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## CONTENTS

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# Information and Communication Technology Tools for Managing Indigenous Knowledge in KwaZulu-Natal Province, South Africa

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## Abstract

*This article addresses the use and the types of information and communication technology (ICT) tools that are currently used in the management of indigenous knowledge (IK) in the province of KwaZulu-Natal, South Africa. The theoretical basis of the study was informed by the Knowledge Creation theory (KC) proposed by Ikujiro Nonaka. The study adopted a post-positivist research paradigm to enable multiple perspectives by using both quantitative and qualitative research approaches. A total of 96 copies of the questionnaire designed for this study were administered to ICT users/ beneficiaries; 57 (59%) were returned. Additionally, interviews were conducted with the owners or custodians of IK. Fully, 224 owners or custodians of IK were sampled, while 196 (88%) were interviewed. The study acknowledged the wealth, access to and use of indigenous knowledge in the province. The study found that the advent of ICT tools provides a good platform for managing indigenous knowledge. It was found that a number of tools are currently used to manage indigenous knowledge. However, the number of challenges facing the use of ICTs is not uniform between ICT users/beneficiaries and owners or custodians of IK. Most crucial among ICT users/beneficiaries and owners or custodians of IK was the aspect of access to relevant ICT infrastructure and resources and a lack of digital skills. This study contributes to the current literature and discourse on IKS; it interrogates the applicability and models of knowledge creation theory to IK research; it adds fresh data, information and knowledge on IK research, particularly in South Africa; it and proposes practical solutions to problems of ICT application for IK development.*

**Keywords**: Information and Communication Technology, ICT Tools, Indigenous Knowledge, KwaZulu Natal

## Introduction

The present-day society relies on information and communication technology (ICT) tools to manage intangible and tangible knowledge. ICT has the capacity to support knowledge management through its multiple technologies which combine microelectronics, computer hardware and software, telecommunications, and optoelectronics, such as microprocessors, semiconductors and fibre optics, which enable the processing and the storage of large amounts of information, as well as its rapid dissemination through computer networks (Ngenge, 2003).

It is argued that tacit indigenous knowledge (TIK) needs to be managed because it is at risk of becoming extinct if appropriate measures are not taken to preserve and manage it. For example, indigenous knowledge (IK) is predominantly tacit or embedded in the experiences and/or local knowledge of the community. The literature on indigenous knowledge provides multiple definitions of the concept. For example, the World Bank Group (2004) defines IK as knowledge appropriate to for local

decision-making in agriculture, health, natural resource management, and other activities. It comprises experimental locality-specific knowledge and medicinal practices, as well as healing, hunting, fishing, gathering, agriculture, combat, education and environmental conservation developed by indigenous people over many years (Chisenga, 2002; Ngulube, 2002). Notably, much of indigenous knowledge (IK) is preserved in oral traditions, such as human memories which are gradually disappearing due to loss of memory and death (Dlamini, 2016; Lwoga and Ngulube, 2009) or other forms of brain drain. It is commonly exchanged through personal communication and demonstration and gets transmitted from master to apprentice, from parents to children, and from one neighbour to the other, and so on (Dlamini, 2016; Ngulube, 2002). Based on the views and experiences above, it can be said that, IK is gradually disappearing in most African countries because there are no tangible efforts to recognise or manage it through technology (Lwoga, Ngulube and Stilwell, and 2010). Ngulube (2002) argues that the reason IK is diminishing is because there are no proper mechanisms for capturing, storing, processing, retrieving and disseminating the valuable asset for future generations. It would seem, therefore, that with the advent and the use of ICT tools in the management of IK, the possibility of IK becoming extinct can be minimised or even eliminated

Many studies (e.g. Agrawal, 2002; Ilo 2012) acknowledge that there is a need to access and use information and communication technologies in the management of indigenous knowledge. Much earlier, Nonaka (1994), too, emphasised a need to manage tacit knowledge through technology. The question that arises is: What types of ICT tools are used in the management of IK for the future generations?

Africa uses 80% of its IK for medical purposes (Mahomoodally, 2013; World Health Organisation (WHO), 2003) and yet IK is marginalised (Ocholla, 2007). Marginalisation is a very broad term. Ocholla (2007) defines marginalisation as exclusion, and argues that IK has often been referred to in a negative or derisive manner, with phrases such as "primitive", "backward", "archaic", "out-dated", "pagan" and "barbaric". For example, the World Bank Group (2004) remarks that in the past the scientific community despised traditional knowledge and doubted its credibility or reliability. Thus, scientists tended to dismiss traditional knowledge as subjective, anecdotal and unscientific. However, Mutula (2002) submits that the fact that indigenous knowledge is believed to be knowledge possessed by a person and shared orally does not mean that it is non-essential and can therefore be ignored. He observes that indigenous knowledge continues to suffer from a lack of recognition because of the limited economic self-sufficiency of many traditional communities. To him, the rapid globalisation has awakened many countries and development organisations to the threat of losing IK, and they are putting in place initiatives aimed at preserving and revitalising this valuable resource. Furthermore, it is apparent that globalisation threatens the existence of IK due to a lack of adequate protection for it. A study by Ngulube (2002) acknowledges that indigenous knowledge is diminishing, and argues that there are no proper mechanisms for capturing, storing, processing, retrieving and disseminating indigenous knowledge for future generations. However, the increased exploitation of indigenous knowledge (IK) in alternative medicine, agriculture, sports, culture and business has awakened societies, countries and corporate sectors to the threats of losing IK.

IK, being largely a tacit or an intangible form of knowledge, is easily lost if no proper mechanism is developed for transforming it into explicit/tangible knowledge through capturing, storing, processing, retrieving and disseminating it (Dlamini, 2016). Ngulube and Lwoga (2009) believe that information and communication technologies offer a window of opportunity for emerging nations to harness and utilise IK. They suggest that a need exists for intervention to revive the processes of managing IK for future projects in agriculture, a sector in which IK is very rich. They further recommend that IK be documented and preserved so that it can be available for poverty reduction initiatives before much of it is completely lost. The major challenge is how this can be achieved and what types of ICT tools can be adopted for managing IK for future generations. Would documentation and management of IK be achieved at the source level (e.g. IK holders/owners) or proxy level (IK beneficiaries)? Notably, the rapid development and the utilisation of ICTs in South Africa provide an avenue for technology to improve access to IK. This raises questions concerning the methods and the types of ICT tools that are currently in use for the management (capture, storage,

dissemination and use) of indigenous knowledge in the Province of KwaZulu-Natal and their benefits to society.

## Contextualization

Related studies indicate that most societies, countries and corporate organisations are introducing initiatives aimed at preserving, revitalising and disseminating this valuable resource. For instance, the adoption of an IK policy for the protection of indigenous knowledge has become a top priority in South Africa. As argued by Mosimege (2005), South Africa initiated its IK policy in September, 1996. The adoption of this IK policy was effected by the national cabinet in 2004 (NRF: Framework Document, 2016). According to the Department of Trade and Industry (2008), inter-governmental institutions, such as the United Nations Educational, Scientific and Cultural Organisation (UNESCO), World Intellectual Property Organisation, World Trade Organisation, United Nations Environment Programme and United Nations Conference on Trade and Development, also unlocked discussions on the possibility of safeguarding IK, referred to in the policy as local knowledge (LK). It is widely acknowledged that the protection of IK is necessary because traditional knowledge holders are frequently disadvantaged economically and socially without protection. Furthermore, the country as a whole is also disadvantaged economically if no immediate protection is afforded. Thus, the IK policy is directed against the poaching of local knowledge which is the largest threat (Department of Trade and Industry, 2008).

South Africa has several indigenous knowledge (IK) policy frameworks and institutions that guide the development of indigenous knowledge (IK). These include the Department of Trade and Industry's publications 'The Protection of Indigenous Knowledge through the Intellectual Property System: A Policy Framework (2008)', and 'Innovation Towards a Knowledge-Based Economy: Ten-Year Plan for South Africa (2008-2018)', the Leshiba Arts and Culture Trust's 'Proposed Establishment of a Centre for Indigenous Knowledge and Appropriate Technology (2003)', the National Research Foundation's (NRF) document 'Indigenous Knowledge Systems Knowledge Fields Development (KFD) Framework Document (2014)' National Research Foundation's (NRF) 'Indigenous Knowledge Systems Knowledge Fields Development (KFD) Framework Document (2016)' and the Department of Science and Technology's 'The Bio-Economy Strategy (2013)'.

The IK policy document (2008) has nine main objectives or goals which are summarised as follows: to develop new epistemologies and research methodologies on IKS; to develop, promote and protect IK and IKS; to contribute towards a knowledge economy; to develop new technologies in line with national priorities; to record and document IK and IKS; to document and activate traditional knowledge in a modern development paradigm; to contribute towards a strategy for sustainable living that harnesses, showcases and educates local people in indigenous knowledge and appropriate technology; to identify viable business opportunities that could establish a sustainable economic base for job creation and community upliftment through the application of IK; and to develop and enhance the role IKS plays in eco-tourism as a blend of natural and cultural attractions. It is evident that transformation of IK from tacit knowledge to explicit knowledge through proper documentation and recording systems is emphasised in the policy document, and that ICT is to play a major role to enable such documentation to occur and be more effective.

The protection of IK faces several challenges. For example, not all countries accept the idea that indigenous knowledge should be protected. Developed countries are not in favour of protecting IK because they are the greatest poachers of traditional knowledge (Department of Trade and Industry, 2008). For instance, the Department of Trade and Industry (2008) reports that the United States is not a member of the Convention on Biological Biodiversity (CBD), which promotes the protection of IK through an Intellectual Property (IP) system. In other words, there is international resistance to the protection of IK by some very developed countries.

### Purpose of the Study

The purpose of the study was to examine the use and the types of ICT tools for managing indigenous knowledge in the province of KwaZulu-Natal. The study is a response to the following research questions: What ICT tools are currently used for

recording or capturing IK? What ICT tools are used for storing IK? What ICT tools are used for disseminating IK?

## Conceptualization/Theoretical Model

This study was largely informed by Nonaka's (1994) SECI model/theory known as Knowledge Creation Theory. In this theory, knowledge is generated in a four-way mode, and is transferred and converted based on socialisation, externalisation, combination and internalisation (Nonaka and Takeuchi, 1995). In this context, Knowledge Creation model is highly interactive in generating, sharing, documenting, and transferring knowledge through knowledge management approaches (Lwoga, Ngulube and Stilwell, 2010; Ngulube, 2003). The study adopted knowledge creation model because of the four distinctive interactions between tacit and explicit and vice versa, which could be used to manage tacit knowledge (Nonaka and Takeuchi, 1995). The four key elements show the process of knowledge creation as follows:

1. Socialisation is where tacit-to-tacit knowledge is shared and converted through shared experiences.
2. Externalisation is the process of conversion of tacit knowledge into explicit knowledge.
3. Combination is the process of converting explicit knowledge into more systematic sets of explicit knowledge.
4. Internalisation involves the conversion of explicit knowledge into tacit knowledge, for example, learning by doing (Monika and Takeuchi, 1995).

It is widely acknowledged that knowledge management theories can provide scientific lens and framework for the management of indigenous knowledge (Lwoga, Ngulube and Stilwell, and 2010). In that light, this article uses knowledge creation model because of its notion of promoting the management of tacit knowledge such as indigenous knowledge. It is argued that knowledge creation as a model for knowledge management highlights the likelihood of managing indigenous knowledge using ICT tools (Dlamini, 2016). Research reports by Mosoti and Masheka (2010), for example, sum up the drive to manage knowledge in African culture with an old African proverb that states, "In Africa, when an old man dies, the entire library is burnt." With that notion in mind, knowledge creation has promoted the management of IK by converting it from tacit to explicit knowledge. Notably, knowledge creation demonstrates that socialisation can be used as a tool which commands custodians of IK to share their experiences, skills, intuition, local knowledge and beliefs with people who do not have access to that knowledge, but who may view it to be valuable through conversation and close interaction (Dlamini, 2016). Socialisation in this study is important because it allows and promotes knowledge sharing among communities and organisations for the benefit of all. Ngulube (2003) narrates that in the past, when rural communities wished to remember or celebrate the values of their society, they composed or performed songs, proverbs, myths, poetic forms and oral prose, including folktales and riddles. In this regard, indigenous knowledge was shared and created through cultural roles, such as apprenticeships, initiation rites during adolescence and age set systems. (Lwoga, Ngulube and Stilwell, 2010). The study also took advantage of externalisation as it an important element in the management of IK. For example, externalisation takes place when a person holding tacit knowledge converts it into any secondary form (for example, document or image, or rock painting) where another can retrieve it, even in the absence of a person holding it (Ngulube, 2003; Lwoga, Ngulube and Stilwell, 2010). The study noted that the process of externalisation enables people with different backgrounds to share their tacit knowledge. Interestingly, the process of externalisation minimises lack of trusts and promotes understanding among rural-based and urban- based people, particularly ICT beneficiaries (Dlamini, 2016). It can be said that externalisation was used because it allows the interaction between owners of IK and users of ICTs. For instance, ICT beneficiaries visit owners of IK to observe methods they use in IK, for example, in drying food such as pumpkins, meat, and green vegetables, just to mention a few, for the purpose of capturing, storing and disseminating for future generations (Dlamini, 2016). Interestingly, a study by Ngulube and Lwoga (2007) approves that technological tools can be used to capture, store and make IK accessible. It is argued that one of the advantages of using technology to manage IK is that

it facilitates the presentation of knowledge in databases and documents (Ngulube and Lwoga, 2007).

The third key element in the management of IK is combination. It is used to exchange from explicit knowledge to explicit knowledge (Ngulube, 2003; Nonaka, 1997). It is argued that a secondary form of knowledge is used to make another secondary form of knowledge (Ngulube, 2003). Lwoga, Ngulube and Stilwell (2010) provide the example of traditional farmers sharing their explicit knowledge with others through village meetings, group interactions, documents, and ICTs, such as cell phones and emails. In that regard, ICT tools are innovations that can work interchangeably with owners or custodians of IK in storing and transmitting valuable information which is IK. In addition, individuals' perceptions of ICT tools have been found to play a pivotal role in how IK is managed (Dlamini, 2016). For instance, Chisenga (1999) is of the view that ICT tools enable Africa to contribute to global information resources by translating indigenous knowledge into web content. A study by Le Roux (2003) concludes that the Internet is considered pivotal for communicating and preserving of indigenous knowledge. Lastly, internalisation is widely accepted as one of the important elements in knowledge creation theory. For example, Ngulube (2003) posits that internalisation occurs when external knowledge from documents, databases and artifacts is used to create new knowledge inside a person that can also be transferred to others. In that regard, internalisation is crucial for learning by doing, where shared bodies of knowledge are internalised (Nonaka, 1994). Dlamini (2016) adds that internalisation allows any person interested in the use of IK to learn by doing. This means that if users acquire certain knowledge from the beneficiaries of IK, they are unwittingly drawn to take part in any activity. For instance, local people perform their traditional dance, while others observe and join them once they master their style. One of the advantages of internalisation, as indicated by Ngulube (2003), is that it ensures that explicit knowledge does not become obsolete and irrelevant.

## Methodology

The study adopted a post-positivist research paradigm to enable multiple perspectives. Both quantitative and qualitative research approaches were used during a single phase of data collection. Quantitative data was gathered by the survey method involving self-administered questionnaires among ICT users/beneficiaries. The qualitative data was gathered by both survey and qualitative content analysis, largely through open-ended questions, which were embedded in the semi-structured interviews held with owners or custodians of IK. In-depth literature review and document analysis formed part of the qualitative content analysis. Because the province of KwaZulu-Natal is too large, the study used cluster sampling which is appropriate for such a province. Notably, the province of KwaZulu-Natal is divided into districts. The districts with high infrastructure are considered urban while those with low infrastructure are considered rural. The districts with high infrastructure are Metropolitan Municipality in Durban and Umgungundlovu District Municipality in Pietermaritzburg. Districts municipalities which were considered rural included: Zululand District Municipality (Lundi), Umkhanyakude District Municipality (Mkhuze), Ugu District Municipality (Port Shapstone), Sisonke District Municipality (Ixopo/ Kokstad), iLembe District Municipality (Kwa Dukuza/ Stanger), Umzinyathi District Municipality (Dundee), Uthukela (Ladysmith), and Amajuba District Municipality (Newcastle).

The study also took advantage of purposive and snowball sampling which are effective when the exact type of participants to be involved in the study is not known. The sample for the study was drawn from ICT users/beneficiaries and owners or custodians of indigenous knowledge (IK) in the province of KwaZulu-Natal. Notably, the ICT users/ beneficiaries consisted of researchers, information specialists and/or librarians, academic staff, students and/or trainees in the field of IK; cultural officers, IK recorders, IK documentation centre managers, journalists, and artisans. Respondents who are owners or custodians of IK consisted of traditional healers, diviners and herbalists, traditional farmers, traditional musicians, rural artisans, community elders, traditional midwives, rainmakers, chiefs, traditional food specialists, and storytellers as profiled in Table 1.

**Table 1: Demographic Profile of the Respondents**

| Demographic data of ICT users/beneficiaries and owners/custodians of IK | | | | |
|---|---|---|---|---|
| **Variables** | **ICT users/beneficiaries** | | **Owners/custodians of IK** | |
| | **F** | **%** | **F** | **%** |
| **Gender** | | | | |
| Female | 30 | 52.6 | 100 | 51 |
| Male | 27 | 47.4 | 96 | 48.9 |
| **Total** | **57** | **100%** | **196** | **100%** |
| **Age** | | | | |
| 31-40yrs | 31 | 54 | 54 | 27.5 |
| 21-30yrs | 15 | 26 | 11 | 5.6 |
| 41yrs and above | 11 | 19 | 121 | 61.6 |
| 18-20yrs | 0 | 0 | 10 | 5 |
| **Total** | **57** | **100%** | **196** | **100%** |
| **Status** | | | | |
| Researcher | 14 | 24.5 | 0 | 0 |
| Information librarian | 10 | 17.5 | 0 | 0 |
| Field worker | 8 | 14 | 0 | 0 |
| IK recorder | 8 | 14 | 0 | 0 |
| IK consultant | 6 | 10.5 | 0 | 0 |
| IK documentation centre manager | 4 | 7 | 0 | 0 |
| IK coordinator | 3 | 5 | 0 | 0 |
| Cultural officer | 2 | 3.5 | 0 | 0 |
| Government employee | 1 | 1.7 | 0 | 0 |
| Collections officer | 1 | 1.7 | 0 | 0 |
| Owner of IK | 0 | 0 | 196 | 100 |
| **Total** | **57** | **100** | **196** | **100** |

The study employed largely non-probability sampling where cluster, snowball and purposive sampling techniques were used at different stages to select the respondents. A total of 96 copies of the questionnaire were administered to ICT users/ beneficiaries; 57 (59%) were returned. Additionally, interviews were conducted with the owners or the custodians of IK. A total of 224 owners or the custodians of IK were sampled; however, 196 (88%) were interviewed. The quantitative data aspect from the ICT users/beneficiaries of the study was analysed using the Statistical Package for the Social Science (SPSS). This paper reports part of the study based on quantitative data analysis.

## Results and Discussions

The findings of the study are reported by themes derived from the research objectives below.

**ICT Tool(s) Currently Available for Recording, Storing and Disseminating IK**

It was important for the study to identify the types ICT of tools used for managing IK. ICT users/ beneficiaries (the two concepts will be used interchangeably) largely use ICT tools for managing indigenous knowledge, whereas a large number of owners and/or custodians of IK do not. Notably, only 62 (32%) of owners of IK used ICT tools to manage IK (Table 2) in this sample.

**Table 2: ICT Tools Used for Recording and Capturing Indigenous Knowledge**

| Variables | ICT users/beneficiaries 57 | | Owners and/or custodians of IK 62 | |
|---|---|---|---|---|
| | Frequency | % | Frequency | Percentage % |
| Video/camera | 52 | 91 | 13 | 20 |
| Video/recording/filming | 39 | 68 | 0 | 0 |
| Tape/sound recording | 37 | 64.9 | 0 | 0 |
| Cell phone recording | 34 | 59.6 | 49 | 79 |

The study found that most ICT users and some owners or custodians (the two concepts are used interchangeably) of IK use ICT tools for recording or capturing purposes. Additionally, even though a large number of owners of IK do not use ICT tools to manage IK, 62 (32%) still use them. It was noted that a lack of awareness, culture, skills and financial constraints may also have contributed to ICT tools not being used in managing IK. These findings were corroborated by Nonaka (1994) who was of the view that KM models such as Knowledge Creation should be applied in managing tacit knowledge through technology. Thus, Nonaka and Takeuchi's (1995) observation was that externalisation and combination is very effective in this process. The importance of using ICTs to manage indigenous knowledge is also seen as a remedy in the present-day society (Oppenneer 2010:3; Molawa 2009; Adam 2007; Akinde 2007).

The findings showed that some ICT tools are used by owners of IK and some by ICT beneficiaries for recording or capturing IK. Cell phones and digital cameras are largely used by owners of IK, while ICT beneficiaries use multiple tools for recording or capturing IK. A study by Lwoga (2009) concurs that cell phones and digital photographs have been used to capture IK. Other related studies (Adetoun, 2007: and Fogwill, *et al.* 2011; Christie, 2005; Ilo, 2012; and Okore, Ekere and Eke, 2009) have reported that the use of digital film/video cameras to record and/or capture IK is one of the most effective ways to ensure the availability of indigenous knowledge on ICT tools. Similarly, Ilo (2012) noted that video cameras have become vital tools used to capture different forms of art and other physical objects. Chista (2011) and Kargbo (2005) observed that tape recorders are also used in capturing traditional knowledge in agricultural environments. The recording system has recently improved with the use of modern mobile phones for both photo and video recordings. The views of these authors reinforce the possibility of managing IK using new technologies.

Studies by Ilo (2012), Flor (2013), Owiny, Mehta and Maretzki (2014) acknowledge that mobile phones are a vital tool for capturing knowledge. We have established that these devices are used in multifarious ways, such as: to record music, stories, tales and idioms, all of which constitute an integral part of tacit indigenous knowledge. Contrary to this enthusiasm, Oppenneer (2010) argues that ICT tools are in fact ill-equipped to manage IK successfully, because not all IK is "capturable". This sentiment is shared by other authors, such as Semali and Kincheloe (1999), whose viewpoint is that the design of ICTs does not accommodate IK. The literature suggests that there are challenges faced in the management of IK through ICTs. For example, a looming challenge involved in using ICTs for cultural preservation and revitalisation is the reality of obsolescence (Oppenneer, 2010).

**Table 3: ICT Tool(s) Used for Storing or Preserving IK**

| Variables | ICT users/beneficiaries 57 | | Owners and/or custodians of IK 62 | |
|---|---|---|---|---|
| | Frequency | % | Frequency | % |
| Computer | 57 | 100 | 0 | 0 |
| Internet (e.g. Facebook, YouTube, Google Docs, Twitter, etc.) | 42 | 73.6 | 0 | 0 |
| USB | 40 | 70 | 0 | 0 |
| DVDs | 38 | 66.6 | 42 | 67.7 |
| E-mail | 31 | 54 | 0 | 0 |
| CD | 0 | 0 | 31 | 50 |
| Cell phone | 16 | 28 | 14 | 22.5 |
| Tape/voice recorder | 12 | 21 | 0 | 0 |
| Video/digital camera | 6 | 10.5 | 0 | 0 |

**Table 4: ICT Tool(s) Used for Disseminating IK**

| Variables | ICT users/beneficiaries 57 | | Owners and/or custodians of IK 62 | |
|---|---|---|---|---|
| | Frequency | % | Frequency | % |
| Internet (e.g. YouTube, Facebook, Twitter, databases, etc.) | 57 | 100 | 0 | 0 |
| Cell phone | 37 | 65 | 49 | 79 |
| DVDs | 0 | 0 | 41 | 66 |
| CD | 0 | 0 | 21 | 34 |
| Telephone | 19 | 33 | 12 | 19 |
| Laptop | 0 | 0 | 9 | 14.5 |
| Radio | 3 | 5 | 0 | 0 |
| Television | 3 | 5 | 0 | 0 |
| E-mails | 1 | 1.7 | 0 | 0 |

The findings of the study indicate that ICT tools are used by ICT beneficiaries and owners of IK to store or preserve (Table 3) and disseminate tacit indigenous knowledge (Table 4). It is evident that some ICT tools can perform multipurpose tasks. These ICT tools include the Internet, e-mails, CDs and cell phones. The findings indicate that the Internet (social media, search engines, etc.) is predominant multipurpose tool for storing and disseminating IK among ICT users, while DVD a is the most predominant multipurpose tool for storing and disseminating IK among IK owners. The effectiveness of the Internet for enabling access to and the use of documented knowledge is indisputable.

