

**THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGY TOOLS  
IN MANAGING INDIGENOUS KNOWLEDGE IN THE PROVINCE OF  
KWAZULU-NATAL, SOUTH AFRICA**

**By**

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**2016**

## DECLARATION

I, Petros N Dlamini declare that

- (i) This study, “The use of information and communication technologies (ICTs) in managing indigenous knowledge in the province of KwaZulu-Natal”, is my original work.
- (ii) This dissertation/thesis has not been submitted to any other university for the award degree or examination except this submission:
- (iii) This dissertation does not contain any other persons’ data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.
- (iv) Every data and information used in this research work has been acknowledged in the text, references and appendixes.

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## DEDICATION

This thesis is first and foremost dedicated to the Almighty God, “ *The LORD is my shepherd; I shall not want. He maketh me to lie down in green pastures: he leadeth me beside the still waters. He restoreth my soul: he leadeth me in the paths of righteousness for his name's sake. Yea, though I walk through the valley of the shadow of death, I will fear no evil: for thou art with me; thy rod and thy staff they comfort me. Thou preparest a table before me in the presence of mine enemies: thou anointest my head with oil; my cup runneth over. Surely goodness and mercy shall follow me all the days of my life: and I will dwell in the house of the LORD for ever*” (Psalms 23:1.5)

I also dedicate this work to my gorgeous wife Sma Dlamini and my lovely daughter and son Swelihle Dlamini and Ndaloyenkosi Samuel Dlamini respectively; who have been by my side throughout this period and who without knowing it, have always stimulated me and given me the strength to carry on.

## ACKNOWLEDGEMENT

I wish to direct my deepest gratefulness and thankfulness to the following people for their inestimable contributions and support towards the completion of this thesis:

- Prof DN Ocholla, my study coach and my leader, for sharing your workmanship in both qualitative and quantitative research approaches. Thank you for providing me with expert and wise guidance and encouragement. Most of all, I thank him for seeing me through the most challenging times of my study.

I also wish to acknowledge all the people who encouraged, kept, and powered me in the course of my research project. I wish to thank:

- My late father and mother, who always had faith in me accomplishing my educational dream;
- The respondents from IK centres, information centres, Arts and Culture and indigenous people for their massive benevolence, time and for agreeing to respond to such long questionnaire and interviews;
- My colleagues at the University of Zululand Library;
- Fonds from the Netherlands (Mr. C.L. Devit) for his financial assistance from undergraduate to postgraduate degree. God bless you sir.

## **ABSTRACT**

The need to manage tacit indigenous knowledge (TIK) through Information and Communication Technology (ICT) tools is imperative because it is at risk of becoming extinct without proper recordable and management systems. Indigenous Knowledge (IK) is largely tacit in nature and is mainly preserved in the memories of elders which is a risk to its documentation and preservation. We argue that ICT can be used effectively for enabling documentation, access and use of IK in the modern society. The study mainly focused on the types of ICT tools used for capturing, storing and disseminating IK in South Africa's KwaZulu-Natal province. Specifically, the study investigated the use and types of ICT tools, in the management of indigenous knowledge, in the province of KwaZulu-Natal. For the purpose of the study, five research objectives were used that guided the research questions. These research objectives included: discussing the nature of indigenous knowledge; evaluating the types of indigenous knowledge practices in South Africa's KwaZulu-Natal province; discussing the types of ICT tools currently used in the management of indigenous knowledge; discussing problems encountered in the availability and use of ICT tools in managing IK; and discussing strategies for improving the use of ICT tools in the management of indigenous knowledge.

The theoretical basis of the study was informed by the Knowledge Creation theory (KC) by Nonaka as discussed in detail in chapter two. The study adopted a post-positivist research paradigm to enable multiple perspectives from participants/target population rather than a single reality. Both quantitative and qualitative research approaches were simultaneously used during a single phase of data collection. Quantitative data was gathered by survey method involving self-administered questionnaires with 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 with owners or custodians of IK. In depth literature review and document analysis formed part of qualitative content analysis. The sample for the study was drawn from ICT users/beneficiaries and owners or custodians of indigenous knowledge 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 on IK, cultural officers, IK recorders, IK documentation centre managers, and journalists and artisans. Furthermore, respondents who were owners or custodians of IK consisted of traditional healers, diviners and herbalists, traditional farmers, traditional musicians, rural artisans, community elders, traditional midwifery, rainmakers, chiefs, and traditional food specialists and storytellers.

The study employed probability and non-probability sampling where cluster, snowball and purposive sampling techniques were used at different stages to select the respondents. A total of 96 questionnaires were administered to ICT users/beneficiaries and 57 (59%) were returned. Additionally, interviews were conducted with the owners or custodians of IK. 224 owners or custodians of IK were sampled, however, 196 (88%) were interviewed. The quantitative data from the ICT users/beneficiaries was analyzed using Statistical Package for the Social Science (SPSS). The qualitative data from owners or custodians of IK was analyzed through the use of qualitative contents analysis.

The study acknowledged the wealth, access and use of indigenous knowledge in the province and showed that indigenous knowledge is not only used by indigenous people, as it is also being used by professional people for their own benefit. Many categories of traditional roles of custodians of IK have brought about the sustainability of indigenous knowledge practices in KwaZulu-Natal as it is still vital in these modern times and highly relevant in the areas of medicine and agriculture. Although KwaZulu-Natal has proven to possess rich indigenous knowledge practices, the knowledge is not sufficiently recorded with relevant ICTs for future use. There is a growing use of multiple ICT tools by institutions, IK centres and individuals to record or capture, store and disseminate indigenous knowledge which is quite positive. It is observed that ICT users/beneficiaries and owners or custodians of IK require ICT literacy to improve access and use. The challenges facing IK access are not uniform between ICT users/beneficiaries and owners or custodians of IK. The most crucial challenges among ICT users/beneficiaries and owners or custodians of IK was related to access to relevant ICT infrastructure and resources and lack of digital skills. The existing IK policy should be revised to accommodate rapidly changing ICT requirements of the sector. This study contributes to current literature and discourse on IKS; interrogates the applicability of knowledge creation theory and models to IK research; adds fresh data, information, and knowledge on IK research, particularly in South Africa; and proposes practical solutions to ICT application for IK development. The full thesis is available in the University of Zululand Institutional Repository and other publications from the thesis.

**Keywords:** Information and communication technology tools, Indigenous knowledge, Capture, Store, Disseminate, ICT users/beneficiaries, IK owners or custodians.

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## **ACRONYMS AND ABBREVIATIONS**

ICT	Information and Communication Technology
ICTs	Information and Communication Technologies
IT	Information Technology
LK	Local Knowledge
LIS	Library and Information Studies
IS	Information Studies
IK	Indigenous Knowledge
IKS	Indigenous Knowledge Systems
IKP	Indigenous Knowledge Policy
TK	Traditional knowledge
ITK	Indigenous Technical Knowledge
KCT	Knowledge Creation Theory
KC	Knowledge Creation
CBD	Convention on Biological Biodiversity
CD-ROM	Compact Disk Read Only Memory
TV	Television
CD	Compact Disc
VCD	Video Compact Disc
E-mail	Electronic Mail
DVD	Digital Video Disk
UNDP	United Nations Development Programme
IIRR	International Institute of Rural Reconstruction
DTI	Department of Trade and Industry
DST	Department of Science and Technology
NRF	National Research Foundation
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIZULU IR	University of Zululand Institutional Repository
RCKM	Regional Knowledge Management Conference
WIPO	World Intellectual Property Organization
WTO	World Trade Organization
UNEP	United Nations Environment Programme
UNCTAD	United Nations Conference on Trade and Development
SPSS	Statistical Package of Social Sciences

IP	Intellectual Property
UZ	University of Zululand
KZN	KwaZulu-Natal
SCT	Social Cognitive Theory
AIDS	Acquired Immune Deficiency Syndrome
HIV	Human Immunodeficiency Virus
NRCATM	National Reference Centre for African Traditional Medicine
SECI	Socialisation, Externalisation, Combination and Internalisation
SSA	Statistics South Africa
DRC	Democratic Republic of Congo
USB	Universal Serial Bus
URL	Uniform Resource Locator
WWW	World Wide Web
NGO	Non-Governmental Organisation
VCR	Videocassette Recorder
KMM	Knowledge Management Models
LANs	Local Area Network
PDA	Personal Digital Assistant
CSCTWG	Civil Society Content and Themes Working Group
WSIS	World Summit on the Information Society
ICTT	Information and Communication Technology Tools
IKC	Indigenous Knowledge Centre
RIK	Researchers on Indigenous Knowledge
IKR	Indigenous Knowledge Recorders
IKC	Indigenous Knowledge Consultants
IKDCM	Indigenous Knowledge Documentation Centre Managers
IKC	Indigenous Knowledge Coordinators
ITU	International Telecommunication Union
IDRC	International Development Research Center
ICU	International Communication Union
WHO	World Health Organization
IKMM	Indigenous Knowledge Management Model
UZ	University of Zululand

## **CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY**

### **1.1 Introduction and Conceptual Setting**

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. Notably, much of indigenous knowledge (IK) is preserved in the memories of elders, thus gradually disappearing due to loss of memory and death (Dlamini, 2017; Ngulube, 2002). Moreover, indigenous knowledge (IK) is predominantly tacit or embedded in the experiences and/ or local knowledge of the community. 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, 2017; Ngulube, 2002). Based on the views 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 & Stilwell, 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 use of ICT tools in the management of IK, the possibility of IK becoming extinct can be forestalled.

Studies by Agrawal (2002) and Ilo (2012) posit that there is a need to use information and communication technologies in the management of indigenous knowledge. Nonaka (1994) also emphasised a need to manage tacit knowledge through technology. The questions that arise are: to what extent can ICT tools be used to manage indigenous knowledge for future generations, in the same way it is done in organisational knowledge? What types of ICT tools are used in the management of IK for the future generations? Based on the views above, that IK is in danger of getting lost, the use of knowledge management theories such as knowledge creation and the use of ICT tools to manage IK, are important matters to be addressed by this study.

However, information and communication technologies have emerged as powerful tools that are instrumental and pivotal in the creation of knowledge and networks for sharing knowledge. There are different definitions of information and communication technologies (ICTs); however, the varying definitions bear some similarities. The United Nations Development Programme

Evaluation Office (2001) defines ICT as the combination of microelectronics, computer hardware and software, telecommunications, and optoelectronics, such as microprocessors, semiconductors and fibre optics, which enable the processing and storage of large amounts of information, as well as its rapid dissemination through computer networks. Ngege (2003:1-3) agrees with the foregoing perspective by defining ICT tools “as technologies that enable the handling of information and facilitate different forms of communication between human sectors, between human beings and electronic systems, and between electronic systems”.

Mbatha, Ocholla and Le Reoux (2011:1) advance the preceding views by explicating that “ICTs are perceived to be key catalysts in current and future social and organisational” development. These authors define ICT as a composite term, referring to the merging new technologies that are currently developed and utilised in the making, dispensation and communication of information. In addition, Mutula (2002:129) asserts that, ICTs have enhanced the globalisation of information systems and created great concern about the survival of indigenous knowledge systems. As such, the term ICT refers to coinciding and interconnected technologies. Instances are devices for cellular phone hardware and SMS, and social networking sites in the web and the internet.

The importance of ICTs has been emphasised by various scholars. Adam (2007), for example, contrary to Mutula’s (2002) view, discovered that ICT tools have an important function in bettering the accessibility of indigenous knowledge systems and enhancing its blending with contemporary technical and scientific knowledge. Adam (2007) advances the preceding views by explicating that, the fresh information and technologies for communication, (i.e. computers and the internet) could assist in creating wealth and jobs, connect governments and people, enforce relations among organisations and the public, and advance the delivery of crucial services to the poor.

Chisenga (1999:3) also explains that “ICTs are tools that enable Africa to contribute to global information resources by translating indigenous knowledge into web content”. In other words, ICT tools can smoothen the quick collection, ordering, storage and distribution of data; thus, facilitating knowledge creation and dissemination process. In addition, a study by Ilo (2012) affirms that ICT has given rise to storage devices such as flash drive, hard discs, mp3, mp4, mobile phones, CD-ROM, computer hard disc and many others. O’Farrell, Norrish and Scott (1999) also explain that,

the advantage of ICT tools is that they are potential tools for enhancing people's daily lives because the tools increase information that is applicable to their economic living, improved access to other sources of information, health care, transportation and distance education.

A study conducted by the United Nations Development Programme Evaluation Office (2001) state that the advantages of ICT tools are, to permit accessibility to sources of information world-wide, encourage networking, transcend borders of cultures and languages, facilitate empowerment of women, young people and socially underprivileged groups, and assist to disseminate knowledge and experience in diverse fields of study and "best practices". The United Nations Development Programme Evaluation Office (2001) concludes that, information and communication technologies (ICTs) are indispensable in realising the global information society and the global knowledge society. Adeya (2001) asserts that, ICTs are set in networks and facilities that impact local and worldwide flow and the accrual of knowledge. She argues that, the internet, with its World Wide Web platform, amenities and information exchange tools, networked with services for the management of knowledge (e.g. intelligent gateways and electronic publication), epitomises the impact of ICTs. In the present study ICT is considered as the technology that supports activities involving information.

Bwalya, Mnjama and Sebina (2014) claim that, the emergence of information and communication technologies (ICTs) has metamorphosed the way information resources are managed, not only in similar environments, but also in heterogeneous environments. These authors conclude that ICTs have become a global information management platform. However, Ngege (2003) informs that, the common feature of ICTs is digitisation. She is of the view that, any information that is either transmitted textually, through sound, voice or image, is changed into digital and binary language used by computers. According to Ngege's explanation, digitisation promotes the merging of telecommunications, computers, office technologies and an array of audio-visual consumer electronics. Furthermore, (Ngege, 2003) asserts that the integration permits the handling of information at advanced flexible speeds with better reliability, but at a lower cost.

The different types of ICT tools are widely discussed. These ICT tools are categorised as either new ICTs or old ICTs. New ICTs encompass computers, satellites, wireless one-on-one

communications (including mobile phones), the internet, e-mail, multimedia and telecentres. On the other hand, old ICTs include radio, television (TV), land-line telephones and telegraphs (Greenberg, 2005). Unlike Greenberg (2005), Adam (2007) opines that telephony, satellite, radio, cable, as well as computers, information networks and software (which are digital technologies) are all part of ICTs. Gigler (2004) also lists the tools to include community radios, e-mail, and several multimedia instruments, such as videos, CD-ROMs and audio recordings. However, Shklovski, Palen and Sutton (2008) argue that, hardware and software -- digital/computational forms of technology – Information are included in (ICT).

A recent study by Satapathy (2014) claims these technologies include software and hardware, media for assembling, storing, handling, conduction and presenting of information in formats such as text, data, voice, and image through the internet, computers, CD-ROMs, radio, telephone, television, digital cameras, video and many others. As a result, the “networked world”, which is a huge interconnection of telephone services infrastructure, hardware for standardised computing, radio and television, and the internet, is a combination of different tools working together to reach the farthest corners of the world (United Nations Development Programme Evaluation Office (2001:2).

