewarded and practiced in a systematic way. Myall et al. (2008) and Hutchings et al. (2005) asserted that for mentorship to be successful it has to be institutionalised and mentors should be given ample support by their institutions.

7.4.5 Recommendation Five – Scholarly Collaboration and Participation in Professional Networks

Respondents were required to provide information on their participation in professional societies in their fields. The results indicated that approximately half of the academic staff (135, 51%) and just under half (131, 42%) of postgraduate students were members of professional societies. Additionally, the study required respondents to indicate whether they were engaged in any collaboration with members of their departments, other departments or international peers for research and/or publication. The results of the study indicated that slightly more than half of academic staff (143, 55%) and just under half (129, 43%) of graduate students were collaborating with departmental colleagues; 79 or 31% of academic staff and 120 or 40% of graduate students were involved in interdepartmental collaborations while 64 or 25% of academic staff and 102 or 37% of graduate students were collaborating with international peers (refer to Tables 5.34, 5.36, and 5.38 in Chapter 5). The results also suggested that most of these collaborations were involved with data collection and publication of articles with few other activities being shared between collaborators. The

collaborations were also found to be simple dyads, triads and a few tetrads between scholars. The benefits of membership in professional societies and scholarly collaborations were described as sharing of knowledge between participants, building of participants' CVs, improvement of research skills, networking and mentorship. The results revealed little collaboration between scholars implying that a majority were not benefitting from participation.

The researcher therefore recommends that the universities and their scholars must seek to understand the important role played by scholarly collaborative partnerships in the advancement of research. This will enable them to put in place enabling policies and infrastructure to encourage scholars to participate more in collaborations to enhance scholarly productivity. Studies have shown that collaboration is vital for knowledge exchange and dissemination, exchange of skills, networking and mentorship, and creation of new knowledge (Hopkins, 2011; Mata et al., 2010; McFadyen et al., 2009). The policies should ensure senior scholars initiate research collaborations with junior scholars and graduate students to institutionalise mentorship.

In addition, the researcher recommends that Kenyan scholars should leverage the power of modern technologies such as the internet, and Web 2.0 tools to extend their collaborative networks beyond their universities and engage with other scholars abroad and also with industry in order to tap into external research funding and skills. Perkmann & Walsh (2009) asserted that university-industry relationship provided an avenue for learning in universities and in turn led to technological innovations. Guerrero Bote, Olmeda-Gomez & Moya-Anegon (2013) showed that the more a country was involved in international scientific collaboration, the more positively its science was impacted.

7.4.6 Recommendation Six – Research Funding in the Universities in Kenya

As shown in section 5.9.4 in Chapter 5, respondents were required to indicate the extent of support for research and scholarly communication they had received from their universities in the period 2010-2014. The results of the study revealed that except for library resources which were considered sufficient, most respondents opined that the support they received for was inadequate or non-existent. This included funding; infrastructural and material support for example computer facilities; research training workshops; and mentorship (refer to Tables 5.44 and 5.45 in Chapter 5). Interviews with research office representatives confirmed that

they were facing financial challenges and were therefore unable to provide adequate support for their scholars. This situation was found to contribute greatly to the low quality of research going on as well as low productivity of the scholars. In mitigation, the universities had partnered with private and public sponsors who provided financial and material support for research and scholarly communication. Nevertheless, this was not sufficient to meet the huge demand for funding. The respondents specifically commented on the meager financial support they received from government.

In this respect, the researcher recommends that universities in Kenya should continue to seek funding partnerships that will facilitate increased research, innovation and entrepreneurship amongst their scholars. The university must continually engage with government and other external agencies to provide more resource for research capacity development. Specifically, the researcher recommends that the government directly supports research in universities by injecting more funding for improving infrastructure such as equipped laboratories to enable scholars to engage in high quality research. Meo et al. (2013) and Halpenny et al. (2010) found that countries whose governments supported R&D with a larger portion of the GDP produced higher quality and quantity of research outputs. McGill & Settle (2012) recommend that to increase faculty research productivity, institutions and departments should pay more attention to funding additional staff support, such as research assistants, allow more release time for academic staff to concentrate more on research, and allocate travel funds to enable faculty to attend conferences.

7.4.7 Recommendation Seven – Research Niches in the Universities in Kenya

Respondents were asked to provide information on their local and international collaboration partners. This information was used to map a network showing who they collaborated with and the disciplines they and their partners belonged to. The SNA revealed research areas where these collaborations were vibrant in the various universities indicated by the number of nodes in a particular community (refer to Figure 5.11 in Chapter 5). These results suggest these are niche research areas for the different universities within which many scholarly conversations are going on as well as sharing of knowledge leading to creation of new knowledge.

The researcher therefore recommends that the universities should strengthen these existing research niches and further identify other niche areas in which they can develop excellence.

This would help universities avoid duplicating research efforts and instead become competitive in their respective niches. It is also important that the universities endeavor to revitalise the research culture among scholars. Walker et al. in Jacobs, Berg & Cornwall (2010) are of the view that "Intellectual communities are not simply a matter of ambiance, nor do they happen by accident or magic", the universities must therefore put in the required effort and implement strategies that will ensure the development of research capacity and a conducive environment for research. Jacobs et al. (2010) recognise that research culture will vary from institution to institution and each should initiate conversations among its members to identify ways in which such cultures can be developed or supported.

7.5 Contributions and Originality of the Study

The study was carried out to determine the strategies employed by universities in Kenya to manage the scholarly content that is generated by its academic staff and postgraduate students. The study covered various concepts in managing scholarly content including the types of content generated by scholars, the preservation techniques used to ensure the longevity of the content, the extent of collaboration and professional networking amongst scholars, and the extent of support offered by the universities towards scholarly communication. The originality and contributions of this work is demonstrated along different facets.

Firstly, the study carried out an empirical exploration of these concepts in the context of six universities in Kenya. In addition to exploring the experiences of academic staff, the study also surveyed postgraduate students to understand their experiences in scholarly communication and scholarly content management. Previous studies that have been conducted in Kenya on scholarly communication have predominantly surveyed academic staff and excluded postgraduate students, despite the fact that this population segment is part of the research and scholarly communication process. Postgraduate students are expected to carry out research as part of their studies and are the next generation of researchers but as the study revealed, minimal attention is given to them in terms of mentorship and resource investment. Examples of studies conducted in Kenya are the studies by Muriithi (2013); Sulo, Kendagor, Kosgei, Tuitoek & Chelangat (2012); and Lairumbi, Molyneux, Snow, Marsh, Peshu & English (2008). Muriithi (2013) studied computer mediated collaboration among academic members of staff in four universities in Kenya, in four disciplines namely Agriculture, Engineering, Public Health and Computing. Among other things, the study

found that academic staff used e-mail significantly in their collaborations and less of other internet technologies. Sulo et al. (2012) examined the factors affecting research productivity of academic staff at Moi University as a case study of public universities of Kenya. The study found that staff qualifications, research environment, funding, and time available to staff for research significantly impacted on research output. Lairumbi et al. (2008) carried out 40 in-depth interviews to explore the role of collaborative partnerships in a health research priority setting in Kenya, and the way in which research findings were disseminated to aid policy making and implementation. Interviewees for the study included policy makers, researchers, policy implementers and representatives of organisations funding health reforms in Kenya. Among these were senior research scientists from the UoN. This study, like the other two cited above, excluded graduate students in the university indicating that this group is sidelined and overlooked in surveys that involve other researchers. This implies that their role in scholarly communication and contribution to the body of knowledge is not regarded as important.