It has been used for storage, retrieval, dissemination, sharing and access of knowledge quite successfully. The findings of the study are in line with the findings of Nonaka (1994) who reported that it is possible to store and disseminate tacit knowledge through technology. Websites like YouTube allow users to upload, share, and view videos anywhere in the world. Facebook is another tool that most individuals use to post video messages, share their interests, make connections, and join groups with similar interests (Essoungou, 2011). Twitter is also used by businesses and farming communities to broadcast their merchandise or commodities for sale, check prices and interact with customers and suppliers (Owiny, Mehta and Maretzki, 2014). A study by Owiny, Mehta and Maretzki (2014) highlighted that information on growing and marketing local indigenous vegetables is normally featured on local radio programmes, using the language of the area.

The study also showed that there are some ICT tools in managing IK, which include computers, USBs, tape/voice recorders, and video/digital cameras. Computers were the predominant tools used by ICT beneficiaries to store or preserve IK, as was also confirmed in related studies (Ilo, 2012).

**Table 5: Effectiveness of ICT Tools Used in Recording or Capturing IK**

| Types of ICT tools | Very effective | | Effective | | Less effective | | Not effective | |
|---|---|---|---|---|---|---|---|---|
| | ***F*** | ***%*** | ***F*** | ***%*** | ***F*** | ***%*** | ***F*** | ***%*** |
| Video/camera | 39 | 68 | 19 | 33 | nil | nil | Nil | Nil |
| Video/recording/filming | 34 | 59.6 | 19 | 33 | 4 | 7 | Nil | Nil |
| Cell phone recording | 9 | 15.7 | 28 | 49 | 18 | 31.5 | 2 | 3.5 |
| Tape/voice recording | 24 | 42 | 28 | 49 | 5 | 8.7 | Nil | Nil |

It was established that ICT tools are ranked as effective tools in recording or capturing IK. ICT users revealed that videos/cameras were the predominant tools used to record IK (Table 5). Lwoga (2009) also found that multiple ICT tools are either effective or very effective in disseminating indigenous knowledge. Evidently, these tools are used significantly for recording and filming IK from the custodians of IK in this study, a testament to their effectiveness. Fogwill *et al*, (2011) also reported that using digital film/video cameras to record or capture IK was one of the most effective ways to ensure the availability of IK. Similar studies by Christie (2005) and Okore, Ekere and Eke (2009) show that digital/video cameras are used to record indigenous ceremonies while owners of IK are performing. The literature also illustrated the advantage of using digital cameras, which cannot be quantified. They can be used to record data, later copied onto CD-ROMs, and subsequently viewed using either a computer or via a computer on the Internet (Okore, Ekere and Eke, 2009; Adetoun, 2007). A study by Kargbo (2005) and Chisita (2011) also reported that tape/voice recorders are useful in capturing traditional knowledge in agriculture. The literature showed that tacit indigenous knowledge practices can also be converted to explicit knowledge through the use of ICT tools such as video/camera, video recording/ filming, tape voice recording, and cell phones (Ilo, 2012).

**Table 6: Effectiveness of ICT Tools in Storing or Preserving IK**

| Types of ICT tools | Very effective | | Effective | | Less effective | | Not effective | |
|---|---|---|---|---|---|---|---|---|
| | *F* | *%* | *F* | *%* | *F* | *%* | *F* | *%* |
| Computer | 36 | 63 | 21 | 36.8 | nil | nil | nil | Nil |
| Internet (e.g. You Tube, Facebook, Twitter and Google Docs, Wikis) | 37 | 65 | 20 | 40 | nil | nil | nil | Nil |
| Tape/voice recorder | 30 | 53 | 24 | 42 | 3 | 5 | nil | Nil |
| Video | 19 | 33 | 38 | 66.6 | nil | nil | nil | Nil |
| USB | 19 | 33 | 29 | 50.8 | 7 | 12 | 2 | 3.5 |
| Intranet | 36 | 63 | 21 | 37 | nil | nil | nil | Nil |
| DVDs | 27 | 47 | 30 | 52.6 | nil | nil | nil | Nil |
| Cell phone | 12 | 21 | 24 | 42 | nil | nil | nil | Nil |
| CDs | 22 | 38.5 | 35 | 61 | nil | nil | nil | Nil |
| Film reels | 4 | 7 | 12 | 21 | 25 | 43.8 | 16 | 28 |

It was established that ICT tools are very effective in storing or preserving IK. ICT users pointed out that computers, the Internet (YouTube, Facebook, Twitter and Google Docs, Wikis), video, television, and radio are highly effective tools in storing or preserving IK. Notably, other ICT tools, such as intranets and mobile phones are also effective.

**Table 7: Effectiveness of ICT Tools in Disseminating IK**

| Types of ICT tools | Very effective | | Effective | | Less effective | | Not effective | |
|---|---|---|---|---|---|---|---|---|
| | *F* | *%* | *F* | *%* | *F* | *%* | *F* | *%* |
| Internet (i.e. You Tube, Facebook, Twitter, etc.) | 40 | 70 | 17 | 29.8 | nil | Nil | nil | nil |
| Computer | 37 | 64.9 | 20 | 35 | nil | Nil | nil | nil |
| Video | 28 | 49 | 29 | 50.8 | nil | Nil | nil | nil |
| Intranet | 17 | 29.8 | 30 | 52.6 | 10 | 17.5 | nil | nil |
| Television | 32 | 56 | 25 | 43.8 | nil | Nil | nil | nil |
| Radio | 36 | 63 | 21 | 37 | nil | Nil | nil | nil |
| Cell phones | 13 | 22.8 | 32 | 56 | 12 | 21 | nil | nil |
| Film reels | 4 | 7 | 8 | 14 | 44 | 77 | 1 | 1.7 |

We consider effectiveness as the extent to which ICT tools used to disseminate IK and reach a targeted or intended audience. It was established that ICT tools are generally effective in disseminating indigenous knowledge. The most highly cited ICT tools in disseminating indigenous knowledge were the Internet (i.e. YouTube, Twitter, Facebook, Google Docs, etc.), computers, video, television and radio (Tables 6 and 7). Other very effective ICT tools for disseminating IK were intranets and mobile phones. Le Roux (2003) and Tihapi (2004) also mention that the use of the Internet in disseminating IK is crucial and that it does not only disseminate but also communicates and preserves IK. Internet connectivity is used to promote awareness and appreciation of IK nationwide (Lor, 2004).

**Table 8: Passing Indigenous Knowledge (IK) by Word of Mouth or Storing it on ICT Tools**

| Variables | Frequency | Percentage % |
|---|---|---|
| Strongly agree | 18 | 31.5 |
| Agree | 2 | 3.5 |
| Strongly disagree | 21 | 36.8 |
| Disagree | 16 | 28 |
| Undecided | Nil | Nil |
| **Total** | **57** | **100** |

The study has established that the use of ICT tools is preferred for use in passing and storing by word of mouth in the transmission of IK. ICT users attested to storing and transmitting tacit indigenous knowledge through ICT tools, while a minority preferred word of mouth (Table 8).

The study identified various reasons why indigenous knowledge should be managed through ICT tools. ICT tools transmit IK globally, while word of mouth is limited to regions where custodians of IK live; young people no longer have an interest in IK as they consider it old-fashioned; and the numbers of holders of the knowledge are diminishing, due to old age and incurable diseases, threatening the continued existence of the knowledge; it would die with them. Various literature sources support the findings of the study. For example, Nonaka and Takeuchi (1995:31) approves and encourages the use of ICT tools to manage IK. Mosoti and Masheka (2010:111) support this by citing an old African proverb alluded to at the beginning of this article." We did not underestimate the suggestions from a minority of ICT beneficiaries supporting the use of word of mouth to transmit IK.

### Problems Encountered in the Availability and Use of ICTs in Preserving and Disseminating Indigenous Knowledge

In this section, we discuss problems encountered by ICT users and owners of IK in the use and availability of ICT tools (Table 9).

**Table 9: Challenges Encountered in the Use and Availability of ICT Tools in Managing IK**

| | ICT Users/beneficiaries 57 | | Owners and/or custodians of IK 62 | |
|---|---|---|---|---|
| | F | % | F | % |
| Low battery (lack of electricity to charge cell phones and digital cameras) | 29 | 56 | 32 | 51.6 |
| Lack of digital skills to capture and store quality data | 22 | 42 | 47 | 75.8 |
| Recorded data sometimes gets lost | 14 | 27 | | |
| Memory of ICT tools too small to contain recorded data | 8 | 15 | 38 | 61 |
| ICT tools like digital cameras are sensitive to being carried and are affected by dust over long distances | 4 | 7.6 | 0 | 0 |
| Some ICT tools have viruses | 3 | 5.7 | 0 | 0 |
| USB memory sticks get lost in many cases | 2 | 3.8 | | |
| Some cell phones and digital cameras are complicated to operate | 0 | 0 | 21 | 33.8 |
| ICT tool manuals are written in English, thus instructions are difficult to understand | 0 | 0 | 17 | 27 |

**Table 10: Challenges Related to the Unavailability of ICT Tools in Managing IK**

| | ICT Users/beneficiaries 57 | | Owners and/or custodians of IK 62 | |
|---|---|---|---|---|
| | F | % | F | % |
| ICT tools are expensive to purchase | 15 | 37.5 | 62 | 100 |
| Poor networks in rural communities | 0 | 0 | 47 | 75.8 |
| Lack of electricity in rural areas | 0 | 0 | 41 | 66 |
| Lack of awareness of proper tools to record and store IK | 0 | 0 | 41 | 66 |
| Poor infrastructure | 0 | 0 | 37 | 59.6 |
| ICT tools are expensive to maintain | 15 | 37.5 | 0 | 0 |
| ICT tools are in short supply, therefore we keep borrowing | 12 | 30 | 0 | 0 |
| Batteries are few and shared among us | 6 | 15 | 21 | 34 |
| There is no budget for ICTs | 6 | 15 | 0 | 0 |
| We do have Internet access and computers | 2 | 5 | 0 | 0 |

The study established that there are problems encountered by ICT users and custodians of IK which are related to the un-availability of ICT tools to manage IK (Table 10). The problems were identified as: ICT tools being expensive to purchase and maintain; a lack of awareness of proper tools; lack of electricity in the community; poor networks in the community; the fact that some ICT tools are shared among many IK recorders, etc.

## Conclusion and Recommendations

This study confirms that ICT can be used to manage IK, while also acknowledging skeptics (Oppenneer, 2010; Semali and Kincheloe, 1999) who find them ill-equipped to manage IK. The study recognised Nonaka's (1994) knowledge creation model which supports the management of IK through ICT tools. Evidently, ICT tools are used relatively more frequently by ICT beneficiaries (57; 100%) than by owners of IK (62; 32%). We assume that IK beneficiaries (e.g. researchers, tourists) are expected to use ICT more than IK owners because the former are more aware of ICT benefits and access them relatively easily due largely to their economic status and understanding of their requirements. The use of mobile and other modern voice and image recording systems such as digital cameras seems prevalent. Mobile phones have become an appropriate technology in many social environments that were deprived of telephones; their use for multiple purposes and with increasing access makes them the most appropriate technology for enabling IK access, dissemination and use in many communities in Africa. As noted in Table 5, the Internet and mobile phones play a crucial role in IK dissemination. Reviewed literature in this paper concurs and indicates the increasing use of social media platforms (e.g. Facebook, YouTube and Twitter). This study did not obtain details on the depth and breadth of the use of social media for IK management, but has noted it for further research. It was noted that DVDs are used mostly by IK owners to store, preserve and disseminate IK. The use of multifunctional ICT tools (e.g. computers, mobile phones, the Internet, recording devices) seems to be popular among both ICT beneficiaries and IK owners, although IK beneficiaries use computers and ultimately the Internet most. They (ICT beneficiaries), as was noted, have economic and intellectual advantages and are able to use more sophisticated ICT tools and services. We note that ICT tools are effective in all stages and processes of IK management. The mobile phones, the Internet, modern data recording and storage devices (e.g. digital technology) play a significant role in enabling ICT impact for IK management. The study recognises that several challenges (see Table10; 11) accompany ICT applications. Among them, emerging from this study, is a lack of ICT literacy, e.g. digital skills, computer literacy, media literacy, information literacy; economic drawbacks, e.g. the affordability and sustainability of the technology; systemic limitations of the gadgets (hardware maintenance, software issues) memory, security, access; language of the technology (largely English and does not accommodate local languages; poor networks).

Using ICT for indigenous knowledge management is a relatively broad area of study; therefore, gaps in specific areas (e.g. the Internet, social media, and digitisation) are to be expected and require attention. ICT awareness (e.g. through workshops) among ICT owners is crucial for them to effectively access and use the technologies. Such workshops could be organized (stemming from this study and related studies) as part of a community outreach. Unlike other ICT tools, mobile phones seem to be used most (Table 2, 3, 4 and 5) by owners of IK which is reasonable and sustainable. The application of ICTs in low access and usage areas should be investigated and training provided to enhance access.

This study recommends that because technology changes rapidly, there is an urgent need to manage IK with what is available rather than waiting for proper devices. In that regard, the following needs should be considered:

- Government and NGOs should adopt community-based resource centres that can enhance the flow of IK;
- There is an urgent need to apply readily available traditional and modern technologies that respond to local culture; and
- Focus should be on tools that promote oral interaction such as audio-visual technologies.

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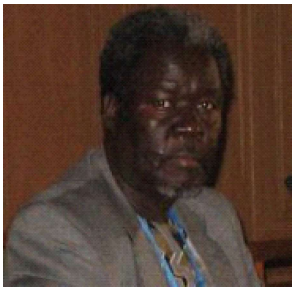

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# Towards a Uniform Terminology for Indigenous Knowledge Concepts: Informetrics Perspectives

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## Abstract

*The knowledge of the traditional and indigenous communities (herein referred to as indigenous knowledge) lacks a uniform label or definition as there are several labels that have been used to describe the knowledge. The purpose of this study is to explore and identify the most influential label of the indigenous knowledge so as to identify the most influential label. To achieve the aforementioned objective, the study sought to: (a) find out the most cited label; and (b) determine the citation impact of various labels through the determination of the h-index, average citations per paper and the number of authors per paper. The study focused on citations analysis and used Google Scholar as the source of relevant data. The Publish or Perish software was used to extract relevant data from Google Scholar. Results indicate that local knowledge (LK) is the most cited label, followed by indigenous knowledge (IK), traditional knowledge (TK), and traditional ecological knowledge (TEK). In terms of the citation impact, measured by average citations per paper, TEK had the highest impact, followed by rural people's knowledge (RPK) and local knowledge (LK). These mixed patterns of citedness of the literature published on indigenous knowledge implies that there is no outright winner among the labels although we can safely say that there are four core labels with which indigenous knowledge can be known. Further study, using a content analysis technique, is recommended to explore patterns that may validate or invalidate the findings of the current study, thereby leading to a more concrete conclusion on a uniform label that can be used to describe indigenous knowledge. In addition, we recommend further research to investigate the usage of the various labels by geographic regions, disciplines and other fields of knowledge to find out if differences do exist.*

**Keywords**: Indigenous Knowledge, Local Knowledge, Traditional Knowledge, Citation Analysis, Bibliometrics, Informetrics

## Introduction

According to Sandstrom (2009), the essence of research and the main reason why researchers conduct research is to produce 'new knowledge'. Once the research has been conducted, the empirical results are often published as journal articles, papers in peer-reviewed proceedings, books or technical reports, just to name a few. As Sandstrom (2009) observes, "scientific and technical literature is the

constituent manifestation of that knowledge and it can be considered an obligation for the researcher to publish their results, especially if the public sector funding is involved." The author further argues that because the published research undergoes extensive peer-review process (quality control) prior to its publication, the research can be used. Otherwise, any researcher who "choose not to use these resources may seem to be very aside of the international research community" (Sandstrom, 2009). It is assumed that researchers, who find a particular published research important and relevant to their research, would acknowledge those resources by way of citing them.

There is an assumption that researchers cite previously published papers because they find them to be relevant and important for their research. Underscoring the relationship between *importance* of any given research and its *citedness*, Sandstrom (2009) opines thus: "because authors cite earlier work in order to substantiate particular points in their own work, the citation of a scientific paper is an indication of the importance the community attaches to the research". But the same author warns that the use of bibliometric indicators [in research evaluations] requires far greater watchfulness when applied to a research group or an individual than for a general description of science at the country or university level. Citing Martin, Aragon (2013) states thus "the impact of a publication describes its *actual* influence on surrounding research activities at a given time. While this will depend partly on its importance, it may also be affected by such factors as the location of the author, and the prestige, language, and availability, of the publishing journal."

Diodato (1994) defines *importance* as the tendency of a document or author to be cited by other documents or authors. He further explains that the measurement of importance through the counting of citations is based on the assumption that more important documents or authors get cited than do the less important ones. An importance index, according to Diodato (1994), measures the relative importance of one journal among a group of journals in a given subject area. He notes that the basic evidence of importance is how often articles in the journal cite and are cited. Importance and influence are two terms that are sometimes used interchangeably in bibliometrics. Diodato (1994) sees influence as the "tendency of an author, document, or journal to be cited by another author, document, or journal" whereby the "cited item is said to have influence over the citing item", which implies that the citing item has "receptivity for the cited item". This view is held by MacRoberts and MacRobers (2010: 2) who observe that, "when it is evident in the text that an author makes use of another's work, either directly or through secondary sources, he or she has been influenced by that work." Diodato (1994) likens influence to impact, impact factor, and importance.

**Diversity of Indigenous Knowledge**

Indigenous knowledge has been cited as one of the most diverse of knowledge and/or knowledge systems (see Kok, 2005; Dekens, 2007). Dekens (2007) has provided a synopsis of the different *types of local knowledge* (herein interchangeably used with *indigenous knowledge*) in order to explain the diversity of IK. The types of local knowledge, according to Dekens (2007), include *local technical knowledge, environmental and agricultural knowledge,* and *socialcultural and historical knowledge*. The diversity of IK has also been expressed in terms of the numerous labels used to describe the concept or subject domain, as well as the various sometimes-different definitions (see Ngulube and Onyancha, 2011; Njiraine, Ocholla and Le Roux, 2009). *Indigenous knowledge* has evolved over time to an extent that it is now known by several labels (Ngulube and Onyancha, 2011; Njiraine, Ocholla and Le Roux, 2009). For instance, Ngulube and Onyancha (2011) identified 17 labels that are used to refer to *indigenous knowledge*. The use of different labels to refer to a concept has divided scholars. It has also been observed that despite *indigenous knowledge* coming into play in the early 1980s, most indexing and retrieval tools still do not have *indigenous knowledge* or its related terms as indexing terms in their thesauri. Attempts, however, have been made to classify indigenous knowledge and its related concepts (see Longacre, 2003; Mearns, 2006; World Bank Group, 2000). Nevertheless, the classification systems that have attempted to classify IK have not been able to bring divergent voices on IK together. The classification systems are also limited to specific and narrow applications. It is therefore difficult for information

managers and information users to effectively organise and/or retrieve information related to *indigenous knowledge*. The limitations of these classification systems can be attributed to several factors. First, Dekens (2007) has observed that the various classifications of local knowledge are only a partial indication of the complexities and diversity of different modes of knowing by communities, households, and individuals. Not only is IK diverse in the labels used to describe and define the concept, but also in its application. Second, scholars such as Agrawal (2002), Batiste (2005) and Kaya and Seleti (2006) argue that the constraints of creating knowledge organisation systems and databases capable of covering indigenous knowledge lie in their Western knowledge systems foundations, thanks to educational systems adopted by indigenous communities to the detriment of their own. The main concern expressed by the aforementioned scholars is that the Western rooted knowledge organisation systems do not embrace the contextual, dynamic, holistic and harmonious nature of indigenous knowledge such that often the used terms or information used to describe it compromises it to the extent of the loss of its uniqueness among others.

### Research Problem and Purpose of the Study

The diversity of IK described above sets the tone for an investigation of the terms or labels used to describe *indigenous knowledge*. As Dekens puts it, a diversity of local knowledge exists and that most of it remains untapped. Ngulube and Onyancha (2011) have conducted a study using a publications count method and revealed that the terms *local knowledge (LK)* and *traditional knowledge (TK)* are increasingly becoming popular labels as opposed to the term *indigenous knowledge*. It was found that some labels such as marginalised people's knowledge (MPK) and defeated knowledge (DK), although they were identified as labels that are used to refer to *indigenous knowledge*, did not yield any paper in Google Scholar. Other labels that were lowly ranked in terms of the number of papers addressing the specific label include subjugated knowledge (SBK) and endogenous knowledge (EK). Whereas research output (i.e. publications count) on a specific topic may imply the popularity of such a topic, the impact, influence or importance (measured through citation analysis) is seen as another way of measuring the popularity of a label. As a result, this paper adopts a similar approach as Ngulube and Onyancha's (2011) and seeks to find out the most preferred label for *indigenous knowledge*, using citations count as an indicator, with a view to determining the terms that can be used to index as well as retrieve information on *indigenous knowledge*.

In view of the above broad purpose, the study seeks to:

- Determine the citation frequency of each label per year
- To find out the label in which the most cited papers belong
- To identify the label with the highest citation impact
- To map the trend of citations per label over time.

## Methods and Materials

As mentioned above, this study adopted a citation analysis approach to investigate the most preferred label for *indigenous knowledge*. A citation is simply defined as an acknowledgement that one document receives from another (Diodato 1994; Smith 1981). Although citation analysis techniques are usually conducted to find out, among others, the most influential researchers/authors, journals, articles, institutions and countries in a given field of study/ research or discipline using different measurements such as number of citations, average citations, h-index and g-index (Diodato, 1994:33), we argue that the same approach can be used to identify the most influential label for *indigenous knowledge*. We opine that a label that receives most citations is likely to be the most influential or preferred among scholars.

Google Scholar was used in this study for purposes of comparing labels as opposed to using it as a tool for evaluating research performance of individuals, institutions, nor countries. A comparative study, such as the current one, might not be affected by the limitations that have been enumerated by various writers. Nevertheless, we laboured to minimise any errors that might have emanated from the limitations of Google Scholar by cleaning the data,

e.g. removal of non-English and irrelevant titles. We believe that citations to labels may be an indicator of a label's popularity, irrespective of the database used as a data source. We have also noted several strengths of Google Scholar which make it a relatively reliable source of data (see Meho and Yang ,nd; Onyancha and Ocholla, 2009; Mikki, 2010; Mingers and Lipitakis, 2010; Franceschet, 2010; Abrizah, Zainab, Kiran and Raj, 2012; and Aguillo, 2012).

In order to retrieve relevant data for the study, 17 labels were obtained from Ngulube and Onyancha's (2011) study as reflected in Table 1. Once the labels were obtained, they were used as search queries to search for the relevant data in Google Scholar using the Publish or Perish software, developed by Anne-Wil Harzing. The software is available at www.harzing.com/pop.htm. The software is meant to retrieve and analyse academic citations. It obtains raw citations from Google Scholar, analyses these citations to generate various citation-based statistics such as number of citations, h-index, g-index, age-weighted citation rate, average citations per paper, author, and year, as well as the number of papers. The searches, using the labels as search terms on the 'general citation search' platform, were limited to the titles of papers. The basis of using titles as the sources of data can be found in Yitzhaki (2002) who notes that:

> *The great importance of titles being highly informative is almost unanimously accepted in literature, assuming that the more informative titles are, the more effectively they serve their functions. The most common measure of title 'informative-ness' has been the number of 'significant' (i.e. non-trivial) words included in it… many information retrieval systems depend heavily on indexing by automated computerized selection of words from article titles.*

**Table 1: Competing Labels for *Indigenous Knowledge***

| No. | Label(s) | Abbreviation/Acronym |
|---|---|---|
| 1 | African indigenous knowledge systems | AIKS |
| 2 | Defeated knowledge(s) | DK |
| 3 | Endogenous knowledge | EK |
| 4 | Ethnobiological knowledge | EBK |
| 5 | Indigenous knowledge | IK |
| 6 | Indigenous knowledge system(s) | IKS |
| 7 | Indigenous technical knowledge | ITK |
| 8 | Local knowledge | LK |
| 9 | Marginalised people's knowledge(s) | MPK |
| 10 | Native knowledge | NK |
| 11 | Rural people's knowledge | RPK |
| 12 | Subjugated knowledge | SK |
| 13 | Subaltern knowledge | SBK |
| 14 | Traditional ecological knowledge | TEK |
| 15 | Traditional knowledge | TK |
| 16 | Traditional science | TS |
| 17 | Traditional wisdom | TW |

(Source: Ngulube and Onyancha, 2011: 135)

The use of titles as sources of data has been widely adopted to conduct bibliometric or informetrics studies (e.g. Tocatlian, 1970; Bird and Knight, 1975; Buxton and Meadows, 1977; Balog, 1979; Yitzhaki, 2002; Lewison and Hartley, 2005; Ball, 2009; Onyancha and Ocholla, 2009b; and Jamali and Nikzad, 2011). The searches were conducted per year of publication to obtain the following statistics which were relevant to the current study's objectives: the number of papers, title of papers, number of citations, average number of citations per paper, h-index, and most cited papers per label during the period (Table 2).