The use of ICT tools is widely acknowledged. Adam (2007) identifies five key uses of ICT tools. He claims they: (a) assemble, keep and distribute indigenous knowledge to preserve traditional knowledge for generations to come; (b) promote economical diffusion of indigenous knowledge; (c) produce easily reached indigenous knowledge information systems; (d) encourage indigenous knowledge integration into education and training that is formal and non-formal, and (e) avail an advocacy platform for the poor to have improved benefit from IK systems. Unlike Adam (2007),

Ngenge (2003) identifies five key uses of ICT tools as:

- capturing and preserving technologies that collect and digitise information such as keyboards, image scanners;
- providing storage technologies, such as magnetic tapes, optical disks (such as CD-ROMS), radio cassettes, video cassettes, VCDs, DVDs;

- making available technologies for communication that aid the production of networks and devices that transfer information, e.g. digital mobile phone network, intranet and internet, and
- providing technologies that display various output devices for digitised information such as computer screen displays , digitalised TV sets and digitalised video discs and many others.

However, Greenberg (2005) adds that, ICT also involves all those instruments, modes, and means through which information or data is captured, processed, stored and transmitted or communicated from one person to another or from place to place.

A study conducted by Hafkin and Odame (2002) confirmed that, new and recent equipment for human digital communication are effective in the collection, storage and transmission of information, while Zahedi and Zahedi (2012) discovered that, ICT tools provide the easiest and cheapest method for organisations and communities to collect, store, transmit, manipulate, customise and use information. In another study conducted by Ogbomo and Ogbomo (2008), it was acknowledged, that, ICT tools are not just about technologies, but are more about information transferral and communication. In a recent study by Duggal, Mangla and Singal (2014), ICTs are considered to be an expanding assembly of technologies that are used to handle information and aid communication. A study, by Blurton (1999), concludes that ICT tools are used as resources to communicate, create, disseminate, store and manage information.

Gigler (2004) states that community leaders are using ICT tools to strengthen the local organisations and share their experiences with other indigenous communities; both national and international. Mbatha, Ocholla and Le Reoux (2011:1) also explain that, “these technologies encompass all aspects of data or information recording, handling and transmission which include computers, telecommunications, satellites, fiber optics, video-based multimedia applications, automated speech outputs and electronic broadcast technologies”. This view encompasses a range of ICTs, including capturing technologies that assemble and configure information digitally. Examples of these are systems for recognizing voice, keyboards, image scanners and barcode readers, etc. Pinned to that are technologies for storage, e.g. hard disks, magnetic tapes, optical disks such as CD-ROMs and financial transaction smart cards. Micro cards can also be added to these latest storage devices.

In a recent study by Asenso-Okyere and Mekonnen (2012), it is argued that, the emergence of PCs (personal computers), cellular phones and the internet, in the past two decades, has widened options for collecting, storing, handling, disseminating and presenting information in many formats that meet people's different requirements and skills. Islam and Islam (2007) assert that, the enhanced adoption and utilisation of ICT resulted in the globalisation of knowledge resources and information. Notably, individuals and organisations (governmental or intergovernmental) often use ICT for official or personal activities. As a global tool, its use permeates all human fields such as commerce, medicine, engineering, education, architecture, agriculture, and library services. It is concerned with the handling of information (its acquisition, processing, storing and the dissemination of information) (Alhassan & Afolabi, 2012). It can be concluded, according to Ashok (2011), that, ICT tools can potentially convert and preserve traditional governance knowledge for the future.

### **1.1.1 Indigenous Knowledge (IK)**

The literature on indigenous knowledge provides multiple definitions of the concept. Ngulube and Onyancha (2011) acknowledge that despite the recognition of the importance of the knowledge of traditional and indigenous communities, there is limited agreement on its definition and conceptualisation. The two authors state that, there are competing ways of defining IK and various ways of labelling it. Nevertheless, the various definitions also have some common traits. For example, World Bank Group (2004) defines indigenous knowledge (IK) as the knowledge for local decision-making in agriculture, health, natural resource management and other activities. It is view to be used at the local level by communities, in the developing countries, as the basis for decision-making pertaining to food security, human and animal health, education, natural resource management, and other vital activities. Indigenous knowledge is experimental locality-specific knowledge and practices of medicine, as well as healing, hunting, fishing, gathering, agriculture, combat, education and environmental conservation developed by indigenous people over many years (Chisenga, 2002; Ngulube, 2002).

It is a local body of knowledge that is common to a certain group of people (Kibuka-Sebitos, 2008; United Nations Environment Programme, 2008). This knowledge is embedded within the culture of the people and is often orally transmitted. Kaniki and Mphahlele (2002:18) and Makara (2002:40) argue that, the advantage of indigenous knowledge is that, it is part of everyday life and

is thus usually regarded as a problem-solving mechanism for rural communities. Indigenous knowledge is also known as local knowledge, folk knowledge, people's knowledge, traditional wisdom or traditional science. In a study by Ocholla (2007:2), indigenous knowledge, which is also known as local/traditional/folk knowledge, ethnoscience, is defined as a dynamic archive of the sum total of knowledge, skills and attitudes belonging to and practiced by a community over generations, and is expressed in the form of action, objects and sign language for sharing. Masango (2010:74) considers indigenous knowledge as “the totality of all knowledge and practices established on past experiences and observations that is held and used by people”.

Studies by Forsyth (2013) and Mutula (2002:129) identify other important components of indigenous knowledge to include traditional doctors, traditional dances, pottery, blacksmithing, folk tales, drama, beliefs, rules and techniques, stories, brass work, jewellery, architecture, astrology, cultural rituals, traditional medicine, family units, economic, philosophical, learning, governance system, innovations and practices.

Forsyth (2013); Materer, Valdivia and Gilles (2002) identify three characteristics of indigenous knowledge. They claim:

- indigenous knowledge is largely generated within communities for its survival;
- common knowledge is held by most people in a community. For example, almost everyone knows how to cook sweet potatoes (or the local staple food);
- shared knowledge is held by many, but not all, community members. For example, villagers who raise livestock will know basic animal husbandry.

It is widely acknowledged that indigenous knowledge is important in several ways, such as ethno-veterinary medicine, anthropology, agricultural development, forest management, soil management, and food security among many others (Sraku-Lartey, 2014). It, also, empowers community members with new skills that are needed to live a better life and adapt effectively to their local environment and environmental changes. Local knowledge helps indigenous people with the cross-pollination of ideas about cultural information between one indigenous community and another. Thus, local communities are able to imbibe ideal practices that are prevalent in other communities but relevant to them (Ilo, 2012). In medicine for example, IK is now increasingly

used to derive new concepts that may help (Sraku-Lartey, 2014). In that regard, Boven and Morohashi, (2002) and Ngulube (2002) describe indigenous knowledge as a dominant resource of indigenous people and a vital component in the fight against poverty and social exclusion for several rural societies overall.

Ngulube (2002), World Bank (1998) argue that, the basic component of any country's knowledge system is its indigenous knowledge which encompasses the skills, experiences and insights of people which are applied in order to maintain or improve their livelihood. In a study by Ilo (2012), indigenous knowledge has been shown to provide opportunity for indigenous communities to be recognised globally with their cultural heritage. Indigenous knowledge also equips indigenous people with the relevant information needed to earn a living. Additionally, IK helps rural communities produce food, acquire education and vocational skills, and conserve their natural environment (Anyira, Onoriode & Nwabueze, 2010).

## **1.2 Contextual Setting**

There are several Indigenous Knowledge (IK) policy frameworks and institutions that guide Indigenous Knowledge (IK) development in South Africa. These include the Department of Trade and Industry's 'The Protection of Indigenous Knowledge through the Intellectual Property System: A Policy Framework, (2008)', Department of Science and Technology's 'Innovation Towards a Knowledge-Based Economy: Ten-Year Plan for South Africa (2008-2018)', Leshiba Arts and Culture Trust's 'Proposed Establishment of a Centre for Indigenous Knowledge and Appropriate Technology, (2003)', the National Research Foundation's (NRF) '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 National Research Foundation's (NRF) Framework Document (2016) in particular defines IKS policy as an enabling framework to stimulate and strengthen the contribution of IK to the social and economic development of South Africa. The aims of IK policy as highlighted by IK Policy Frameworks are: firstly, to tap into such technologies for recording, storing, and disseminating IK which is considered as an innovation for the benefit of IK holders; secondly, to

support, advance, promote and safeguard IK in South Africa and thirdly, to develop and protect IKS as well as help to improve the livelihood and economic well-being of the indigenous and local communities, by ensuring equitable and fair benefit sharing. It can be said that the management of IK through ICTs in South Africa appears promising, as demonstrated by the presence of an Indigenous Knowledge Systems (IKS) policy. The Department of Trade and Industry (2008) and Leshiba Wilderness (2003), in particular, highlight that the scope of IK policy encompasses, inter alia, the integration of IK into the national education, research and development systems, propose administration of IK systems, institutions, funding and legislative imperatives.

The IK policy's documents have 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 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 uplift through the application of IK;
- to develop and enhance the role IKS plays in eco-tourism as a blend of natural and cultural attractions.

Broadly speaking, the adoption of IK policy, in the protection of indigenous knowledge, has become a top priority in South Africa. As argued by Mosimege (2005), South Africa initiated IK policy in September, 1996. The adoption of the IK policy was made by the national cabinet in 2004 (NRF: Framework Document, 2016). According to the Department of Trade and Industry (2008), inter-governmental institution such as United Nations Educational, Scientific and Cultural Organisation, 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 of IK, referred to in the policy as local knowledge (LK). It is widely acknowledged that, the protection of IK is based on the fact that the traditional knowledge holders are disadvantaged economically and socially without protection. It

is argued that, the country is also disadvantaged economically if no immediate protection is afforded. The IK policy is against poaching of local knowledge which is the largest threat (Department of Trade and Industry, 2008). As such, the intellectual property system, databases, sui generis laws (laws of a special kind) and registers were implemented.

It must be mentioned that the protection of IK has several challenges. For example, not all countries are in favour of 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). The Department of Trade and Industry (2008) reports that the United State is not a member of the Convention on Biological Biodiversity (CBD), which promotes the protection of IK through Intellectual Property (IP) system. In other words, there is international resistance in the protection of IK by very well developed countries. Thus, the protection of IK will minimise developed countries' chances of abusing rural communities, in using traditional knowledge, for the benefit of their already developed countries.

### **1.3 Research Problem**

Africa uses 80% of IK for medical purposes (Mahomoodally, 2013; World Health Organisation (WHO), 2003) and yet organisations still consider IK marginalised (Ocholla, 2007). Ocholla (2007) defines marginalisation as exclusion. It means a state of being left out or insufficient attention being given to something; in this case IK.

According to Him, IK was often referred to in a negative or derisive manner, with phrases such as “primitive”, “backward”, “archaic”, “outdated”, “pagan” and “barbaric”. 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. Related studies indicate that, most societies, countries and corporate organisations are putting in place initiatives aimed at preserving and revitalising and disseminating this valuable resource. For example, South Africa has put in place IK policy which addresses the protection and management of IK through ICT tools. The IK policy has its main objectives, which guide the implementation of the management of IK through ICTs.

IK, being largely a tacit or intangible knowledge, is easily lost if no proper mechanism is developed for transforming it into explicit/tangible knowledge through capturing, storing, processing, retrieving and dissemination. 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 within 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 increase in 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 the lack of adequate protection thereof. A study conducted on indigenous knowledge 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.

Ngulube and Lwoga (2009) admit that the introduction of information and communication technologies offers a window of opportunity for emerging nations to harness and utilise IK. They suggest a need for intervention to revive the processes of managing IK for future projects in agriculture, a sector where IK is very rich. They recommend that IK needs to 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 and what types of ICT tools have been adopted for managing IK for future generations? Thus, the rapid development and utilisation of ICTs in South Africa provide an avenue where IK can be processed, shared and stored using modern ICT practices and methods. Ultimately, considering the importance of IK as highlighted above, it is important to find modern ways of capturing, storing, processing, improving, retrieving, sharing and disseminating this knowledge in the hope of improving the utilisation of IK globally. Additionally, it is vital to indicate whether the tools used to manage IK are user friendly or not. This raises a question as to

how, and what types of ICT tools are currently used for the management (capturing, storing, dissemination and use) of indigenous knowledge in the Province of KwaZulu-Natal to benefit the society.

#### **1.4 Motivation of the Study**

The researcher of the current study used his experiences as he was born and natured in a rural area (in Ngwavuma) where survival is largely dependent on indigenous knowledge practices. This experience provided the vantage point of view with which to conduct the current project. The researcher noticed that African countries are putting in place strategies that would ensure that indigenous knowledge is managed through ICT tools for economic development and for future generations. As argued by McNulty (2012) that, nowadays, ICTs are capable of documenting and disseminating indigenous knowledge for future generation. In the light of the foregoing, the researcher's intention is to discuss the types of ICT tools used, in the management of indigenous knowledge (IK).

#### **1.5 Aim of the Study**

The aim of the study was to examine the use and types of ICT tools for the management of indigenous knowledge in the Province of KwaZulu-Natal.

#### **1.6 Objectives of the Study**

To achieve its aim, the study set out to:

- Discuss the nature of indigenous knowledge systems (IK);
- Evaluate the types of indigenous knowledge practices in general;
- Discuss the types of ICT tools that are used in the management of IK;
- Discuss problems encountered in regards to the use of ICT tools in the management of IK; and
- Discuss strategies for improving the use of ICT tools in the management of IK in KwaZulu-Natal

## **1.7 Research Questions**

- What is the nature of indigenous knowledge systems?
- What type (s) of indigenous knowledge practices have been inherited?
- What ICTs are currently available for storing, capturing and disseminating indigenous knowledge?
- What problems are encountered in the availability and use of ICTs in preserving and disseminating indigenous knowledge?
- What strategies could improve the use of ICT tools suitable for effective recording or capturing, storing, retrieving and disseminating indigenous knowledge?

## **1.8 Significance and Contribution of the Study**

It is widely acknowledged that the importance of a study is judged by its contribution towards furthering research and knowledge (Kwake, 2007:18). Thus, this study is of importance to the researcher in many different ways. Firstly, it has widened the researcher's research skills by conducting a research of this nature, which dealt with indigenous knowledge and information and communication technologies. Secondly, this research enabled the researcher to exactly know what is happening in rural areas in terms of sharing tacit indigenous knowledge and how ICT users/beneficiaries and owners or custodians of IK use ICT tools to manage IK. Additionally, the study is of enormous value to national and international debate. For example, the use of ICT tools in the management of indigenous knowledge has become prominent in national and international discussions (Department of Science Technology, 2015). For example, national governments, public libraries, academic institutions, to mention a few, are fully involved in the discussion of the management of IKS using ICTs. This study adds more value in the discussions as it establishes the types of ICT tools that are relevant in managing IKS. It must be mentioned that additional discussion about the significance and contribution of the study is presented in Section 7.3.1 of Chapter Seven.