In addition, the current study also engaged librarians and representatives of the research offices in the universities that were surveyed, regarding them as key informants who would provide information pertinent to understanding of scholarly content management from the managerial point of view. Again this was divergent from previous studies which have focused on analysing the experiences of creators and users of scholarly content leaving out the experiences of facilitators, administrators and managers of research and scholarly communication processes. These studies include Muriithi (2013); Sulo et al. (2012); and Lairumbi et al. (2008). Other documented studies investigate service provision by the libraries leaving out the user experiences. For example, Kavulya (2004) examined the methods used by university libraries in Kenya to market their services to different categories of users and the problems experienced therein. By collectively analysing the experiences of these diverse but interlinked stakeholders, the current study sought to provide a more wholesome picture of the current status of scholarly content management in universities in Kenya.

The study also made contributions from modelling the social networks existing amongst scholars in Kenya universities. Using data from the study, Social Network Analysis was carried out to map the departmental, interdepartmental and international scholarly collaboration networks that existed among scholars in the universities that were surveyed

(refer to Figures 5.7 – 5.12 in Chapter 5). This provided an informative picture of the nature and structure of the relationships between scholars in the universities surveyed. The study revealed that there was minimal collaboration between scholars whether in their departments, across their disciplines or with international peers. Furthermore, the analysis revealed that these collaborations were mostly dyadic relationships with a few others comprising triads and tetrads. In addition, the SNA revealed the disciplines that were strong in collaborative research in the different universities. This information is very important as it may serve to inform policy development on how to strengthen collaborative research in the universities as well as informing funding decisions to further develop niche research areas.

The study contributed to knowledge as it generated primary data that is likely to enable the universities to be understood at their different levels in terms of their research environments, research outputs, scholarly communication processes and management of scholarly content in general. This data would go a long way in contributing to the interrogation of the veracity of the global university ranking systems especially the Webometric ranking system which relies on a few criteria based on information portrayed on the institutional websites. These criteria include the number of web pages hosted in a university's web domain; a count of the entire external in-links the university's web domain receives from third parties; the number of institutional rich files published in a university's dedicated websites, such as in an IR; and an analysis of the university's academic papers published in high impact international journals. The information on the universities websites may actually be incomplete or subjectively mounted on the web to portray a different picture from what is actually on the ground. Therefore, the results of this study may present a different picture from what the ranking tools rely on. Using information gathered from this and related studies, stakeholders such as the government and the universities may consider developing local tools for ranking local universities that will consider these institutions from a local perspective.

The study also demonstrated originality by use of multiple theoretical lenses through which scholarly content management was explored. Using the Conversation Theory, Social Network Theory and the Knowledge Management Process Model which were all borrowed from other disciplines, the various concepts in scholarly content management such as the scholarly conversations that generate new knowledge, the scholarly networks that scholars are part of and the creation, dissemination and management of knowledge within a university setting were analysed. This was divergent from previous studies which used different theoretical lens

(Sulo et al., 2012 used Vroom's expectancy theory) while other studies do not indicate their theoretical underpinnings (Muriithi, 2013; Lairumbi et al., 2008; Kavulya, 2004).

The study investigated how concepts and variables from the theoretical framework played out in the universities in Kenya. The investigation demonstrated the usefulness of these theories and model to the study and discussion of scholarly content management in the broader perspectives investigated by this study and also in the context of Kenyan universities. For example, the study demonstrated that knowledge sharing and conversations between scholarly peers generates more knowledge as proposed by the Conversation Theory. The study investigated scholarly collaborations and links between scholars at the six universities in Kenya supported by concepts and techniques from the Social Network Theory. Through this, the study demonstrated that social networks amongst scholars play a fundamental role in knowledge sharing and generally influence the extent of knowledge production by the scholars. The strength and nature of the ties binding scholars determine their knowledge sharing behaviour and in the long run, they influence production of new knowledge. Further, the study investigated knowledge management at the universities against the backdrop of ICT as endorsed by the Knowledge Management Process Model and the Knowledge Management Technology Framework. The investigation showed that effective management and utilisation of the vast knowledge resources generated and accessed by the universities can only be achieved with the assistance of modern technology.

7.6 Suggestions for Further Research

The study examined strategies for managing scholarly content in universities in Kenya. The study was limited to six universities in Kenya, five of which were public and one private. The study obtained information from postgraduate students and academic staff as well as from university librarians and university research office representative.

The results of the study suggest a poor research culture in the universities in Kenya resulting in relatively low scholarly productivity. The researcher therefore suggests further research to establish the nature of policies that would be required to improve research especially those that would improve research capacity and training programs within the universities in Kenya. In relation to this, further study would be needed to establish the extent and nature of research collaboration currently going on between universities and industry since this is one of the ways in which universities can improve their research capacities.

The results of the study showed that some of the graduate students indicated they did not have access to the electronic journals provided in their libraries despite the fact that the librarians confirmed that on the contrary, these journals were available and accessible via the university LANs. This suggests a disconnect between the service provided and actual usage of the same. The researcher therefore suggests that further research on the actual use of the electronic journals is necessary to establish how and why they are being used or not used.

The researcher further suggests a need for research on the role of librarians in the scholarly communication of academics and students especially in the ever-changing scholarly and technological environment. The study would need to establish how university libraries in Kenya are responding to the changing needs of their clientele.

Research needs to be carried out to further analyse the scholarly collaborations existing among scholars by using bibliometric techniques to determine the level of research collaboration among scholars. This may provide a clearer picture on the research productivity of Kenyan scholars by using co-authorship as an indicator based on information available on databases such as Google Scholar, Scopus, and Web of Science as well as the universities' institutional repositories that are increasingly harvesting such publications. SNA can then be used to map the resulting collaborations.

Another area of further research would be to examine the current role and relevance of the university presses in Kenya in relation to publication of local content and making local scholarship visible. According to Esposito (2007), university presses "have a platform in place that can be exploited for the good of scholarly communications". Such a study would establish whether university presses in Kenya are still meeting their objectives and how they are responding to the global changes in the scholarly communication processes.

7.7 Summary

This chapter provided a summary and conclusion of the study's results, as well as giving recommendations on improving practice on management of scholarly content in the universities in Kenya. Furthermore, it discussed the implications of the study for theory, policy and practice. Areas for further research were also highlighted. The aim of the study was to investigate the strategies used by universities in Kenya in managing their scholarly content. This aim was achieved by answering several subsidiary questions touching on the kinds of scholarly content generated and used in universities in Kenya; how this content is

preserved and archived for current and future use; how scholars communicate amongst themselves in the various stages of their research work; the extent to which Kenyan scholars participate in local/international professional social networks; and the extent to which existing institutional facilities support scholars' research and communication needs.

The study was informed by the Conversation Theory, the Social Network Theory and the Knowledge Management Process Model. The study reviewed literature from various sources that buttressed the researcher's understanding of the underlying and surrounding issues in the area of scholarly content management. The study employed a mixed-method research strategy that enabled the researcher conduct an indepth investigation into the issues prevailing in the management of scholarly content management in the universities in Kenya. The analysis and interpretation of data resulting from the investigation was conducted thematically and it revealed that management of scholarly content in universities in Kenya is currently facing challenges that have impacted negatively on scholarly productivity and general ranking of local universities in the global ranking schemes. The study concluded by giving recommendations on how various stakeholders can improve the management of scholarly content to make it more accessible and visible to local and international users.

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APPENDICES

APPENDIX 1: SURVEY QUESTIONNAIRE FOR POSTGRADUATE STUDENTS

Dear respondent,
I kindly request you to participate in this survey that aims at assessing different issues in the management of scholarly content in Kenyan universities. These include types of content generated, collaborations among scholars and support from the universities for researchers. The term 'scholarly content' implies formally published scholarly literature (or scholarly communication) in particular journal articles and conference proceedings; editorial documents and doctoral dissertations; any documents generated by the institution's students, faculty, non-faculty researchers and staff. This content may include pre-prints and other works-in-progress, peer-reviewed articles, monographs, teaching materials, datasets and other research material, conference papers, electronic theses and dissertations and grey literature (reports, trade literature, translations).