The extracted data was then saved in Microsoft Excel worksheets. The errors (e.g. titles with incomplete bibliographic data, duplicate titles, and parts of titles that were in a different language than English) were removed in the data cleaning process. Data was then analysed using the Microsoft Excel software and UCINET for Windows. Whereas Microsoft Excel was used to compute further statistics to correspond to the objectives of the study, UCINET for Windows was used to obtain the social network of the most common words in the literature of *indigenous knowledge*. The data was largely presented in tables, year by year, so as to show the changes or trend of popularity of one label over the other(s).

**Table 2: Total Number of Papers per Label, 1991-2012**

| | 1991-1992 | 1993-1994 | 1995-1996 | 1997-1998 | 1999-2000 | 2001-2002 | 2003-2004 | 2005-2006 | 2007-2008 | 2009-2010 | 2011-2012 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IK | 94 | 183 | 240 | 238 | 363 | 375 | 457 | 490 | 535 | 520 | 489 | 3984 |
| TK | 23 | 67 | 57 | 100 | 164 | 220 | 375 | 406 | 419 | 499 | 420 | 2750 |
| LK | 49 | 63 | 102 | 144 | 207 | 211 | 297 | 341 | 405 | 353 | 358 | 2530 |
| TEK | 12 | 35 | 17 | 33 | 49 | 47 | 60 | 48 | 69 | 82 | 72 | 524 |
| TW | 3 | 8 | 5 | 12 | 17 | 4 | 18 | 16 | 15 | 17 | 14 | 129 |
| TS | 6 | 7 | 11 | 8 | 14 | 8 | 3 | 8 | 21 | 19 | 10 | 115 |
| ITK | 10 | 8 | 5 | 10 | 10 | 15 | 15 | 15 | 7 | 12 | 6 | 113 |
| IKS | 4 | 4 | 2 | 1 | 6 | 7 | 10 | 5 | 9 | 12 | 8 | 68 |
| NK | 1 | | 5 | 4 | 4 | 4 | 4 | 9 | 9 | 9 | 5 | 54 |
| EK | 1 | 0 | 3 | 4 | 6 | 9 | 2 | 1 | 6 | 5 | 10 | 47 |
| RPK | 13 | 23 | 2 | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 1 | 45 |
| AIKS | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 7 | 8 | 3 | 6 | 30 |
| SK | 1 | 1 | 3 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 5 | 21 |
| EBK | 0 | 2 | 1 | 2 | 4 | 0 | 2 | 0 | 1 | 0 | 2 | 14 |
| SBK | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 4 |
| DK | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MPK | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## Limitations of the Study

The limitations of this study are largely associated with the source of data and the method that was adopted in the study. In the first instance, several authors have observed that Google Scholar has several limitations (e.g. Onyancha and Ocholla, 2009a; Aguillo, 2012), especially in regard to its use in measuring individual performance of scholars or institutions in research. Otherwise, for purposes of conducting a study as the present one, it is safe to use Google Scholar citation statistics. On the other hand, citation analysis, which was adopted to conduct this study, is said to suffer from the following limitations:

- Citations do not reflect actual scientific contribution, e.g. exaggerated self-citation. This implies that the most cited document or, in the case of this study, label may not necessarily mean that it is the most preferred as citations may be exaggerated (Aksnes and Rip 2009). It is however well acknowledged that citations reflect influence of units of analysis, such as authors, institutions, papers.
- The authors take cognisance of the fact that not all of the "labels" researched are necessarily equivalent and therefore their applications in various academic domains (e.g. Library and Information Science, Economics, Anthropology, Medicine, Sociology, Philosophy, etc.) may differ. We also acknowledge that the subdomain of "*indigenous knowledge*" may have its own preferred terminology in some academic domains, and that there may be significant material differences in the volume of published research in the subdomain between parent domains. Despite these domain-based variations of applications of *indigenous knowledge*, we believe that the overall performance of each label in terms of citations may reflect the label's popularity among scholars across disciplines.

## Results and Discussions

The findings of this study are presented and discussed under the following four sub-headings which are drawn from the objectives of the study:

- Number of citations per label per year between 1991 and 2012
- H-index of each label between 1991 and 2012
- Number of average citations per paper between 1991 and 2012
- Citedness of the labels between 1991 and 2012/

### Number of Citations per Label per Year

Table 3 provides the trend of the number of citations of the literature on *indigenous knowledge* between 1991 and 2012. The illustration shows that there is a mixed pattern of citing the literature whereby the number of citations dropped as much as it rose over the years. Except for "LK" which registered a total of 10000 citations between 1999 and 2000, there was no label that exceeded 5000 citations in any given two-year period. In fact, even "LK" did not post a figure beyond 10000 citations in any other given year-period safe for 1999-2000. Generally, only four labels yielded a total of at least 1000 citations in at least one-year period between 1991 and 2012. These are "LK" which posted a total of 32997 citations between 1991 and 2012, followed by "IK" (27939), "TK" (18647), and "traditional ecological knowldedge" (7712). All other labels yielded less than 1000 citations during the period under investigation.

**Table 3: Number of Citations per Label, 1991-2012**

| | 1991-1992 | 1993-1994 | 1995-1996 | 1997-1998 | 1999-2000 | 2001-2002 | 2003-2004 | 2005-2006 | 2007-2008 | 2009-2010 | 2011-2012 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LK | 1001 | 1085 | 2023 | 1720 | 10104 | 3237 | 5710 | 3341 | 2672 | 1533 | 571 | 32997 |
| IK | 1236 | 2642 | 3661 | 3291 | 4376 | 3011 | 2901 | 3001 | 2041 | 1396 | 383 | 27939 |
| TK | 366 | 1163 | 676 | 1157 | 4251 | 2148 | 3255 | 2403 | 1490 | 1291 | 447 | 18647 |
| TEK | 196 | 1054 | 356 | 603 | 2939 | 328 | 894 | 489 | 400 | 348 | 105 | 7712 |
| NK | 4 | 0 | 21 | 58 | 57 | 17 | 2 | 508 | 32 | 9 | 1 | 709 |
| TS | 11 | 3 | 97 | 108 | 128 | 24 | 5 | 36 | 227 | 26 | 15 | 680 |
| RPK | 40 | 576 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 622 |
| TW | 14 | 109 | 3 | 90 | 40 | 13 | 32 | 15 | 16 | 37 | 15 | 384 |
| EK | 2 | 0 | 20 | 143 | 32 | 43 | 4 | 20 | 0 | 6 | 1 | 271 |
| ITK | 73 | 18 | 7 | 35 | 13 | 33 | 13 | 38 | 5 | 11 | 3 | 249 |
| SBK | 107 | 0 | 34 | 21 | 32 | 13 | 0 | 0 | 0 | 23 | 24 | 235 |
| IKS | 34 | 16 | 2 | 0 | 12 | 96 | 5 | 5 | 11 | 51 | 0 | 232 |
| EBK | 0 | 69 | 0 | 10 | 115 | 0 | 0 | 0 | 0 | 0 | 0 | 194 |
| AIKS | 0 | 29 | 0 | 0 | 0 | 0 | 51 | 17 | 34 | 37 | 1 | 169 |
| SK | 0 | 0 | 0 | 0 | 2 | 14 | 0 | 0 | 0 | 1 | 0 | 17 |

## H-Index of Labels of Indigenous Knowledge Literature

Table 4 reveals various h-index values for each label in the period under investigation. Proposed by J.E Hirsch in 2005 (Hirsch, 2005), the h-index gives an estimate of the importance, significance, and broad impact of a scientist's cumulative research contributions. Hirsch defined the h-index thus:

> "*A scientist has an index h if h of his or her Np papers have at least h citations each and (Np – h) papers have less than or equal to h citations each.*"

It therefore follows that the h-index of any given author takes into consideration the number of papers (research output) and citations (research impact) in the measurement of the author's cumulative contributions. The same principle is herein applied to measure the significance or importance of each of the labels used to describe *indigenous knowledge*.

Out of the 17 labels investigated in this study, only four yielded a h-index value that was higher than 10, in at least one two-year period, during the period of investigation, i.e. 1991 to 2012. Generally, as it was the case with the analysis of the total number of citations per label, four labels were ranked at the top in Table 4. An examination of the yearly h-index shows that none of the labels recorded a value beyond 33; a value that was recorded by "IK" in 1999-2000. The second highest h-index, i.e. 32, belonged to "LK" and was recorded in 2005-2006. Other high h-index values for various labels were registered as follows: "LK" (31) in 2003-2004, "IK" (27) in 2003-2004, "TK" (27) in 2003-2004, and "IK" (26) in 2005-2006. A h-index score of 25 was realised as follows: "IK" in 1997-1998 and 2001-2002, "LK" in 1999-2000 and 2001-2002. Three labels, namely "IK", "TK" and "LK" competed for popularity as they scored a h-index value of 9 and above throughout the period of study.

**Table 4: H-Index of each Label per Year**

| | 1991-1992 | 1993-1994 | 1995-1996 | 1997-1998 | 1999-2000 | 2001-2002 | 2003-2004 | 2005-2006 | 2007-2008 | 2009-2010 | 2011-2012 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| IK | 17 | 23 | 22 | 25 | 33 | 25 | 27 | 26 | 20 | 18 | 7 |
| LK | 14 | 18 | 19 | 19 | 25 | 25 | 31 | 32 | 28 | 20 | 10 |
| TK | 9 | 14 | 11 | 16 | 23 | 21 | 27 | 23 | 18 | 17 | 9 |
| TEK | 4 | 10 | 5 | 91 | 15 | 7 | 14 | 12 | 11 | 10 | 5 |
| TS | 2 | 1 | 5 | 2 | 5 | 2 | 2 | 3 | 6 | 3 | 2 |
| TW | 1 | 3 | 1 | 5 | 4 | 3 | 3 | 2 | 3 | 3 | 2 |
| ITK | 3 | 3 | 2 | 4 | 2 | 4 | 2 | 3 | 1 | 2 | 1 |
| NK | 1 | | 2 | 2 | 2 | 2 | 1 | 4 | 3 | 2 | 1 |
| IKS | 2 | 2 | 1 | 0 | 2 | 2 | 1 | 2 | 2 | 4 | 0 |
| EK | 1 | | 2 | 3 | 1 | 3 | 1 | 1 | | 1 | 1 |
| RPK | 4 | 6 | 1 | 0 | 0 | | | 1 | 0 | 0 | 1 |
| AIKS | | 1 | | | | | 3 | 2 | 3 | 2 | 1 |
| SK | 1 | 0 | 2 | 1 | 2 | 2 | 0 | 0 | 0 | 1 | 2 |
| EBK | | 2 | | 2 | 4 | | | | | | |
| SBK | | | | | 1 | 1 | 0 | | | 1 | |

**Average Citations per Paper**

Another measurement that was used to find out the most preferred label was the computation of the average number of citations per paper. The Thomson Reuters (2010) defines the average citations as the mean value, or the quotient obtained by dividing the sum total of citations in the database by the number of citing articles. Lehmann, Jackson and Lautrup (2006) point out that a "scientist's full citation record is summarised by simpler measures, such as average citations per paper, or the recently proposed Hirsch index." The latter has been explained in 4.2 above. Although the two indicators have been largely applied to authors' citation performance or influence and/or journals (Herbertz, 1995; Narin and Hamilton, 1996; Katz and Hicks, 1997; Lehmann, Jackson and Lautrup 2006), we believe that they can be applied to measure the influence of labels. The average citations per paper were obtained by dividing the total number of citations by the total number of papers for each label in each two-year period. Column 13 of Table 5 reflects the average citations per label, calculated as the total number of citations divided by the total number of papers for the entire period of investigation, i.e. 1991-2012. The table reveals that SBK registered the highest average number of citations per paper (i.e. 58.75) between 1991 and 2012, followed by TEK (14.72), EBK (13.86), RPK (13.82), NK (13.13) and LK (13.04), just to name the labels that recorded an average of over 10 citations per paper. An examination of the citation impact of each label per two-year period between 1991 and 2012 shows a mixed pattern whereby the average number of citations rose as they fell. The SK registered the highest frequency of 107.00 citations per paper in 1991-1992. It was, in fact, the only value that surpassed 100 citations per paper. Other high frequencies were recorded as follows: TEK (59.98 in 1999-2000); NK (56.44 in 2005-2006); LK (48.81 in 1999-2000); EK (35.75 in 1997-1998); EBK (34.50 in 1993-1994) and TEK (30.11 in 1993-1994).

**Table 5: Average Citations per Paper, 1991-2012**

| | 1991-1992 | 1993-1994 | 1995-1996 | 1997-1998 | 1999-2000 | 2001-2002 | 2003-2004 | 2005-2006 | 2007-2008 | 2009-2010 | 2011-2012 | Overall |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SBK | - | - | - | - | 2,00 | 14,00 | 0,00 | - | - | 1,00 | - | 58,75 |
| TEK | 16.33 | 30.11 | 20.94 | 18.27 | 59.98 | 6.98 | 14.90 | 10.19 | 5.80 | 4.24 | 1.46 | 14.72 |
| EBK | - | 34.50 | 0.00 | 5.00 | 28.75 | - | 0.00 | - | 0.00 | - | 0.00 | 13.86 |
| RPK | 3.08 | 25.04 | 1.00 | 0.00 | 0.00 | - | - | 1.00 | 0.00 | 0.00 | 2.00 | 13.82 |
| NK | 4.00 | - | 4.20 | 14.50 | 14.25 | 4.25 | 0.50 | 56.44 | 3.56 | 1.00 | 0.20 | 13.13 |
| LK | 20.43 | 17.22 | 19.83 | 11.94 | 48.81 | 15.34 | 19.23 | 9.80 | 6.60 | 4.34 | 1.59 | 13.04 |
| IK | 13.15 | 14.44 | 15.25 | 13.83 | 12.06 | 8.03 | 6.35 | 6.12 | 3.81 | 2.68 | 0.78 | 7.01 |
| TK | 15.91 | 17.36 | 11.86 | 11.57 | 25.92 | 9.76 | 8.68 | 5.92 | 3.56 | 2.59 | 1.06 | 6.78 |
| TS | 1.83 | 0.43 | 8.82 | 13.50 | 9.14 | 3.00 | 1.67 | 4.50 | 10.81 | 1.37 | 1.50 | 5.91 |
| EK | 2.00 | - | 6.67 | 35.75 | 5.33 | 4.78 | 2.00 | 20.00 | 0.00 | 1.20 | 0.10 | 5.77 |
| AIKS | - | 29.00 | - | - | - | - | 4.64 | 2.43 | 4.25 | 12.33 | 0.17 | 5.63 |
| IKS | 8.50 | 4.00 | 1.00 | 0.00 | 2.00 | 13.71 | 0.50 | 1.00 | 1.22 | 4.25 | 0.00 | 3.41 |
| TW | 4.67 | 13.63 | 0.60 | 7.50 | 2.35 | 3.25 | 1.78 | 0.94 | 1.07 | 2.18 | 1.07 | 2.98 |
| ITK | 7.30 | 2.23 | 1.40 | 3.50 | 1.30 | 2.20 | 0.87 | 2.53 | 0.71 | 0.92 | 0.50 | 2.20 |
| SK | 107.00 | 0.00 | 11.33 | 2.00 | 16.00 | 6.50 | - | - | - | 23.00 | 4.80 | 0.81 |

**Cited Versus Uncited Papers**

The citedness (or uncitedness) of a particular unit of analysis (i.e. individual, paper, or journal) is another way of assessing the unit's influence among the peers. Although uncitedness may not necessary imply that the unit of analysis is not influential or popular, it also raises questions about the lack or seldom-citedness of the unit. We take cognisance of the fact that there are several reasons why a particular unit may not receive any citations throughout its lifetime. Glanzel (2003) argues that "analogously to a brand-new device that is not operating satisfactorily, a paper that is never cited can be considered not to give satisfactory performance of its intended function already when it was published." We also argue that if an often-cited paper is seen as being of influence or importance, then a seldom-cited or uncited paper may imply little or no influence or importance, if at all. Glanzel and Moed (2002: 173) argues that among some of the attempts that have been made to improve the impact factor or to develop additional or alternative journal citation measures include the use of the percentage share of uncited papers. Citing Schubert and Glazel (1983) and Moed et al (1999), the authors observe thus:

> *Since one single impact measure might not be sufficient to describe citation characteristics of journals, supplementary indicators have been introduced. The most simple, robust, readily interpretable and reproducible indicator of this type is the share of uncited papers or cited papers respectively* (Glanzel and Moed 2002: 176).

In view of the above, this study used the share of uncited and cited papers to gauge the popularity of the labels given to *indigenous knowledge*. Table 6 provides the number the cited (i.e. *x*) and uncited (i.e. *y*) papers. Table 6 reveals that out of the 3984 papers that were published on *IK*, 2465 (accounting for 61.9%) have been cited at least once while 1519 (i.e. 38.1%) papers have not been cited at all. This pattern was the same for the other most cited labels which, respectively, posted the following results in the order of cited (***x***) and uncited papers (***y***): *TK* (***x*** = 1655 or 60.2%; ***y*** = 1095 or 39.8%); *LK* (*x* = 1531 or 60.5%; *y* = 999 or 39.5%); and *TEK* (*x* = 350 or 66.8%; *y* = 174 or 33.2%). It was noted that some of the labels had fewer cited papers when compared to the uncited papers. These labels are: *TW* (*x* = 64 or 49.6%; y = 65 or 50.4%); *TS* (x = 55 or 47.8%; y = 60 or 52.2%); *IKS* (x = 33 or 48.5%; y = 35 or 51.5%); and *EK* (x = 18 or 38.3%; y = 29 or 61.7%). The other labels yielded more cited papers than uncited papers.

**Table 6: Rank of Labels according to the Number and Percentage Share of Cited and Uncited Papers (Key: X – Cited Papers; Y – Uncited Papers)**

| | *Paper counts* | | | | *Rank (r)* | | | |
|---|---|---|---|---|---|---|---|---|
| | *Total papers* | | *Percentage share* | | *Total papers* | | *Percentage share* | |
| | x | y | x | y | x | y | x | y |
| AIKS | 19 | 11 | 63.3 | 36.7 | 11 | 11 | 6 | 10 |
| EBK | 9 | 5 | 64.3 | 35.7 | 14 | 14 | 5 | 11 |
| EK | 18 | 29 | 38.3 | 61.7 | 12 | 9 | 15 | 1 |
| IK | 2465 | 1519 | 61.9 | 38.1 | 1 | 1 | 7 | 9 |
| IKS | 33 | 35 | 48.5 | 51.5 | 9 | 8 | 13 | 3 |
| ITK | 62 | 51 | 54.9 | 45.1 | 6 | 7 | 10 | 6 |
| LK | 1531 | 999 | 60.5 | 39.5 | 3 | 3 | 8 | 8 |
| NK | 29 | 25 | 53.7 | 46.3 | 10 | 10 | 11 | 5 |
| RPK | 36 | 9 | 80 | 20 | 8 | 12 | 1 | 15 |
| SBK | 3 | 1 | 75 | 25 | 15 | 15 | 2 | 14 |
| SK | 14 | 7 | 66.7 | 33.3 | 13 | 13 | 4 | 12 |
| TEK | 350 | 174 | 66.8 | 33.2 | 4 | 4 | 3 | 13 |
| TK | 1655 | 1095 | 60.2 | 39.8 | 2 | 2 | 9 | 7 |
| TS | 55 | 60 | 47.8 | 52.2 | 7 | 6 | 14 | 2 |
| TW | 64 | 65 | 49.6 | 50.4 | 5 | 5 | 12 | 4 |

## Conclusion and Recommendations

First, the results presented and discussed in the previous section indicate that the competing labels, for supremacy, can be reduced from 17 to three, namely IK, LK and TK. The three labels of *LK*, *IK*, and *TK* contributed a combined two-thirds of the total number of citations produced by all labels. This pattern implies the dominance of the three labels as the most preferred to describe *indigenous knowledge*. It should however be noted that the total number of citations depicted in column 13 in table 3 includes duplicates across the labels. Second, the results revealed that there was no outright winner even among the three labels as each of the measurement techniques (average cites per paper, number of citations, H-Index, and percentage share of cited and uncited papers) produced mixed patterns of performance.

In conclusion, and to answer the question on whether or not there is a preferred label for *indigenous knowledge*, the citation-based metrics applied in this study have revealed that there is no one preferred label. Instead, there are three competing labels, namely *LK, IK* and *TK*. This occurrence, in our view, may or may not pose challenges in terms of not only information organisation but also information retrieval. In regard to information organisation, it has already been noted by Ngulube and Onyancha (2011) that none of these terms have been used as indexing terms in the major thesauri. One is therefore left to wonder about which indexing term to use to organise the literature published on and/or addressing the *indigenous knowledge*. Should we use IK, TK or LK? The same worries may be encountered when discussing matters on searching and retrieval. For instance, which descriptors or terms can be used to yield not only most and relevant documents on *indigenous knowledge* but also documents of high precision and specificity in the subject domain? The importance of specificity in information searching and retrieval is a topic that has been widely discussed in the field of library and information science (see Stapley, 2000; White, 2007, among others).

It should be noted however that there are various factors that may influence the preference of one label over another. These may include:

1. Personal, historical and regional preferences
2. Disciplinary preferences (for example, library and information science and environmental science may show preferences for different terms)
3. Sociolinguistic preferences of research subjects and researchers
4. Publishers' preferences

As a result, we propose further research to be conducted in different contexts (e.g. different scientists' preferences, disciplines, sociolinguistic preferences, publishers' indexing preferences, etc.) to ascertain whether or not the pattern of citation is similar or different to the current study's findings. We further recommend that a content analysis of full-text documents may shed more light on the usage of different labels given to the knowledge of indigenous and traditional communities.

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# Electronic Library Support Services and Resources for Law Students in South East Nigerian University Libraries

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## Abstract

*This study investigated electronic support services and resources for law students in Nigerian university libraries. Descriptive research design was adopted. Questionnaire was used as an instrument for data collection. The overall population of law students in the five selected universities was three thousand five hundred and sixty-four (3564). One hundred (100) students were randomly sampled from each of the five universities. In all, 475 (95%) responses were retrieved as sample size for the study. The findings revealed that law students were aware of and could access e-resources such as CD ROM, Law Pavilion, Open access journals, e-magazines, DOAJ, JSTOR, LexisNexis and electronic journals. Though result showed a remarkable accessibility of electronic information resources in the law libraries, the core legal e-resources appear to be inaccessible to users. However, among the core legal e-resources, Law Pavilion and LexisNexis recorded highest accessibility and Law Pavilion was frequently used by law students. Majority of the respondents acquired information literacy skills through assistance from the library staff. The study identified some challenges experienced in access to electronic legal resources. The study recommends that there should be regular subscription to important law databases that will be highly beneficial to law students in order to enhance legal education and research.*

**Keywords:** Electronic Library, Law Library, Electronic Resources, Nigeria Universities, South East Nigeria

## Introduction

The primary mission of any university library is to support teaching, learning, research, and community service through dissemination of information. Over the years, there has been an exponential increase in global publications and the library has increased roles to play in the management, organisation and accessibility of these publications (Pareek and Gangrade, 2016). The library is at a vantage position in the provision of relevant information necessary for research and scholarship, especially in electronic form. The critical roles of the library transcend all fields of study, including legal education and scholarship. Apparently, legal information to a large extent contributes in the success of law students and practising lawyers. Law librarianship is meant to provide library and information services for the legal profession.. There is no class of men, professional or otherwise, as dependent upon books as the lawyers. There is no library of whatsoever kind or nature which so directly pertains to the interest which it is designed to serve as the law library.

Berring (1997) notes that legal practice in the United States of America is usually built around law books, but predicts an imminent revolution in the use of electronic resources for legal information as print resources continue to decline. Margolis and Murray (2013) in their remark confirmed that legal practitioners need to acquire information literacy skills to flow with the new information environment. The adoption of electronic information service delivery is even more crucial now because many libraries are experiencing budget cut by their parent organisations (Fitchett, Hambleton, Hazelton, Klinefelter and Wright 2011; Chase and Barnes, 2014). In that regard, Wu (2005) advocates for the existence of both print and electronic resources side by side. Literature seems to suggest that as the legal profession expands, so are the law library facilities growing accordingly in different formats. Therefore, in the present information environment where greater emphasis is placed on the accessibility of information in a digital platform, the information sector is witnessing a paradigm shift in the method of acquisition, organisation and accessibility of legal information.

Information and communication technologies (ICT) currently propel library and information services in many law libraries resulting in the development of digital law libraries in many parts of the world including Nigeria. This is why Harker (2013) underscores the need for law students and the young legal practitioners to acquire the necessary skills for accessing legal information in the new environment. Harker (2013) observed further that law librarians are better placed to assist law students in developing these skills in the ICT information environment.