## **1.9 Literature Review**

Current literature was sourced and reviewed from journals, conference papers, research publications, official government publications and books. However, most information was gathered from the internet, since it is a reservoir of latest publications. The sources pertained to the nature of indigenous knowledge, types of indigenous knowledge, importance of indigenous knowledge, types of ICT tools for recording or capturing IK, types of ICT tools for storing or preserving IK, types of ICT tools for disseminating IK, problems encountered in the use and availability of ICT tools, and strategies for improving the use and availability of ICT tools. Furthermore, the theoretical framework used for this study was the knowledge Creation Theory, of Nonaka (1994). The details of the literature review are discussed in chapter three and four.

## **1.10 Scope and Limitation of the Study**

According to Mugenda and Mugenda (1999:41), the scope of a study includes the area, degree or latitude a study can cover. Mugenda and Mugenda (1999:41) define the limitation of a study as the restrictions that are imposed on the research. The following section presents the scope, subject coverage and methodological frames of the study.

### **1.10.1 Scope**

This study analyses the use of ICT tools in managing indigenous knowledge (IK) in the Province of KwaZulu-Natal. The study emphasises different types of ICT tools such as video/cameras, video/filming/recording, tape/voice/recording, mobile phones, computers, internet, emails, DVDs, CDs, among others. These are used by ICT users/beneficiaries, and owners or custodians of IK to record or capture, store and disseminate IK.

The study admits the characteristics of the nature of indigenous knowledge, availability of the types of indigenous knowledge, existence of the categories of owners or custodians of IK, survival of IK in KwaZulu-Natal, available ICT tools for recording or capturing, storing and disseminating IK, effectiveness of ICT tools in recording or capturing, storing and disseminating IK, problems encountered in the use and availability of ICT tools and strategies for improving the use of ICT tools in managing IK.

The study targeted the population of 224 owners or custodians of IK and 96 ICT users/beneficiaries. The cluster and snowball sampling were used to select the 224 owners or custodians of IK and ICT users/beneficiaries across the province of KwaZulu-Natal. This gave 87.5% and 59% of the entire population, calculated against expected and actual sample, over one hundred percent. In particular, the study focuses on the owners or the custodians of IK which include traditional healers, herbalists, diviners, traditional farmers, traditional midwives, traditional musicians, traditional storytellers, traditional artisans, community elders, traditional food specialists, the chiefs and rainmakers. On the other hand, ICT users/beneficiaries include researchers, information librarians, fieldworkers, IK recorders, IK consultants, IK documentation centre managers, IK coordinators, cultural officers, government employees and collection officers, among others. The owners or custodians of IK were interviewed, while questionnaires were administered to the ICT users/beneficiaries.

It must be mentioned that data gotten from respondents through questionnaires and interview approaches were organised, coded and presented for analysis. Additionally, the data collected by questionnaire was analysed by means of Statistical Package of Social Sciences (SPSS), of descriptive and inferential statistics and Microsoft excel for conversion. The data obtained through interviews was coded and clustered into themes and key words. It was presented in tables and figures using simple percentages for the demographics of interview respondents and content analysis for narrations of owners or custodian's of IK opinion views.

### **1.10.2 Subject Coverage of the Study**

Broadly speaking, the subject coverage of the study focuses on the types of ICT tools used for recording, capturing, storing and disseminating IK. It also covers the effectiveness of ICT tools in managing IK.

### **1.10.3 Methodological Scope**

The survey research method was used to collect both quantitative and qualitative data from the ICT users/beneficiaries and owners or custodians of IK.

### **1.11 Dissemination of Research Results**

Broadly speaking, dissemination is about sharing information and knowledge. In other words, it is to make the research material physically available to a targeted audience. In a study by Ocholla (1999:141), it was argued that the possession of information without dissemination is useless and research is not complete until it is disseminated. Thus, the results of this study will be disseminated through a thesis that will be submitted to the University of Zululand Institutional Repository (UNIZULU IR) for wider distribution globally. Part of the research output has been disseminated through conferences and as chapters in peer-reviewed books as follows:

- Dlamini, P. N. (2017). Use of Information and Communication Technology Tools to Capture, Store and Disseminate Indigenous Knowledge: A Literature Review. In P. Ngulube (Ed.), *Handbook of Research on Theoretical Perspectives on Indigenous Knowledge Systems in Developing Countries* (pp. 225-247). Hershey, PA: IGI Global Publication.
- Dlamini, P. N. (2016). Information and Communication Technology (ICT) Tools for Indigenous Knowledge Management in KwaZulu-Natal Province, South Africa: A Preliminary Report. *Information Studies (IS) 2016 Annual Conference Announcement, University of Zululand, South Africa*, (7 - 9 September, 2016).
- Dlamini, P. N. (2015). Applying Knowledge Creation (KC) Model to the Management of Indigenous Knowledge Research. *Regional Knowledge Management Conference (RCKM) in Kenya*, (22-24 November, 2015).

### **1.12 Definition of Terms**

**Information and Communication Technologies (CTs):** This is broadly defined as a merger of computing and telecommunication technologies for information acquisition, storage, retrieval and dissemination (Alhassan and Afolabi, 2012).

**Indigenous:** This is broadly defined by Dei (2002) as a term used to refer to specific groups of people defined by ancestral territories, collective cultural configuration, and historical locations. This study adopted the definition by Owuor (2007) that the term indigenous, refers to the knowledge that is typical and belongs to peoples from specific places with common cultural and social ties.

**Knowledge:** This is broadly defined as the capacity of individuals, or groups, to learn from information (Mercer, 2005). This study adopted the definition by Mercer, (2005), Jakubik (2007) that, the term knowledge embodies the different categories of skills, know-how, experiences, beliefs and capabilities.

**Indigenous Knowledge:** It is widely acknowledged that the word indigenous knowledge is used interchangeably by numerous scholars from different schools of thought to refer to one of the following concepts - traditional knowledge, indigenous knowledge, community knowledge, traditional ecological knowledge, local knowledge, traditional environmental knowledge (World Intellectual property Organization, 2002). Indigenous knowledge is regarded as experimental locality-specific knowledge and practices of medicine, as well as healing, hunting, fishing, gathering, agriculture, combat, education and environmental conservation developed by indigenous people over many years (Chisenga, 2002:94); Ngulube, 2002:61). It can also refer to local knowledge that is unique to a given culture or society.

### **1.13 Structure of the Thesis**

**Preliminaries:** Title page, declaration, acknowledgements, dedication, abstract, table of contents, list of tables/ figures, abbreviations and acronyms, and list of appendices

**Chapter One:** Introduction and background to the study

Chapter One introduces the study and provides the conceptual and contextual settings of the study; problem statement; aims, objectives and research questions; motivation; significance; literature review; scope and limitations of the study; dissemination of results; and definition of terms.

**Chapter Two:** Theoretical framework

The chapter discusses the Knowledge Creation Theory and how it applies to the management of Indigenous Knowledge (IK).

**Chapter Three:** Literature related to the area of the study

Chapter Three deals with the literature review on the nature of indigenous knowledge; characteristics of indigenous knowledge; types of indigenous knowledge; and the importance of

indigenous knowledge. The chapter also deals with the literature review on the types of ICT tools currently in use for recording or capturing indigenous knowledge; types of ICT tools used for storing or preserving indigenous knowledge; types of ICT tools used for disseminating indigenous knowledge; problems encountered in the use and availability of ICT tools; solution to the problems encountered; implications and application of ICT tools in managing indigenous knowledge.

#### **Chapter Four: Research Methodology**

This chapter deals with research methodology and the design of the study. The chapter describes the research paradigms, research design and methodology, the qualitative and quantitative approaches used, the study's population, the sampling methods and the data collection instruments. Data collection procedures and analyses are also discussed.

#### **Chapter Five: Data presentation and analysis**

Chapter five presents results relating to each research question. In this chapter, the findings are presented in the form of numbers, tables and narrations.

#### **Chapter Six: Results and Discussions**

Chapter six presents the clarification of the vital findings in the light of the research objectives and questions.

#### **Chapter Seven: Summary of Results, Conclusion and Recommendations**

This chapter presents the summary of the results as derived from the set objectives, conclusions and recommendations of the study for the field. It also proposed areas for further research.

#### **References**

This section shows a list of references that is, books, journals, articles and online resource material that were used in developing this research project.

#### **Appendices**

These are supportive materials that are placed at the end of the thesis and they include data collection instruments and letters to subjects.

### **1.14 Summary**

This chapter provided the conceptual setting which is the background of the study. It explained in detail the term information and communication technologies (ICTs) with its significance and uses. It also dealt with the contextual setting of the study by addressing the status of IK in South Africa. In addition, other relevant aspects such as the statement of the problem, aim, objectives, research questions, significance, literature review, scope and limitations of the study, dissemination of results and definition of terms were covered.

The key theme emerging from this chapter is that there are ICT tools available which can be used to manage IK. The management of IK through ICTs is also supported by IK policy which states that there is need to record, store and disseminate IK through ICTs. The reason behind managing IK through ICTs is that IK is becoming extinct due to the lack of adequate methods to manage it. Additionally, IK is largely tacit and stored in people's minds and unequally shared in the communities where it had been generated. Thus, it becomes vital to investigate the use of information and communication technologies (ICTs) in managing indigenous knowledge (IK) in KwaZulu-Natal specifically. The following chapters provided responses to the research objectives in order to grow the knowledge base on the use of ICTs in managing indigenous knowledge (IK) in KwaZulu-Natal.

The study now proceeds to Chapter 2 to provide a detailed explanation of the theoretical framework used in the current study.

## CHAPTER TWO: THEORETICAL FRAMEWORK

### 2.1 Introduction

The previous chapter covered the conceptual and contextual setting as well as the background to the study. In this chapter, the conceptual framework concerning the investigation of the use of ICT tools in managing indigenous knowledge in the province of KwaZulu-Natal (KZN) is explored.

The term theory and concept are widely discussed. However, the study starts with the definition of a theory and concept. A theory is defined as a set of systematically interrelated concepts, definitions, and propositions that are advanced in order to explain and predict facts (Kumar, 2014; Liehr & Smith, 1999: 8). (Kumar, 2014), in particular, argues further that a theory can be explained or defined by the framework of assumptions and concepts in which it is embedded. Liehr and Smith (1999: 8) opine the following about theory: A theory is like a blueprint, a guide for modeling a structure. A blueprint depicts the elements of a structure and the relation of each element to the other, just as a theory depicts the concepts, which compose it and the relation of concepts with each other. On the other hand, Imenda (2014) cautions that in research, there are concepts that are used and they reflect theoretical concerns and ideological conflicts. Noticeably, Liehr and Smith (1999: 7) define a concept as “an image or symbolic representation of an abstract idea”. In other words, concepts have the components of theory which “convey the abstract ideas within a theory” and that they are a “complex mental formulation of experience” (Chinn & Kramer, 1999: 252).

The concept theoretical and conceptual frameworks are also widely discussed. A theoretical framework serves to guide a researcher in his or her study in a broad field of know-how by expounding on a fundamental principle, foundation with reverence to the research subject (Imenda, 2014; Khan, 2010). In a study by Neuman (2000: 59), it is construed that theoretical frameworks provide collections of assumptions, concepts, and forms of explanation. Likewise, a study by Awang (2014) explains that a theoretical framework is a systematic diagram showing how the study believes the variables should relate among each other. Imenda (2014) believes that a theoretical framework is the application of a theory, or a set of concepts drawn from one and the same theory, to offer an explanation of an event, or shed some light on a particular phenomenon or research problem. Thus, it could refer to, for instance, the set theory, evolution, quantum

mechanics, particulate theory of matter, or similar pre-existing generalisation such as Newton's laws of motion, gas laws, that could be applied to a given research problem, deductively.

Ocholla and Le Roux (2011) consider a theoretical framework as that part of a research proposal or study that sets out to describe the research question (hypothesis) and the line of inquiry and methodology used to answer it. They explained further that, a theoretical framework is quantitatively geared towards improving clarity, correctness and usefulness in research. They also claim that it refers to the agenda, outline, and theoretical construct of a research approach and that it normally precedes literature review. Thus, concepts and constructs are used at a theoretical level while variables are used at the empirical level as explanations or interventions. As such, theories are generalisations about variables and the relationships amongst them.

A study by Ngulube and Mathipa (2015) discuss a number of characteristics of theoretical framework as:

- It serves as a basis of a research plan;
- It situates the researcher within a scholarly discourse and links the study to the broader body of literature;
- It provides a frame within which a problem under investigation can be understood (Bryman, 2012:20);
- It shapes the research questions and helps to focus the study;
- It allows the researcher to narrow the project down to manageable size;
- It offers a plan for data collection;
- It operates as a tool to interpret research findings; and
- It provides a vehicle for generalisations to other contexts.

On the other hand, Imenda (2014) defines a conceptual framework as an end result of bringing together a number of related concepts to explain or predict a given event, or give a broader understanding of the phenomenon of interest or simply, of a research problem. The process of

arriving at a conceptual framework is akin to an inductive process whereby small individual pieces (in this case, concepts) are joined together to tell a bigger map of possible relationships. Thus, a conceptual framework is derived from concepts, in-so-far as a theoretical framework is derived from a theory (Imenda, 2014).

According to Ngulube and Mathipa (2015), a conceptual framework has a number of characteristics which include:

- a motivation for selecting concepts and linking them to a research problem;
- a set of concepts and aspects of theories that assist in establishing coherence in research;
- less developed than theories;
- giving direction to research, just as the theoretical framework does;
- a diagrammatic representation of concepts and their relationship in a specific research context; and
- linking abstractions to empirical data.

In a nutshell, the conceptual or theoretical framework is the soul of every research project. The two frameworks inform the research process. In that regard, the two frameworks determine how a given researcher formulates his/her research problem and how s/he goes about investigating the problem, and what meaning s/he attaches to the data accruing from such an investigation (Imenda, 2014; Ngulube & Mathipa, 2015). Based on the characteristics of the two frameworks discussed above, the study adopted the theoretical framework.

This chapter is aimed at discussing Knowledge Creation Theory (KCT) as the theoretical foundation for indigenous knowledge management. The advantage of this theory is that it is widely applied in organisations and in rural communities. The reason for using Knowledge Creation Theory by the current study is that it addresses the question of codification and documentation of IK. Questions such as, “how do we codify IK, which is largely oral? How do we preserve and communicate IK? How do we communicate IK using convocational means?, are treated. In that

regard, Ngulube (2003) posits that such questions are not easily answered. However, Nonaka and Takeuchi's (1995) theory of converting knowledge is widely recommended with few adaptations to provide some informed answers. The theory of Nonaka (1994) describes the four ways of relating tacit knowledge to explicit knowledge and vice versa. These are socialisation, externalisation, combination and internalisation. Additionally, Nonaka (1994) is of the view that the theory has been widely applied in organisations to manage knowledge, by capturing and disseminating it. Bratianu and Orzea (2010) argue that in a knowledge creating firm, the knowledge is created through dynamic interactions with the environment. He adopted this theory in his study because of its applicability in knowledge management and has thus made it the most relevant theoretical framework for this study.