This survey focuses on ascertaining your awareness and practices of managing this content and seeks your views on several issues in scholarly content management. Your views are highly valuable regardless of whether or not you already have extensive experience with scholarly content. Your personal opinion matters and there are no right or wrong answers. Results from this survey form a crucial part of my PhD thesis and will provide an important component in assessing the current practices and challenges in Kenyan universities with an aim of making suitable recommendations for management of scholarly content.

Your answers will be treated with strict confidentiality and at no time will your data be passed on to a third party. Survey results will only be used for scientific purposes.

I appreciate the value of your views. Please do not hesitate to contact me for clarification on any aspect of this questionnaire.

Irene M. Moseti
PhD student (University of KwaZulu-Natal, South Africa)
E-mail: 213549666@ukzn.ac.za

Section 1: Biographical information

1. a)Please indicate the name of your university _____

   b) Indicate whether it is Public [ ] or Private [ ]

   c) Department_____

   d) Current program? Masters [ ] PhD [ ]

   e) Which year did you enrol for the program? _____

2. Gender: Male [ ] Female [ ]

3. Age profile
   20-30 yrs [ ] 31-40 yrs [ ] 41-50 yrs [ ] 51-60 yrs [ ] ≥ 61yrs [ ]

4. Highest academic qualification
   Bachelor's Degree [ ] Master's Degree [ ] PhD [ ]
   Other (*specify)*: _____

5. What is the mode of your studies? Full-time [ ] Part-time [ ]

Section 2: Types of scholarly content generated and used in Kenyan universities

6. Does your department produce any scholarly journals? Yes [ ] No [ ]

7. What types of scholarly content have you generated or participated in generating? (Tick all that apply)

Preprints	[ ]	Journal article	[ ]
Working papers	[ ]	Technical reports	[ ]
Book chapter	[ ]	Book	[ ]
Book reviews	[ ]	Thesis	[ ]
Conference paper	[ ]	Datasets	[ ]
Software	[ ]	Multimedia	[ ]

Other_____

8. Please indicate the quantity of different scholarly output(s) you have made in the last five years. For each scholarly output, please tick (√) the appropriate column

Type of scholarly output	**None**	**1-3**	**4-6**	**7-9**	**>10**
Conference presentation					
Journal article					
Book					
Book chapter					

Book review					
Abstract					
Thesis					
Technical report					
Working paper					
Other_____					

9. How would you rate the level of research in your department in terms of quantity of output?

High [ ] Medium [ ] Low [ ] I don't know [ ]

Section 3: Preservation and archiving of scholarly content for current and future use

10. How much do you know about data curation?

A lot [ ]
Quite a lot [ ]
A little [ ]
Nothing at all [ ]

11. To what extent do you agree with the following statements describing your practices during and after research?

	Strongly disagree 1	**Disagree 2**	**Agree 3**	**Strongly Agree 4**
I document my research procedures meticulously				
I back-up information on my computer regularly				
I back-up my information by storing copies of it in different locations				
I migrate (move) files from older computers to newer computers or from my former workstation to new workstation				
I print out specific valuable documents so as to retain hardcopies of the same				
I regularly review the files I have whether in print or hardcopy and make decisions on what to keep and what to destroy				

12. What is your preferred mode of preserving scholarly content such as research data or any other scholarly output?

Computer at work [ ] Portable storage device [ ]
University server [ ] Computer at home [ ]

University digital archive [ ] Digital archive of discipline [ ]

External web server [ ]

Hard copy e.g print-outs, notebooks etc [ ]

Other _____

13. Apart from infrastructure (e.g. buildings, computer hardware), what do you think is needed to guarantee that valuable digital research data is preserved for access and use in the future in your department? (multiple answers possible)

Training [ ]
More knowledge/expertise [ ]
More resources (financial and operational) [ ]
More digital repositories/archives [ ]
Nothing else [ ]
Other (please specify)_____
_____

14. In your opinion, is your institution making any visible efforts towards digital preservation of research data and research findings?_____
_____
_____

Section 4: Communication amongst Kenyan scholars

15. Please indicate the importance of the following means of communication to your research work:

	Not important	**Moderately important**	**Very important**
Phone (both landline and mobile)			
E-mail			
Web forums/blogs/wikis			
Instant messaging services/chat			
VOIP e.g. Skype, Google talk			
Social networking sites e.g. Face book, Twitter			
LinkedIn			
Fax			
Postal mail			
Face to face			

16. Please indicate with a tick (√) your preferred model(s) for publishing your scholarly content (multiple answers possible)

Model	Yes	No	Reason for use or non-use
Personal websites			
Traditional subject-based journals			
Fee-based Open Access Journals			
Free Open Access Journals			
Institutional Repositories			
Institutional websites			
Conference proceedings			

17. Please indicate with a tick (√) your preferred source of scholarly content (multiple answers possible)

Source	Yes	No	Reason for use or non-use
Traditional subject-based journals			
Google scholar			
Open Access Journals			
Books			
Institutional Repositories			
Institutional/personal websites			
Conference proceedings			
Other _____ _____			

18. a) Does your university have an institutional repository?

Yes [ ] No [ ] I don't know [ ]

b) If yes, who runs the repository?_____

c) If yes, have you ever deposited any of your research output in your institutional repository?

Yes, I did so voluntarily [ ]

Yes, I was required to do so [ ]

No, but I would do so willingly if there was an opportunity [ ]

No, and I don't intend to [ ]

d) If yes, which of the following research outputs have you deposited in your Institutional Repository?

Pre-prints and other works-in-progress [ ] Peer-reviewed articles [ ]
Monographs [ ] Teaching materials [ ]
Datasets [ ] Conference papers [ ]
Electronic theses and dissertations [ ]
Grey literature (e.g. reports, working papers) [ ]
Other_____

e) Does your university expressly require you to deposit copies of your thesis in soft copy to the university library? Yes [ ] No [ ] I don't know [ ]

f) If yes, please explain your feelings about this requirement_____

_____

_____

19. a) Are you being mentored academically by anybody at the moment?

Yes [ ] No [ ]

b) Please explain any barriers to the success of this academic mentorship (if any)____

_____

_____

c) Please give your perception of the mentoring culture amongst scholars at your institution_____

_____

Section 5: Participation by Kenyan Scholars in Local and/or international professional social networks

20. a) Are you a member of any professional society in your discipline? Yes [ ] No [ ]

b) If yes, please give the name of the society_____

c) i) Do you derive any benefits from being a member? Yes [ ] No [ ]

ii) Please explain _____

_____

_____

21. a) Are you engaged in any collaboration with members of your department in research and publication Yes [ ] No [ ]

If yes,

(i) Please state the nature of the collaboration e.g. co-authoring publications after research, data collection, sharing data etc. _____

_____

_____

_____

(ii) Please give the names (or initials of the names) of members in the department that you are collaborating with _____

_____

b) Are you collaborating with members from other departments in your university or with other research groups in the country? Yes [ ] No [ ]

If yes,

(i) Please state the nature of the collaboration e.g. co-authoring publications after research, data collection, sharing data etc. _____

_____

_____

_____

(ii) Please give the names (or initials of the names) of members in the department that you are collaborating with _____

_____

c) Are you collaborating with international peers? Yes [ ] No [ ]

If yes,

(i) What is the name of the institution you are cooperating with and its home country?