An electronic library can be referred to as a library in which collections are stored in digital formats and accessible by computers. Its content can be stored locally and accessed remotely through computer networks (Aneru,Yakub, Nweke and Makintami 2014). Developing and providing an electronic library support service, in the views of Odeh (2011), is one of the current challenges for university libraries, and the level of interest as regards this has continued to increase, as a great number of institutions consider it critical in library and information service delivery.

E-resources, on the other hand, are those materials that require computer access whether through a personal computer, mainframe or handheld mobile devices (Konappa, 2014). They may either be accessed from the Internet or remotely with local area networks (LANs). Similarly, Okiki and Asiru (2011) defined electronic resources as information stored and transmitted in digital, electronic or computerized formats such as diskettes, CD-ROM databases, DVDs and online public access catalogues (OPAC). From the definitions above, one can deduce that electronic resources require computer and the Internet for easy access from any location of the user. It increases flexibility of search and increased access through networking. Hence, electronic resources in this study are those that are subscription-based, and resources on open access platforms, made accessible by the institutions to law students.

The use of electronic resources has gained prominence in universities across the globe, and many academics are availing themselves of the opportunity to exploit these resources to access relevant, current and updated information for diverse purposes. While libraries approach a crisis point in financing collection development, these new technologies offer possible ways to reduce costs and revolutionise ways to access information. Studies have shown that electronic databases are convenient for searching huge amounts of data with efficiency (Aregbesola and Oguntayo, 2014).

The legal profession depends largely on constant update of information and knowledge (Kerins, Madden and Fulton, 2004), therefore, a good understanding of the information needs of the legal professionals is needful for efficient library and information service delivery (Haruna and Mabawonku, 2001). Apart from the traditional print materials that law libraries often use to provide the required information services, there are numerous legal databases and software that are of great help to law students and the legal profession as a whole. The need for legal information to students and legal practitioners facilitated the 2009 Durham Statement on Open Access to Legal Scholarship (which advocates for open access publication of legal information) with the intention of reducing print publication of law journals and commitment to keeping the digital versions available in open, consistent and electronic format (Danner, Leong and Miller, 2011; Danner, 2012). However, the global information environment has transformed legal information and legal education and research

(Germain, 2007), resulting in some law libraries digitising their printed and pictorial documents (White, Bordo and Chen, 2015). This has given rise to different methods of accessing legal information in electronic platform. They include but are not limited to JSTOR LexisNexis academic and professional, Westlaw international, EBSCOHOST, DOAJ, Law pavilion, Law of the Federation (LFN), Easylaw, Legalpedia and OPAC for online bibliographic access of legal materials on the shelves. Anaeme and Akpom (2013) indicated that the present legal professional can walk to a computer and access virtual law library, a world of almost limitless information resources open to the professional. In their views, much of the renewed interest in classification, organising and retrieval device for information resources has been sparked by the growth in usage of the internet and World Wide Web (www). As a result of information glut, Kahlthau and Tama (2001) believe that the use of user profiling for personalized electronic information service delivery would be ideal for legal professionals.

However, the global trend now is characterised by a fundamental shift from traditional information environment to an e-environment where emphasis is placed more on the acquisition of e- resources such as e-books, e-journals, as well as online databases (Abubakar, 2011). Therefore, the emergence of electronic resources in the views of Sethi and Panda (2011) has revolutionized reading experience and introduced production of library resources for instant worldwide distribution. That is the more reason why libraries generally and law libraries in particular are shifting their focus of operation, in addition to their basic functions from library-oriented to information-centered, from library as an institution to the library as an information provider, and to the librarian as skilled information specialist functioning in all related information environment; from using technology for the automation of library functions to utilizing technology for the advancement of information access and delivery not physically contained in the four walls of the library. Omekwu (2004) also indicated that the use of digital technology has led to migration of lawyers' instrument of trade to electronic formats. Judicial decisions and all other sources of information germane to the work of lawyers are now available in electronic format.

However, it appears that there is lack of research on the electronic library support services in Nigerian law libraries. It is based on the importance of the use of e-resources in teaching, learning and research in legal education that this study was initiated.

## Research Problem

Much as there are numerous benefits to the use of e-resources, law students seem to face a lot of challenges in access to and use of electronic resources. Pre-research visits to some of the universities studied revealed that providing access to legal resources more especially the core legal databases with an efficient access support service, has been a major challenge. This situation is worrisome. The study therefore was an attempt to examine the electronic library support services and resources, its usage and access by law students of five university libraries in South East Nigeria. The study also attempts to find out the core legal e-resources accessible and investigate their frequency of use.

## Objectives of the Study

The main purpose of the study is to examine the electronic library support services, usage and access among Nigerian law students. Specifically, the study was intended to:

- determine the level of awareness and accessibility of electronic library support services in the law libraries studied.
- identify the core legal resources accessible in the law libraries.
- Investigate the frequency of use of these core legal resources.
- find out how law students accessed information literacy skills for the use of electronic resources and services.
- identify benefits students derived from the use of electronic library support services.
- identify the challenges faced by law students in accessing electronic support services.

## Literature Review

The last decade has witnessed growth in the acquisition and utilisation of electronic resources in many academic libraries in Nigeria. Print-based information resources are increasingly giving way to electronic information sources (Sharma, 2009). Electronic resources, such as CD-ROM, online journals, e-books, OPACs, and the Internet, are gradually replacing the use of print resources (Aregbesola, and Oguntayo, 2014). Consequently Dadzie (2005) and Bhatia (2011) remark that the availability and accessibility of electronic resources (e-resources) in a library plays a prominent role in facilitating access to required information to the users in an easy and expeditious manner. It is expected that when library users are aware of the available materials, they would likely access and use them.

It is imperative that one should be familiar with the use of e-resources for the promotion of research and academic excellence. A recent study by Thomas (2015) on use and user perception of e-resources of post graduate students at Thomas College, Thrisur India reported that the students were aware of the e-resources in their field and most of them could access the resources from the library. He further reported that majority of the students preferred e-books and acquired electronic and information literacy skills through their teachers. The major challenge facing students in the use of the available e-resources was slow downloading. Also, in India, a study was carried out by Nazir (2014) on the use and adequacy of e-resources by the research scholars and students, and findings indicated that lack of awareness regarding the different types of e-resources and lack of library assistance are major causes behind low usage of e-resources. Therefore, awareness is part of availability, and it indicates the extent to which users have information and knowledge of electronic resources being subscribed to. When users of a law library have adequate information on the electronic resources being subscribed to, they are encouraged to use them.

These resources are being subscribed to by institutions in Nigeria, thereby making them available for use by law students. A study by Justiss (2011) found that some law libraries use other online legal database such as Loilaw, Bloomberg Law, Fastcase, Casemaker and Versuslaw as alternatives to LexisNexis and Westlaw which have dominated the legal information sector for a long time. However, the use of these resources solely depends on its availability. Adediran (2013) presented the results of a study assessing the usage of electronic resources by undergraduate students at the Redeemers University in Nigeria. The study revealed that even though the students were aware of the different types of electronic information resources available in the university library, their use rate of these resources was low. More so, some factors posed as challenges to the students. Among the factors were: large mass of irrelevant information, the need to filter the results from search, download delay, failure to find information, inadequate or lack of search skills, high cost of access, inaccessibility of some electronic resources, difficulties in navigating through electronic resource, etc. In the same vein, Dadzie (2005) investigated the use of electronic resources by students and faculty of Asheshi University, Ghana to determine the level of use, the type of information accessed, and the effectiveness of the library's communication tools for information research and problems faced in using electronic resources. Results indicate that 85 per cent of respondents used the Internet to access information, and that respondents mainly accessed information in the library by browsing the shelves. Another study in Ghana on the use of electronic resources by undergraduate students by Amankwah (2014) revealed that, although students were aware of electronic resources, they did not fully utilise them to support their academic pursuit due to poor level of information literacy skills. Some of the major problems indicated by the students using electronic resources include inadequate computers in the library, poor internet connectivity, power outages, and insufficient search skills.

Given the critical nature of electronic information resources in legal education and research, users of these resources need adequate information literacy skills in order to access such resources. Kuhlthau and Tama (2001) found that due to the complex task of lawyers, most of them would prefer printed texts, particularly when there are no mediators like librarians who would assist them in filtering and evaluating electronic resources. In a related study, Kerins, Madden and Crystal (2004) examined information seeking behaviour of law and engineering students and found that they have difficulties in accessing electronic materials because

of their ignorance of assistance they would get from librarians. They therefore advocated for greater information literacy training among the students. Peoples (2005) also found that modern legal researchers prefer the use of electronic platform in accessing legal information to traditional printed resources but lacked the required skills. He therefore recommended that law librarians should get more involved in electronic database instructions. In Nigeria, Haruna and Mabawonku (2001) investigated the information needs and seeking behaviour of legal practitioners and found that their information needs revolved round most recent legislations, court rulings, application of legal knowledge and available conferences and workshops. The study also found that the use of electronic resources was quite low, as most of the libraries surveyed lacked ICT facilities and skills.

However, numerous benefits abound when electronic resources are used by library users, especially law students. Mafix Digital (2010) emphasised the usefulness of electronic resources and the need for their adoption by law faculties in Nigeria. He opined that electronic legal information sources are designed specifically for law students, legal professionals and lecturers. They make research work fast, save time and also enhance efficiency due to powerful searching and cross-referencing technology. A combination of electronic legal sources is a formidable information powerhouse for any institution, law practice agency, courts, etc. Looking at the above mentioned benefits of electronic legal information sources, one can deduce that the resources have reduced time needed to access print legal resources thereby eliminating monotony and stress associated with it.

In the challenges encountered by users in accessing electronic resources, Evans and Zarnosky (2000), cited in Salaam and Adedigba (2012), opined that the use of electronic resources requires regular power supply which sometimes increases library operating cost, and it often presents new challenges for staff in terms of acquisition of new digital skills. Similarly, in another study carried out by Ezema (2013), low Internet bandwidths, lack of funds in developing countries such as Nigeria, poor power supply, waiting time for files to download, waiting to have a server accept queries or being abruptly cut off in mid-session are sources of frustrations that do not exist with paper-based resources, and these usually pose serious challenges for students in accessing e-resources.

The high cost of law information resources has also been underscored by many studies ( Runyon 2009, Fitchett et al 2011). In such a situation, acquisition of electronic resources will go a long way in improving the collections of such libraries. Also, a study by Runyon (2009) found a low percentage expenditure on legal e-resources among law libraries in the United States of America, and this is likely to be poorer in developing countries where interest is minimal. Other challenges of adoption and use of electronic resources in Nigeria have been revealed in the literature. Igbo and Imo (2010) identified lack of electronic resources and irregularity in subscription to electronic journals as major challenges of access to e-resources, while Ezema and Ugwu (2013) found lack of information and communication technology (ICT), infrastructure such as power supply and good Internet bandwidth as serious barriers for access to e-resources in Nigeria. Watts and Ibegbulam (2006) examined some of the barriers to the use of electronic information resources available at the medical library of College of Medicine, University of Nigeria, Nsukka and found that lack of ICT infrastructure, high cost of online access, absence of in-depth ICT skills and information searching skills are some barriers to the use of electronic resources. These are corroborated with earlier findings by Oduwole and Akpati (2003) who found that the major constraints to information accessibility and retrieval of automated library services were infrastructural: the limited number of terminals available for use and power supply outages. Madukoma, Onuoha and Ikonne (2014) identified lack of awareness as major contributing factor to non-use of e-resources.

## Methodology

Law faculties in two federal and three state university libraries in the South East zone of Nigeria were studied. The universities were purposively chosen based on their better funding than other universities in terms of adoption of information communication technology (ICT). The population of law students in the five universities was 3564. One hundred (100) students were randomly sampled from each of the

five universities. The questionnaire was purposively administered to third, fourth and fifth year law students of these universities because they are expected to have more exposure to the use of e-resources accessible than the first year and second year students. The researchers personally visited the universities and distributed copies of the questionnaire. A total of 500 law students of the University of Nigeria, Nsukka; Nnamdi Azikiwe University, Awka; Ebonyi State University, Abakiliki; Enugu State University of Science and Technology; and Abia State University, Uturu participated in this study. Out of this, 475 (95%) copies of the questionnaire were returned and found valid to be used for the analysis.

## Results

### Background Information of the Respondents

Data was analysed using percentages in relation to the objectives of the study and presented in charts and tables. Table 1 shows the distribution of students accross the five universities and the level of study.

**Table 1: Distribution of the Respondents**

| S/N | University | 3rd Year Students | 4th Year Students | 5th Year Students | Total | Per Cent |
|---|---|---|---|---|---|---|
| 1 | UNN | 25 | 35 | 40 | 100 | 100% |
| 2 | UNIZIK | 20 | 35 | 40 | 95 | 95% |
| 3 | ESUA | 23 | 38 | 26 | 87 | 87% |
| 4 | ESUT | 19 | 41 | 36 | 96 | 96% |
| 5 | ABSU | 21 | 38 | 38 | 97 | 97% |

### Awareness/Accessibility to Electronic Library Support Services

Findings from Table 2 indicate that the law students were aware of and could access eight (8) electronic resources. Top on the list was CD ROM (87%), followed by Law Pavilion (85.4%), Open access e-journal (83.3%), e-magazine (83.2%), DOAJ (83.2%) JSTOR (81%), LexisNexis (79%), and Electronic Journal(65%). On the other hand, some respondents had a negative view pertaining to awareness and accessibility of some electronic support services in their libraries. 87.3% of the respondents indicated that they were not aware of OPAC and cannot access it. This is preceded by Legalpedia (84.4%), e-thesis and dissertation (84.4%), Easy law (84.2%), EBSCOHOST (84.2%), Law of the federation (84.2%), Database of law report (64%) and e-books (62.1). From the table above, among the five core legal e-resources, law pavilion and LexisNexis recorded highest accessibility in the libraries studied. LexisNexis could be assessed in all the five libraries studied while just two university libraries (UNN and UNIZIK) could access Law Pavilion.

**Table 2: Ranked Order Distribution of Awareness/Accessibility to Electronic Library Support Services in the Law Libraries. (N = 475)**

| Rank | Electronic information resources | Yes/% | No/% |
|---|---|---|---|
| | | | |
| 1 | Law Pavilion | 406 (85.4%) | 69 (15%) |
| 2 | Open Access e-journal | 396 (83.3%) | 76 (16%) |
| 3 | e-magazine | 395 (83.2%) | 80 (17%) |
| 4 | DOAJ | 395 (83.2%) | 80 (17%) |
| 5 | JSTOR | 385 (81%) | 90 (19%) |
| 6 | LexisNexis | 375 (79%) | 100 (21%) |
| 7 | Electronic-journals | 309 (65%) | 166 (35%) |
| 8 | e-book | 180 (37.8%) | 295 (62.1%) |
| 9 | Database of law reports | 170 (36%) | 305 (64%) |
| 10 | Easy law | 75 (16%) | 400 (84.2%) |
| 11 | Legalpedia | 75 (16%) | 401 (84.4%) |
| 12 | EBSCOHOST | 75 (16%) | 400 (84.2%) |
| 13 | e-thesis and dissertation | 401 (84.4%) | 74 (16%) |
| 14 | LFN (law of the federation) | 75 (16%) | 400 (84.2%) |
| 15 | OPAC (Online Public Access Catalogue) | 60 (13%) | 415 (87.3%) |
| 16 | CD ROMS | 412 (87%) | 63 (13.2%) |

**Frequency of Use**

From responses in Table 3, 92% indicated that Law Pavilion was frequently used by the law students. This is was followed by LexisNexis with 76%. Law of the Federation (12%), Legalpedia (19%), Easylaw (20.4%) respectively were the least used.

**Table 3: Frequency of Use of Core Legal E-Resources**

| Rank | Items | VO 4 | O 3 | S 2 | N 1 | % of positive response |
|---|---|---|---|---|---|---|
| 1 | Law Pavilion | 285 | 150 | 27 | 13 | 92% |
| 2 | LexisNexis | 265 | 96 | 70 | 44 | 76% |
| 3 | Legalpedia | 30 | 60 | 229 | 156 | 19% |
| 4 | Easylaw | 35 | 62 | 121 | 257 | 20.4% |
| 5 | LFN (law of the Federation) | 32 | 25 | 155 | 263 | 12% |

***VO = Very Often; O = Often; S = Seldom; N = Never**

**Sources of Information Literacy Skills**

Table 4 shows that majority of the respondents acquired information literacy skills through assistance from the Library (98%), assistance from IT (computing) staff in the library (98%), and self-taught (93%). From the negative responses, the respondents disagreed with the fact that they acquired information literacy skills through guidance from lecturers (83%), assistance from fellow students (83%), ICT training from outside the universities (80%) and ICT training offered by the universities (71%).

**Table 4: Ranked Order Distribution Sources of Information Literacy Skills for Access to Electronic Resources in the Law Library (N = 475)**

| Rank | Sources of information literacy skill | SA 4 | A 3 | D 2 | SD 1 | % of positive responses |
|---|---|---|---|---|---|---|
| 1 | Assistance from the librarians | 236 | 228 | 8 | 3 | 98% |
| 2 | Assistance from ICT (computing) staff in the Library | 237 | 225 | 7 | 6 | 97.2% |
| 3 | Self-taught | 242 | 200 | 20 | 13 | 93% |
| 4 | ICT training from outside the universities | 30 | 64 | 158 | 223 | 20% |
| 5 | ICT Training offered by the universities | 40 | 100 | 140 | 195 | 29.5% |
| 6 | Guidance from lecturers | 53 | 29 | 231 | 162 | 17.2% |
| 7 | Assistance from fellow students | 20 | 62 | 165 | 228 | 17.3 |

**SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree**

**Benefits of Electronic Information Sources**

All the respondents as shown in Table 5 agreed to the listed benefits of electronic resources were ranked highly. However, the benefits with high percentage scores are economy of time spent in access to print materials from the library (97.2%), easy access to materials for class assignments and projects (96%), reduction of cost of buying books and other learning resources (95%), up-to-date access to newspapers and magazines (95%), access to online databases globally (84%), easy flow of information for collaboration with other students(80.6%), allows the use of social media for contacts with friends and colleagues(78%), access web dictionaries and directories (77%), robust metadata for information retrieval (74%), creates opportunities for access to online legal databases such LexisNexis and Law Pavilion (71.1%), timely access to online law reports locally and internationally (59.1%) and access OPAC (online public access catalogue) for library holdings (53%).

**Table 5: Benefits of Using Electronic Information Sources (N = 475)**

| S/N | Benefits | SA | A | D | SD | % of Positive Responses | % of Negative Responses |
|---|---|---|---|---|---|---|---|
| 1 | Provides up-to-date access to newspapers and magazines | 301 | 150 | 6 | 18 | 95% | 5.% |
| 2 | Reduction of cost of buying books and other learning resources | 250 | 200 | 9 | 16 | 95% | 5.2% |
| 3 | Faster means of accessing legal information | 264 | 179 | 7 | 25 | 93.2% | 4.3% |
| 4 | Economy of time spent in accessing print materials from the library | 185 | 277 | 4 | 9 | 97.2% | 2.7% |
| 5 | Easy access to materials for class assignments and projects | 181 | 275 | 7 | 12 | 96% | 4% |
| 6 | Provides access to online databases globally | 195 | 204 | 48 | 28 | 84% | 16% |
| 7 | Provides easy flow of information for collaboration with other students | 186 | 197 | 55 | 37 | 80.6% | 19.3% |
| 8 | Allows the use of social media for contacts with friends and colleagues | 169 | 202 | 62 | 42 | 78% | 21.9% |
| 9 | Access web dictionaries and directories | 175 | 191 | 57 | 52 | 77% | 23% |
| 10 | Provides robust metadata for information retrieval | 164 | 186 | 55 | 70 | 74% | 26% |
| 11 | Creates opportunities for access to online legal databases such LexisNexis, Law pavilion etc. | 137 | 201 | 78 | 59 | 71.1% | 28.8% |
| 12 | Timely Access to online law reports locally and internationally | 105 | 176 | 138 | 56 | 59.1% | 40.8% |
| 13 | Access OPAC(online public access catalogue) for library holdings | 165 | 85 | 110 | 105 | 53% | 45.3% |

**Challenges of Law Students in Accessing Electronic Support Services**

Table 6 presents the results of the challenges law students encountered in gaining access to e-resources and services. Indications from the finding show four major challenges: poor electric power supply, low Internet bandwidth, irregularity in subscription to legal electronic databases, and lack of broader subject coverage during subscription. As reflected in the table based on negative responses, the respondents did not agree that accessing e-resources takes a lot of time (93%); was associated with poor awareness of electronic resources (66%); was as a result of inadequate ICT skills among students (58%); and had to do with problems associated with reading from computer screens (57%).

**Table 6: Challenges on Access to Electronic Support Services (N = 475)**

| Rank | Challenges | SA 4 | A 3 | D 2 | SD 1 | % of Positive Responses | % of Negative Responses |
|---|---|---|---|---|---|---|---|
| 1 | Poor electric power supply | 275 | 174 | 17 | 9 | 94.5% | 5.5 |
| 2 | Low Internet bandwidth in the library | 164 | 190 | 88 | 33 | 75% | 25% |
| 3 | Irregularity in subscription to legal electronic databases | 168 | 185 | 79 | 43 | 73.2% | 26% |
| 4 | Lack of broader subject coverage during subscription | 170 | 178 | 75 | 52 | 73.2% | 27% |
| 5 | Absence of functional network among Nigerian Universities | 175 | 172 | 75 | 53 | 73% | 27% |
| 6 | Lack of printing facilities in the libraries | 154 | 189 | 98 | 34 | 72.2% | 27.7% |
| 7 | Limited number of computer terminals in the libraries | 160 | 180 | 82 | 53 | 72% | 28% |
| 8 | Problems associated with reading from computer screens | 60 | 143 | 176 | 96 | 43% | 57% |
| 9 | Inadequate ICT skills among the students | 68 | 132 | 166 | 109 | 42% | 58% |
| 10 | Poor awareness of electronic resources | 75 | 88 | 168 | 144 | 34% | 66% |
| 11 | Much time is spent in accessing e-resources | 10 | 23 | 265 | 177 | 6.9% | 93% |

## Discussion

The results of the study present a very good insight to the electronic library support services in law libraries in South East, Nigeria. While it is interesting to see a remarkable awareness and accessibility of electronic information resources in the law libraries investigated. The findings reveal that core legal e-resources appear to be inaccessible. According to Omotayo (2010), some of these e-resources such as e-magazines, CD ROMs and open access e-journals, are freely available online, while libraries have to subscribe to the core legal resource. It is, however, interesting to observe the high awareness and accessibility of Law Pavilion and LexisNexis which are very important legal databases in many of the libraries. It appears that these two legal databases are the most common among law libraries studied. The libraries may not have the required funds to subscribe to all the legal databases as a result of poor funding of education and particularly libraries as it has been reported as one of the major challenges of acquisition of e-resources in Nigeria in extant literature (See Oduwole and Akpati, 2003, Watts and Ibegbulam, 2006; Igbo and Imo, 2010; Ezema, 2013; Ezema and Ugwu, 2013). The low accessibility of Law of the Federation in electronic format from the findings is an obvious source of worry because it is one of the major sources of legal information in the country. Perhaps, the libraries still rely heavily on the print version of this important legal information. While it is true that the level of accessibility of electronic library support services in the law libraries is encouraging, it is important to subscribe more to the core collections.

From the findings, Law Pavilion and LexisNexis top the list of core legal e-resources accessible in the law libraries. It is interesting to observe that Law Pavilion is frequently used by the students. Evidently, these e-resources are available in the university law libraries. However, down the list are the less used e-

resources and among these are core legal e-resources such as Easylaw, Legalpedia and Law of the Federation. The low usage is a reflection of their unavailability which relates with Aina's (2011) position that availability correlates with access and use. The core legal e-resources that are often used are Law Pavilion and LexisNexis, which is in line with the findings of earlier studies of Justiss (2011).

Findings indicate that the law students acquire information literacy skills mainly through assistance from the librarians and ICT (computing staff) in the library.

One of the major challenges law students encountered in accessing electronic support services in Nigerian university libraries is the issue of power supply. This has been mentioned in several studies in Nigeria and Ghana (Oduwole and Akpati, 2003; Ezema, 2013; Ezema and Ugwu, 2013) and from the findings of the present study, the situation is yet to improve. The frustrations which often result from epileptic power supply in Nigeria discouraged libraries from subscribing to these e-resources.

## Conclusion and Recommendations

The study did examine the electronic library support services in law libraries in selected South East Nigerian universities. A large proportion of the electronic resources and services were those freely accessible online which in most cases do not support core collection of legal education. However, access to existing e-resources and services to the students is hindered by a number of challenges such as irregular power supply, irregular subscription of e-resources and low Internet bandwidth. These challenges require efficient policy framework from libraries, universities and government. It is based on this that the following recommendations are made:

- Provision of good Internet services as priority in their development agenda. This is because teaching, learning and research can only be driven through efficient internet services. There should be dedicated internet bandwidth sufficient enough to enhance access to online resources.
- There should be regular subscription to important law databases that will be highly beneficial to law students and their lecturers to enhance legal education and research.