The chapter is divided into six parts which provides few examples of indigenous knowledge management theories; presents an overview of the Knowledge Creation Theory (KCT) and discusses the key elements of Knowledge Creation (KC). In addition, it presents an overview of the critique of Nonaka's theory; provides the application of knowledge creation theory to the management of IK and presents a summary which carries the silent issues, implications and limitations. The appraisal that follows highlights each of these aspects.

## **2.2. Indigenous Knowledge Management Theories**

In the recent study by Ocholla and Le Roux (2011), it is observed that LIS research is informed by a number of theories (see [www.is.theorize.org](http://www.is.theorize.org)). Most of them originate from other disciplines. Previous research on indigenous knowledge management has been informed by several of these theories, including but not limited to the following:

- The Three Knowledge Facets (Yang, 2003) or Holistic Learning Theory: This theory defines knowledge as a construct with three distinct and interrelated facets—implicit, explicit, and emancipatory knowledge. It must be mentioned that the advantage of using holistic theory is the fact that it promotes knowledge creation and transformation through the interactions among three knowledge facets (Yang, 2003). The holistic learning theory proclaims that the construct of knowledge consists not only of the three facets but also of three knowledge layers (Yang, 2003). The knowledge layers include foundation, manifestation, and orientation. The first layer is a stratum of foundation or premise, which serves as the basis for our knowing and

determines the boundary. Foundation includes those tacit assumptions that have been taken for granted as valid and are not normally requiring proof. This layer indicates people's epistemological beliefs. The second layer is manifestation that represents the outcomes of our knowing. The third layer is the orientation of our knowing, which defines the direction and tendency of knowing action. The third layer indicates the driving forces of our learning process (Yang, 2003). Based on the characteristics of the theory above, it is concluded that the theory falls short of this study's objectives.

- Edvinsson's Model of Intellectual Capital (IC) (Edvinsson & Sullivan, 1996): the two authors spell out the concept of IC and how it fits into the knowledge economy. They also differentiate between human capital and intellectual assets, between physical and intangible structural capital, and between generic and specific complementary business assets, which are all considered as core fundamental sources of value for a firm. The IC model also highlights where IC fits into the knowledge firm and what the component elements of it are and how to manage them. However, there are limitations for IC model, for example, authors such as Koh et al. (2005:59) are doubtful of the model as it seems to fail to realise the classification of knowledge in an organisation and to identify the way in which to manage the resources for knowledge management. It is argued that IC model is more suitable for an industrial environment. It can be concluded that the model falls short of the study's objectives.

- Earl's Model (Earl, 1989): This model concentrates on the stages through which organisations pass in planning their information systems. The theory was revised a number of times, first in 1983 and subsequently in 1986, 1988, 1989, and 2001. The revised Earl's model based on seven branches grouped into three major schools of knowledge management. They are the technocratic school, which consists of codified systems; the commercial school, which uses codified systems to manage intellectual assets; and the behavioral school, which is mainly concerned with personal knowledge (Earl, 2001: 215-233; Blackman & Henderson, 2005:152; Hicks, Dattero & Galup, 2006: 25). There are five parameters or indicators that allow Earl's model to attain its goals. These parameters or indicators are: focus, aim, unit and success factors, and also the philosophy behind each school which is categorised by a "C" (Codification, Connectivity, Capability, Commercialisation, Collaboration, ease of Contact and Consciousness). These stand out in each school by factoring in the use of information

technology for effective impact and in inventorying what is to be managed (Earl, 2001:217). It must be mentioned that the model falls short of this study's objectives and that it has various limitations. For example, a study by Perrin and Rolland (nd: np) have argued that Earl's model has challenges with regard to effective measuring of the knowledge transfer process. It was also revealed that the model measures of knowledge are not universal or even generic. On the other hand, authors such as Blackman and Henderson (2005:158), identify problems in some of the schools of Earl's model, e.g. the cartographic school. The two authors above reported that the school enables the sharing of how, what, where and which kinds of knowledge. However, it does not address the question of why, which makes it difficult to validate the knowledge that the school alludes to. Ocholla (2007:4) also argues that the cartographic school of Earl's theory leaves a gap of not being able to understand why a particular problem happens, therefore relying on what is already documented. In that regard, this is where intangibility poses a challenge when trying to answer questions as to why. The issue here is lack of evidence of the validation process where the process in question has to be tested over time and be used for problem solving.

- The Three Pillars of Knowledge Management by Wiig (1997): This is a framework which is based on three pillars and the foundation of KM (Mostert & Snyman, 2007). KM, as it is referred to here, is the way knowledge is created and used during problem solving and decision making. The three pillars are the exploration of knowledge, its value assessment, and its active management. A study by Wiig (1997:1-2) posits that the primary objectives of this theory are to make the enterprise act as intelligently as possible to secure its feasibility and general success and to realise the best value of its knowledge assets. Debatably, the overall purpose of KM is to maximise the enterprise's knowledge -related effectiveness and returns from its knowledge assets and to renew them constantly. Although the values of the theory seem suitable in the management of indigenous knowledge, they do not apply to this study. There are various limitations of Wiig's model. For example, a study Koh et al. (2005:58), error the model for the lack of clarifications on the several steps referred to in the model, especially in instances of doing things such as handle, use, and control knowledge“, which does not say why or how to control this knowledge, nor how to handle or control tacit or cultural knowledge. It is also revealed that the model also lacks an execution framework or strategy and that it is

generic in nature without considering the differences in industry, organisational structure, culture, etc.

- Senge and the Learning Organisation: Senge's model is also known as the fifth dimension. It is defined as organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together (Senge, 1990:3). It is argued that Senge's learning organisation is merely a vision which has a life and its purpose is to be reproductive to the world. In that regard, it can be said that an organisation is a living community of people with communal responsibilities (Fulmer & Keys, 1998:35). The model is widely recognised because of the five principles it possesses (Fulmer & Keys, 1998:35). These are namely:

- Building a shared vision: this is the practice of unearthing shared pictures of the future that foster genuine commitment (Fulmer and Keys, 1998:35).
- Personal mastery: is a skill that repeatedly elucidates and deepens our personal vision.
- Mental models: it is the ability to unearth our internal pictures of the world, to examine them, and to make them open to the influence of others.
- Team learning: is the capacity to think together, which is gained by mastering the practice of dialogue and discussion.
- Systems thinking: it is the discipline that integrates the others, fusing them into a coherent body of theory and practice.

However, Senge's model has a number of limitations. A study by Smith (2001:9), fault Senge's model for being too idealistic, especially when most organisations in a capitalistic environment are profit-oriented. On the other hand, Raelin, J. (2007), opine that Senge was just out to elevate or promote himself, and also objected to the extensive use of simulation tales which make the theory more utopian than real. Based on the limitations and intentions of the model, it falls short of this study's objectives.

- Knowledge Creation Theory: Proposed by Nonaka (1994). This theory is used in organisations to manage knowledge. It deals with four components, namely socialisation, internalisation, combination and externalisation. These four components of knowledge creation are relevant and support the objectives and research questions of the study as discussed in section 2.3 below.

Evidently, the theories are many and would be very problematic to use at the same time. Their variety and correctness makes it inconceivable for researchers to apply them in diverse contexts, subject on the research topic and their professed relevance. In the next section, the knowledge creation theory is discussed.

### **2.3 Knowledge Creation Theory is Defined**

In a study by Nonaka (1994), knowledge creation is defined as the process that stems from accumulating information, whilst knowledge transfer refers to “the transfer of knowledge to places and people, where the information is necessary in order to fulfill some activity or task”. Knowledge essentially stems from beliefs, skills and experience. He conceptualises knowledge creation in terms of two types of knowledge: tacit knowledge and explicit knowledge. It must be mentioned that the terms tacit and implicit knowledge are often used interchangeably in this chapter because they mean the same thing. In that regard, Polanyi (1966) also posits that tacit and implicit knowledge generally mean one and the same thing.

A study by Nonaka and Takeuchi (1995) stresses the creation of knowledge through the conversion of tacit knowledge to explicit knowledge and vice versa. On the other hand, Bennet and Bennet (2008) explain that tacit and explicit knowledge are not mutually exclusive entities. They further argue that people cannot truly understand a phenomenon without first-hand experience of it. In other words, unless one tries to convert tacit knowledge to explicit knowledge, one cannot reflect upon and share it at an organisational level; neither in a community. Additionally, through the dynamic interaction between the two types of knowledge, personal knowledge becomes organisational and/or community knowledge.

Tacit knowledge is essentially un-codified knowledge that is not easily visible and expressible. Aman and Nicholson (2003); Nonaka and Krogh (2009) consider tacit knowledge as personal,

context specific, embedded in individual experience, difficult to communicate, and shared within the community and organisation. Thus, it has to be converted into words or numbers that others can understand. A study by Nonaka and Krogh (2009) agree that implicit knowledge is extremely personal and hard to formalise, making it tricky to share with others.

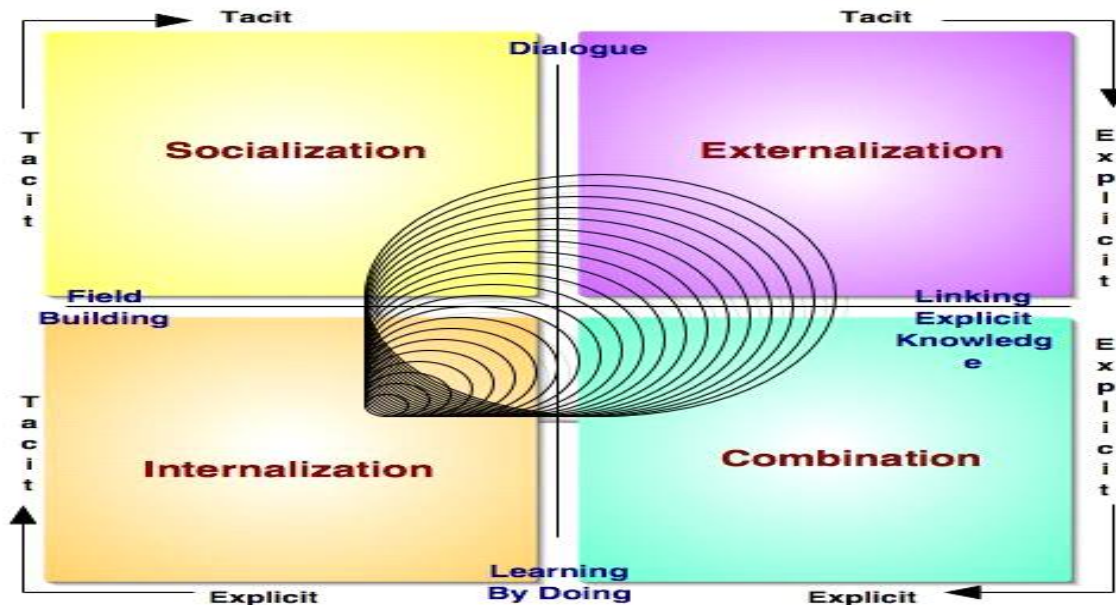
Nonaka and Krogh (2009) in particular, consider tacit knowledge as a cornerstone in organisational knowledge creation theory and that it covers knowledge that is unarticulated and tied to the senses, movement skills, physical experiences, intuition or implicit rule of thumb. Explicit knowledge, on the other hand, is easily communicated and shared. Nonaka and Krogh (2009) claim that explicit knowledge is uttered and captured in drawings and writings while Mir and Rahaman (2003) refer to explicit or codified knowledge as knowledge that is transmittable in formal and/or systematic language. Mir and Rahaman (2003) further explain that explicit knowledge can be expressed in words and numbers, and easily communicated and shared in the form of hard data, scientific formulae, codified procedures, or universal principles.

It is therefore in this sense that knowledge creation encompasses tacit knowledge and explicit knowledge (Nonaka & Konno, 1998). Nonaka (1994) argues that unless people convert implicit knowledge into obvious knowledge, it would be difficult to share it organisationally. However, through this process between the implicit knowledge and explicit knowledge, individual knowledge becomes institutional knowledge.

In a study by Nonaka and Konno (1998), it is pointed out that the interaction between the two types of knowledge brings about four modes of knowledge conversion: socialisation (from individual tacit knowledge to group tacit knowledge), externalisation (from tacit knowledge to explicit knowledge), combination (from separate explicit knowledge to systemic explicit knowledge), and internalisation (from explicit knowledge to tacit knowledge). These modes of knowledge creation are Nonaka's theories in managing the tacit and explicit knowledge of an organisation. Nonaka (1994) argues that tacit knowledge in an organisation is acquired mainly through the socialising and externalising skills and experiences of employees for the benefit of the organisation. This means that the tacit knowledge of employees is captured, preserved and disseminated in order to be used by the organisation to increase its production. In that regard, the process of the four modes of knowledge conversion is explained in the diagram, in the next section.

## 2.4 Articulating Key Elements of the Knowledge Creation Theory (KCT)

The four elements of knowledge creation, as pointed out by its founder, Nonaka, (1994), are illustrated in the diagram below.



**Figure 2.1: Key elements of the knowledge creation theory**

(Source: Nonaka, 1994)

### 2.4.1 Socialisation

Nonaka (1994) defines socialisation as the process of creating common tacit knowledge through shared experiences. In order for socialisation to be effective, people need to build a ‘field’ of interaction, where individuals share experiences and space at the same time, thereby creating common unarticulated beliefs or embodied skills. Hoegl and Schulze (2008); Marley (2012) concur that socialisation gives new implicit knowledge that is made through casual communication, that is, through the dialog of implicit knowledge.

Nonaka and Konno (1998) explain that tacit knowledge that cannot be formally articulated between individuals may be exchanged through joint activities. This may involve being together for some time or living in the same environment, which allows newcomers to understand others’ ways of thinking, skills, feelings, and experiences. Mosoti and Masheka (2010) emphasise that during socialisation, the conversion is tacit to tacit (for example, watching somebody doing something, then copying it). In the same vein, Bratianu and Orzea (2010) view socialisation, as an

opportunity for participating individuals to share their experiences and to learn through the direct exchange of tacit knowledge. Also, Hemmecke and Sary (2003); Holmqvist (1999) assert that knowledge sharing within communities is embedded in their practices that are considered to be tacit knowledge. In that regard, Holmqvist (1999); Marley (2012) argue that experience is the primary driver of this form of knowledge conversion. This kind of knowledge sharing among communities corresponds with the process of socialisation.

It is argued by Hemmecke and Sary (2003) that knowledge sharing within and between communities only occurs when the socially embedded tacit knowledge is at least partly converted into explicit knowledge. Nonaka and Konno (1998) are of the view that this is the process of transferring one's ideas or images directly to colleagues or subordinates in sharing personal knowledge. In this process, individuals share feelings, emotions and experiences, and this removes barriers and increases trust and commitment (Nonaka & Konno, 1998). According to Nonaka and Konno (1998), in order for socialisation to take place, individual people should share face-to-face experiences, which then makes it possible to transfer tacit knowledge. Clark (2004) agrees with Nonaka and Konno (1998), adding that socialisation includes observation, imitation, and practice. Clark (2004:2) thus concludes that sharing experiences is the key, which is why the mere transfer of information often makes little sense to the recipient.