_____

(ii) Please state the nature of the collaboration e.g. co-authoring publications after research, data collection, sharing data etc. _____

_____

_____

_____

(iii) Please give the names (or initials of the names) of the international peers that you are collaborating with _____

_____

d) If yes in a, b, c, above how did you get to be involved in the collaboration(s) mentioned above? _____

_____

_____

e) Have you experienced any benefits from the collaboration? Yes [ ] No [ ]

Please explain _____

_____

f) Please comment briefly on the challenges (if any) of such a collaborative venture ___

_____

_____

Section 6: Institutional Support Available to Enhance Scholarly Communication and Research by Kenyan Scholars

22. In your view, to what extent is your institution concerned about your personal success as a researcher and author?

Very concerned [ ]

Concerned a little [ ]

Not concerned [ ]

Please elaborate on your answer_____

_____

_____

23. a) Are you conversant with the global universities ranking systems, such as the Webometric Ranking of World Universities? Yes [ ] No [ ]

b) If yes, please comment on their suitability and applicability to the Kenyan situation___

_____

_____

_____

24. i) Please indicate with a tick (√) the extent of support you may have received from your institution/department since you enrolled for your studies.

	None 1	**Insufficient 2**	**Sufficient 3**
a) Funds to attend professional meetings/ conferences			

b) Improvements to working space(s) (research lab, studio space, etc.)			
c) Computer lab			
d) Mentorship (informal or formal)			
e) Workshops or training concerning academic research and publication			
f) Student Supplies & Equipment Mini-Grants			
g) Library resources e.g. journals and books			

iii) Please provide any other recommendations or comments regarding scholarly communication in general_____
_____
_____

APPENDIX 2: SURVEY QUESTIONNAIRE FOR ACADEMIC STAFF

Dear respondent,

I kindly request you to participate in this survey that aims at assessing different issues in the management of scholarly content in Kenyan universities. These include types of content generated, collaborations among scholars and support from the universities for researchers. The term 'scholarly content' implies formally published scholarly literature (or scholarly communication) in particular journal articles and conference proceedings; editorial documents and doctoral dissertations; any documents generated by the institution's students, faculty, non-faculty researchers and staff. This content may include pre-prints and other works-in-progress, peer-reviewed articles, monographs, teaching materials, datasets and other research material, conference papers, electronic theses and dissertations and grey literature (reports, trade literature, translations).

This survey focuses on ascertaining your awareness and practices in managing this content and seeks your views on several issues in scholarly content management. Your views are highly valuable regardless of whether or not you already have extensive experience with scholarly content. Your personal opinion matters and there are no right or wrong answers. Results from this survey form a crucial part of my PhD thesis and will provide an important component in assessing the current practices and challenges in Kenyan universities with an aim of making suitable recommendations for management of scholarly content.

Your answers will be treated with strict confidentiality and at no time will your data be passed on to a third party. Survey results will only be used for scientific purposes.

I appreciate the value of your views. Please do not hesitate to contact me for clarification on any aspect of this questionnaire.

Irene M. Moseti
PhD student (University of KwaZulu-Natal, South Africa)
E-mail: 213549666@ukzn.ac.za

Section 1: Biographical information

1 a) Please indicate the name of your university _____

b) Indicate whether it is Public [ ] or Private [ ]

c) Department_____

2. Gender: Male [ ] Female [ ]

3. Age profile

20-30 yrs [ ] 31-40 yrs [ ] 41-50 yrs [ ] 51-60 yrs [ ] ≥ 61yrs [ ]

4. Highest academic qualification
Bachelor's Degree [ ] Master's Degree [ ] PhD [ ]
Other (*specify)*: _____

5. Academic rank at the university?
Assistant Lecturer/Tutorial fellow [ ] Lecturer [ ]
Senior Lecturer [ ] Associate Professor [ ] Professor [ ]

6. Please indicate how long you have worked at the university: _____

Section 2: Types of scholarly content generated in Kenyan universities

7. Does your department produce any scholarly journals? Yes [ ] No [ ]

8. What types of scholarly content have you generated or participated in generating? (Tick all that apply)

Preprints [ ]
Journal article [ ]
Working papers [ ]
Technical reports [ ]
Book chapter [ ]
Book [ ]
Other_____

Book reviews [ ]
Thesis [ ]
Conference paper [ ]
Datasets [ ]
Software [ ]
Multimedia [ ]

9. Please indicate the quantity of different scholarly output(s) you have made in the last five years. For each scholarly output, please tick (√) the appropriate column.

Type of scholarly output	**None**	**1-3**	**4-6**	**7-9**	**>10**
Conference presentation					
Journal article					
Book					
Book chapter					
Book review					
Abstract					
Thesis					
Technical report					
Working paper					
Other					

10. How would you rate the level of research in your department in terms of quantity of output?

High [ ] Medium [ ] Low [ ] Not sure [ ]

Section 3: Preservation and archiving of scholarly content for current and future use

11. How much do you know about data curation?

A lot [ ]
Quite a lot [ ]
A little [ ]
Nothing at all [ ]

12. To what extent do you agree with the following statements describing your practices during and after research?

	Strongly disagree 1	**Disagree 2**	**Agree 3**	**Strongly Agree 4**
I document my research procedures meticulously				
I back-up information on my computer regularly by storing copies of it in different locations				
I migrate (move) files from older computers to newer computers or from my former workstation to new workstation				

I print out specific valuable documents so as to retain hardcopies of the same				
I regularly review the files I have whether in print or hardcopy and make decisions on what to keep and what to destroy				

13. What is your preferred mode of preserving scholarly content such as research data or any other scholarly output?

Computer at work	[ ]	Portable storage device	[ ]
University server	[ ]	Computer at home	[ ]
University digital archive	[ ]	Digital archive of discipline	[ ]
External web server	[ ]	My blog	[ ]
Hard copy e.g print-outs, notebooks etc	[ ]		

Other_____

14. Apart from infrastructure (e.g. buildings, computer hardware), what do you think is needed to guarantee that valuable research data is preserved for access and use in the future? (multiple answers possible)

Training	[ ]
More knowledge/expertise	[ ]
More resources (financial and operational)	[ ]
More digital repositories/archives	[ ]
Nothing else	[ ]

Other (please specify)_____
_____

15. In your opinion, is your institution making any visible efforts towards digital preservation of research data and research findings? Please explain_____
_____
_____

Section 4: Communication amongst Kenyan scholars

16. Please indicate the importance of the following means of communication to your research work:

	Not important	**Moderately important**	**Very important**
Phone (both landline and mobile)			
E-mail			

Web forums/blogs/wikis			
Instant messaging services/chat			
VOIP e.g. Skype, Google talk			
Social networking sites e.g. Face book, Twitter			
LinkedIn			
Fax			
Postal mail			
Face to face			

17. Please indicate with a tick (√) your preferred model(s) for publishing your scholarly content (multiple answers possible)

Model	**Yes**	**No**	**Reason for use or non-use**
Personal websites			
Traditional subject-based journals			
Fee-based Open Access Journals			
Free Open Access Journals			
Institutional Repositories			
Institutional websites			
Conference proceedings			

18. Please indicate with a tick (√) your preferred source of scholarly content (multiple answers possible)

Source	**Yes**	**No**	**Reason for use or non-use**
Traditional subject-based journals			
Google scholar			
Open Access Journals			
Books			
Institutional Repositories			
Institutional/personal websites			
Conference proceedings			
Other _____ _____			

19. a) Does your university have an institutional repository?

Yes [ ] No [ ] I don't know [ ]

b) If yes, who runs the repository?_____

c) Have you ever deposited any of your research output in your institutional repository?