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# An Assessment of Mzuzu University Library after a Fire Disaster

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## Abstract

*This article presents findings of a study that assessed the progress in restoring the Mzuzu University Library which was destroyed by a fire disaster in December 2015. Data were collected from 64 undergraduate students, 18 library staff and an official from the Office of Vice-Chancellor. Interview was conducted with the Assistant Librarian (who represented the University Librarian). The study revealed that the interim library (formally a university hall) was almost fully recovered, and was stocked with relevant and current collection. The study established further that students, library staff and the Office of Vice-Chancellor were all satisfied with the progress the University had made in restoring library services. The university had learnt a lesson from the disaster, and it had started regarding the library as an essential part of the university. Inadequate reading space, absence of Internet services for users, and absence of off-campus information services remain the key problems. The study made various recommendations that if implemented could make the library to satisfactorily serve the needs of its users.*

**Keywords:** Disaster Management, Library Fire Disaster, Library Recovery, Malawi; Mzuzu University

## Introduction

Libraries are prone to a wide range of calamities that have potential to put the operations of their parent organisations to standstill. Defined as "any incident which threatens human safety and/or damages, or threatens to damage a library's building, collections, contents, facilities or services" (Matthews and Eden, 1996:4), disaster occurrences are often inevitable and usually unpredictable (Ayoung, Boatbi and Baada, 2015). Examples of disasters in libraries and information centres can be natural occurrences or man-made and may include hurricanes; tornadoes; flash flooding; earthquakes; fires; sudden collapse of library buildings, volcanic eruptions, power outages, termites and insect activities, leaking roofs and pipes, chemical spills; theft, arson, bomb threats, and acts of war and terrorism (Abareh, 2014; Coppola, 2006; Hasenay and Krtalic, 2010; Wilson et al. 2010; Baumwoll, 2008; Ngulube and Magazi, 2006; Adinku, 2003).

Disaster occurrences in libraries have spurred researchers in the developed world to conduct various studies on disaster management and security control (Ngulube and Magazi, 2006). Ngulube and Magazi (2006) observe further that there is scant evidence of such research in sub Saharan Africa. Over the years, resource constraints coupled with a decline in funding and donations for libraries, have led to

libraries' inability to meet user demands (Mathews, 2005). Many libraries world over, are likely to be hit by disasters and this calls for protection of libraries from potential disasters (Osei-Boadu and Ahenkorah-Marfo, 2013). The key disaster preventive ways include formulation of disaster management plans, staff training, and insurance (Forbes, 2003:190; Ngulube, Modisane and Mnkeni-Saurombe, 2011; Abareh, 2014). Thus, this study attempted to find out various aspect's about the disaster that hit the Mzuzu University (MZUNI) Library in December, 2015.

## Context of the Study

MZUNI had a library (although not purposely built) that supported the teaching, learning and research activities of students, lecturers, non-academic members of staff, and members of the surrounding community before the disaster in 2015. For many years, the Library had invested in print materials, electronic resources and information and communication technologies. However, in December 2015, the Library was destroyed by a fierce fire that led to the loss of all its collections and ICT equipment. Specifically, 53,000 books, 68 desktops computers, 403 reading chairs, 62 reading tables, 111 shelves, three heavy duty photocopiers, eight printers and other countless valuable items were destroyed. The total value of items damaged is MK5, 891,214,532 (Approximately $7, 854, 952). Efforts are being made to restore the Library collection. An informal visit to the makeshift Library (formerly a University Hall) shows that the Library has resumed offering some services and facilities. The focus of the study was to assess the progress made by MZUNI in restoring the library services and facilities after the disaster. The old library was adopted as a model whereby services and facilities offered in the new library are compared with those that were offered in the burnt library. In this study, the new library is referred to as an interim library because it is a temporary one.

## Motivation and Justification for the Study

MZUNI is a living testimony to the far-reaching effects of library disasters having lost the whole library worth of millions of dollars to a fire disaster. Since the disaster struck the Library, it is only the media (print, electronic – TV, radio and online) that have been communicating about the disaster to the public. Much as the media have played a commendable role in reporting about the disaster, their news stories become stale and misplaced as soon as they are consumed by the masses. Furthermore, the media focussed on the devastating effects of the fire disaster and the losses incurred. Yet, since this catastrophe, a band of librarians immediately started working around the clock to restore the much treasured arm of Mzuzu University. This development was to the delight of students, parents and all education stakeholders who had fears that the disaster might affect the University academic calendar. More importantly, the researchers were justified to carry out this study because Abareh (2014) reports that there is little concern about disasters in academic libraries despite their repeated occurrences because of failure to document and report or share these many cases of disasters. Thus, this study was carried out to assess the progress that MZUNI has made towards the restoration of the library services and facilities. In that regard, the study answers the following questions:

- What is the library's staff and students' perception towards the interim library facilities and services as compared to the old library?
- How satisfied are students, library staff and MZUNI Management with the recovery process of the library?
- What are the challenges being faced in the interim library?

Considering that most prior studies have focused on disaster management plans in libraries, the nature of this unique empirical study offers new literature to the research community in library and information science (LIS). This study will certainly stimulate a sparkling discourse on disasters in libraries thereby, spurring more research in this area – the study sets the tone for unreported or non-researched cases of similar disasters. More so, looking at the reported cost of damage and inconveniences caused by this disaster, academics teaching in the LIS profession and comparable fields will find this scholarly work (based on real-life experience) valuable in their teaching and research activities. Finally, library managers in Africa may use this scholarly article as a framework for compelling

their parent institutions and the donor communities to allocate enough funds for implementing disaster management plans in libraries.

In respect to MZUNI, the study brings to light some factors that are crucial to the recovery process for libraries and other information centres after experiencing tragedies such as fire. The study provides MZUNI Management and other stakeholders with a reality check on the progress that has been registered since the library recovery process was launched immediately after the disaster.

### Literature Review

Although many researchers in the library profession have defined disaster from different perspectives, this study adopts the one offered by Ngulube and Magazi (2006) and Matthews and Eden (1996:4). Ngulube and Magazi (2006) and Matthews and Eden (1996) describe a disaster as an unexpected event that may drastically threaten the lives of humans or damage buildings, destroy the information infrastructure, disrupt services, and render documentary materials inaccessible to users. From the literature reviewed, these researchers are convinced that the definition is more encompassing as it touches on every single form of a disaster that might occur in a library setting.

Wilson et al. (2010) warn that fire is the major threat to libraries and archives, and library safety should be managed accordingly. In that regard, Ogden (2004:3) proposed some best practices that libraries can adopt to prevent fire. They include minimising exposure to arson which is accountable for nearly a third of all library fires; use of compartmentation to limit the spread of fire; and employment of fire detection and water-based fire suppression systems for collection protection. Ogden (2004) is of the opinion that restoring collection damaged by water is far much easier than those damaged by fire. A study by Ayoung, Boatbil and Baada (2015) revealed that much as most libraries in polytechnic colleges in Ghana had fitted smoke detectors, fire alarms installed and fire extinguishers, these apparatus were rarely or never serviced at all.

Regardless of the many documented cases of disasters that have hit libraries in the past, librarians seem not to learn lessons from the devastating effects thus library disasters continue to occur. Between 1991 and 1995, the warring republics of former Yugoslavia, now Serbia and Croatia, led to the destruction of many library and archive materials (Hasenay and Krtalic, 2010). Another man-made disaster occurred recently in 2011 in Ficksburg Public Library in the Free State Province of South Africa where it is reported by de Lange (2011) that riots by the community members resulted into the burning of a community library. In India, apart from the Thapar Technology Campus Library which lost 44,535 of 63,000 library items in 1983 (Kaur, 2009), the American Library Association (2005) reports that Madras University Library was a victim of tsunami in 2004, resulting into the loss of thousands of library information resources and equipment.

## Methodology

In this study, quantitative and qualitative data were collected from various categories of participants in two distinct and systematic phases. Taking into account that the library staff are the custodians of the library and are directly involved in the recovery of the Library, the researchers purposively included all of them in this study. In all, the Library had 18 members of staff whose qualifications range from a basic library certificate to master's degrees. A questionnaire with open-ended and closed-ended questions was used to collect data from library staff. The questionnaire items gathered data about library staff's perception towards the interim library facilities and services as compared to the old library, the interim library's environment, information services restored, satisfaction with the overall recovery process, and the challenges being encountered.

The study also collected data from level four undergraduate students pursuing their four-year programmes in LIS and Information and Communication Technology (ICT). LIS students were included in the study because they were more conversant with library operations in general, and the researchers hoped they could provide important information. ICT students were also included because of the role that ICT plays in the LIS profession. A questionnaire with only open ended questions was sent to the Office of the Vice-Chancellor of the university which was purposively selected

Finally, the researchers conducted follow-up interviews with the Assistant Librarian for

information. This particular Assistant Librarian was purposively selected because he often acted as University Librarian whenever the University Librarian was on holidays or away for other official duties. The researchers did not conduct these interviews with the University Librarian because he was one of the conductors of this study. Interviews are usually very useful as a follow-up to questionnaires to further investigate responses (McNamara, 1999). In this study, Follow-up interviews involved seeking further clarifications on some issues, concerns and inconsistencies noted after analysing data collected in phase one. Thus, the researchers are convinced that their research report is objective and reliable because they triangulated their data collected from multiple participants using multiple data collection instruments.

Prior to the commencement of the study, the researchers sought permission from and granted by MZUNI through the Office of Director of Research to conduct this study. To make sure that participation was voluntary, before answering the questionnaire, respondents were asked to read the following statement: "I understand that my participation is voluntary and I am free to withdraw at any time without giving any reason". Furthermore, respondents were not asked to indicate their names and they thus remained anonymous.

## Results and Discussion

This section presented, analysed and discussed the findings of the study. As stated in the previous section, the study collected data from students, library staff, the Assistant Librarian and the Office of the Vice-Chancellor. Apart from background information for library staff and students, the results were presented and discussed in line with the research themes as follows:

- Library facilities and services available in the interim library;
- Satisfaction with library recovery process; and
- Challenges faced in the interim library.

### Background Information

A questionnaire was submitted to 18 members of staff in the Library and 17 (94.4%) responded. Of these respondents, 13 (76.5%) were males and 4 (23.5) were females. In terms of students, a questionnaire was sent to 60, of which 35 were sent to LIS students and 25 were sent to ICT students. Fifty-five (91.6%) students responded to the questionnaire. Of those who responded, 31 (56.4%) were from the LIS Department and 24 (43.6%) were from the ICT Department. Results showed that there were less males than females with scores of 23 (41.8%) and 32 (58.2%) respectively. An SPSS cross-tabulation of the results showed that, in both departments, there were more females than males, as it was noted that LIS had 18 (58%) females and ICT had 14 (58%) females.

### Library Facilities and Services Available in the Interim Library

Since all the facilities that were in the old library got destroyed by fire, the researchers found it necessary to find out the progress that the Library had made in replacing those services and facilities. Results presented in Table 1 reveal that MZUNI had made substantial headways in replacing the items it lost. As it can be seen in Table 1, it is clear that all library staff appreciated that the Library had enough office spaces, barcode readers, printers, Internet, desktop computers photocopying machines, LCD projectors, CCTVs and digital cameras. The facilities mentioned in the preceding sentence matched the standard of the old library. However, findings show further that some facilities were only available to some library staff. For example, a cross-tabulation of results showed that most junior library staff did not have laptops and executive furniture. Follow-up interviews with the Assistant Librarian revealed that some facilities such as executive furniture and laptops were only purchased for senior staff.

One peculiar instance that was noted from an analysis of questionnaire data is that library staff, despite working under the same roof, had divided knowledge about the existence of some obvious facilities such as CCTVs, LCD projectors, security check systems and TV stations. When probed during follow-up interviews about what might have been the cause for such knowledge gaps, the Assistant Librarian indicated that it is sometimes difficult for staff working in different sections to know every facility available in all other sections of the library. The study established that both the old and the interim libraries did not have television set. It was thus

revealed that the only respondent who mentioned of a television set in the questionnaire may have referred to the only television set which was available in the Mzuzu American Corner. The Mzuzu American Corner is an information technology and communication centre located at the MZUNI campus, and it is an annex to the library. According to Chawinga and Ngwira (2015), it is one of the centres that the Embassy of the United States of America (USA) has established in collaboration with some universities in Malawi.

The only facilities that the library is yet to restore according the findings are the CD-ROM, and it is not surprising because these facilities are increasingly being replaced by e-journals. Another service that the library is not offering on full scale is electronic books. The library made attempts to procure e-books but according to the Assistant Librarian, "the library noted that there were many issues that required to be sorted out including copyrights, negotiation for licences and costs for full e-book books or individual chapters". However, a comment by a respondent from the Office of Vice- Chancellor that "a major effort is under way to better utilise electronic material" symbolised that MZUNI appreciates the power of electronic resources in the realisation of quality higher education. Regardless of the unavailability of some facilities and services, the study concluded that within the shortest period, the library had managed to replace most of the facilities that were available in the old library.

**Table 1: A Comparison of Available Facilities between Interim and Old Libraries**

| | Interim library | | Old library | |
|---|---|---|---|---|
| **Name of equipment** | ***f*** | **%** | ***f*** | **%** |
| Offices | 16 | 94.1 | 17 | 100 |
| Barcode readers | 17 | 100 | 17 | 100 |
| Printer | 17 | 100 | 17 | 100 |
| Internet | 17 | 100 | 17 | 100 |
| Desktop computers | 17 | 100 | 17 | 100 |
| Photocopying machines | 16 | 94.1 | 16 | 94.1 |
| LCD projectors | 16 | 94.1 | 15 | 88.2 |
| Scanners | 15 | 88.2 | 15 | 88.2 |
| CCTVs | 14 | 82.4 | 16 | 94.1 |
| Digital cameras | 12 | 70.6 | 14 | 82.4 |
| Video cameras | 12 | 70.6 | 15 | 88.2 |
| Executive furniture | 12 | 70.6 | 14 | 82 |
| Laptops | 13 | 76.5 | 15 | 88.2 |
| Security check system | 7 | 41.2 | 15 | 88.2 |
| TV stations | 0 | 0 | 1 | 5.9 |
| CD-ROM readers/writers | 0 | 0 | 11 | 64.7 |

## Services Restored

Considering the fact that the burnt library offered a compendium of services to its users, the researchers found it necessary to learn from the library staff about the services that had been restored in the interim library.

An analysis of the findings presented in Table 2 revealed quite clearly that the interim library had restored a number of services. The key services that most library staff were aware that the library is currently offering to its users include Online Public Access Catalogue (OPAC), full-text journal articles

(e-journals), books (print), circulation services, reference services, full-text journal articles (print) and research support services, with scores of 17 (100%), 17 (100%), 17 (100), 15(88.2%), 15 (88.2), 14 (82.4%) and 14 (82.4%) respectively. Data from the Office of the Vice-Chancellor showed further that the interim library can seat 400 users. The library had made a lot of progress in book collection because data from the Office of Vice Chancellor indicated that within a short period of time, the library had received over 12,000 books through donations and designated purchase.

However, there were many basic services and facilities that the interim library was yet to start offering to users. Specifically, the interim library was not offering Internet services, electronic books, library computer laboratories, interlibrary loan services, scanning services, special needs information services, printing services, photocopying services and CD-ROM services. It was, however, revealed during follow-up interviews with the Assistant Librarian that the library was in the process of procuring facilities such as computers for students' computer laboratory. This means that students could soon start accessing Internet and computer services in the library. Through follow-up interviews, it was further revealed that the library could start offering photocopying and scanning services soon. Considering that the library computer laboratory might not be enough to accommodate the current 2873 students studying through the face-to-face delivery mode (MZUNI Report, 2015), the Office of Vice Chancellor indicated that the interim library had put in place adequate power sockets for student laptop computers.

Some services that were neither offered in the old nor were they offered in the interim library include information for people with special needs, scanning services, interlibrary loan services and CD-ROM services (See Table 2).

**Table 2: A Comparison of Services Offered in the Interim and Old Libraries**

| | **Interim library** | | **Old library** | |
|---|---|---|---|---|
| **Name of equipment** | ***f*** | **%** | ***f*** | **%** |
| Online Public Access Catalogue | 17 | 100 | 17 | 100 |
| Books (print) | 17 | 100.0 | 17 | 100 |
| Full-text journal articles (e-journals) | 17 | 100.0 | 17 | 100 |
| Full-text journal articles (print) | 14 | 82.4 | 15 | 88.2 |
| Research support services | 14 | 82.4 | 15 | 88.2 |
| Circulation services | 15 | 88.2 | 14 | 82.4 |
| Reference services | 15 | 88.2 | 15 | 88.2 |
| Bibliographic databases | 8 | 47.1 | 10 | 58.8 |
| Electronic books | 6 | 35.3 | 9 | 52.9 |
| Book reservation | 5 | 29.4 | 12 | 70.6 |
| Scanning services | 1 | 5.9 | 1 | 5.9 |
| Interlibrary loan services | 1 | 5.9 | 6 | 35.3 |
| Library computer laboratories | 2 | 11.8 | 17 | 100 |
| Off-campus information services | 0 | 0 | 1 | 5.9 |
| CD-ROM services | 0 | 0 | 9 | 52.9 |
| Photocopying services | 0 | 0 | 17 | 100 |
| Printing services | 0 | 0 | 12 | 70.6 |
| Special needs information services | 0 | 0 | 0 | 0 |
| Internet services | 0 | 0 | 17 | 100 |

**Awareness of Perceived Library Services**

The students were asked their awareness of the services that the interim library had resumed offering. The researchers' assumption was that it was possible for users not to know some of the services currently being offered in the interim library. Results are presented in Table 3 where it was revealed that most students were aware about the existence and offering of books (print), OPAC, journal articles (both print and electronic), reference services and research support services. However, findings showed that not all students were aware about the existence of some crucial services such as OPAC, electronic journals and research support services. Perhaps, the library needed to raise awareness of these services across the university community. According to follow-up interviews with the Assistant Librarian, the library had not conducted any formal awareness campaigns about the services being offered in the interim library, but the library had just orientated first year students on various services offered in the interim library.

A further analysis of the findings presented in Table 3 supports those from library staff about the absence of some services such as printing, photocopying, Internet and scanning services. Follow-up interviews with the Assistant Librarian revealed that though both staff and students indicated that printing and photocopying services had not been restored, the truth is that the library had been offering these services through the Mzuzu American Corner which was saved from the fire. According to Chawinga and Ngwira (2015), the Mzuzu American Corner's services which include Internet, printing and photocopying were cheaper and affordable because they were subsidised by the Embassy of the United States of America which donated computers, photocopiers and computers; and in addition, MZUNI contributed to the subsidy through offering space and paying staff.

According to the findings from students and library staff, the only services that did not exist in both the old and the interim libraries were information services for off-campus students and scanning services. It was revealed through follow-up interviews that the library had already placed a purchase order for a proxy server that could allow all users to access the library e-resources remotely. An analysis of both students' and staff's results led researchers to conclude that various services that were offered in the old library had been restored and were currently being offered in the interim library. This is perhaps the reason a respondent from the Office of the Vice-Chancellor commented that "The conversion of the University Hall into an interim library and the stocking of the library with furniture and books, all within a short period of time, was a major achievement".

**Table 3: Student's Knowledge of the Interim and old Libraries' Services**

| Service | Interim library | | Old library | |
|---|---|---|---|---|
| | *f* | % | *f* | % |
| Books (print) | 55 | 100 | 55 | 100 |
| Online Public Access Catalogue | 47 | 85.5 | 52 | 94.5 |
| Full-text journal articles (print) | 37 | 67.3 | 47 | 85.5 |
| Full-text journal articles (e-journals) | 37 | 67.3 | 54 | 98.2 |
| Reference services | 37 | 67.3 | 47 | 85.5 |
| Research support services | 34 | 61.8 | 50 | 90.9 |
| Book reservation service | 27 | 49.1 | 46 | 83.6 |
| Electronic books | 25 | 45.5 | 42 | 76.4 |
| Circulation services | 23 | 41.8 | 39 | 70.9 |
| Bibliographic databases | 15 | 27.3 | 42 | 76.4 |
| Internet services | 0 | 0 | 55 | 100 |
| CD-ROM services | 7 | 12.7 | 38 | 69.1 |
| Interlibrary loan services | 4 | 7.3 | 27 | 49.1 |
| Special needs information services | 3 | 5.5 | 3 | 5.5 |
| Photocopying services | 0 | 0 | 40 | 72.7 |
| Off-campus information services | 0 | 0 | 0 | 0 |
| Printing services | 0 | 0 | 40 | 72.7 |
| Scanning services | 0 | 0 | 0 | 0 |

## Library Environment

When asked to compare or rate the interim library with the old library about various environmental aspects, it was noted that there were some areas where the interim library was better or similar to that of the old library. Specifically, 14 (82.4%) library staff indicated that the interim library had collected more current and relevant information resources than the old one. The study found further that 11 (64.7%) library staff indicated that the interim library had adequate ICTs for staff whereas 14 (82.4%) stated the old library had adequate ICTs for staff. As for users' ICTs, the study revealed that the majority of library staff with a score of 15 (88.2%) expressed that the interim library did not have enough ICTs compared to 10 (58.8%) who reported that the old library had adequate ICTs for users. Similarly, 54 (98.2%) students indicated that the interim library had less space than the old library, 52 (94.5%) indicated the interim library did not have ICTs for users, 25 (45.5%) reported the security was inadequate and 47 (85.5%) said the materials were current and relevant.

As for security and safety for staff, 11 (64.7%) library staff indicated the interim library and the old libraries had adequate security and safety with scores of 11 (64.7%) and 10 (58.8%) respectively. Sentiments from the library staff were well corroborated with those from the Office of the Vice-Chancellor as evidenced by the following comment:

> "We are taking fire and other safety issues very seriously in our design of the interim and future library. Special attention is being paid to electrical safety, the availability of fire extinguishers and detectors, as well as CCTV, to ensure we can track what is happening in the library."

Based on these findings, it could therefore be concluded that the interim library outclassed the old library in three aspects which include: currency of information resources, ICTs for staff and general security. For students' security, the old library was slightly better because it had a specialised place for keeping students' bags. Many students made comments similar to the one that read: "No safety; books can be easily stolen and students' luggage can as well be easily stolen because students just leave their bags without any form of security measures being taken." Another challenge with security in the interim library was associated with identifying unauthorised users as it was revealed that there were no formal procedures that had been put in place to vet the authenticity of authorised users. Such a security lapse put users and library materials at risk.

One interesting evidence emerging from the study was that unlike the old library, the Interim library was stocked with current and relevant information resources. However, the most striking drawback in the interim library according to the findings was that it did not have ICT resources for users, so they would not be able to access relevant literature in electronic form. This is the reason Ani et al. (2010) have postulated that ICTs are now commonly used for information gathering, processing, storage and retrieval, and dissemination in university libraries.

## Satisfaction with the Recovery Process

Officials of the Library were asked to express their satisfaction with the overall recovery process of the library. Results showed that 15 (88.2%) library officials were satisfied whereas 2 (11.8%) said they were not satisfied. Respondents who said they were satisfied with the recovery process gave various reasons. The most prevalent reasons were that the library was almost functioning normally, the library had purchased reasonable ICT resources for staff, the library had acquired the most current and relevant information resources and that there had been good managerial support. As discussed in some previous sections, the library has acquired a good number of information resources such as books which were not just current but also relevant. Information gathered from the Office of the Vice- Chancellor showed that apart from the moral and financial support received from the Malawi Government, the University had received support from universities in Malawi, USA, Scotland, Ireland and New Zealand.

Much as most library staff and the Office of the Vice-Chancellor expressed outright satisfaction with the recovery process, the researchers were interested to know why the other two expressed discontent. They indicated that it was taking too long to restore some facilities such as computers for the library computer laboratory. However, during the interview with the Assistant Librarian, it was revealed

that all the equipment for the library computer laboratory had been acquired and both the University Management and the procurement office had been very supportive in the recovery of the library.

Majority of the students who responded to the questionnaire were pleased that the academic calendar was not disrupted by the disaster. Only nine (16.4%) students said they were not satisfied with the recovery process because according to them, there was inadequate reading space and also because there were no Internet services for students. It has to be mentioned that the Internet services were offered for free in the old library and this was the reason students wanted this service restored as soon as possible.

Considering the huge costs MZUNI had incurred in putting up an interim library, results from the Office of the Vice-Chancellor showed that the University had learnt three key lessons about the value of the library as follows:

- The University Management could never take the library again for granted. It emerged from the study that because the Library was always there silently in the background, it was often under-valued but the fire incident had served to bring the library back to the centre of excellence;
- There was need to continuously appreciate, improve and professionalise the library both as a building as a service centre; and
- The University recognised the need to have in place a disaster management plan and a risk management strategy to avoid, as well as to manage disasters.