It has been emphasised that the effectiveness of the socialisation process depends on the organisational culture and the balance between individual competition and group cooperation. Moreover, it has been highlighted that socialisation must go beyond the everyday dialogues and exchange of neutral phrases. In other words, it must stimulate deeper layers of experiences and stored knowledge (Bratianu & Orzea, 2010; Holste & Fields, 2010; Marra, 2004).

In order for socialisation to be effective, Hong (2010:6) suggests spending prolonged hours every day attending social events and working under a team structure, and developing a close and enduring working relationship with other colleagues. It can therefore be deduced that the company is not only a place of work but also a coherent social community with profound emotional attachment and common identity. In other words, it is a place where hidden knowledge is shared among other employees who might be interested in increasing their knowledge and learning a new skill. As argued by Nonaka and Konno (1998), in socialisation, tacit knowledge can only be shared

if the self is freed to become the larger self that includes the tacit knowledge of the other. The next part focuses on externalisation.

#### **2.4.2 Externalisation**

The second knowledge creation element is externalisation (Nonaka, 1994). Externalisation is defined as the conversion of tacit knowledge into explicit knowledge (Bratianu and Orzea, 2010; Marley, 2012; Nonaka, 1994). According to Nonaka and Konno (1998); Clark (2004), the process of externalisation is supported by two key factors: the conversion of tacit knowledge into explicit knowledge that involves techniques to help express one's ideas or images as words, concepts, figurative language (e.g. metaphors, analogies or narratives) and visuals, and translating the tacit knowledge of customers or experts into readily understandable forms.

A study by Scharmer (1996) regards externalisation to be the process of articulating tacit knowledge into explicit knowledge as concepts and/or diagrams, often using sketches. The advantage of externalisation, according to Marley (2012), is that it makes tacit knowledge transferable to others, and makes it useful and applicable in a wider context. Authors such as Nonaka and Konno (1998), Mosoti and Masheka (2010), and Marley (2012) consider externalisation to be the conversion of tacit knowledge to explicit knowledge (that is, doing it and then telling it). Bratianu and Orzea (2010) note that once the knowledge becomes explicit, it can be shared, disseminated, and transferred to others through verbal and non-verbal language. However, Nonaka (1997) adds that dialogue is an important means of exchanging ideas in externalisation. For instance, during face-to-face communication, people share beliefs and learn how to better articulate their thinking through instantaneous feedback and the simultaneous exchange of ideas. However, Hemmecke and Stary (2003) regard externalisation to be the method of converting implicit knowledge into tangible knowledge. They argue that it is not usually acknowledged that the vocalisation of intangible knowledge is really possible. On the other hand, Nonaka and Konno (1998) and Marley (2012) are of the view that the results of the externalisation process enable people with different backgrounds to share gained or acquired tacit knowledge.

According to Marley (2012), tacit knowledge needs to be codified and converted into an understandable format, such as words or images. It is further indicated that some technologies,

such as groupware, databases, radio, television, internet, flash drives and many others, assist in the externalisation of tacit knowledge. It is worth noting that this is an area where ICT tools are applied to safeguard traditional knowledge for future use. Finally, the methods of externalisation entail capturing the personal, historical, social and material contexts of knowledge, including both the individual and collective work practice. It also involves being adaptable to and reflecting the dynamics of knowledge in work activities and in various organisational settings, in particular between communities and various stages of knowledge-management maturity. A study by Bratianu and Orzea (2010) concluded that externalisation reduces the entropy of total knowledge by structuring and integrating new created knowledge into the existing explicit knowledge structures. The following discussion involves that combination.

### **2.4.3 Combination**

Nonaka (1997), Sarayreh, Mardawi and Dmour (2012) assert that once knowledge is explicit, it can be transferred as explicit knowledge through a process called that the authors refer to as ‘combination’. Nonaka (1994), Scharmer (1996) and Bratianu and Orzea (2010) define combination as the process of assembling new and existing explicit knowledge into systematic knowledge, such as a set of specifications for the prototype of a new product. Combination is the process of converting tangible knowledge into more multifaceted sets of tangible knowledge (Nonaka & Konno, 1998). Nonaka and Takeuchi (1995), Mosoti and Masheka (2010) and Marley (2012) are of the view that the combination of new explicit knowledge with existing information and knowledge generates and systematises explicit knowledge throughout the organisation. They identify three important phases of the conversion process, namely: capturing and integration, dissemination, and editing and processing.

In a study by Marley (2012), it is noted that capturing and integrating involves collecting essential data from both internal and external sources and combining data or knowledge. During dissemination, new knowledge is spread and shared amongst members. This can be achieved in various ways, for example, during presentations or meetings. Lastly, during the editing and processing phase, the knowledge that has been created is made explicit in the form of documentation, which is then put through a process of justification. In order for the knowledge to

be justified, it needs to correlate with the knowledge vision of the organisation. According to Nonaka and Konno (1998), the aforementioned process makes information concrete and useful.

According to Nonaka (1997) and Sarayreh, Mardawi and Dmour (2012), combination is where information technology is most helpful because once tacit knowledge has been converted into explicit knowledge, it can be conveyed again through documents, emails, databases, as well as through meetings and briefings. Nonaka and Konno (1998) add that mechanisms for explicit knowledge conveyance include the use of on-line networks, group-ware, documentation and databases for storing valuable assets. Thus, a newly created concept is combined with existing knowledge to materialise it into something tangible.

Combination, according to Nonaka (1997), allows not only for knowledge transferal among groups across organisations, but also for the collection of relevant internal and external knowledge towards dissemination, editing and processing, in order to make it more usable and accessible to the organisation. It has been argued by Marley (2012), that the combination of external and internal knowledge is facilitated or triggered by coordinating teams and their activities, as well as by the means of the documentation of existing knowledge. The next step under discussion is internalisation.

#### **2.4.4 Internalisation**

Nonaka (1994) consider the fourth element in the knowledge creation theory to be internalisation. Internalisation, according to Nonaka and Konno (1998), Marley (2012), and Sarayreh, Mardawi and Dmour (2012), involves the conversion of explicit knowledge into tacit knowledge that is shared at an organisational level. During internalisation, individuals identify and acquire explicit knowledge that is created during the externalisation and combination phase. This knowledge is then explored by means of practice, following which individuals acquire and understand the tacit dimension of this knowledge (Nonaka & Konno, 1998; Marley, 2012). It is argued by Nonaka (1997), that knowledge in its personal form is demonstrated by only its owner. In that regard, Bratianu and Orzea (2010) posit that the advantage of internalised knowledge is that it increases the level of individual understanding and absorptive capacity.

Authors such as Clark (2004), Hong (2010), and Sarayreh, Mardawi and Dmour (2012) concur with Nonaka (1997) by regarding internationalisation as the exchange of explicit knowledge with tacit knowledge. Clark (2004), in particular, clarifies that internalisation is learning by doing. Likewise, Marley (2012) and Nonaka (1994) emphasise that internationalisation is generated by "learning by doing or using". This means that tangible knowledge, that is documented as manuscripts, sound, or in video format, enables the internalisation process. Therefore, booklets, a quintessential example of tangible knowledge, are broadly used for internalisation. Sarayreh, Mardawi and Dmour (2012) conclude that internalisation is largely experiential and that it actualises concepts and methods, either through the actual doing or through simulations.

In conclusion, from the foregoing, it can be deduced that internalisation is the process of understanding and absorbing explicit knowledge into the tacit knowledge held by an individual. In the process of internalisation, the experiences of experienced workers in an organisation are transferred to the tacit knowledge of the individual. It is also deducible that knowledge in its implicit form is demonstrated by the owner while others are observing.

## **2.5 Critique of Nonaka's Theory**

Authors such as Ngulube (2003), Glisby and Holden (2003), Andriessen and Boom (2007), Harsh (2009), Bratianu and Orzea (2010), Lwoga, Ngulube and Stilwell (2010) have noted that Nonaka's model has various shortcomings. Glisby and Holden (2003), for example, argue that Nonaka's knowledge-creating theory has been indiscriminately applied across contexts and cultures as inherently superior to other systems of knowledge management. However, while Nonaka's model of knowledge dynamics in organisations can be very well understood and used in the context of Japanese culture, it is unlikely to produce successful results in other cultures (Bratianu, 2010; Gourlay, 2006; Kaplan, 2008; Snowden, 2007). The basic cornerstone is the concept of *Ba*, which can hardly be understood in a culture where the Cartesian dualism produced such a gap between rational and non-rational worlds (Bratianu, 2010:195).

Snowden (2007) also considers Nonaka's knowledge creation theory as only relevant in the Japanese context, and that it cannot be applied in a different setting. The author laments that implicit knowledge and explicit knowledge are dimensions which cannot be transformed from one form to the other. Andriessen and Boom (2007) and Harsh (2009) likewise argue that the Eastern knowledge perspective is very different from the Western. The three authors provide an example

of the Western perspective where emphasis is put on explicit knowledge, while in the Eastern perspective the emphasis is put on tacit knowledge. This is an indication that people from different cultures differ widely, and their methods of communication may not be the same due to the influence of culture.

The four processes of knowledge creation have also been heavily criticised. For instance, Bratianu (2010) postulates that by integrating the four basic processes of knowledge dynamics, that is socialisation, externalisation, combination and internalisation, into a pattern of knowledge conversion, Nonaka is blurring the lines between individuals and groups. The author asserts that according to the epistemological dimension (Nonaka, 1994; Nonaka and Takeuchi, 1995), knowledge conversion - from tacit to explicit and from explicit to tacit - is clearly a process developed at the individual level. Bratianu (2010) opine that there is no reason for such a process to be developed between the tacit knowledge of a given person and the explicit knowledge of another person. He argues further that if the entire spiral of knowledge creation were to be limited to only two individuals, it could perhaps be understood. However, the author posits that if we consider a group of people, it is difficult to explain and demonstrate how knowledge conversion works because of the sequential interplay between strictly individual processes and group processes.

In discussing the four modes of knowledge creation between tacit and explicit, Nurse (2001) argues that what the knowledge creation theory lacks is context to the process and the kind of knowledge it is envisaging through this process. The author believes that the knowledge creation theory has failed to describe how the conversion of knowledge leads to the creation of new knowledge. This raises the question of whether having knowledge transferred between one person and another is, in fact, knowledge creation.

According to Gourlay (2003), while many authors and writers acknowledged Nonaka for recognising that the capacity for corporate action depends on ideas and beliefs as much as on scientific knowledge, they (the author) concluded that his subjectivism tended towards a dangerous relativism because he made justification a matter of managerial authority, and neglected to consider how scientific criteria relate to corporate knowledge. In the study by Gourlay (2003),

Nonaka's theory does not clarify how fresh ideas are formed, nor how deep of understanding (necessary for expertise) develops. The author perceives Nonaka's model of knowledge creation to be unconvincing, and that it makes collaborative work a mystery.

A theory, according to McLean (2004), must be clear and precise if it is to be understandable, internally consistent, and free from ambiguities. In other words, a good theory must have precision and clarity. For McLean (2004), in the operational phase, Nonaka's model must be interpreted, or transformed to noticeable, provable components or elements. The author argues that knowledge creation theory is very difficult to understand due to the relatively abstract nature of the subject matter. Thus, it is understandable why the concepts included in the theory are difficult to operationalise. For him, the authors of the knowledge creation theory attempts to operationalise the concepts through case examples, conceptual models, and general statements about it. The author posits that many of the concepts are somewhat abstract, leading to a certain amount of ambiguity. McLean emphasises that the work to operationalise this theory appears to lack explicit, testable hypotheses that would show how the concepts relate to each other beyond these general statements.

However, McLean (2004) admits that Nonaka's theory was able to identify and describe the knowledge creation process through concepts such as modes of knowledge conversion, conditions for knowledge creation, and levels in the process. In doing so, Nonaka made this process easier to understand. Therefore, while the theory has cultural and other criticisms levelled against it, there is still considerable potential in the application of knowledge creation theory to the management of indigenous knowledge. Ngulube (2003) emphasised the need to adopt knowledge management theories; such as knowledge creation (KC) as a tool for managing indigenous knowledge that is embedded in rural communities of developing countries. In that regard, the following section is a discussion of how knowledge creation theory has been applied by previous studies and the current study in the management of indigenous knowledge.

## **2.6 Review of the Application of Knowledge Creation to the Management of Indigenous Knowledge by Related Studies**

The first part of this section looks at how other studies applied knowledge management theories such as knowledge creation in the management of indigenous knowledge. The researcher used some examples of studies conducted in this context in Africa which include Lwoga (2009); Marley (2012) and Lwoga, Ngulube and Stilwell (2010), just to mention a few.

Lwoga (2009) used Nonaka's theory in her study entitled, "*Understanding Indigenous Knowledge: Bridging the Knowledge Gap through a Knowledge Creation Model for Agricultural Development Knowledge*". Her findings revealed that socialisation was effective among farmers where new knowledge was created through interactions, group meetings and observations. Externalisation was also useful among farmers where carvings, which included toys, drawings from clay pots, utensils and other, were used in externalising their tacit knowledge into explicit knowledge for the benefit of the community. Lwoga also acknowledged that, combination was also useful because the farmers shared their explicit knowledge with others through village meetings, group interactions, as well as print formats and ICTs such as cell phones and emails. Lastly, Nonaka explains that, internalisation showed that even though explicit knowledge was available on ICTs, farmers were receiving information from tacit sources compared to explicit sources of knowledge. Lwoga (2009) concluded that some knowledge management theories such as knowledge creation were applicable in the management of indigenous knowledge, especially in rural areas.

Marley (2012:1) applied Nonaka's theory in a study entitled, "*Investigating the Appropriateness of the Theory of Organisational Knowledge Creation as a Management Model for Practice-Led Research*". She also used knowledge creations which proved to be the useful tool in practice-led research. The researcher emphasised that the four elements of knowledge creation namely socialisation, externalisation, combination and internalisation (SECI) were used to accomplish the goal of the study. Marley believes that the driving force behind knowledge creation theory is facilitating the move from tacit to explicit knowledge by means of social interaction. Marley (2012:9) discovered that knowledge creation is a useful approach with salient tangential points between practice-led research and the theory of organisational knowledge creation. The author found that knowledge is subjective and created through social interaction and that this subjective

view of knowledge comprises both tacit and explicit knowledge (which are different but inextricable modalities of knowledge). It was concluded that it is the interaction and utilisation of both modalities that provide a holistic view of knowledge and, consequently, of knowledge creation.

Ngulube and Lwoga (2007:1) used Nonaka's theory in their study entitled, "*Knowledge Management Models and their Utility to the Effective Management and Integration of Indigenous Knowledge with other Knowledge Systems*". The two authors emphasised the possibility of using knowledge management models like knowledge creation theory in the management of tacit indigenous knowledge. Additionally, it was evident in their study that there is need to utilise knowledge management models in the management and preservation of indigenous knowledge.