Yes, I did so voluntarily [ ]

Yes, I was required to do so [ ]

No, but I would do so willingly if there was an opportunity [ ]

No, and I don't intend to [ ]

d) If yes, which of the following research outputs have you deposited in your Institutional Repository?

Pre-prints and other works-in-progress [ ] Peer-reviewed articles [ ]
Monographs [ ] Teaching materials [ ]
Datasets [ ] Conference papers [ ]
Electronic theses and dissertations [ ]
Grey literature (e.g. reports, working papers) [ ]
Other_____

Section 5: Participation by Kenyan Scholars in Local and/or international professional social networks

20. Are you a member of any professional society in your discipline?

Yes [ ] No [ ]

If yes, please give the name of the society_____

b) What are the benefits you enjoy by being a member? _____

_____

_____

21. a) Are you mentoring (or being mentored by) anybody academically at the moment?

Yes [ ] No [ ]

b) Please comment on your answer giving reasons _____

_____

c) Please explain any barriers to the success of this academic mentorship (if any) in your department/university _____

_____

_____

d) Please comment on the mentoring culture amongst scholars at your institution_____

_____

22. Please respond to the following questions describing your interaction with your colleagues on scholarly matters:

	Never	**Rarely**	**Sometimes**	**Often**	**Always**
How often do you spend time on personal interactions with colleagues so as to discuss ideas, solutions, and scientific proposals?					
How often do you hold professional meetings with colleagues in your department based on a pre-planned schedule?					
How often do you hold professional meetings with colleagues from other departments based on a pre-planned schedule?					
How would you rate the willingness of your more qualified and/or experienced colleagues to assist others in learning scientific issues?					
How would you rate the willingness of your colleagues to share their knowledge and resources with others?					

23. a) Are you engaged in any collaboration with members of your department in research and/or publication? Yes [ ] No [ ]

If yes,

(i) Please state the nature of the collaboration e.g. co-authoring publications after research, data collection, sharing data etc. _____

_____

_____

_____

(ii) Please give the names (or initials of the names) of members in the department that you are collaborating with _____

_____

b) Are you collaborating with members from other departments in your university or with other research groups in the country? Yes [ ] No [ ]

If yes,

(i) Please, give the name of the department or institution you are collaborating with.

_____

_____

(ii) Please state the nature of the collaboration e.g. co-authoring publications after research, data collection, sharing data etc. _____

_____

_____

_____

(ii) Please give the names (or initials of the names) of members in the department that you are collaborating with _____

_____

c) Are you collaborating with international peers? Yes [ ] No [ ]

If yes,

(i) What is the name of the institution you are cooperating with and its home country?

_____

(i) Please state the nature of the collaboration e.g. co-authoring publications after research, data collection, sharing data etc. _____

_____

_____

_____

(ii) Please give the names (or initials of the names) of the international peers that you are collaborating with _____

_____

d) If yes in a, b, c, above how did you get to be involved in the collaboration(s) mentioned above? _____

_____

_____

e) Have you experienced any benefits from the collaboration? Yes [ ] No [ ]

Please explain _____

_____

i) Please comment briefly on the challenges (if any) of such a collaborative venture ___

_____

_____

Section 6: Institutional Support Available to Enhance Scholarly Communication of Kenyan Scholars

24. Please comment on the ability of the existing ICT infrastructure at your university to support your efforts in accessing research output by other scholars and disseminating your own_____

_____

_____

25. In your view, to what extent is your institution concerned about your personal success as a researcher and author?

Very concerned [ ]

Concerned a little bit [ ]

Not concerned [ ]

Please elaborate on your answer_____

_____

_____

26. a) Are you conversant with the global universities ranking systems, such as the Webometric Ranking of World Universities? Yes [ ] No [ ]

b) If yes, please comment on their suitability and applicability to the Kenyan situation___

_____

_____

_____

27. i) Please indicate with a tick (√) the extent of support you may have received from your institution in the last three academic years.

	None 1	**Insufficient 2**	**Sufficient 3**
a) Funds to attend professional meetings/conferences			
b) Alerts about new and forthcoming grant opportunities from funding bodies			
c) Time at my job to perform research tasks			
d) Sabbaticals			
e) Improvements to office space and other			

facilities (research lab, studio space, etc.)			
f) Computer purchase or upgrade			
g) Mentorship (informal or formal)			
h) Staff support (research assistants, clerical, other)			
i) Workshops or training concerning academic research and publication, promotion and tenure			
j) Workshops or training on financial management and general administration of the research process			
k) Library resources e.g. journals and books			
l) Help in locating potential research or publication collaborators			
m) Collaborative management of research documents and data			
n) Tools for analysis of large aggregations of text and data			
o) Training and development of skills in information handling			
p) Finding the most effective vehicles and channels through which to disseminate and publish research work			
q) Advice on protecting intellectual property rights			

28. Please provide any other recommendations or comments regarding scholarly communication in general.

_____

_____

APPENDIX 3: INTERVIEW SCHEDULE FOR UNIVERSITY LIBRARIANS

Name of University_____

Private___ Public_____ Gender_____ Position_____

Introduction: I kindly request you to participate in this survey that aims at assessing different issues in the management of scholarly content by academic staff in Kenyan universities. These include types of content generated, collaborations among scholars and support from the universities for researchers. The term 'scholarly content' implies formally published scholarly literature (or scholarly communication) in particular journal articles and conference proceedings; editorial documents and doctoral dissertations; any documents generated by the institution's students, faculty, non-faculty researchers and staff. This content may include pre-prints and other works-in-progress, peer-reviewed articles, monographs, teaching materials, datasets and other research material, conference papers, electronic theses and dissertations and grey literature (reports, trade literature, translations).

1. a) Please explain the role played by the library in the university's scholarly communication process.

   b) Do you face any challenges in supporting your researchers in their pursuit of scholarly communication? If yes, please explain

2. Please describe your institution's policy (if any) regarding dissemination of research findings (by students & staff) either to the university community or to the general public?

3. Please describe your department's role as concerns grey literature generated in the university.

4. How are students' theses archived and managed by your university?

5. Who is responsible for management of scholarly content in the university, faculties or even departments?

6. a) Are you aware of your university's rank among universities in Kenya?

   b) In your view, what is contributing to your visibility and high ranking?

   c) Are you aware of the ranking system and criteria used? Would you say they are applicable to our local universities?

7. a) To what extent has your institution considered use of modern scholarly content management strategies including
    - Digital libraries/archives
    - OA & Institutional repositories

    b) If you have already implemented any of them, describe their functions

    c) Describe some of the challenges you have faced

    d) Please elaborate on the successes so far

    e) If you have not considered any, please explain the reasons why.
8. Does your department offer any programs or services aimed at helping students and academic staff with data management in general?
9. Explain your understanding of the subject of data curation (subsets are data archiving and data preservation).
10. In light of the large amount of data and digital information being produced by the university community, explain whether your institution is currently exploring any digital preservation initiatives (training, awareness, tools and infrastructure, digitization).

APPENDIX 4: INTERVIEW SCHEDULE FOR REPRESENTATIVE FROM RESEARCH OFFICE

Name of University_____

Private___ Public_____ Gender_____ Position_____

Introduction: I kindly request you to participate in this survey that aims at assessing different issues in the management of scholarly content in Kenyan universities. These include types of content generated, collaborations among scholars and support from the universities for researchers. The term 'scholarly content' implies formally published scholarly literature (or scholarly communication) in particular journal articles and conference proceedings; editorial documents and doctoral dissertations; any documents generated by the institution's students, faculty, non-faculty researchers and staff. This content may include pre-prints and other works-in-progress, peer-reviewed articles, monographs, teaching materials, datasets and other research material, conference papers, electronic theses and dissertations and grey literature (reports, trade literature, translations).