## Challenges

We asked library staff an open-ended question to mention the challenges that they were facing in offering services in the interim library. A thematic analysis of the findings showed that the key challenges in that order included limited reading space for users, electricity outages, slow procurement process for some resources, unavailability of ICTs for users, unreliable Internet, and limited furniture. Worth highlighting in this study is the slowness in the procurement process for new library facilities and other information resources. Almost all the library staff highlighted this problem. As discussed in one of the previous sections, this factor also contributed to some library staff express their dissatisfaction with the recovery process of the library.

The most common challenges that students faced are depicted in Table 4, which include: absence of off-campus information services, absence of computers in the library, poor Internet and lack of reading space. MZUNI admits all students as non-residential and this is the reason the findings show that the majority of 52 (94.5%) students stated that one of the challenges they encounter is inability to access library services off-campus.

From MZUNI management perspective, the Office of Vice Chancellor highlighted the following key challenges:

- Maintaining the momentum to improve and re-stock the library with books, electronic resources and to replenish the Malawiana collection (a specialised room in the library that houses all information resources published with a focus on Malawi);
- Maintaining efforts to improve the provision of e-materials for e-learning;
- Acquiring resources for construction of a replacement Hall, given that the original Hall has been converted into the interim library; and
- Acquiring substantial multi-million dollar resources to allow the construction of a new, modern, purpose built library by 2019 for a student population that will likely reach 8,000 by 2020.

**Table 4: Challenges in the interim library**

| | Interim library | | Old library | |
|---|---|---|---|---|
| **Challenge** | *f* | % | *f* | % |
| No off-campus students, services | 52 | 94.5 | 52 | 94.5 |
| Unavailability of computers in the library | 50 | 90.9 | 0 | 0 |
| Poor Internet | 49 | 89.1 | 50 | 90.9 |
| Lack of reading space | 47 | 85.5 | 42 | 76.4 |
| Lack of security and safety | 42 | 76.4 | 11 | 20.0 |
| Inadequate computers | 36 | 65.5 | 50 | 90.9 |
| Lack of relevant information materials | 29 | 52.7 | 8 | 14.5 |
| Lack of library support | 8 | 14.5 | 9 | 16.4 |
| Out-dated information materials | 3 | 5.5 | 52 | 94.5 |

## Conclusion and Recommendations

The study revealed that the library had managed to restore most of the basic services such as full text journals (both print and electronic), books, particularly print, OPAC and research support services. It emerged from the findings that library staff, students and management were highly satisfied with the progress the library had made in recovering its services with the key reason being that the University Academic Calendar was not disturbed. The researchers also noted that MZUNI had learnt a lesson from the fire disaster because the University had started treating issues of library security very seriously and the library had become one of the priority areas of the University.

The following recommendations if implemented in the interim library or in the new library that will be built will make the MZUNI library one of the best libraries in Southern Africa:

- The library should start offering information services to off-campus students
- The library should speed up the installation of computers and networks in the students' library computer laboratory so that students should start benefiting from these free services as soon as possible
- There is need for the library to raise awareness about the existence of the services that have been restored and were currently available
- The University should consider offering reliable Internet services to both library staff and students
- The University should immediately embark on building a new purpose built library structure with adequate space and state of the art technology.

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# The Linguistic-Cultural Impact of the Institutional Repository of North-West University, South Africa

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## Abstract

*This paper analyses the content of the North West University Institutional Repository (NWU-IR), also known as Boloka - a term that means "to save" in the Setswana language. The paper uses the documents hosted by Boloka to determine her representation of languages and culture. The research methods employed are informetrics and content analysis. It was found that Boloka has scant Setswana language and cultural representation as only 7 out of 21389 (0.033%) documents digitised are in this marginalised language. Its Afrikaans representation was found to be commendable as 4705 out of 21389 (22%) documents are in Afrikaans. The repository has excellent English language representation as more than 77% (16521 out of 21389) of documents digitized are in English. Three non-official languages in South Africa, Dutch (with 91 or 0.43% documents), German (with 14 or 0.07% documents), and French (with 10 or 0.047% documents) have more influence on Boloka than Setswana. Based on the scant Setswana representation, the paper argues that Boloka has minimal impact on this language and culture.*

**Keywords**: *Institutional Repositories, Universities, Content, Language, Culture, Impact*

## Introduction

Among the biggest challenges that confronted academic libraries at the beginning of the 21st century were the rising costs of journals, and the decreasing budgets. Running parallel to those challenges were unlimited opportunities associated with the introduction of new technologies. One way in which academic libraries responded to the challenges was through the establishment of institutional repositories (IRs). Initially, these digital collections of intellectual outputs and cultural heritage were used to digitise unpublished educational content in the form of theses and dissertations, but they later expanded to include other published and unpublished content such as journals, conference papers, magazines, artifacts, videos, and other university publications, some of which are written in indigenous languages. IRs trace their origins from William Gardner's 1990 article when the first proposal was made for the use of the World Wide Web and the Internet to publish academic research. In response to this proposal, arXiv.org was started at the Cornell University in 1991 (Jones, 2006). It was not until 2000 that the first university repository would be established in South Africa with the establishment of the University of Pretoria's repository (Van Wyk and Mostert, 2014).). Since then, the academic library landscape in South Africa saw a seismic shift, as almost all public universities in the country now host an IR (Bangani, 2018). Although Fredericks and Mvunelo (2002) and Ngulube (2012) decried the lack of interest to publish in languages and culture other than English and Afrikaans in South Africa by the traditional publishers,

with the introduction of IRs, libraries are now able to publish content in the language and culture of their choice free of any interference from the traditional publishers (Raju et al 2015). Language and culture were at the centre of several major events that shaped the future of South Africa, including the South African War (Anglo-Boer War) and the 1976 Soweto Uprisings. It also featured in two major negotiations that determined the future of the country: the negotiations for the Union of South Africa in 1908 and the Convention for a Democratic South Africa in 1991. In order to minimise conflicts that come as a result of the marginalisation of certain languages, the Constitution of the Republic of South Africa recognises eleven official languages. As a result, the development of African languages and culture is a constitutional obligation in the country (South Africa, 1996; Constitutional Court of South Africa, 2017). It is further encouraged by the National Development Plan of South Africa which calls for all citizens to learn an indigenous language (South Africa, 2012). Alexander (2011), Olaifa (2014), and Benson *et al* (2017) point out that African nations need to link their development agenda to the promotion of indigenous African languages. IRs have redefined the role of academic libraries from just collecting, preserving, and disseminating intellectual outputs and cultural heritage of universities to also publishing original content on the Internet, free of any access restrictions. In the African context, they provide libraries an opportunity to showcase the seriousness with which they treat the obligation to provide information for all in the language of their choice (South Africa, 1996). IRs further provide academic libraries an opportunity to take practical steps to promote African languages and cultural rights.

The aim of this paper, therefore, is to analyse the content and determine the linguistic-cultural impacts of public university IRs in South Africa, with the North-West University Institutional Repository (NWU-IR) used as a case study. In other words, this paper seeks to determine whether and to what extent do universities represent the languages and culture of the communities within which they operate. Specifically, this study has four objectives which are to:

- Analyse content held by the NWU institutional repository
- Determine age of documents on *Boloka*
- Establish the meaning of the oldest documents on *Boloka*
- Determine linguistic-cultural impact of the NWU-IR by identifying the languages it represents.

The concept linguistic-culture which depicts a symbiotic relationship between culture and language is often credited to Schiffman in literature. Schiffman (1996) defines linguistic-culture as "*a set of behaviours, assumptions, cultural forms, prejudices, folk belief systems, attitudes, stereotypes, ways of thinking about language, and religio-historical circumstances associated with a particular language.*" The subsection on the link between language and culture provides more in-depth explanation of this relationship. In the context of research, impact is often defined as the effect of research to any of the following aspects: culture, the society at large, academy, education, health, environment, public policy, professional services, and the economy (Jones and Liam, 2014).

## Context of the Study

It is important that the context within which this study is conducted is fully expedited.

### Universities and Libraries in South Africa

Before 1994, South African public universities were broadly reserved for certain groups along racial lines with separate universities for Blacks, Whites, Coloureds, and Indians (The New Encyclopaedia Britannica, 2003). Among the white universities were universities meant to promote the English language and culture, and those meant for the Afrikaans language and culture, while Black universities could also be divided along ethno-linguistic and cultural lines (Bunting, 2006). The biggest structural changes in universities did not come until 2002. In 2002, an attempt was made by the government to dismantle the racial and ethno-linguistic foundations of universities by merging several universities most of which came from different backgrounds (Bunting, 2006). This resulted to the reduction of the number of universities from 36 to 23 (Bunting, 2006). The then Potchefstroom University for Christian Higher Education (CHE) which historically catered for white

Afrikaans speakers and culture was merged with the Batswana dominated University of the North-West, with students and staff (not facilities) of the Sebokeng Campus of the then Vista University incorporated into the new institution to form the North-West University (South Africa, 2002a). Due to disparities in language, culture and missions, the university opted for a federalist system with the three campuses of Vaal, Potchefstroom and Mafikeng having parallel management structures. In the case of libraries, the Mafikeng and Potchefstroom Campus libraries had separate directors who reported to their respective vice-rectors while the Vaal Campus had a senior manager who reported to the Vaal Campus rector. The university moved towards a unified structure in 2017 with the library having a senior director to oversee all campuses (Bangani *et al* 2018).

## Language in Higher Education in South Africa

African languages never achieved the status of mediums of instruction in higher education in South Africa. The New Encyclopaedia Britannica (2003) and Giliomee (2004) point out that when Transkei, Bophuthatswana, Venda and Ciskei, and other "homelands" acquired the status of independence they soon removed Afrikaans as a second language in the school curriculum and introduced an African language instead. When universities were established in these homelands, they then introduced departments of African languages where the local dominant African language was also taught but mainly as part of the education or arts faculty (The New Encyclopaedia Britannica, 2003). It was not until 1993, that nine indigenous African languages were recognised as official languages of the country, together with English and Afrikaans (South Africa, 1996). Those are: Sepedi, Sesotho, Setswana, siSwati, Tshivenda, Xitsonga, isiNdebele, isiXhosa, and isiZulu. Ngulube (2012), however, asserts that the new found official status of these indigenous African languages did not lead to their recognition as mediums of instruction in higher education. At a policy level, attempts were made to promote the indigenous African languages. In the case of universities, the Gerwel Report (South Africa, 2002c) recommended that the then Potchefstroom University for Christian Higher Education and Stellenbosch be retained as Afrikaans universities. This recommendation was partially rejected as this would have resulted to perception of these universities being the exclusive reserves of Afrikaans speaking students and academics. In rejecting this recommendation, however, the government left room for Afrikaans to be developed in those universities and others in the context of multilingualism. In the case of indigenous African languages, a committee that was formed to investigate their usage as mediums of instruction in higher education recommended that certain universities should be tasked with the development of certain indigenous African languages.

According to the recommendations of the committee on use of indigenous languages in higher education, the present-day Mafikeng Campus of the NWU was tasked with the development of Setswana while the recommendations of the Gerwel Report suggested that the Potchefstroom Campus should be tasked with the development of Afrikaans in the context of multilingualism. The position of Setswana and Afrikaans at the NWU was affirmed by their recognition as official languages of the university with the third language, SeSotho, recognised as a working language (North-West University, 2012). Ngulube (2012), Lor (2012), and Thorpe and Galassi (2014) concur that as custodians of the nation's cultural heritage, libraries have some responsibility to develop the marginalised indigenous languages. The IRs, therefore, are best placed platforms to develop African languages from the librarian's perspective, as they do not always require the interference of publishers (Raju *et al* 2015).

## Language Policy of NWU

The majority of South Africa's universities profess multilingualism and multiculturalism in their language policies (South Africa, 2015). Thirteen of the 23 public universities (excluding the three newly established universities) recognise at least three official languages in their policies (South Africa, 2015). English is an official language of all 23 universities, while Afrikaans is part of official languages of fourteen public universities, followed by IsiXhosa in nine universities, IsiZulu in six, Sesotho in four, Sepedi in four, Setswana in three, Xitsonga in two, Tshivenda in two, IsiNdebele in two, and SiSwati in one (South Africa, 2015). North-West University is one of the

multilingual/multicultural universities, meaning that it recognises more than two languages as its official languages (North-West University, 2012).

The language policy of NWU took into account the provincial language dynamics of the North West Province where the two biggest campuses of NWU are situated, and the languages represented by the student population of the NWU. Figure 1 depicts the languages represented in the North-West province.

More than 63% of people in the North West Province speak Setswana, followed by Afrikaans at 8.96% (Statistics South Africa, 2011), hence the recognition of Setswana, English and Afrikaans as official languages. Sesotho is also given a prominent role as a working language in the Vaal Triangle Campus based in Sebokeng, a Sesotho dominated area of the Gauteng Province. According to Mwaniki (2014) and South Africa (2015), however, there is a disconnect between the overt language policy of public universities and what transpires on the ground.

## Literature Review

The literature review is divided into five themes in order to better align it with the objectives of the research. The sections are:

- The link between language and culture
- Role of libraries in the promotion of language and culture
- Content analysis in institutional repositories
- Impacts of institutional repositories
- Language representation on institutional repositories.

### The Link between Language and Culture

According to Ferraro (2004), culture can be defined as symbols (e.g. language), things (artifacts), ideas and knowledge, and patterns of behaviour in a community, hence the use of the concept Linguistic-culture, by Schiffman (1996). Leveridge (2008) argues that language and culture are intertwined, as language is used "to maintain and convey culture and cultural ties". Leveridge (2008) cites Emmitt and Pollock (1997) as indicating that language determines one's worldview. People from similar backgrounds who speak different languages have different worldview due to the differences in language and culture. Prodromou (1988) points out that teaching or learning a language is on its own a cultural action. This places a responsibility to those who teach a new language to understand the culture within which the language functions. Ferraro (2004) goes on to point out that the most important aspect of culture is language which allows a sense of identity within a cultural group. Cultures of people are classified as Setswana culture, isiXhosa culture, isiZulu culture, Sepedi culture, Afrikaaner culture, and other groups based on their language. African intellectuals, Ngugi Wa Thiong'o (1986; 2003) and Thorpe and Galassi (2014), point out that language is an expression of who we are as a group or community. Wa Thiong'o (1986) with support from Rajaram (2015) adds that written language is not only a means of communicating a culture but it is also a carrier of it. A document written in Setswana, for example, carries in itself a Setswana cultural expression and symbol even though the writing may have nothing to do with the Setswana language. In fact, Wa Thiong'o (1986) adds that language is part of one's identity. This prompted Rajaram (2015) to observe that "language without culture is unthinkable, but so is human culture without language." Just by dominance of a language in a university, that university can be described in terms of that language culture, meaning that the former Afrikaans universities in South Africa could be referred to as having had an Afrikaans culture. Kidd (2002) and Wa Thiong'o (1986; 2003) concurs that language and culture are interlinked as culture is a "way of life of people". Linguistic symbols (language), therefore, form a key ingredient within which a culture functions.

In agreement with other researchers, Moseley (2010) argues that "languages are vehicles of value systems and cultural expressions and are an essential component of the living heritage of humanity." Moseley adds that out of the +-6000 in the world, 43% are endangered. Though no official language in South Africa is part of the endangered list, Lor (2012) points out that 10 of the endangered and extinct languages are spoken or were spoken in South Africa, which raises the stakes even higher for the indigenous languages of the country as they may find themselves in a similar situation in future. Another prominent South African scholar, Ngulube (2012), links culture and language by arguing that publishers

who do not publish in indigenous languages are discriminating against both the culture and language of the people concerned. This study is not the first study in Africa to use the language on IRs to determine cultural impacts. Marungudzi and others' (2014) and Hikwa and Maisiri (2017) pointed a link between language and culture in their studies of IRs. Marungudzi and others (2014) take their contribution further by pointing out that not only there is a link between culture and language, but also language itself is culture. Olaifa (2014) and Hikwa and Maisiri (2016) argue that without language, culture is dead, as cultures are expressed through language- meaning that when a language becomes extinct but so is the culture within which that language operates. Thus by speaking a language, one is not merely speaking the language, but is also expressing the culture of a people. This is similar to the act of digitising a document; it leads to the preservation of the cultural heritage of people concerned (Ngulube, 2012; Marungudzi *et al* 2014; Hikwa and Maisiri, 2017).

### Role of Libraries in the Development and Promotion of Language and Culture

Libraries cannot be spectators in the development and promotion of language and culture (International Federation of Library Associations and Institutions (IFLA) and United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2012). They play a critical role in developing and promoting the culture and language of the communities within which they operate (Feather and Sturges, 1997:255; Lor, 2012; Ngulube, 2012; IFLA and UNESCO; 2012; Marungudzi *et al.*, 2014; Nkondo *et al* 2014; Olaifa, 2014; Fauchelle, 2017; Hikwa and Maisiri, 2017). Olaifa (2014) points out that libraries are language banks through which written documents are kept. According to Feather and Sturges (1997), IFLA and UNESCO (2012), and Fauchelle (2017), libraries in a globalised world play a role to ensure the continuation of local identities and cultures by preserving material of concern to the local communities. Fauchelle (2017) argues that libraries should strive to reflect the demographics of their users (both in their physical and virtual environments) in order to ensure that they feel a sense of welcome, inclusion, acceptance, and belonging in the library. Users may feel alienated when their local libraries do not reflect their language/s and culture. Though the authors locate this role within the public library context, Lor (2012), Ngulube (2012), Marungudzi and others (2014) would later argue that it is not only public libraries that should play a role in preserving local culture, languages, and knowledge but academic libraries should also play their part. IFLA and UNESCO (2012) concurs that all types of libraries should play an active role in promoting and preserving marginalized indigenous languages and culture by "reflecting, supporting, and promoting cultural and linguistic diversity at international, national, and local levels…". This will result to multicultural and multilingual libraries that promote dialogue and active citizenship. While Hikwa and Maisiri (2017) advises libraries to collect, preserve and disseminate content in indigenous languages, Ngulube (2012), and Marungudzi (2014) and others see an expansive role for libraries as publishers of content in indigenous African languages. This will ensure that they bypass the normal traditional publishing obstacles placed by commercial publishers.

Fredericks and Mvunelo (2002) point out that library collections in South Africa are dominated by Afrikaans and English language books, with indigenous languages making less than one percent of most public libraries. Benson *et al.* (2017) also observed a similar phenomenon in the context of Nigeria where fewer documents are published in indigenous languages, and there is a strong preference for English language. It is clear that librarians have as much of a role to play to promote African indigenous languages as publishers and government. IRs have given librarians the best solution to the problem of lack of content on African languages.

## Content Analysis of Institutional Repositories

Content analysis of IRs has been conducted in several countries (Abrizah *et al* 2010; Nyambi and Maynard, 2012; Namaganda, 2012; Chilimo, 2015; Raju *et al.,* 2015; Tsunoda *et al* 2016; Kakole, 2016). Abrizah and others (2010) studied content in Asian IRs and found that the dominant contents were journal articles, followed by ETDs, unpublished reports, conference papers, and book chapters. These findings were at odds with the findings of Namaganda (2012) who found that in the case of Uganda, ETDs were the most prevalent content, followed by journal

articles, conference papers, workshop reports, technical reports, working papers, braille, sound, and other documents. Another study by Nyambi and Maynard (2012) determined that in Zimbabwe the following materials are represented in IRs: ETDs, examination papers, journal articles, ebooks, book chapters, working papers, research reports, and seminar papers. Chilimo (2015) studied content in IRs in Kenya and determined that ETDs, journal articles, past exam papers, conference papers, archives, research papers or reports, books and book chapters, learning objects, and lectures and speeches were deposited. In the case of South Africa, Raju *et al.* (2015) determined that the most prevalent content in IRs was both ETDs and journal articles, followed by book chapters and conference papers, inaugural addresses, working papers, and data sets.

Tsunoda and others (2016) sought to determine the quantity and the type of contents on IRs of the top 100 universities in the world. The researchers found that in terms of quantity, Harvard University was ranked first, followed by Peking University, Monash University, Uppsala Universitet, University College London, University of Queensland, Wageningen UR Corporate headquarters, Rijksuniversiteit Groningen, University of Cambridge, and University of Oxford. In terms of content types, journal articles formed the overwhelming majority of content at 43%, followed by electronic theses and dissertations (ETDs), conference proceedings, book chapters, datasets, multimedia and audio-visual materials, unpublished reports and working papers, learning objects, patents, software, and bibliographic references. Kakole (2016) studied the type of content held by *Boloka* and found that ETDs were the most prevalent content, followed by journal articles and journal volumes or issues, special collections, inaugural lectures, and other publications.

## Linguistic-Cultural Impacts of Institutional Repositories

Abrizah *et al* (2010), Budzise-Weaver *et al* (2012), Wasa and Chakravarty (2013), Diekema (2013); Chilimo (2015), Dhanavandan and Mary (2015), Key and Tseng (2016), Das and Singh (2017), Ezema and Onyancha (2017), and Bangani (2018) studied the representation and usage of languages in institutional repositories in Asia, Kenya, Brazil, China, and Africa respectively.

Research conducted by Abrizah *et al.* (2010) determined that the majority of Asian languages and cultures are marginalised in IRs in Asia, with 84% of them dominated by English, followed by Japanese (37.7%), and Chinese (14%). Budzise-Weaver *et al.* (2012) made somewhat similar findings while studying key features of four multilingual digital libraries in the United States. Budzise-Weaver *et al.* (2012) found that the digital libraries contained 28,791 ebooks in English, 1685 in French, 718 in German, 544 in Finnish, and 501 in Dutch. This means that more than 89.3% (28, 791 out of 32, 239) of ebooks in these digital libraries are in English. Wasa and Chakravarty (2013) studied the representation of languages in IRs in India and found that all 25 IRs had content in English; of the 25 IRs, 4 also covered Hindi, Malayalam and Kannada were covered on two, while Sanskrit and Arabic were covered on one each. Dhanavandan and Mary (2015) determined that 74% of IRs in Brazil are monolingual. Spanish language and culture is marginalised, as only one IR uses the language with the majority opting for Portuguese. 15.48% of IRs in Brazil were bilingual, and 10.71% were trilingual. Diekema (2013) researched the advantages of multilingual and multicultural IRs, and determined that these IRs enhance the language and cultural impact of an IR, as they have a potential to reach wider audiences. Chilimo's 2015 study on content in IRs in Kenya found that the few Swahili documents on Kenyan IRs attract considerable attention. Key and Tseng (2016) report a project where the Taiwan National Central Library collaborated with international partners to digitise Chinese books and other books of cultural value in order to enhance their visibility. As a result of the project, 8, 988 titles and 2, 097, 163 images had been digitised by 2016. The authors point out that the digitisation of these books enhanced their cultural value. In the case of China, Das and Singh (2017) determined that the majority of IRs are in Chinese (9), followed by English (3). The rest were bilingual , either with Chinese dominating English (24) or English dominating Chinese (3). Ezema and Onyancha (2017) studied the most frequently used languages on open access publishing in Africa and found that 89.9% of open access resources in Africa were in English, followed by German, French, Dutch, Afrikaans, and Sepedi, with IsiXhosa appearing as number 15 on the languages represented, followed by Dutch Flemish. This means that only two African

languages are represented, which are Sepedi and IsiXhosa. These are both official languages in South Africa. Likewise, Bangani (2018) determined that English is represented in all 22 university IR's in South Africa, followed by Afrikaans (15), IsiZulu (7), IsiXhosa (5), Tshivenda (5), Xitsonga (3), Setswana (3), SiSwati (3), Sepedi (2), Sesotho (2), and IsiNdebele (1). Bangani predicted that English and Afrikaans are likely to also dominate on the number of documents on IR's in public universities in South Africa.

## Methodology

This is a quantitative study that uses informetrics research methods to determine the content and linguistic-cultural impact of *Boloka*.. The content on *Boloka* as indicated under the "communities" section was used to determine the content covered on this IR. The age of documents was determined by creating an Excel spreadsheet divided into periods: 1844 to 1910, 1911 to 1950, 1951 to 1993, 1994 to 2002, and 2003 to 2017. The counting of the documents was done with the assistance of *Boloka* which provides an option to browse the documents by year of publication. Documents published from 1844 to 1899 were then downloaded and, for non-English language documents, searches were done on Google Translate to determine their language and meaning.

To further determine the representation of languages and culture on *Boloka*, five Excel spreadsheets were created each divided into the five periods covered by the study. Four columns were initially added for each spreadsheet covering the year, English language, Afrikaans, and Setswana language documents. These languages are the official languages of NWU (North-West University, 2012). The expectation was that all official languages of NWU will show significant representation on *Boloka*. Columns depicting other languages were added as documents in those languages were discovered. All four-thousand-eight-hundred and sixty-one documents written in languages either than English and Setswana were downloaded and their languages determined using Google Translate. This is because it proved a challenge for the researcher to confidently differentiate between Afrikaans and Dutch, and to a certain extent Frisian documents given the proximity of these languages. A statistical analysis of the data was thereafter carried out and the results are presented in the form of tables and pie chart.