Their findings gave confidence to the researcher of the current study that it is possible to manage IK, using selected knowledge management theories, like knowledge creation. In that regard, the application of the four modes of knowledge creation and their relevance to the management of indigenous knowledge are discussed as follows.

## **2.7 Relevance of the Theory to the Current Study**

The relevance of any model is measured by its capability to achieve the desired goal. Knowledge Creation Model (KCM) is relevant to this study because of its capability to manage tacit knowledge which indigenous knowledge is about. It is widely acknowledged that tacit indigenous knowledge needs to be managed because it is at the risk of becoming extinct, if appropriate measures are not taken to preserve and manage it. Lwoga, Ngulube and Stilwell (2010) posit that, IK needs to be managed by using knowledge management theories because much of IK is preserved in the memories of elders, thus gradually disappearing due to loss of memory and death. Mosoti and Masheka (2010:111) explained this predicament of tacit knowledge with an old African proverb that states "In Africa, when an old man dies, the entire library is burnt." In this sense, knowledge management models, such as knowledge creation (KC), can be used to manage and share IK in communities that recognise its relevance and its importance.

Ngulube and Lwoga (2007), Eftekhazadeh (2008), Lwoga and Ngulube (2008), Marley (2012), Mosoti and Masheka (2010) recognise that knowledge management models can be useful

strategies for managing and integrating IK into other knowledge systems. These models provide the possibility of creating knowledge that is relevant to local communities. Mosoti and Masheka (2010) conclude that Africa needs to capture tacit IK and share and transfer it globally. However, Ngulube (2003) cautions that tacit indigenous knowledge should not be separated from the individuals who possess it. He suggests that efforts should be made to enable the communities to innovate, create, and manage their own knowledge and to adapt other knowledge systems for a sustainable variety of indigenous knowledge practices like agriculture, medicine, artwork, and others.

Broadly speaking, the knowledge creation model has been proven as a theoretical model effective in converting tacit knowledge into explicit knowledge and back again. It can be deduced that, the knowledge creation theory encourages encoding indigenous knowledge into information in order for it to be well managed. This can be achieved through the use of ICTs, which is also encouraged in knowledge creation. In this respect, Maponya and Ngulube (2007) posit that one of the advantages of using knowledge management theories like knowledge creation in managing IK is that it provides strategies to get the right knowledge to the right people at the right time and in the right format. In that regard, Marley (2012) hypothesises that knowledge creation theory constitutes the mechanism that facilitates the conversion of existing knowledge into new knowledge. She states that social interaction is the driving force behind this model.

Ngulube (2003) reiterates that knowledge can be transferred from tacit to tacit through a process called socialisation. For Ngulube (2003) socialisation happens through face-to-face and social interaction, storytelling, music and dance. Socialisation is a major tool for the transmission of local knowledge in rural areas. In the present study, this method is used because historically, oral transmission was the only hope for the survival and preservation of local knowledge. Lwoga, Ngulube and Stilwell (2010) opine that, the advantage of socialisation is that it enables individuals to share tacit knowledge (such as experiences and technical abilities) with each other. They provide the example of farmers who create new knowledge through individual interaction, group meetings (such as social gatherings and farmers' group meetings) and observation.

The knowledge creation theory, and especially socialisation, mandates the owners or custodians of traditional knowledge to share their experiences, skills, local knowledge and beliefs with people who do not have access to that knowledge, but who may view it to be valuable. Therefore,

socialisation reduces selfishness and promotes knowledge sharing among communities and organisations for the benefit of all. Ngulube (2003) posits 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, tacit indigenous knowledge is also shared and created through cultural roles such as apprenticeships, initiation rites during adolescence, age set systems, and many others (Lwoga, Ngulube & Stilwell, 2010).

While reflecting on knowledge creation theory, the researcher establishes that the wisdom and strategies derived from the theory can help rural communities convert tacit indigenous knowledge to explicit form through a process known as externalisation. Authors such as Ngulube (2003), Lwoga, Ngulube and Stilwell (2010) agree that in order for externalisation to take place, a person holding tacit knowledge should convert it into any secondary form (for example, documentation, images, or rock painting) where another can retrieve it, even in the absence of the person who is representing it. Since the advent of the knowledge creation theory, especially the externalisation element, sharing of skills, feelings, experiences and/or local knowledge by rural communities and users of ICTs has been adopted. In this light, Nonaka and Konno (1998) argue that the results of the externalisation process enable people with different backgrounds to share their former tacit knowledge.

Notably, rural communities have different perceptions about their beliefs, culture, social life, experiences, and feelings. Thus the sharing of their local knowledge and/or experiences with people who have different backgrounds is pivotal. In this way, externalisation minimises lack of trust and promotes understanding among rurally based and urban-based people, particularly users of ICTs. The adoption of externalisation is an effective strategy in the dissemination of the local knowledge of rural people. Zibani (2002) provides the example of how different African tribes, such as the Zulus, have different ways and means of preserving food and preventing it from being spoilt. The Zulu people try to be as economical as possible because of scarcity of resources.

It is worth mentioning at this point that this study is primarily about ICT users/beneficiaries and the management of IK; therefore, the focus is chiefly on them and their interaction with owners or custodians of IK. ICT users/beneficiaries visit indigenous people to observe the methods they use for drying food like pumpkins, meat, or green vegetables, and document it for future generations.

Lwoga, Ngulube and Stilwell (2010) argue that there is a need to encourage rural farmers to join farmer groups in order to cultivate communities of practice; which are an effective mechanism for sharing knowledge. In other words, as tacit knowledge is shared by owners or custodians of IK, ICT tools record or capture that which is being shared for future use. Ngulube and Lwoga (2007) agree that technological tools are used to capture, manage and make IK accessible. The two scholars assert that one of the advantages of using technology to manage IK is that it facilitates the presentation of knowledge in databases and documents.

The third element which is vital in the knowledge creation theory is combination. According to Ngulube (2003) and Nonaka (1997), combination is important in the exchange from explicit knowledge to more explicit knowledge. Ngulube (2003) explains that this occurs when a secondary form of knowledge is used to make another secondary form of knowledge. 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, recorded or captured information is shared among those who require it for their own benefit.

Various ICT tools, such as the internet (including YouTube, Facebook, Twitter, etc.), databases, mobile phones, digital cameras, radio, television, and flash drives, are being adopted in order to share valuable knowledge among people who are interested in its use for their benefit. In that regard, ICT tools are therefore innovations that can work interchangeable with owners or custodians of IK in terms of storing and transmitting the valuable information which is IK. In addition to this, individuals' perceptions of these ICT tools have been found to play a pivotal role in how IK is managed. For instance, Chisenga (1999) and Charyulu (2004) are of the view that ICT tools enable Africa to contribute to global information resources by translating indigenous knowledge into web content. These views are also shared by Le Roux (2003: 1) in his argument that the internet is the most effective tool for communicating and preserving IK.

The researcher also found internalisation to be important to this study as it is part of the knowledge creation activity; it allows recorded and stored knowledge to be learned and internalised for future use. Ngulube (2003) asserts that internalisation occurs when external knowledge from documents, databases and artefacts is used to create new knowledge, which can also be transferred to others,

for a person's use. In other words, internalisation is essential for learning by doing, where shared bodies of knowledge are internalised (Nonaka, 1994).

In addition, internalisation allows any person interested in the use of IK to learn by doing. This means that if users acquire certain knowledge from the owners and/or sources of IK, they are unconsciously drawn to take part in any activity. For instance, local people perform their traditional dances, 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. In other words, tacit knowledge feeds into explicit knowledge, resulting in the creation of new knowledge. It can be deduced from the literature that knowledge management models such as the knowledge creation theory acknowledge that knowledge is a valuable resource and that it needs to be shared.

## **2.8 Summary**

This chapter presented Knowledge Creation (KC) model, which guided the study. It was observed that there are silent issues, which emanated from this study. Firstly, it can be argued that knowledge creation model focuses on business or organisational settings. Secondly, various studies that have used KCM demonstrated the value placed on the use of this theory in research investigations. Thirdly, various studies that have used this theory revealed that it is possible to use Knowledge Management theories, such as knowledge creation, to manage tacit knowledge like indigenous knowledge. Fourthly, the four elements of KCM namely socialisation, externalisation, combination and internalisation have shown that it is possible to manage tacit knowledge like indigenous knowledge. Thus the four elements of knowledge creation are also fundamental to exchanging knowledge, not only within organisations, but also in the affairs of life. Fifthly, it was observed that socialisation and combination are key in the transfer of knowledge in the social context, while externalisation and internalisation processes allow knowledge conversion at the individual level. Sixthly, despite the criticism of this theory, it is still widely applied in recent studies as discussed in previous sections.

The present study intended to measure the application of Knowledge Creation model and ICT in managing IK, in local communities. It adapted ideas from this model in order to provide theoretical guidance for the application of knowledge creation in the management of IK, in local communities. Knowledge creation model uses different labels to show its Knowledge Management process. It

has also demonstrated that knowledge can be managed through the knowledge creation process. Thus, the availability of permitted frameworks concerning IK helps to ensure that IK is generated, shared and protected from misuse. Even though the model is effective in managing knowledge in organisations, its elements showed that managing IK through ICT is also possible.

The next chapter discusses the literature review on indigenous knowledge, which was drawn from the first two objectives of the study.

## CHAPTER THREE: LITERATURE REVIEW

### 3.1 Introduction

The chapter discusses the literature regarding indigenous knowledge and information and communication technologies, in developing countries. The literature review discussed, in relation with the objectives of the study, includes the following subjects: the nature of indigenous knowledge (IK); the types of indigenous knowledge practices; the types of ICT tools for managing indigenous knowledge and problems encountered in the use and availability of ICT tools in the management IK. The chapter also discusses the strategies for improving the use and availability of ICT tools in the management of IK. Finally, the chapter provides a summary of the lessons learned.

It must be mentioned that the significance of a literature review cannot be over emphasised. For example, Neuman (2011) defines a literature review as based on the assumption that knowledge accumulates, and that people learn from and build on what others have done). Hammond and Wellington (2013:99), Hei and David (2006:17) state that an advantage of a literature review is that it gives an overview of what has been written about a particular field or topic. In other words, it reveals what has been said, who said it, and sets out prevailing theories and methodologies of the particular field (Hammond & Wellington, 2013:99). It is presumed, therefore, that the knowledge accumulated helps us to learn and build on what others have done. Neuman (2011) adds that literature reviews vary in scope and depth and all endeavour to fulfil one of the following goals:

- To demonstrate familiarity with a body of knowledge and establish credibility. In other words, it tells the reader that the researcher knows the research in an area and knows the views and findings of other researchers in that area of study;
- To show the path of prior research and how a current project is linked to it. It also outlines the direction of research in a question and shows the development of knowledge;
- To integrate and summarise what is known in an area. It further pulls together and synthesizes different results; and

- To learn from others and stimulate ideas. It outlines what others have found so that the researcher can benefit from the efforts of others.

### **3.2 Nature of indigenous knowledge**

Indigenous Knowledge (IK) encompasses language, systems of classification, resource-use practices, social interactions, as well as ritual and spirituality. Several studies (Akinde 2008, Buthelezi and Hughes 2014, Charyulu 2004, Govender, Mudaly and James 2013, Kaewdang 2004, Obomsawin 2002, Rajasekaran 1993, and Sraku-Lartey 2014) consider indigenous knowledge (IK) to be traditional local existing knowledge within specific and diverse fields of study. Over the years, women and men have shown much interest in indigenous knowledge (IK), in their local communities. Notably, IK is stored in peoples' memories and activities. In the studies conducted by Akinde (2008); Inter-Agency Support Group on Indigenous Peoples' Issues (2014); Kargbo (2005); Hunter (2005); Zaman, Wee and Kulathuramaiyer (2013), it is argued that IK is expressed in the form of stories, songs, folklore, proverbs, dances, myths, cultural values, beliefs, rituals, community laws, local language and taxonomy, agricultural practices, equipment, materials, plant species, and animal breeds to mention but a few. Thus, Adeniyi and Subair (2013) posit that this knowledge comprises culture, religion, mythologies, economy, governance, medicine, and agriculture as well as taboos, poetry, art and crafts. As such, IK is shared and communicated orally and is the transformed cultural heritage of a particular society.

Indigenous knowledge (IK), according to Langill (1999), is the knowledge used by indigenous people to continue living in their local communities. Thus, the term is used in the field of sustainable development to designate the following concept: indigenous technical knowledge, traditional environmental knowledge, rural knowledge, local knowledge and farmers' or pastoralists' knowledge. Several studies (Akullo, Kanzikwera and Barwozeza 2007, Anyira, Onoriode and Nwabueze 2010, and Rajasekaran 1993) acknowledge that indigenous people, including farmers, landless labourers, women, rural artisans, cattle rearers and tribes, are the custodians of indigenous knowledge systems. Rajasekaran (1993) in particular further argues that the custodians of local knowledge are well informed about their own situations, their resources, what works and what does not work, and how one changes, impacts other parts of their system. Kothari (2007) posits that traditional knowledge (TK) (or other co-terminous terms such as indigenous knowledge, and local knowledge) generally refers to the long-standing information,

wisdom, traditions and practices of certain indigenous peoples or local communities. In that regard, Hunter (2005) affirms that IK includes potentially patentable knowledge about traditional medicines, foods, farm practices, architecture and construction, handicrafts, artwork and folk music.

It is further argued that IK encompasses knowledge about people, places, plants, animals, and historical events associated with a particular community. However, Averweg (2010) emphasize that IK includes all forms of local knowledge acquired experiential arts, language, understanding, practices, technologies and beliefs that enable a community to achieve stable livelihoods in its geographical residence. In a recent study by Gupta (2015), it is argued that indigenous knowledge evolves not in the laboratory or any formal educational institution, but in the lap of nature where folk people reside with their perception of “man-nature-Supernature”. It means indigenous people’s collective perception on faith, fear and belief. For Gupta (2015:16), owners/custodians of IK claimed that “magico-religious is seen as an insight of ethno-science”. This means that, there is no way the science of religion can be done away with especially with regards to interconnection between beliefs of non-existence of life.

A study by Langill (1999:4) defines indigenous knowledge as the knowledge built over time among a certain region/group of people in relation to their way of life and culture. The essence is to establish the importance of existence of man and appreciation of nature. This is appreciated from one group of people to another living together for common goals. The existence of this knowledge revolves within and outside the local environment. The people living in certain region/ areas have specifically adapted to the way of life both in norms and value of the system. It is therefore expected that certain requirements become peculiar to the local people in that area (Langill, 1999). The creative nature and experimentation exhibited by this people is continually integrated within and outside influences had from their birth. It can be evident that new innovations evolve on daily basis in order to meet new conditions of life.