1. a) Are you aware of your university's rank among universities in Kenya?

   d) In your view, what is contributing to your visibility and high ranking?

   e) Are you aware of the ranking criteria used by the ranking schemes?

   d) What is your opinion of the web ranking schemes?

   e) Are they a true reflection of our institutions (especially in Africa)?

   f) Should institutions pay any attention to them?

2. Please explain the role of your department.

3. Please comment on some of the specific services you are providing as a department to support your academic staff and graduate students in promoting their research and scholarly communication.

4. a) Do you face any challenges in supporting your academic staff in their research activities? If yes, please explain.

   b) Explain how you are mitigating on these challenges.

5. Describe any of the events you have organised as an institution (if any) to discuss scholarly communication and surrounding issues (such as copyright, publishing models, intellectual property licensing).

6. a) Describe any collaboration your institution is currently involved in with public or private institutions for research and publication.

   b) Do you have any linkages with institutions seeking to promote visibility especially of African research? If not, please explain the obstacles barring you from such collaborations.

   If yes, what benefits have you realized so far?

7. Does your institution have a research policy?

8. a) Who is responsible for management of scholarly content in the university, faculties or even departments?

9. Describe the infrastructural support for academics to effectively communicate with colleagues within and outside your institution and to publish their research output effectively.

APPENDIX 5: ETHICAL CLEARANCE

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

21 May 2014

Ms Irene Moraa Moseti (213549666)
School of Social Sciences
Pietermaritzburg Campus

Protocol reference number: HSS/0331/014D
Project title: Strategies for the management of scholarly content in Kenyan Universities

Dear Ms Moseti,

Full Approval – Expedited Application

In response to your application dated 10 March 2014, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Professor Stephen Mutula
cc Academic Leader Research: Professor Sabine Marschall
cc School Administrator: Ms Nancy Mudau

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 3587/8350/4557 **Facsimile:** +27 (0) 31 260 4609 **Email:** ximbap@ukzn.ac.za / snymanm@ukzn.ac.za / mohunp@ukzn.ac.za
Website: www.ukzn.ac.za

APPENDIX 6: INFORMED CONSENT LETTER

School of Social Sciences
Private Bag X01 Scottsville, 3209
Pietermaritzburg Campus
SOUTH AFRICA

Dear Respondent
Informed Consent Letter

Researcher: Irene Moraa Moseti
Institution: University of KwaZulu-Natal
Telephone number: 0721 735 456
Email address: 213549666@ukzn.ac.za

Supervisor: Prof. Stephen Mutula
Institution: University of KwaZulu-Natal
Telephone number: 033-260 5093
Email address: mutulas@ukzn.ac.za

I, **IRENE MORAA MOSETI**, of University of KwaZulu-Natal, kindly invite you to participate in the research project entitled '***Strategies for the Management of Scholarly Content in Kenyan Universities***'. This research project is undertaken as part of the requirements for the award of the PhD degree (Information Studies), at the University of KwaZulu-Natal.

Participation in this research project is voluntary. You may refuse to participate or withdraw from the research project at any stage and for any reason without any form of disadvantage. There will be no monetary gain from participating in this research project. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Department of Information Studies, at the University of KwaZulu-Natal. Further, I would like to inform you that for purposes of analysis of the data that I will collect, I will need to audio record the interview that I will conduct and therefore request that you allow me to do it.

If you have any questions or concerns about participating in this study, please feel free to contact myself or my supervisor at the contacts provided above.

It should take you about 15 minutes to complete the questionnaire.

Thank you for participating in this research project.

---------- ----------
Signature Date

I ..... hereby consent to participate in the above study.

Name: ..... Date: ..... Signature: .....

Supervisor's details
Prof. Stephen Mutula
Institution: University of KwaZulu-Natal
Telephone number: 033-260 5093
Email address: mutulas@ukzn.ac.za

Student's details
Irene Moraa Moseti
Institution: University of KwaZulu-Natal
Telephone number: +254 721 735 456
Email address: 213549666@ukzn.ac.za

APPENDIX 7: REQUEST TO NCST TO UNDERTAKE RESEARCH

School of Social Sciences
Private Bag X01 Scottsville, 3209
Pietermaritzburg Campus
25th September, 2013

National Council for Science & Technology
8th - 9th Floor, Utalii House off Uhuru Highway, Nairobi
P. O. Box 30623, 00100
Nairobi
KENYA

Dear Sir/Madam

RE: REQUEST FOR PERMISSION TO UNDERTAKE RESEARCH

I am a Kenyan doctoral student in Information Studies Programme in the School of Social Sciences at the University of KwaZulu-Natal, South Africa.

As part of the requirements for the award of a PhD degree, I am undertaking research on a topic titled **Strategies for the Management of Scholarly Content in Kenyan Universities.** The universities targeted for research are: University of Nairobi, Kenyatta University, Maseno University, Jomo Kenyatta University of Agriculture and Technology, Strathmore University, and Egerton University. The methods that will be used to collect data for the research include questionnaires to academic staff and postgraduate students (Masters and PhD) and interviews with university librarians and representatives from the university research offices. This research will assist in facilitating better management of scholarly information by universities and improve access to research output by researchers both within and outside Kenya.

The purpose of this letter is to request for your permission to carry out the research at the said universities between November 2013 to November 2014. Should need further clarification please contact me and/or my supervisor Prof Stephen Mutula at mutulas@ukzn.ac.za

I shall be very grateful for your assistance and I appreciate your cooperation in advance.

Yours sincerely

Irene Moraa Moseti,
Tel. +254- 721 735 456
E-mail: irenemorara@gmail.com

APPENDIX 8: AUTHORITY TO CARRY OUT RESEARCH FROM NCST

NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2241349, 20-267 3550,
0713 788 787, 0735 404 245
Fax: +254-20-2213215

Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke

When replying please quote

Our Ref: **NACOSTI/P/13/0912/91**

9th Floor Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Date:

16th October, 2013

Irene Moraa Moseti
Moi University
P.O.Box 3900-30100
Eldoret.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "***Strategies for the management of scholarly content in Kenyan Universities,***" I am pleased to inform you that you have been authorized to undertake research in **Selected Counties** for a period ending **18th August, 2014.**

You are advised to report to **the Vice Chancellors of selected Universities** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

DR. M. K. RUGUTT, PhD, HSC.
DEPUTY COMMISSION SECRETARY
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Copy to:

The Vice Chancellors
Selected Universities.

National Commission for Science, Technology and Innovation is ISO 2008: 9001 Certified

APPENDIX 9: REQUEST TO UNDERTAKE RESEARCH - UNIVERSITY OF NAIROBI

Irene Moraa Moseti,
School of Information Sciences,
Moi University,
P.O. Box 3900-30100,
Eldoret
Cell: 0721 735 456
E-mail: irenemorara@gmail.com

06/11/13

The DVC Research, Production &Extension,
University of Nairobi,
P.O. Box 30197,G.P.O,
Nairobi,
Kenya.

Dear Madam,

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT UNIVERSITY OF NAIROBI

I am a PhD student currently enrolled at the School of Social Sciences, University of Kwa-Zulu Natal in South Africa and currently affiliated to Moi University, Eldoret. I am conducting a study on the *Strategies for the Management of Scholarly Content in Kenyan Universities*, and have selected University of Nairobi as one of my case studies. The aim of the study is to investigate how the scholarly communication process is currently managed in Kenyan universities. Recommendations will be made on how visibility of research output can be improved to upgrade global visibility of Kenyan scholars.

I will be collecting data using interviews and questionnaires from respondents who are postgraduate students (Masters and PhD), academic staff, the University Librarian, and Representative of Research Department at University of Nairobi.