## Findings and Discussions

According to Table 1, journals dominate content on *Boloka,* followed by ETDs, conference papers, special collections, and inaugural lectures. This is somewhat at variance with the findings of Abrizah and others (2010) and Tsunoda and others (2016), but somewhat at odds with Namaganda (2012), Nyambi and Maynard (2012), and Kakole (2016). The dominance of journals could be a sign of the level of maturity of the NWU-IR, as most IRs start with ETDs during their infancy with other content types following at later stages. This is a reflection of the growth of the journals content since Kakole presented a paper at NWU during the Open Access Week in 2016. It is the view of the author that the dominance of journals is also a reflection of the impact of the National Research Foundation's Open Access Statement that calls for all research outputs published in universities using public funds to be deposited on IRs of universities (National Research Foundation, 2014).

**Table1: Distribution of Type of Collection**

| Type of collection | Number of items |
|---|---|
| Journal articles | 11703 |
| ETDs | 8661 |
| Conference papers | 359 |
| Special collections | 351 |
| Inaugural lectures | 292 |
| Other publications | 23 |

For purposes of determining the age of documents, the periods were divided into: the imperial era from 1844 to 1910, the Union of South Africa era from 1911 to 1950, the Apartheid era from 1951 to 1993, the democratic era from 1994 to 2002, and the period of change and institutional repositories from 2003 to 2017. This division is entirely the authors' creation for analysis purposes. This is not to suggest that the documents deposited on the NWU-IR represents the periods as indicated. Table 2 shows the age of documents on *Boloka*.

**Table 2: Age of documents on *Boloka***

| Period | Number of Items |
|---|---|
| 1844-1910 | 80 |
| 1911-1950 | 777 |
| 1951-1993 | 1792 |
| 1994-2002 | 817 |
| 2003-2017 | 17923 |

Close to 83.8% (17923 of 21389) of documents were created between 2003 and 2017, with 13089 (61.2%) of those documents created between 2010 and 2017. The period before the Union of South Africa (1910) is represented by only 80 documents. Possible reasons for this include the fact that there was little research done at that time, or some relevant documents may have been lost along the way due to the long period of time, or the fact that South Africa was not a unified state at that time. It is the view of the current researcher that the late surge of documents from 2010 to 2017 can be attributed to the 2014 National Research Foundation Open Access Statement as the library started to add documents retrospectively after the NRF instruction.

Fifteen of 27 of documents on *Boloka* during this period are Afrikaans (55.56%), followed by its Dutch cousin language at 25.93% (7 out of 27). The rest are documents in Afrikaans and English at 7.4% (2 out of 27), English, German, and Dutch and English all at 3.7% (1 out of 27 each). Looking at the titles of the documents, this was the period of the build up to the Anglo-Boer War (Shillington, 1987) and the Afrikaans culture was perceived to be under threat, hence the expressions of pride, frustration and defiance through titles of documents, for example, "the history of our country in that language of our people", "Afrikaans our language: 71 theses, or statements, set and explained", and "History of the Afrikaans Language Movement for friend and enemy". Looking at documents during this period only would give a view of excellent linguistic-cultural impacts of *Boloka* on Afrikaans. However, Afrikaans was on the retreat after the Anglo-Boer War. Dutch has more representation on *Boloka* than Afrikaans during this period. Possible reason for this could be the results of the traumatic events of the Anglo-Boer War and the defeat suffered by the Afrikaners during the war. It is possible that Afrikaans and Afrikaner pride were on the retreat during the period immediately after the war.

To further determine the linguistic-cultural impacts, a representation of languages on *Boloka* was established.

There are 9 languages represented in the North-West University institutional repository. Looking at the representation of languages, *Boloka* appears to be a multilingual and multicultural IR. It is also satisfying that all three official languages that are expected to be represented at NWU (North-West University, 2012) are represented on *Boloka*. The marginalisation of African languages (Ngulube, 2012) and the decreasing influence of Afrikaans (Giliomee, 2004) are not apparent at this stage.

Further analysis was done by counting the actual number of documents representing the languages. Table 3 shows the marginalisation of the Setswana language and culture on *Boloka*.

**Table 3: The Marginalisation of Setswana Language and Culture on *Boloka***

| Language | 1844-1910 | 1911-1950 | 1951-1993 | 1994-2002 | 2003-2017 | Total |
|---|---|---|---|---|---|---|
| English | 2 | 16 | 366 | 478 | 15659 | 16521 |
| Afrikaans | 21 | 692 | 1420 | 337 | 2235 | 4705 |
| Dutch | 36 | 48 | 1 | 1 | 5 | 91 |
| Afrikaans +English | 4 | 12 | 1 | 0 | 4 | 21 |
| German | 3 | 3 | 1 | 0 | 7 | 14 |
| French | 0 | 0 | 0 | 0 | 10 | 10 |
| Setswana | 0 | 1 | 3 | 1 | 2 | 7 |
| Frisian | 3 | 2 | 0 | 0 | 0 | 5 |
| Dutch + English | 4 | 1 | 0 | 0 | 0 | 5 |
| Portugese | 2 | 1 | 0 | 0 | 1 | 4 |
| Afrikaans+Dutch +English | 3 | 0 | 0 | 0 | 0 | 3 |
| Afrikaans+Dutch | 2 | 0 | 0 | 0 | 0 | 2 |
| Polish | 0 | 1 | 0 | 0 | 0 | 1 |
| **Total** | **80** | **777** | **1792** | **817** | **17923** | **21389** |

In terms of Setswana culture and language, *Boloka*'s impact is almost non-existent. Three non-official languages in South Africa- Dutch, German, and French, have more representation on *Boloka* than Setswana. These results are somewhat similar to Ezema and Onyancha (2017) who determined that European languages were well represented on IR's in Africa. The 7 Setswana items digitised are nowhere near the 8, 988 Chinese language titles digitized at Taiwan National Central Library (Key and Tseng, 2016), probably because the later took a deliberate decision to collect and digitise items in the Chinese Language. More than 77.2% (16521 out of 21389) of documents on *Boloka* are in English.

With regards to the extent of English dominance, these results are better than those of Budzise-Weaver *et al* (2012) and Ezema and Onyancha (2017) who determined that more than 89% of items in the United States and Africa were in English. However, these results confirm Beukes (2008) and Ngulube (2012) who argue that African culture and languages are marginalised at universities in South Africa. Bangani's (2018) prediction that English and Afrikaans are likely to be dominant in terms of number of documents on IRs in South Africa is confirmed. Giliomee's 2004 prediction of a possible demise of Afrikaans is not immediately noticed in this study unless one compares Afrikaans and English. At face value, it can be argued that Afrikaans is over-represented on *Boloka,* given that only 9% of the population in North-West speak the language (Statistics South Africa, 2011). However, the position of Afrikaans looks precarious when considering that Potchefstroom, the dominant campus at NWU, is a former Afrikaans university.

Afrikaans' position on *Boloka* was not under threat until 1977, when English started to have documents in the double figures at 11, for the first time to Afrikaans' 15. Before then, from 1844 to 1976, English does not have more than 2 documents a year on *Boloka*. In fact, English has 26 documents on *Boloka* during that period to Afrikaans' 1348. *Boloka* at that stage looked like a monolingual and monocultural IR in favour of Afrikaans. The battle between these two languages would be neck and neck in favour of Afrikaans from 1987 to 1994. English took over the lead from Afrikaans each year from 1995 onwards. Giliomee's, and Mwaniki's 2004 and 2014 observations that 1976 and 1994 may have had a negative impact on Afrikaans is thus confirmed. However, due to the huge prior gap between the two languages, Afrikaans only ceded the lead to English

in 2008. This means that *Boloka* was an Afrikaans-English bilingual IR until that time. From 2008 onwards, the gap between Afrikaans and English widened, such that *Boloka* is currently an English-Afrikaans bilingual IR with some documents in seven other languages. If Giliomee's 2004 argument that Afrikaans was facing a possible demise in terms of academic influence was meant to compare English and Afrikaans then the observation is confirmed. Clearly, Afrikaans has lost its place as the leading language of science and scholarship at North-West University (Mandela, 1996), particularly its Potchefstroom Campus, to English. Afrikaans, however, shows improvement in the number of documents produced from 2003 to 2017.

## Conclusion and Recommendations

The results show that despite the flattering Setswana pet name, *Boloka* has almost no Setswana linguistic-cultural impact, as only 7 (or 0.033%) out of 21389 documents are in this language while the impact on the Afrikaans culture and language are commendable. Afrikaans may be losing ground to English (Mwaniki, 2014) but, it still remains a formidable language and culture in terms of documents on *Boloka* sitting comfortable as the second biggest language.

These results also show that unlike Afrikaans in the mid-1920's, indigenous languages have not benefitted from their status as official languages. Instead they have reverted, as some African language departments in the former homelands closed due to loss of subsidy from the homeland governments and the internationalisation of universities (Mwaniki, 2014). English has been a major beneficiary of these events. Given the link between language and culture (Feather and Sturges; 1997:255; Lor, 2012; Ngulube, 2012; Marungudzi *etal,* 2014; Nkondo *et al* 2014; Fauchelle, 2017; Hikwa and Maisiri, 2017), *Boloka*'s impact on Batswana culture is almost non-existent. What this means is that the university is making virtually no impact on the language and culture of 63% of the citizens of North-West Province (Statistics South Africa, 2011) where the university is mainly based. Though English is the dominant language (Mwaniki, 2014) on *Boloka*, Afrikaans culture and language is well-represented on this IR compared to Setswana. Fredericks and Mvunelo (2002) also found that English and Afrikaans are well represented in public libraries in South Africa with indigenous languages represented by less than 1% of collections.

In terms of content, *Boloka* show signs of maturity as journal publications have recently overtaken ETDs by the number of items. The majority of documents in this IR were born in the past five years. It is also interesting that the documents on *Boloka* show some relations with historical events such as Anglo-Boer War, Soweto Uprisings, and the 1994 democratic breakthrough. There are signs that the Soweto Uprisings slowed down the upward trend of Afrikaans as the dominant language in higher education in South Africa. However, these events did not prove a fatal blow to the language (Mwaniki, 2014), as the Afrikaans language remains the second largest language in higher education in South Africa. It is also the second most represented language on university IRs in the whole country (Bangani, 2018).

The findings of this study have implications for universities and the country at large. They point to the possible failure of the South African National Development Plan to "*foster common values across language, culture, religion, race, class and space", and to* ensure that every South African has some knowledge of at least one African language by 2030 (South Africa, 2012). These findings may also be interpreted as the failure of the Republic of South Africa's Constitution and the various language policy documents (South Africa, 1995; South Africa, 1997; South Africa, 2002c, South Africa, 2002d) to inspire public universities to develop and promote African languages. This shows that merely declaring a language official does not automatically result to more recognition of that language unless practical steps are taken to develop, publish and promote material written in the language. There are no signs that the situation of Setswana and other African languages improved due to their official language status, as *Boloka* only has three documents in this language from 1994 to 2017. Dutch and Afrikaans on the other hand showed tremendous benefit from their status as one of two official languages from 1844 to 1925 and 1925 to 1994 respectively. This point to a need for investment and enforcement of the constitutional obligation to develop African languages, as done by the Afrikaaners to Afrikaans between 1925 and 1994.

The results of this study show clearly that declaring a language an official language does not mean the language automatically becomes the language of publication unless it is accompanied by investment and enforcement of the policy. Further, the findings of this study show that despite the professed multilingual and multicultural policies (North-West University, 2012), South African universities continue to marginalise African languages, meaning that there's a gap between the intentions of the policies and what actually transpires (Beukes, 2008; Mwaniki, 2014). The findings point to a general lack of enforcement of language policies not only in the country but also at the universities. Further, this study shows that the majority of people in the North-West Province may not identify with the university (Fauchelle, 2017), as it does not preserve and promote their most important cultural symbol, the language. Many people at the North-West Province, therefore, may feel justified in considering the university an ivory tower, as many of them neither speak nor understand English and Afrikaans.

It is recommended that librarians at the Mafikeng Campus of NWU, a Batswana dominated and historical campus, should consider visiting the communities to request content written in the Setswana language. The librarians should work closely with the Setswana language department at the campus to publish open access publications in this language on *Boloka*. Raju and others (2015) argue that IRs can be used for redress and social justice. Given that Setswana is a historically marginalised language, the NWU Library has a moral obligation to develop the language in order to address the cultural and language imbalances of the past. Providing a publishing platform for this language, therefore, will go a long way towards redress. At national level, university libraries should work with the South African National Library and start a national repository of African languages content similar to the one reported by Key and Tseng (2016) and Hikwa and Maisiri (2017) in Taiwan and Zimbabwe respectively.

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# An Analysis of Master Dissertations: A Case Study of Central University of Technology (CUT), South Africa

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## Abstract

*Knowledge is built on the foundation of information which may be gathered from various sources, including from dissertations. Gathering information from postgraduate dissertations can highlight the differences between, and in, disciplines, with regard to specific variables. Moreover, it has been reported that African postgraduate students struggle to complete their dissertations, as they do not know how to structure them correctly, which may include not knowing how many words, pages, images and tables to include in their dissertations. The purpose of this article is to analyse 157 Master dissertations spanning a 10-year period in order to identify the average number of supervisors, words, pages, images and tables that have been used in successful research studies in order to highlight the differences between disciplines and to provide a guideline regarding the average length of a standard dissertation. An ex-post facto study is employed where informetric analysis is used to obtain quantitative data. Results reveal that the five variables vary dramatically per faculty. Management Sciences produced the highest number of average words (40 467), the highest number of average pages (194) and the highest number of average tables (28), while Engineering produced the highest number of average images (53) per dissertation. Health and Environmental Sciences had the highest average number of supervisors (2.2) per dissertation. An important implication of this research is that it may help postgraduate students to better understand how to structure their dissertations when considering their length. A key recommendation is to include the results of this study in brochures which are distributed to postgraduate students at the start of their studies, giving them a better idea of the differences between, and in, disciplines with regard to the number of supervisors and the length of a standard dissertation.*

**Keywords**: Supervisors, Words, Pages, Tables, Images

## Introduction

"Information is not knowledge (Brainy Quote, 2018)." These words, by Albert Einstein, suggest that information cannot be considered as knowledge, as it only informs people of someone or something. However, "to know" means to dig deeper into the information, linking it with other pockets of information to foster understanding and create meaning. In fact, if one considers the definition of information, it only refers to facts provided or learned about someone or something. On the other hand, knowledge is defined as the theoretical or practical understanding of a subject (Oxford Dictionary, 2017). So, knowledge is built on the foundation of information which may be gathered from various sources, including from dissertations.

Why gather information from postgraduate dissertations? First, dissertations are useful for finding ideas (Leong and Muccio, 2006), which may be used for future research or for new topics in postgraduate research studies. Second, dissertations have changed

in terms of focus and scope over the past years (Shu et al 2016), which necessitates determining how and to what extend this change has occurred. Third, as dissertations have evolved in format from shelved print resources to electronic files housed in institutional repositories, recordkeeping practices have been developed to account for the description of their content and administration (Potvin and Thompson, 2016), which may require determining the effectiveness and efficiency of such practices. Fourth, dissertations are often only as good as the supervisors who oversee their completion (Scott, 2014) and are deeply embedded in the practices of the discipline (Hodges, 2017, Jewell et al 2017), which may lead to determining what differences exist between, and in, disciplines. Fifth, dissertations are the window to high-level research carried out in a university and high-profile publications of scholars in the making (Baro and Otiode, 2014), which may provide a glimpse of the quality and relevance of an institution's research in regard to global trends. Finally, some postgraduate students struggle to complete their dissertations through distance learning institutions (Ndlangamandla, 2015), while many struggle to prepare an acceptable research proposal (Hanyane, 2015) or to structure their dissertation correctly (Schulze, 2012). The structure of a dissertation encompasses a number of variables from the title page through the various chapters to the reference list and annexures (Flamez et al 2017). However, the structure may also include variables relating to the length of a dissertation (Tering, 2010), which may include the number of pages, words, images, and tables to use.

Undergraduate students often ask how long should a laboratory report be (Lobban and Schefter, 2017). Postgraduate students may ask similar questions regarding the dissertation, given the fact that they may never have written one before. Providing a guideline with regard to the length of an acceptable dissertation (number of pages, words, images and tables) may help future postgraduate students to better understand the structure of a dissertation among different disciplines. This type of feedback may further help postgraduate students through their academic writing journey (Azkah et al 2016).

The research question thus arises "What differences exist between, and in, disciplines, with regard to the length of an acceptable dissertation, which may help future postgraduate students to better structure their own dissertations in terms of the number of words, pages, tables and images to use? Gathering this information from dissertations to foster understanding or create meaning requires analysis techniques. These may be broadly grouped under the umbrella of informetrics.

The term informetrics, was defined by Tague-Sutcliffe (1992) as the study of the quantitative aspects of information in any form, not just records or bibliographies, and in any social group, not just scientists. Note that it involves the quantitative study of information; the awarding of numbers or values to information gathered from a specific source, which in turn may be used to build knowledge and recommendations for improvement. Informetrics is applied to develop and measure information in traditional (print-based) as well as proprietary electronic information environments (databases and databanks) (Ocholla and Onyancha, 2005). Obtaining these electronic dissertations has become accessible to people, who cannot travel to an institution or who rely on interlibrary loans (Sterman and Borda, 2017), by means of institutional online repositories.

The purpose of this article is to present an analysis of 157 master dissertations over a 10-year period in order to identify differences between, and in, disciplines, while providing a guideline for students to consult in terms of the acceptable length of a dissertation. These dissertations are sourced from an institution's online repository and analysed using informetrics. This current study aims to analyse master dissertations, with the view to highlighting the differences between, and in, disciplines and providing a guideline regarding the length of an acceptable dissertation. Five variables are to be identified, namely the number of supervisors, the pages, the words, images and the tables that were used per discipline.

## Study Context

The Central University of Technology (CUT) is located in the Free State Province of South Africa, and was originally designated as the Free State Technikon which was established in 1981. No real research agenda existed and no real need existed to improve student learning during the latter part of the 20th Century. However, in 2004, it was re-designated as a university of technology, named CUT. From then

on, a research agenda existed, and a need to improve student learning arose. The university was accredited by the Council on Higher Education (CHE) in South Africa to offer a variety of Master and Doctoral qualifications. The University has four faculties (Engineering and Information Technology (FEIT), Humanities (FH), Health and Environmental Sciences (FHES), and Management Sciences (FMS). The four faculties comprise 21 departments (FEIT, 6; FH, 5; FHES, 4; and FMS, 6)

The Faculty of Health and Environmental Sciences (FHES) has the least number of academic staff (55) and the lowest number of postgraduate students (38), while the Faculty of Management Sciences has 80 staff and 83 postgraduate students. The Faculty of Engineering and Information Technology (FEIT-86 staff and 216 postgraduate students) has the largest number of academic staff members. The Faculty of Humanities has the largest number of postgraduate students (588) and 74 staff.

## Research Methodology

All the dissertations on the institution's repository were analysed which totals 157 Master dissertations. The study determined the differences between, and in, disciplines over a 10-year period (2005 – 2015) with regard to master dissertations at CUT, in order to suggest a guideline for future postgraduate students to consult in terms of the length of an acceptable dissertation.

The quantitative data was extracted using a software program that was specifically developed for this purpose by an external software developer. The software program automatically downloads the dissertations (which are in PDF format) from the institution's online repository. The program then extracts specific information from each PDF and inserts into a spreadsheet for further analysis and presentation. Using specific field codes, it extracts the number of pages and words. The program was also designed to identify the number of images and tables mentioned in the front matter (specifically the list of figures and the list of tables) of each dissertation. The number of supervisors was determined by the software program by only considering the title page of the dissertation (specific field code searching for the word 'supervisor'). This research is therefore limited to the results of the analysis of the front matter of the dissertation.

Systematic sampling was used to determine reliability. Systematic sampling involves using every nth sample from a predefined data stream. In this research, every 10th dissertations was selected and then personally reviewed by the author. The dissertations were first ranked chronologically according to the year of completion in a MS EXCEL spreadsheet, with every 10th dissertations then being selected for review. This provided a systematic sample of 15 Master dissertations which the author physically reviewed (PDF format used), comparing his findings to those of the software program. An average reliability score of 93% was observed. Some concerns with the software program lay in identifying the correct discipline, the faculty and the number of images (or figures) and the tables. Data extracted from all 157 dissertations using the developed software program were then analysed in MS EXCEL, with the results presented next.

## Results and Discussions

Figure 1 highlights the number of dissertations produced over the 10-year period with regard to specific variables- year ranges, word ranges, page ranges, image ranges and table ranges are highlighted. The online repository shows no dissertations prior to 2005, which is due to the fact that the institution was a Technikon, with no real research agenda. No formal online repository either existed at that time. However, since becoming a university, a window of the institutions research needed to be provided to the outside world, which dissertations can provide, according to Baro and Oriode (2014).

Considering the *word* ranges reveal that 48% of the dissertations have between 20,000 and 29 000 words (75 of the 157 analysed). Only 12 have more than 49 000 words, while no dissertations contain less than 10 000 words. This is in contrast to a 2013 study that listed a dissertation with less than 10 000 words, although it was only limited to the discipline of Education (Azlan, 2013). A more recent study, focusing on the analysis of 20 postgraduate dissertations for the discipline of management, had an average length of 24 500 words (Shrivastava, 2016). The overall average word length for all 157 dissertations in this study was 31 831 words.

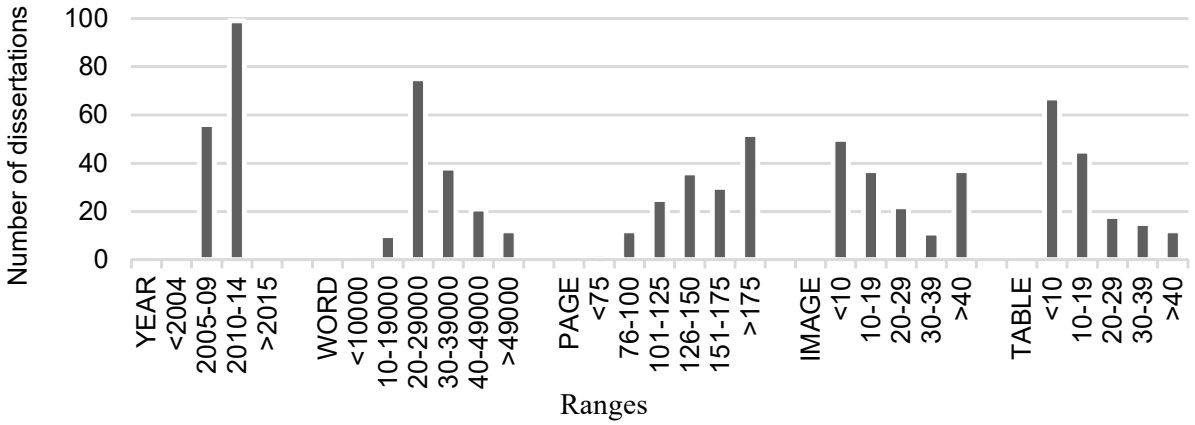


**Figure 1: Dissertations per identified range for the entire university**

One would expect the *page* ranges to follow a similar trend to that of the WORD ranges, which is not the case, as the majority of dissertations had more than 175 pages, which is at the top of the scale and not in the middle, as was the case for the *word* ranges. However, Pearson correlation does reveal a strong relationship (r = 0,990) between the number of words and number of pages for all the dissertations. Consequently, it may be deduced that a higher number of words would lead to a higher number of pages, although this is not readily deduced, which may be attributed to the presence of numerous images or tables that need to be considered. This strong relationship suggests that the font size, used for the paragraphs in the dissertations, has remained relatively consistent. This is due to the influence of font size on the text length and on the number of pages (Reinert et al 2014).

Fifty out of one hundred and fifty-seven of the dissertations had less than 10 images, or figures, while 37 dissertations have more than 40. One would expect that the number of images would impact on the number of words and pages. However, a weak relationship was found between the number of images and the number of words (r = 0,496) with a moderate relationship between the number of images and the number of pages (r = 0,593). This may suggest that the students were not really discussing, in depth, the significance of the images, requiring more pages for presentation, according to the moderate relationship. Students need to reason on the figures and the tables that they present, interpreting their significance in the context of their study (Swart and Hertzog, 2016).

It seems that the postgraduate students at this university did not make use of many tables, as many of the dissertations (67 out of 157) had less than 10 tables. Most theses and dissertations did contain figures and tables in order to help simplify information (Lutabingwa and Jarbandham, 2007). It also seems that students were discussing them in more depth as compared to the figures, as a strong relationship exists between the number of words and the number of tables (r = 0,812).

Figure 2 illustrates the average, maximum and minimum number of words used in the 157 master dissertations per discipline; The FEIT, the FMS and the FH each have four disciplines, while the FHES has eight disciplines. These disciplines were identified from the front page of the dissertation along with the name of the Faculty to which the dissertation belonged. For example, the discipline of Electrical Engineering was listed under the FEIT. These results indicate that 20 disciplines exist at CUT, which are divided among the 21 departments.