In this light, it can be argued that usually, the thought of indigenous knowledge is seen as out-dated, not-new and un-evolving. Buthelezi and Hughes (2014) assert that, indigenous knowledge encompasses the act of way of local people. They believe that the accumulation experiences were

not something that came by easily. As such, getting to know and acquire more knowledge would help them overcome the continuous problems faced from one period of time to another. Another factor believed to have help in this regards, is the relationship with individual living in that environment. The skills and practices of the local people, through collective bargaining is also another view of IK. The indigenous knowledge system (IKS) is the umbrella term used to view the environment where the system of knowledge generation and acquisition operates. The IKS is viewed as the totality of the entire knowledge and skills that is unique to a given culture. Gupta (2011) acknowledged that indigenous knowledge is a sensitive issue if we have to start deliberating on it. The relativity of cultural personality is based on the ethnicity of the elite of the people that live in that environment. This author suggests that, for indigenous knowledge to be sustained, the uniqueness and self-esteem in the people must be respected in the community. Tajudeen (2003:99) argues that the institutionalization of indigenous knowledge would continue to be local; its basis is built from one generation to another. Tajudeen emphasis was based on the development of local knowledge which according to him revolves round certain culture. The culture could be from different or same ethnic group of people living together. The suggestion made by Tajudeen reveals that, to strive and be sustainable in any given ecological environment, indigenous knowledge is a basic requirement. This knowledge helps to solve diverse problems ranging from health, political, socio-economic among others.

Another view by International Institute of Rural Reconstruction (1996) established that, for any given community or environment to develop in adaptation of the norms and value system, indigenous knowledge is very vital. It brings about regeneration of lost history and culture of the people developed over time. Therefore, the level at which people from different geographical region or areas learn and adapt depends largely on the possession of knowledge and skills of the environment they lived in. This has brought many benefits to man that cannot be quantified from the natural point of view. UNESCO (2010) stipulates that, the uniqueness of every culture is seen from the peoples' ways of life. For example, indigenous people show their culture through dressing, interactions among others. It can also be seen that during decision making, most of the knowledge used for deliberations of ideas or issues are diverse, so as to improve on activities carried in the communities. The activities engaged in among owners or custodians of IK are:

- agriculture,
- healthcare, food
- preparation,
- education, and
- natural-resource management.

Several studies (Chisenga 2002:94, IIRR 1996, and Mutula 2008) have argued that IK is based on experience, often tested over centuries of use, adapted to local culture and environment, and dynamic and changing. IIRR (1996) postulates that indigenous knowledge is not confined to tribal groups or the original inhabitants of an area. On the contrary, any community possesses indigenous knowledge - rural and urban, settled and nomadic, original inhabitants and migrants. Other names for indigenous knowledge or closely related concepts are "local knowledge," "indigenous technical knowledge" and "traditional knowledge" (Gupta, 2011:59).

### **3.2.1 Characteristics of Indigenous Knowledge (IK)**

Many authors (Forsyth 2013, Gupta 2015, Langill and Landon 1998, Materer, Valdivia and Gilles, 2002) identify a core characteristic of IK, which is that, it is composed of knowledge from previous generations. These authors acknowledge that the knowledge-set provides structure that explains relationships between particular events in the community. On the other hand, Akinde (2008); Ngara (2007) posit that, the rich complexities of indigenous knowledge are found in the community ceremonies and rituals; including story-telling, proverbs, folktales, recitation, demonstration, sport, epic, poetry, reasoning, riddles, praise, songs, word games, puzzles, tongue-twisters, dance, music, and other education-centered activities. In a study by Ilo (2012), it is argued that indigenous knowledge emanates from a body of knowledge; which has been accumulated from individuals who have lived in a community over a period of time. In that regard, Ilo (2012) further maintains that ancestors orally hand over the peculiar information to younger generations. In other words, the ancestors play a pivotal role in imparting indigenous knowledge skills to the younger generation for its (knowledge sets) survival in local communities.

In a study by Materer, Valdivia and Gilles (2002) a knowledge set is influenced by the previous' generations observations and experiments; and provides an inherent connection to one's

surroundings and environment. It is argued that the knowledge is characteristic of the local climate, flora and fauna, and cultural traits. Thus, an indigenous knowledge system (IKS) is not transferable but provides relationships that connect people directly to their environments and the changes that occur within it. Indigenous Knowledge Systems is defined by Materer, Valdivia and Gilles (2002:6-7) as a society's connection to their surroundings and environment. In that regard, it can be interpreted to be a person's connection to their culture and society. Notably, IK is learned and identified by communities and people within a cultural context. In a study by Dixit and Goyal (2011), indigenous knowledge is said to encompass conviction systems that play an essential role in people's livelihood, preserving their wellbeing, and caring and refilling the environment. It is also notable that the knowledge base uses a specific language, sayings, and belief processes. Thus, it allows for cultural interaction and acceptance that is not identifiable in other situations or cultural contexts. Not only does the knowledge base identify the culture from others but it also provides for social interaction and acceptance. For example, a number of authors including Adeniyi and Subair (2013), Akullo, Kanzikwera and Barwogeza (2007), Chisenga (2002), Dixit and Goyal (2011), Gupta (2015), International Institute of Rural Reconstruction (IIRR) (1996), Langill (1999), Materer, Valdivia and Gilles (2002), Ogbemor (2011), Sraku-Lartey (2014), Zaman, Wee and Kulathuramaiyer (2013) have identified some of the characteristics of IK as:

- a) Common knowledge is held by most people in a particular community.
- b) Shared knowledge is held by many but not all community members,
- c) Specialized knowledge is held by a few people who might have had special training or an apprenticeship, for example,
- d) Based on experience.
- e) Stored in people's memories and activities.
- f) Often tested over centuries of use.
- g) Adapted to local culture and environment.
- h) Dynamic and changing.
- i) Expressed in local languages.
- j) It is oral and rural in nature.

- k) Is tacit knowledge, and therefore not easily codifiable.
- l) It is the knowledge and skills developed outside of formal education.
- m) Elders are considered as the “information storage and processing unit” of a society.
- n) A way of life which includes oral traditions, listening to stories, dancing at celebrations, reciting prayers etc.

### **3.3 Types of Indigenous Knowledge**

Broadly speaking, it is estimated that a large portion (80%) of local or indigenous knowledge is world based (Nyumba, 2006). This implies that across the globe, indigenous knowledge is spoken at one point or the other. This knowledge has helped to meet diverse needs, ranging from healthcare service delivery, agricultural production, construction of houses and roads among others. It was established that the cultivation and production of food supply today in most developed and developing world are indigenous in nature. Fifty (50) percent of the knowledge is used by different African countries. The knowledge is more on the treatment of several diseases to include: malaria, diabetes, cancer and HIV/AIDS (Nyumba, 2006). According to Charyulu (2004), Dixit and Goyal (2011), Eyong (2007), IIRR (1996), Ilo (2012), Makinde and Shorunke (2013), Kaniki and Mphahlele (2002), and Kibuka-Sebitosi (2008), there are several sub forms in which indigenous knowledge sources are drawn from. A good example of such is the sub forms of IK, from various communities:

#### **3.3.1 Beliefs**

Several studies (Charyulu 2004, IIRR 1996, Ilo 2012, Langill and Landon 1998, Kaniki and Mphahlele 2002, and Sobiecki 2014) established that traditional knowledge of indigenous people is normally demonstrated in their beliefs. This is best exemplified by adoring ancestors; and the conviction that the elders who passed on in life stand between the living and God. According to studies by Ilo (2012), Kaniki and Mphahlele (2002), indigenous people strongly believe that ancestors can convene a message with an individual, among family members. Therefore, as part of a bridal ritual, for example, an animal is slaughtered in the kraal, rather than at an abattoir. It is argued that through this procedure, ancestors are besought to pave the way for a well matrimony and partnership. Ilo (2012) argues that ancestral worship is the core of Nigerian indigenous religious belief. Thus, various communities and their beliefs are reflected in the worship of

ancestral spirits. In that regard, IIRR (1996) argues that beliefs play a fundamental role in a people's livelihood and in maintaining their health and environment. In Lesotho, for example, the custodians of indigenous knowledge are the elderly people who live according to their culture and their own traditional practices (Magara, 2002:43).

In a recent study by Dixit and Goyal (2011), it is argued that, African communities value elders because they maintain the old traditions, customs, and kingship systems that are imperative to the group's survival. It is believed that African honor elders for their extensive knowledge of the land and the usefulness of the local resource. It is further maintained that, elders play an important role in traditional medicine in that they are most often act as healers, diviners and herbalists. Additionally, some African communities still believe in traditional virginity testing. For example, young girls are tested for their virginity and after successfully undergoing the virginity test *umthoba* is applied on their body to indicate to the rest of the community that they were still virgins. The yellow colour of *umthoba* signified innocence and this brought pride to the family (Matike, Ekosse & Ngole, 2010).

It must be mentioned that other beliefs in African communities are based on nature itself. In other words, African communities rely, to a significant extent, on nature to communicate certain occurrences with regards weather and rain. For example, the UNEP (2008), states that some African communities believe that floods and drought are acts of God while raping elderly women or children brings floods. Furthermore, it is believed that a "red" moon announces the coming of floods and drought while solar eclipse causes drought and that floods come when the vlera bird cries etc.

According to UNEP (2008), it was established that some community residents in South Africa were of the view that, the forecast of rain is tailed towards pleasing Queen *Mujaji (the gods of rain)*. The traditional healers and leaders believed that, this is a way of offering prayers whenever they want to seek the face of their gods. UNEP (2008) further stressed that, in other African communities, like Swazi communities, the use of variety of methods also tends to predict the weather. The mentioned indicators in UNEP are based on environmental cues and the behaviour of animals. The highlight made thus far is a signal of the height that the nests of the Emahlokohloko

bird (*Ploceus* spp.). This help to predict whether flood would be or not. The flood, when it comes, is believed that, the nest of the emahlokohloko is subject to sensitivity and this sensitivity shows that the trees next to the river could be flooded. But when the flood does not come, the nest is usually lower down. The argument, made thus far, showcases the cry of the phezukwemkhono (*Cuculus solitarius*) bird. The bird shows signal during the start of the period or season. This time of the year is between the month of August and November. At this point in time, farmers must have started planning and preparing to cultivate the seasoned crops, especially when the cry of the bird starts. The author of this study deduced that, when such continuous cry occurs, it is also believed that certain pattern will come which would lead to more sign of imminent rainfall. UNEP (2008) emphasis shows an abundance of swallows of *Psalidoprocne pristoptera*. This is usually in the month of September and October when the sky is ready to start showing sign of imminent rain. The expression by UNEP shows that rural communities should have close contact with this type of nature. It would help them to plan and predict future events, especially during rainy and thunderstorm season. When this belief is spread across African communities, the restlessness and noisy behaviour seen on pigs, peacocks and ducks can help to salvage the situation as it is an indication of imminent heavy storm.

### **3.3.1.1 Birth**

When the mother of a child is expecting a baby, she is protected from all evil spirits that may be harmful to her and the child. The cleansing exercise is done frequently to ensure that all goes well with the child. It is widely recognized (e.g. Abrahams, Jewkes and Myo 2002, and Naidu, 2013) that women who are pregnant should be protected from witchcraft and demonic forces. Naidu (2013), in particular, posits that women who are pregnant are expected to drink isihlambezo. The author states that isihlambezo is one example of a traditional medicinal drink commonly taken by women during pregnancy to stave off fears of ill health around pregnancy.

Studies by Magara (2002:44) and Zibani (2002) point out that in some African communities, a child is born within the realm of women where the child will be confined for a period of three months before the man can see it. Additionally, no man is allowed to enter such a house until the period of confinement is completed. Magara (2002) in particular reiterates that in African communities, a child is given a name only when it has emerged from the mother's "womb" as it is

only then that it is considered a human. Should the child die during the confinement period, it is put in a clay pot and buried either in the house or in an ash heap nearby (Magara, 2002:44). In a study by Matike, Ekosse and Ngole (2010), it is argued that before the advent of modern medical practices, women were allowed to give birth in their homes with the assistance of elderly women who accumulated vast experience in traditional midwifery within the village. The three authors affirm that at the birth of a baby, its whole body was smeared with clay (*imbola*), even before the cutting of the umbilical cord. They further highlight that an effort to cleanse the skin and to keep the baby warm as well as to ensure that the body was properly cleansed and *imbola* would be only washed off after three days of the birth of the child. When a child is born in the Basotho and Zulus communities, the first thing is to inform its grandparents and clan so that things can be done according to traditional practices related to a particular clan (Magara, 2002; Zibani, 2002). For example, an animal is killed as a welcoming sacrifice for the new-born child. The animal's fat is used to make an ointment for the baby, who is believed to have been protected in the traditional manner since it was conceived.

### **3.3.1.2 Death**

Some African communities perform certain rituals in the event of death. For instance, among the Zulu people and Basotho, children are informed in their sleep when someone has passed away, to prevent them from being frightened. When the Basotho and Zulu people bury their dead ones they give them some seeds and their tools, believing that dead people go to some places where they will continue with life. They slaughter an animal, which is meant to accompany the one who passed on. Shedding of blood among Africans, especially the Basotho's belief is something they part ways with (Magara, 2002). On the hand, other African communities kill and spill the blood of animals on the ground during burials so that their deceased members will be well received by their ancestors (Ilo, 2012; Magara, 2002:44; Zibani, 2002).

### **3.3.1.3 Marriage**

In a study by Matike, Ekosse and Ngole, (2010), it is revealed that in Southern Africa, particularly in rural communities before a bride is taken to her husband's house, she is smeared from head to toe with clay (*imbola*) and kept in seclusion for seven days. The aim is to cleanse her skin and lighten it, before she is taken to her husband's home. Magara (2002:44) further affirms that when

a couple marries, the tradition has to be followed. Zibani (2002) too, explains that among the Zulu people the uncle is the most important person in this regard. Furthermore, the bride's uncle has to pay commensurate dowry, and the bridegroom's uncle buys most of the things, for which the bride has to take to her home. These include blankets, mats and brooms. Conclusively, Magara (2002:44) asserts that cattle are the first items to be bought when paying dowry (lobola) among the African community. In that regard, paying dowry symbolizes that one has chosen a woman for himself as his wife forever.