Attached herewith, please find a copy of my research permit issued by the National Commission for Science, Technology and Innovation; my research proposal; and copies of my data collection instruments.

I am kindly requesting that you allow me to conduct research in your institution.

Yours Sincerely,

Irene Moraa Moseti

APPENDIX 10: AUTHORIZATION LETTER - UNIVERSITY OF NAIROBI

UNIVERSITY OF NAIROBI
OFFICE OF THE DEPUTY VICE - CHANCELLOR
(Research, Production & Extension)
Prof. Lucy W. Irungu B.Sc., M.Sc., Ph.D.

P.O. Box 30197-GPO.
00100,Nairobi-Kenya
Telephone: +254-20-2315416 (DI), 318262

Fax:0202317251
Email:dvcrpe@uonbi.ac.ke

UON/RPE/3/5/Vol. X/93 January 13, 2014

Ms. Irene Morara Moseti
School of Information Sciences
Moi University
P.O. Box 3900 – 20100
Eldoret

Dear Ms. Moseti

PERMISSION OT CARRY OUT RESEARCH

I wish to inform you that your request to carry out research in the University of Nairobi entitled: ***"Strategies for the Management of Scholarly Content in Kenyan Universities"*** for the award of Doctor of Philosophy degree from Kwazulu Natal University, South Africa is hereby approved.

Upon completion of your research study, you are required to share the findings of your study by depositing a copy of your research findings/thesis with the Director, Library and Information Services.

Yours sincerely

PROF. LUCY W. IRUNGU
DEPUTY VICE-CHANCELLOR
(RESEARCH, PRODUCTION AND EXTENSION)
AND
PROFESSOR OF ENTOMOLOGY

cc. Vice-Chancellor
Deputy Vice-Chancellor (AA)
Deputy Vice-Chancellor (A&F)
Deputy Vice-Chancellor (SA)
Director, Library and Information Services

SWM/...

APPENDIX 11: REQUEST TO UNDERTAKE RESEARCH - STRATHMORE UNIVERSITY

Irene Moraa Moseti,
School of Information Sciences,
Moi University,
P.O. Box 3900-30100,
Eldoret
Cell: 0721 735 456
E-mail: irenemorara@gmail.com

06/11/13

The DVC Research,
Strathmore University,
P.O. Box 59857, 00200, City square
Nairobi,
Kenya.

Dear Sir/Madam,

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT STRATHMORE UNIVERSITY

I am a PhD student currently enrolled at the School of Social Sciences, University of Kwa-Zulu Natal in South Africa and currently affiliated to Moi University, Eldoret. I am conducting a study on the *Strategies for the Management of Scholarly Content in Kenyan Universities*, and have selected Strathmore University as one of my case studies. The aim of the study is to investigate how the scholarly communication process is currently managed in Kenyan universities. Recommendations will be made on how visibility of research output can be improved to upgrade global visibility of Kenyan scholars.

I will be collecting data using interviews and questionnaires from respondents who are postgraduate students (Masters and PhD), academic staff, the University Librarian, and a Representative of Research Department at Strathmore University.

Attached herewith, please find a copy of my research permit issued by the National Commission for Science, Technology and Innovation; my research proposal; and copies of my data collection instruments.

I am kindly requesting that you allow me to conduct research in your institution.

Yours Sincerely,

Irene Moraa Moseti

APPENDIX 12 : AUTHORIZATION LETTER - STRATHMORE UNIVERSITY

Strathmore
UNIVERSITY

19th November 2013

Irene Moseti-Morara
Lecturer, Dept. of Information Technology
School of Information Sciences
Moi University
P.O Box 3900 – 30100
Eldoret

Dear Irene,

AUTHORISATION TO COLLECT DATA AT STRATHMORE UNIVERSITY

The Strathmore University Research Office has granted you the re-authorization to collect data from students and staff at the University as specified in your PhD Research proposal entitled **"Strategies for the Management of Scholarly Content in Kenyan Universities"**

Please note that this authorization shall only be effected on the receipt of specific dates of data collection on Campus and upon the receipt by the Strathmore University Research Office of a signed acknowledgement from you binding you to share the results of your study, a copy of your PhD thesis and publications resulting from this particular study.

Yours sincerely,

Dr. V. Gichuru
Dean, Research

Acknowledgement: I agree to the above conditions of the authorization.

Full Names: _____

Signature: _____ Date: _____

Ole Sangale Rd, Madaraka Estate P O Box 59857-00200, Nairobi, Kenya Tel +254 (0)703 034000/200/300
Fax +254 (0)20 6007498 Email admissions@strathmore.edu www.strathmore.edu

APPENDIX 13: REQUEST TO UNDERTAKE RESEARCH – MASENO UNIVERSITY

Irene Moraa Moseti,
School of Information Sciences,
Moi University,
P.O. Box 3900-30100,
Eldoret
Cell: 0721 735 456
E-mail: irenemorara@gmail.com
18/11/13

The DVC Planning, Research and Extension,
Maseno University,
Private Bag,
Maseno,
KENYA

Dear Sir,

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT MASENO UNIVERSITY

I am a PhD student currently enrolled at the School of Social Sciences, University of Kwa-Zulu Natal in South Africa and currently affiliated to Moi University, Eldoret. I am conducting a study on the *Strategies for the Management of Scholarly Content in Kenyan Universities*, and have selected Maseno University as one of my case studies. The aim of the study is to investigate how the scholarly communication process is currently managed in Kenyan universities. Recommendations will be made on how visibility of research output can be improved to upgrade global visibility of Kenyan scholars.

I will be collecting data using interviews and questionnaires from respondents who are postgraduate students (Masters and PhD), academic staff, the University Librarian, and a Representative of Research Department at Maseno University.

Attached herewith, please find a copy of my research permit issued by the National Commission for Science, Technology and Innovation; my research proposal; and copies of my data collection instruments.

I am kindly requesting that you allow me to conduct research in your institution.

Yours Sincerely,

Irene Moraa Moseti

APPENDIX 14 : AUTHORIZATION LETTER - MASENO UNIVERSITY

MASENO UNIVERSITY
OFFICE OF THE DEPUTY VICE CHANCELLOR
PARTNERSHIPS, RESEARCH & INNOVATIONS
(PRI)

Tel: 254-057-351622, 351620, 351008, 3511011
Fax: 254-057-351221, 351153
e-mail: dvcpres@maseno.ac.ke

Private Bag
MASENO
Kenya

Our Ref: ACA 7/13/VOL. 1/(125) **Date:** 29th November, 2013

Irene Moraa Moseti
School of Information Sciences
Moi University
P.O. Box 3900-30100
ELDORET

Dear Ms. Moseti,

REF: REQUEST TO CONDUCT RESEARCH

Reference is made to your letter dated 6th November, 2013 on the above subject matter

I am pleased to inform you that your request to conduct Research on ***"Strategies for the Management of Scholarly Content in Kenyan Universities"*** in our institution has been approved.

For further arrangements please get in touch with the undersigned. Please note that upon completion of your research, you are expected to submit a copy of your research report to the University.

Thank you.

Prof. George M. Onyango
DEPUTY VICE CHANCELLOR (PARTNERSHIPS, RESEARCH & INNOVATIONS)

ISO 9001:2008 CERTIFIED

APPENDIX 15: REQUEST TO UNDERTAKE RESEARCH - KENYATTA UNIVERSITY

Irene Moraa Moseti,
School of Information Sciences,
Moi University,
P.O. Box 3900-30100,
Eldoret
Cell: 0721 735 456
E-mail: irenemorara@gmail.com
06/11/13

The DVC Academic,
Kenyatta University,
P.O. Box 43844,
Nairobi,
Kenya.