A noteworthy observation relates to the range of words for dissertations within the discipline of Education, which is divergent. Why would one student produce over 90 000 words, while another student produces 20 000 words?

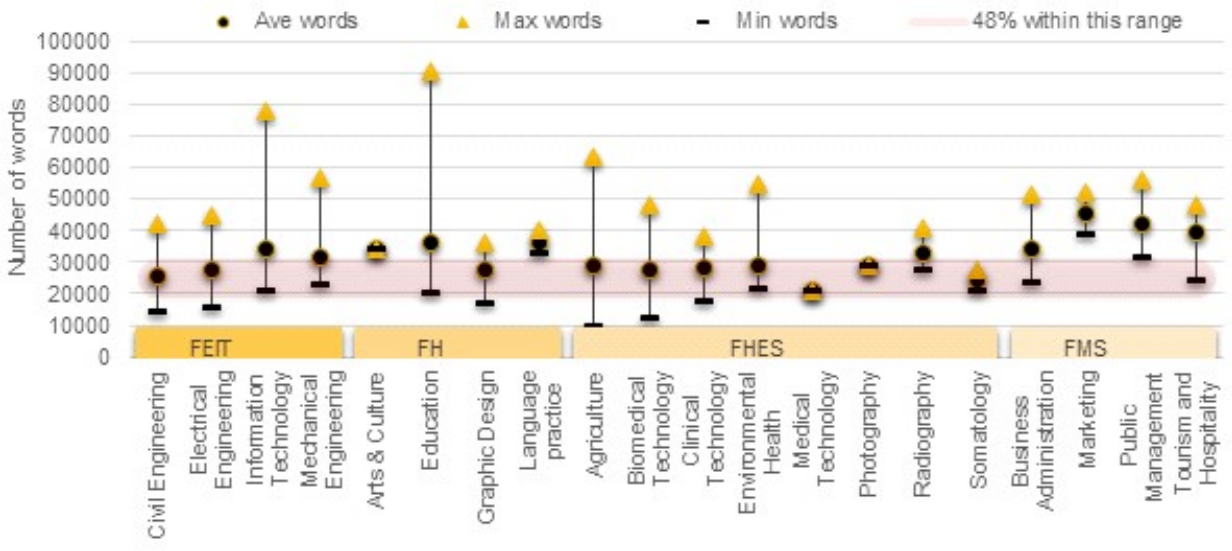


**Figure 2: Number of words used in the Master dissertations per discipline**

In South Africa, 1800 notional hours (180 credits) should be devoted to a Master's in Education degree. These word variations would require significant different amounts of hours, taking into account the actual writing and editing of numerous drafts of the chapters making up these dissertations. Why should there be such a significant difference of 78% ((maximum – minimum) / maximum x 100%) in word counts between these dissertations? The same applies to the discipline of Information Technology (73% difference), Biomedical Technology (74% difference) and Agriculture (85% difference). The most consistent discipline, in terms of the number of words per dissertation, is Somatology, where the dissertations with the maximum and minimum number of words fall within the 48% range (transparent line between 20,000 and 30 000 words). The fields with the smallest percentage difference between the maximum and minimum number of words is Language Practice (18%), Somatology (23%), Marketing (25%), and Radiography (33%). It is noteworthy that research recommends that students need to adhere to the stated dissertation word-length for a master's dissertation (Biggam, 2015), lest one becomes guilty of padding. This occurs when one includes irrelevant information just for the sake of beefing up the dissertation, but really it is an indication that the student may not be able to write succinctly. Adopting an approximate word-length guideline per discipline would align more with the number of credits attached to the qualification.

Figure 3 presents the average, maximum and minimum number of pages used in the 157 Master dissertations per discipline. One would expect Figures 2 and 3 to look similar, as the number of words should correlate with the number of pages, as stated earlier. However, it is the presence of numerous figures and tables within specific disciplines which also impacts on the number of pages, which then needs to be considered. The largest variation in page numbers between dissertations occurs in the disciplines of Information Technology (79% difference), Agriculture (76% difference) and Education (68% difference). The least variation in page numbers occurs between dissertations in Business Administration (22%), Tourism and Hospitality (23%) and Marketing (29%). The average number of pages for all the dissertations is 161, with 42% falling between 125 and 175 pages. A similar study of the social sciences in 1985 reveals an average page length per dissertation of 201 (Hepburn and Dahler, 1985). No literature seems to exist, giving the average number of pages for all disciplines at a university of technology.

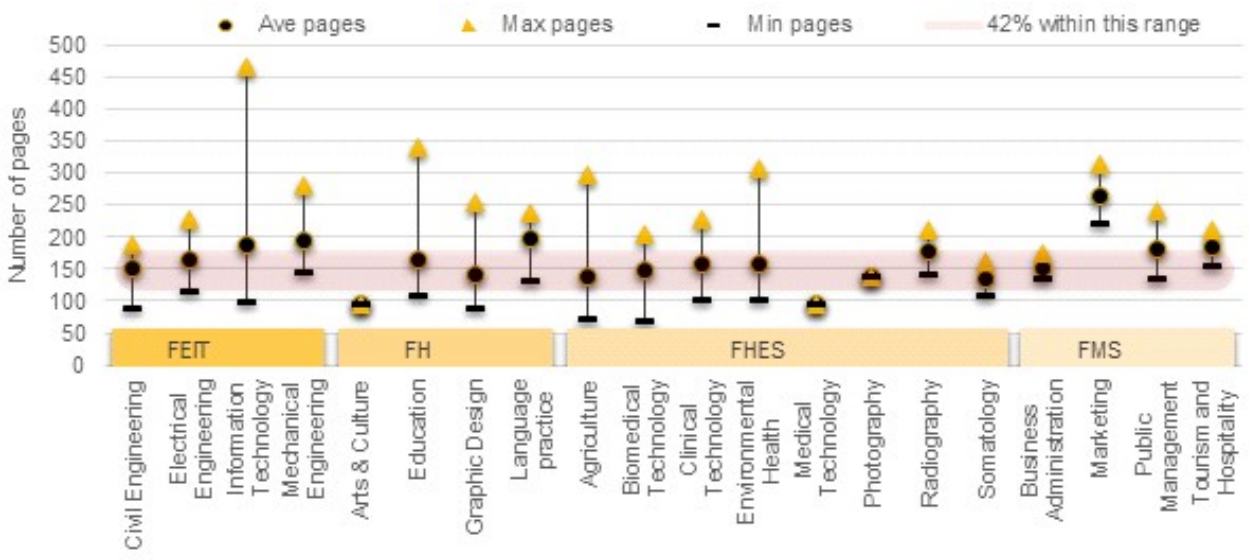


**Figure 3: Number of pages used in the Master dissertations per discipline**

Figure 4 contrasts the various disciplines with regard to the average, maximum and minimum number of images. The discipline of Electrical Engineering recorded the largest number of images, with an average of 72 images per dissertation with the discipline of Mechanical Engineering following in second place (64 images per dissertation). Competence in the understanding and analysis of electrical circuits is a fundamental requirement for electrical engineering students (Duffy et al 2016), which should be presented and explained by using many images or figures.

The disciplines with the lowest number is Photography (5 images per dissertation), followed by Arts and Culture and Public Management (each with 10 images per dissertation). This should not be strange for Photography, as this discipline has expanded and developed, incorporating fine art and journalism, as well as all points in-between (Campbell, 2015), which would not necessarily involve the use of many images. Figure 5 differentiates between the 20 different disciplines in terms of tables used.

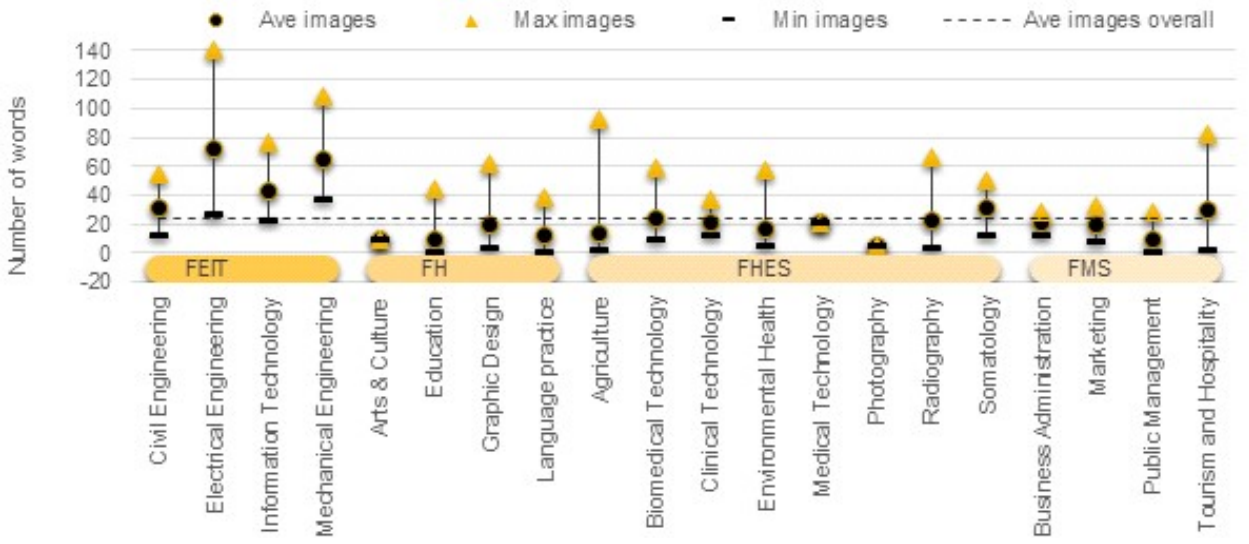


**Figure 4: Number of images used in the Master dissertations per discipline**

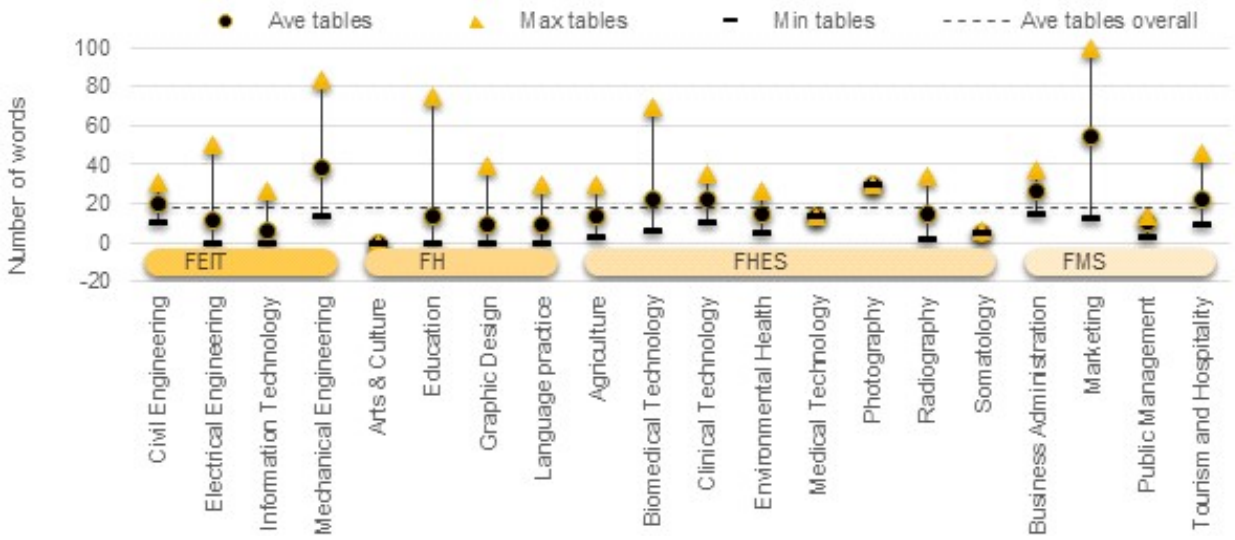


**Figure 5: Number of tables used in the Master dissertations per discipline**

The discipline of Marketing produced the largest number of tables, with an average of 54 tables per dissertation, with the discipline of Mechanical Engineering following in second place (38 tables per dissertation). The students in these disciplines were discussing much quantitative data (numbers and values) or qualitative data (direct quotes and statements) in their dissertations. Tables are helpful to organise extensive data into an accessible form, providing greater impact than text, while maintaining precision (Horrocks et al 2013). The disciplines with the lowest number of tables include Language Practice (9) tables per dissertation and Somatology (6 tables per dissertation).

Figure 6 contrasts the number of dissertations per discipline to the total number of supervisors within that discipline. This figure reveals that the discipline of Education has almost an equal number of dissertations (27) to supervisors (32). This equates to an average of 1.2 supervisors per dissertation.

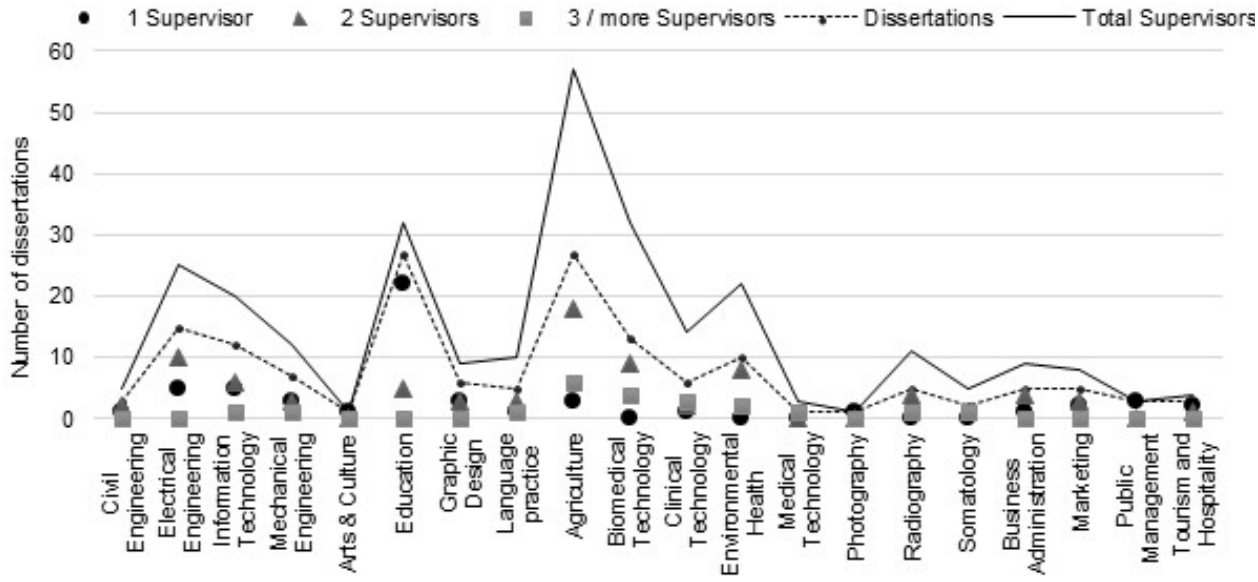


**Figure 6: Number of supervisors used for the Master dissertations per discipline**

Biomedical Technology has an average of 2.5 supervisors per dissertation. This suggests that this discipline had either a low number of experienced supervisors, or that they were engaging in cross-disciplinary research within their specific fields of interest. It must be noted that health sciences often covers research areas within nursing, public health and other health professions (Söderlund and Madison, 2015), while environmental sciences is often defined as an applied and interdisciplinary scientific field investigating human-nature relationships (Berkes and Kýþlalýoðlu, 1990). This may lead one to conclude that more cross-disciplinary research is taking place as compared to a low number of experienced supervisors residing in the faculty. This can be determined by identifying which university the supervisors are affiliated to, which will require the analysis of the proposal or examiner appointment documents.

Furthermore, Pearson's correlation reveals an inverse moderate relationship (r = -0,594) between the average number of supervisors per dissertation and the average number of words per dissertation for all the disciplines. This suggests that as the number of supervisors increase, the overall number of words seem to decrease for a dissertation. If more cross-disciplinary research existed, then a non-inverse moderate relationship should be expected, as the co-supervisors from other disciplines would more likely share their thoughts and inputs. More than one supervisor usually implies that the postgraduate student needs to evaluate multiple opinions (Guerin and Green, 2015), suggesting more words. However, in this case, it seems that the co-supervisors are simply going along with what the main supervisor has suggested, as if they are still "learning the trade of supervision". This may reinforce the thought that the higher number of supervisors per dissertation in Agriculture and Biomedical Technology may rather be due to the training of in-experienced supervisors, rather than cross-disciplinary research. The individual number of supervisors per dissertation is also shown. The discipline of Education had the highest number of dissertations (22 – black dot) with only one supervisor, while the discipline of Agriculture had the highest number of dissertations (18 – grey triangle) with two supervisors.

Figure 7 highlights the normalised percentages for the average words, pages, images and tables for the 20 disciplines within the four faculties at CUT over the 10-year period. This is obtained by determining which discipline produced the highest number of average values per dissertation, and then dividing all subsequent disciplines average values by that highest value. The average values are used as some disciplines are producing more dissertations than other disciplines. The results indicate that the discipline of Electrical Engineering produced the highest average number of images per dissertation, while the discipline of Marketing produced the highest average number of words, pages and tables.

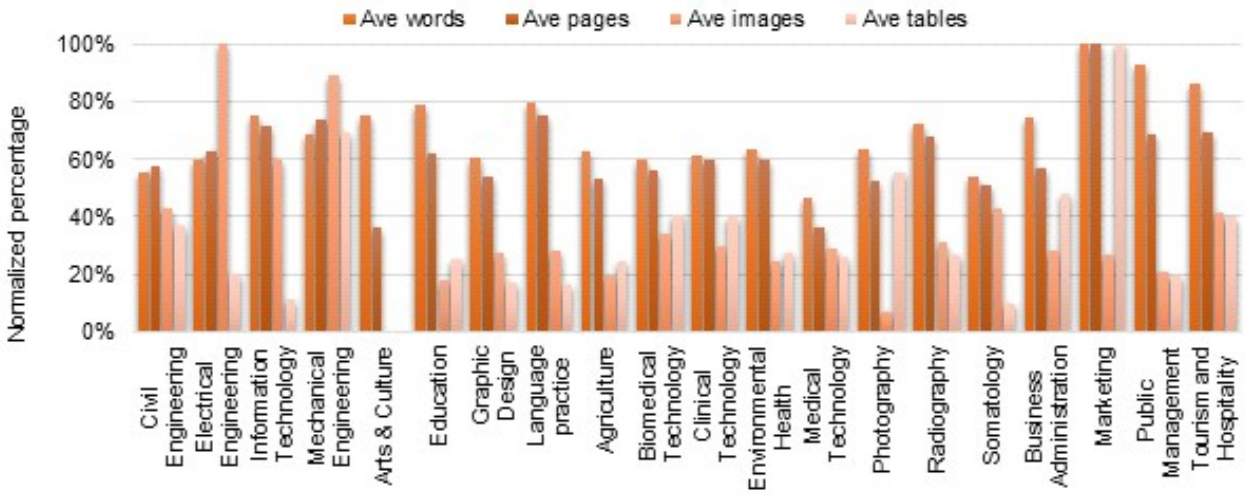


**Figure 7: Averages per discipline for the 10-year period**

From a faculty perspective, the FMS produced the highest number of average words per dissertation (40 467), the highest number of average pages per dissertation (194) and the highest number of tables per dissertation (28). Table 1 provides a concise breakdown of these results, along with the overall average for the university (right-hand column). The cross-disciplinary character of management sciences is based on the created theory and practical solutions following logical compilation of knowledge about economy, praxeology, sociology, psychology, ergonomics and laws (Sexton et al 1989). This extensive discussion of theory would require many words and pages, which may easily be explained and summarized by means of tables. Tables may be used to present information that may be difficult to explain fully in the text (Labani et al 2017).

**Table 1: Overall Differences between the Four Faculties**

| Information per dissertation (averages) | FEIT | FH | FHES | FMS | CUT |
|---|---|---|---|---|---|
| Number of supervisors | 1.7 | 1.3 | 2.2 | 1.5 | 1.8 |
| Number of words | 29 685 | 33 710 | 27 646 | 40 467 | 31 831 |
| Number of pages | 175 | 150 | 144 | 194 | 161 |
| Number of images | 53 | 13 | 20 | 21 | 25 |
| Number of tables | 19 | 8 | 17 | 28 | 18 |

Students from the FEIT are using more images per dissertation (average value of 53), and would therefore make up the majority of dissertations falling under the >40 image range given in Figure 2. Images are widely used in engineering (Xiao and Zhang, 2014) as they may help to conceptualize solutions to problems (Wanjiru, 2016), which is one of the fundamental requirements of engineering. The FH (disciplines of Arts and Culture through Language Practice) is languishing in last place with regard to the use of images and tables. Writing in the humanities requires that phenomena must be established as consequential within a personal perspective so that the audience can be persuaded to accept a new insight (Erixon, 2017), which would not really require many images or tables.

The informetric analysis from this study reveals seven key aspects.m First, the majority of dissertations listed two or more supervisors that speak to the type of supervisor or the type of collaboration. This tends to suggest that more in-experienced supervisors are being mentored (e.g. from the disciplines of Biomedical Technology and Agriculture) or that more experienced supervisors from a number of different disciplines are involved in the supervision of Master dissertations.

Second, differences between disciplines reveal that the disciplines of Marketing, Public Management and Tourism and Hospitality produced the highest average number of words per dissertation. This suggests that the FMS produced more qualitative data, as it is based on created theory and practical solutions following the logical compilation of knowledge. The lowest average number of words per dissertation came from the FEIT, that would be more quantitatively orientated given their science, technology, engineering and mathematical backgrounds.

Third, differences within disciplines reveal a high variation between the maximum and the minimum number of words used in a dissertation. The highest variation occurs within the discipline of Agriculture (85%) with the lowest variation in the discipline of Language Practice (18%). This is a concern that needs to be addressed per faculty, as prospective postgraduate students should be informed about the average word length required for their dissertations.

Fourth, differences within disciplines reveal a large variation between the maximum and the minimum number of pages used in the dissertations. The largest variation occurred in the discipline of Information Technology (79%) with the lowest variation in Business Administration (22%). The number of pages is reflecting the number of words and tables.

Fifth, differences between disciplines reveal that the disciplines of Electrical Engineering and Mechanical Engineering produced the highest average number of images per dissertation, which would be related to circuit diagrams and mechanical drawings. This suggests that the FEIT is more visually orientated.

Sixth, differences between disciplines could be considered that the disciplines of Marketing and Mechanical Engineering produced the highest average number of tables per dissertation. This suggests that the students in these disciplines are providing more quantitative data (numbers and values) or qualitative data (direct quotes and statements) that needs to be organised into an accessible form.

Last, different relationships exist between the average number of words, pages, images and tables for all the dissertations. A strong relationship (r = 0,990) was found between the number of words and the number of pages. A weak relationship (r = 0,496) existed between the number of images and words. A moderate relationship (r = 0,593) existed between the number of images and the number of pages. A strong relationship (r = 0,812) existed between the number of words and the number of tables. This suggests that all students are using a similar font size; that some students were providing a number of images without describing them; and that some students are explaining their tables very well.

## Conclusion and Recommendations

The original research question stated "What differences exist between, and in disciplines, with regard to the length of an acceptable dissertation, which may help future postgraduate students to improve the structure of their dissertations in terms of the number of words, pages, tables and images to use? The results revealed that Management Sciences produced the highest number of average words (40 467), the highest number of average pages (194) and the highest number of average tables (28), while Engineering produced the highest number of average images (53) per dissertation. Health and Environmental Sciences had the highest average number of supervisors (2.2) per dissertation.

The results of this study may not necessarily help students to improve the quality of their dissertations. However, a possible implication is that it can help postgraduate students to better understand the differences between, and within a close range of disciplines, guiding them to structure their dissertations. This has the potential of removing ambiguity among students on how long their dissertations should be, which is relating to the structure of a dissertation. For example, a postgraduate engineering student should aim for around 175 pages, making liberal use of many images to help conceptualize solutions to real-life problems.

A key recommendation is to include the summarised results of this study in postgraduate brochure guidelines which are often distributed to postgraduate students at the beginning of their programme. This may give them a better idea of the differences between disciplines with regard to the number of supervisors and the length of a standard dissertation. Knowing the length of an acceptable dissertations has the potential to help future postgraduate students to start-off structuring their dissertations in a more manageable and realistic way. It should also be emphasised in the brochure that postgraduate students need to introduce and explain all tables and figures in the text. A few examples of such a discussion may be included in the brochure, which often includes examples of how to structure the reference list.

Gathered information must be processed with regard to what is already known so that it can help to create meaning or improve understanding of specific phenomena. Future research needs to consider the bibliometric analysis of these dissertations, as well as the relationship to the academic achievement of these students. In this way, further meaning and understanding may be fostered by the use of informetric analysis that may contribute to the extension of a basic guideline that students may consult when they start to structure their dissertations.

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