Dear Sir/Madam,

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT KENYATTA UNIVERSITY

I am a PhD student currently enrolled at the School of Social Sciences, University of Kwa-Zulu Natal in South Africa and currently affiliated to Moi University, Eldoret. I am conducting a study on the *Strategies for the Management of Scholarly Content in Kenyan Universities,* and have selected Kenyatta University as one of my case studies. The aim of the study is to investigate how the scholarly communication process is currently managed in Kenyan universities. Recommendations will be made on how visibility of research output can be improved to upgrade global visibility of Kenyan scholars.

I will be collecting data using interviews and questionnaires from respondents who are postgraduate students (Masters and PhD), academic staff, the University Librarian, and a Representative of Research Department at Kenyatta University.

Attached herewith, please find a copy of my research permit issued by the National Commission for Science, Technology and Innovation; my research proposal; and copies of my data collection instruments.

I am kindly requesting that you allow me to conduct research in your institution.

Yours Sincerely,

Irene Moraa Moseti

APPENDIX 16: AUTHORIZATION LETTER - KENYATTA UNIVERSITY

KENYATTA UNIVERSITY

OFFICE OF THE DEPUTY VICE-CHANCELLOR (ACADEMIC)

Tel: (+254-20) 8710901-19 Ext 57481
Fax: (+254-20) 8711380
Website: www.ku.ac.ke

P.O. Box 43844-00100
Nairobi, Kenya
E-mail:dvc-acad@ku.ac.ke

Ref. KU/DVCACAD/IRT/VOL.2/303

2nd December, 2013

Ms. IRENE MORAA MOSETI
C/o School of Information Sciences
Moi University
P O Box 3900-30100
ELDORET

Dear Ms. Moseti

REF: REQUEST TO CONDUCT RESEARCH – MS. IRENE MORAA MOSETI

The above subject refers.

Your request to carry out research on **"Strategies for the Management of Scholarly Content in Kenyan Universities,"** at Kenyatta University has been approved.

On completion of your research, you are expected to submit a hard and a soft copy of your research report/thesis to our University Library and the Institute for Research Science and Technology.

Please liaise with the Director, Institute for Research Science & Technology before commencing data collection for further guidance.

Thank you.

PROF. JOHN OKUMU
DEPUTY VICE-CHANCELLOR (ACADEMIC)

c.c. Vice-Chancellor

JO/jww

APPENDIX 17: REQUEST TO UNDERTAKE RESEARCH - EGERTON UNIVERSITY

Irene Moraa Moseti,
School of Information Sciences,
Moi University,
P.O. Box 3900-30100,
Eldoret
Cell: 0721 735 456
E-mail: irenemorara@gmail.com
29/10/13

The Director, Research and Extension
Egerton University,
P.O. Box 536-20115,
Egerton- Njoro,
Kenya.

Dear Sir/Madam,

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT EGERTON UNIVERSITY

I am a PhD student currently enrolled at the School of Social Sciences, University of Kwa-Zulu Natal in South Africa and currently affiliated to Moi University, Eldoret. I am conducting a study on the *Strategies for the Management of Scholarly Content in Kenyan Universities,* and have selected Egerton University as one of my case studies. The aim of the study is to investigate how the scholarly communication process is currently managed in Kenyan universities. Recommendations will be made on how visibility of research output can be improved to upgrade global visibility of Kenyan scholars.

I will be collecting data using interviews and questionnaires from respondents who are postgraduate students (Masters and PhD), academic staff, the University Librarian, and a Representative of Research Department at Egerton University.

Attached herewith, please find a copy of my research permit issued by the National Commission for Science, Technology and Innovation; my research proposal; and copies of my data collection instruments.

I am kindly requesting that you allow me to conduct research in your institution.

Yours Sincerely,

Irene Moraa Moseti

APPENDIX 18: AUTHORIZATION LETTER - EGERTON UNIVERSITY

EGERTON UNIVERSITY

TEL: 051-2217937 P. O. BOX 536-20115

OFFICE OF THE DIRECTOR, RESEARCH AND EXTENSION

EU/RE/DVC/089 30th October 2013

Irene Moraa Moseti
School of Information Sciences
Moi University
P O Box 3900-30100
ELDORET

Dear Ms. Irene Moseti

RE: PERMISSION TO CARRYOUT RESEARCH AT EGERTON UNIVERSITY

Your letter of 29th October 2013 refers.

You intend to carry out a survey on the "Strategies for Management of Scholarly Content in Kenyan Universities" for your PhD research.

1. Having made the requirements of providing a research permit from the National Commission for Science Technology and Innovation (NACOSTI) that you are permitted to conduct the survey in Egerton University, permission is hereby granted.

2. You are required to present both the research permit and this letter to the Chairman of Department/Head of Section where you will be conducting your survey before conducting your survey.

3. Ensure that you comply with the University's rules, regulations and procedures throughout your survey.

DIRECTOR EGERTON UNIVERSITY P.O. Box 536 EGERTON NJORO RESEARCH & EXTENSION

Prof. Alfred C. Kibor
Director, Research and Extension

Egerton University is ISO 9001:2008 Certified

APPENDIX 19: REQUEST TO UNDERTAKE RESEARCH - JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

Irene Moraa Moseti,
School of Information Sciences,
Moi University,
P.O. Box 3900-30100,
Eldoret
Cell: 0721 735 456
E-mail: irenemorara@gmail.com

06/11/13

The DVC Research, Production & Extension,
Jomo Kenyatta University of Agriculture and Technology,
P.O. Box 62,000 – 00200,
NAIROBI,
KENYA

Dear Madam,

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

I am a PhD student currently enrolled at the School of Social Sciences, University of Kwa-Zulu Natal in South Africa and currently affiliated to Moi University, Eldoret. I am conducting a study on the *Strategies for the Management of Scholarly Content in Kenyan Universities,* and have selected Jomo Kenyatta University of Agriculture and Technology as one of my case studies. The aim of the study is to investigate how the scholarly communication process is currently managed in Kenyan universities. Recommendations will be made on how visibility of research output can be improved to upgrade global visibility of Kenyan scholars.

I will be collecting data using interviews and questionnaires from respondents who are postgraduate students (Masters and PhD), academic staff, the University Librarian, and a Representative of Research Department at Jomo Kenyatta University of Agriculture and Technology.

Attached herewith, please find a copy of my research permit issued by the National Commission for Science, Technology and Innovation; my research proposal; and copies of my data collection instruments.

I am kindly requesting that you allow me to conduct research in your institution.

Yours Sincerely,

Irene Moraa Moseti

APPENDIX 20: AUTHORIZATION LETTER - JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY
P.O.Box 62000 - 00200, Nairobi. Kenya. Tel: 067 - 52181 - 4, 52711. Fax: 067 - 52017
Email: dvc@aa.jkuat.ac.ke
OFFICE OF THE DEPUTY VICE CHANCELLOR (ACADEMIC)

Ref: **JKU/2/003/072**

8th January 2014

Irene Moraa Moseti
School of Information Sciences
Moi University
P.O. Box 3900 30100
ELDORET

Dear Madam,

RE: REQUEST TO CONDUCT RESEARCH

Your letter dated 11th November, 2013 on the above subject refers.

On behalf of Jomo Kenyatta University of Agriculture and Technology, I wish to inform you that the request has been granted on condition that the research findings shall be used solely for academic purposes. Kindly note that the title of your research is and should remain **"Strategies for the Management of Scholarly Content in Kenyan Universities".**

I wish you all the best as you embark on your research.

Yours faithfully

PROF. ROMANUS ODHIAMBO, Ph.D.,
DEPUTY VICE CHANCELLOR ACADEMIC

RO/hak