### **3.3.2 Indigenous Knowledge (IK) in Medicine/Health**

It is imperative to know that, one of the main areas in which indigenous knowledge is very rich in the African communities is that of traditional medicine. The reason for indigenous knowledge being strong and rich in this area is because African communities rely heavily on traditional medicine. Several studies (e.g. Coleman, 2013; Eyong, 2007; National Reference Centre for African Traditional Medicine (NRCATM), 2010) affirmed that currently, over “60%-80% of the world's population depends on indigenous healthcare based on medicinal plants”. According to Sraku-Latey (2014), the use of traditional medicine therapies, in meeting health needs globally, is receiving significant attention on international platform. Several studies (Charyulu, 2004; Ilo, 2012; Kaniki and Mphahlele, 2002:18; Magara, 2002:40; Nakapipi, Shalyefu, and Mushaandjan, 2011) acknowledge that medicinal plants fetched in the wild are vital sources of indigenous people. The eight authors are of the view that some common plants are applied in the body for numerous wellbeing conditions. For example, the African potato (leraka) is valuable root for edifying the immune system and regulating high blood pressure in the body (Magara, 2002:40). On the other hand, aloe (sekgokgopha) is applied for cleaning the body from contaminants and free radicals (Magara, 2002:40). Kaniki and Mphahlele (2002) and National Reference Centre for African Traditional Medicine (NRCATM) (2010) further note that traditional plants are used as vital medicinal treatment, and are available to indigenous people. It is also argued that herbs are also used as precautionary medicine. For example, in many African communities the bark of a specific tree is harvested and chewed for cleansing teeth and for protecting it against dental problems. On the other hand, the Dwarf Sage is traditionally used as a medicinal healing plant for external use only (Nakapipi, Shalyefu & Mushaandjan, 2011). Furthermore, the National Reference Centre for African Traditional Medicine (NRCATM) (2010) confirms that humans rely heavily on plants to

treat all manner of illnesses, from minor problems such as coughs and colds to life-threatening diseases such as tuberculosis and malaria. In African communities, the decision taken by indigenous people when there is a sick patient is to consult a witchdoctor, shaman, soothsayer or traditional healer for diagnosis and cure. Thus, treatment for cancer, obesity, drug addiction, diabetes and other ailments have benefited directly and indirectly from indigenous healers through plants such as the iboga as it is known in Cameroon and Gabon (Eyong, 2007). Indigenous peoples in Central Africa have extensive knowledge of plants and animals that have a multi-purpose use at the local, national and international levels (Eyong, 2007). African communities are believed to be very smart and cautious when dealing with symptoms of diseases because it is treated culturally. For example, Makinde and Shorunke (2013) argue that human being is both a somatic and spiritual entity, and that disease can be due to supernatural causes arising from the anger of ancestral or evil spirits, the result of witchcraft or the entry of an object into the body. The two authors state that not only the symptoms of the disease that are taken into account, but also psychological and sociological factors.

In a study by Magara (2002:40), it is explained that for a Mosotho or the Basotho to take a patient to the health center is something that is done only after some traditional ways of helping the patient have failed. It is argued that the Basotho first observe the patient's behavior and then come up with a suitable medication for him or her. For instance, in the case of minor illnesses like headaches, flus and stomach-ache, they get something from outside the house or right there in the village to prepare for the patient. They boil it after which the patient drinks it. For a headache, the bark of a peach tree is peeled and burned, and then the patient is made to inhale the smoke from this peel (Magara, 2002:40). Similarly, Gumede (1990:38) argues that unlike the Western people who knew the germ theories such as Bacteriology, Parasitology and Pathology, the Zulu people had a different understanding of the causes and the healing of diseases. For instance, instead of understanding that the diseases were caused by the breach of laws of nature that could lead to the spread of germs, bacteria, viruses, parasites and many more, they believed that diseases are caused by witches and wizards who wished to do bodily harm to the family. Then they would invite a traditional healer to cleanse the family from any harm. It can then be concluded that African communities have very rich traditional medicinal plants particular as their source of medicine (Anani et al, 2000; Eyong 2007; Hutchings et al., 1996; Van Wyk (2011).

Though the study was not meant to measure and classify traditional plants used in African communities, however, mentioning few examples of plants was of paramount importance.

**Table 3.1: Commonly used traditional plants and their indigenous use(s) in African communities**

<b>Common Name (local name)</b>	<b>Part of plant used</b>	<b>Medicinal uses</b>
Pterocarpus soyauxi (padouk, or camwood)	Ground stem	Child birth, marriages
Milicia excelsa (Iroko)	Most sacred tree species	Sacrifices to appease gods
Nauclea diderrichii (bilinga)	Bark, root, and wood or trunk	Fevers, stomach problem
Canarium schweinfurthii (aiele)	Fruits, popular in local market	Resin is burnt as incense start fires or as “bush candle”
Lophira alata (azobé or ironwood)	Trunk	Medicine for back pain, toothache
Costus afer	Stem and juice	Coughs, sore throats, eye infection
Emilia coccinea	Entire plant	Anti-poison, jaundice, snakebite
Eremomastax speciosa	Leaves	Purify and strengthen blood
Aframomum spp	Leaves	Spice for food, coughs, magnifiers in medicinal mixtures
Piper guineensis	Leaves	Spice for food, treat hangovers, stomach problems, build strength
(Garcinia kola) Bitter Kola	Seeds	Digestive agent, poison antidote, protects microsomal enzymes against phalloidin
Bush Pepper	Seeds	Mix with others to treat cough, chest pain spleen for children
Araceae (Ihlukwe)	Leaves and rhizomes	Leaves used for wounds, sores and boils. Ground leaves applied to parts affected
Bombacaceae (Isimuku)	Bark	Asthma and skin disorders
Celastraceae (Umhlawazizi, umhlwazi)	Leaves	Coughs, asthma and other respiratory conditions, relief sleeplessness
Geraniaceae	Roots	Gonorrhoea, diarrhoea, dysentery, colds and lung infections
Lamiaceae	Leaves	Colds, influenza, liver problems and piles
Velloziaceae (Isiphemba, isiqumama)	Root, whole plant and bark	Dried leaves are smoked to stop nose bleeding
Zingiberaceae (Isiphepheto, indungulo)	Rhizomes	Asthma and dysmenorrhea

(Source Anani et al, 2000; Eyong, 2007; Hutchings, et al., 1996; Van Wyk , 2011)

### **3.3.3 Human Resources and Indigenous Knowledge (IK)**

Kinship groups, clan elders, or groups of elders in African communities have demonstrated some characteristics required of them to act as leaders in the communities. This was done to determine who should play a certain role in decision making in the community. The decisions made in most cases depend on who is in power as desired by the community development leadership group. Traditional communities' leaders have also seized the opportunity to exercise their right as leaders in the communities. This they do through encouragement by working together as team members. The guidance given by the chief and village headman has proven to be very impressive and supportive in the development of the community. In that light, as head of community, they are expected to exhibit their role through supportive way of providing resources to the community members who are needy. It is believed that by so doing, they are serving their own people and doing community development work. This has explained how committed and willing to serve the homeless people in the traditional societies. It is seen that during those time, men and women work together in building their own houses, although some much stronger men and women have exhibited the position of head and chiefs in their different capacities (Kaniki & Mphahlele, 2002:19). Indigenous land owners have used their land for farming systems and this has encouraged many in rural communities. This pattern of land cultivation is a form of labour sharing among farmers in most African communities. The use of IK has increase drastically especially in efficiency of local stoves. This has replaced the use indigenous institutions credited through existing village loan groups (United Nations Educational Scientific and Cultural Organization, 2003).

In a study by Magara (2002:42) and Zibani (2002), for generations cattle ownership has been an important aspect of the Basotho and Zulu ethnic identity and dignity. The two authors share the same sentiments that cattle ownership, among these two ethnic groups, is primarily regarded as a sign of wealth and status and that their potential as a source of food is only secondary. Magara (2002) further highlights that, the Basotho people are also weavers and are in the same league as organizations, like the Hatooa mose mosali, which is an organization where women make handcrafts. They make beautiful tapestries of wool and mohair, using only their hands, the wool and the wood. In so doing, the Basotho manage to minimize poverty as well as generate income from selling these woven items. In a recent study Ilo (2012), identifies some of the art, craft and practices emanating from indigenous communities like bead making,

pottery, knitting, basket making, molding, jewelry. It is argued that others include brass and iron-work, crafts, jewellery, leather textiles, pottery and ceramics.

It must be understood that when indigenous knowledge is practiced it becomes tangible and the tangibility of indigenous knowledge is known as traditional property. According to Kalinoe (2005), the term ‘tangible traditional property’ refers to works of art such as carvings, totem poles, pottery, paintings, drawings, designs, patterns, traditional instruments such as the Sepik flutes, garamuts (silt gongs) and kundus (hourglass drums), traditional costumes and finery, and traditional architectural designs such as the Sepik Haus Tambaran. A study by Nettleton, (2010) argues that different indigenous communities in South Africa almost serve the same purpose, do same things and act collectively. For example, indigenous craft, such as Zulu baskets and weave, have been developed in a number of collective endeavors, in order to support the rural poor. Examples of indigenous resources produced by humans are:

### **3.3.3.1 Handcrafts**

Handicrafts according to (Nettleton, 2010; Sirika, 2008) are made from wool, mohair, clay beads, grass and even animal skins. Handicraft design is the work of artisan. It is usually sustained when carved wooden work and pottery making takes place. From inception of life and man, artisan has always demonstrated different talents of woodcarving, tannery and basketry which are owned and sustained the artisan for a living (Nettleton, 2010; Sirika, 2008). The Basotho and the Zulu people have shown different talents of styles. This they make into hats (mosetla or molianyeoe) among others. The Basotho hat is called mokorotlo as well as brooms, mats and so on. This hat has grass and twine, using different colourings to decorate them. The Zulu hats are traditionally worn by chiefs. However, in present day, they are generally worn by ordinary people. Other people, mostly tourists, use them for decoration, while others use them as lampshades (Magara, 2002:42; Zibani, 2002). Additionally, Zulu women use their traditional knowledge and skills to create commercially viable products like beads and baskets; which they sell to enhance their lives economically and socially. Baskets are made in a wide range of sizes as vessels for various foodstuffs from grain and vegetables to liquids such as beer.

Today, the baskets are doing remarkably well commercially and at flea markets all over South Africa and make a pivotal contribution towards the economy (Nettleton, 2010). On the other hand, the Zulu people make a large variety of baskets ranging from small beer pot covers

(*imbenge*), among many others, to baskets that are big enough for an adult person to fit inside. Apart from the Zulu indigenous people, there are other indigenous groups in South Africa; which make and use baskets traditionally. For instance the Pedi people normally make woven grain storage (*seshego*) baskets, while the Vha-Venda and Tsonga produce baskets with lids for serving or keeping food, (Nettleton, 2010).

### **3.3.3.2 Clay Pots**

The Zulu women have earned themselves the reputation of being masters of pottery craft. Once the clay soil, as raw material, has been collected from the river banks or quarries, it is prepared by softening and kneading. The pliable lump is flattened into a disc like bottom of the pot; which is placed on the small grass wreath or any flat object. The coiling techniques is then used, coils of increasing lengths are added on the disc to build up the walls of the clay pot (Zibani, 2002). Similarly, Magara (2002: 43) argues that the Basotho, normally the women, make clay pots and candles. Both potting skills as well as cooking is expected of a prospective bride. It is further asserted that the pots are used for cooking (*pitsa*) and drawing water (*lefisoana* or *leritsoana*). Notably, some types of clay pots (*nkho*) are used for keeping things like sour milk (*mafi*) and *motoho* (a drink made of fermented sorghum flour). *Lenyetana* is a broken piece of clay pot (Magara, 2002:43). A study by Sirika (2008), laments that women are directly and totally dominate pottery and/or clay pot maker. This is an indication that the indigenous knowledge possessed by people living in rural areas can be regenerated into the production of goods and services. The goods and services identified by them as at that time and which is also obtainable now include the followings; agriculture, clay molding, fishing, mining, transporting just to mention but a few. These have helped in sustainability of the family of the rural dwellers. The marketability of the products of mineral, clay molding, fishes among others produced depends on the awareness of the people in the communities where these products can be sold. It may be argued that women have taken a center stage and shining in craft-work especially in pottery making.

### **3.3.3.3 Wooden Spoons**

A study by Zibani (2002), argues that the Zulu people have their own way of making spoons from indigenous trees. It is noted that the Zulu people know a special tree that is tough enough for making spoons and other items. Furthermore, to make this type of item one has to possess certain skills since the wood can be either too hard to carve or too soft. The elders teach the young men how to make *mpshane* (spoons) (Zibani, 2002).

### **3.3.3.4 Food Preservation**

It must be mentioned that indigenous knowledge represents valuable source of local solutions to the food preservation without the aid of modern technology. Indigenous knowledge in food preservation, as reported in recent studies by Ibnouf, (2012); Kamwendo and Kamwendo, (2014), includes local knowledge, skills known, and practiced in food processing, preservation, and storage activities which rural women derived from their direct interaction with the local environment. For example, Africans, especially the Zulus have different ways and means of preserving food and preventing it from being spoilt, for example, this is done by drying or pre-boiling the food. Methods for drying things like pumpkins, meat, green vegetables are applied (Zibani, 2002). In a similar vein, Magara (2002:43), asserts that the Basotho try to be economical as possible because of their scarce resources. For instance, Lipabi is flour, made out of roasted sorghum or maize, and is eaten as it is or sometimes mixed with little water. It is further asserted that Lipabi is normally taken along as provisions when a Masotho has travelled a long distance (Magara, 2002:43. According to Ibnouf (2012), during seasonal food gaps, indigenous people are entirely dependent on the preserved foods as the only food source until the onset of harvest later in the year. Ibnouf (2012) further highlights that rural women possess an enormous amount of indigenous knowledge about food processing, preserving and other important survival skills. Furthermore, sun drying or dehydration is one of the many ways in which African communities use the indigenous methods of food processing and preservation (Ibnouf, 2012).

African communities, especially women, immerse fresh foods like vegetables in salted boiling water for a few minutes and then dry them under the sun for about three days. These are then stored in a safe, dry place. Edible insects such as locusts and caterpillars are also boiled, salted and sundried (Ibnouf, 2012; Kamwendo & Kamwendo, 2014). Food crops like sorghum, pearl millet, sweet potatoes, cassava, beans and groundnuts are usually kept drying under the sun

before storage in traditional underground store or pits (locally called *matmorahcan*). Other foods like meats and tomatoes are first salted to avoid the danger of decaying during the drying process, as is the case with and afterwards stored in dry place at room temperature. Dried-tomatoes are then soaked in warm water to be turned into tomatoes sauce. Meat from slain animal sheep, goats, cow, and camel is first cut in long pieces, salted, smeared with powdered coriander, and dried for about a week to give a product called “shermout”, (Ibnouf, 2012; Kamwendo & Kamwendo, 2014). The two authors conclude that rural women also have a special skill and had ingenuity of brewing and processing beer, mahewu and milk. It is argued that this indigenous knowledge was based on the scientific knowledge of fermentation.

### **3.3.3.5 Transfer of Indigenous Knowledge Technology**

A study, by Kaniki and Mphahlele (2002), highlights that, the environment, in which human beings stay, has a lot of influence on their existence. This would foster the knowledge acquisition and disseminated to meet the societal goals. In the traditional rural setting, indigenous people have demonstrated the use of different designs in decorating their houses and environment. They use cow dung to decorate the walls and floors of their houses. The seal of the lids of baking pots is another thing used to keep an even temperature in the pot when baking bread. It is on this note, that Kaniki and Mphahlele (2002) suggest that the production of charcoal is very important. It helps to produce energy needed in times of immemorial. Therefore for indigenous people to enjoy the charcoal produced, specific materials that would make it to last long should be used. Materials such as fresh logs of specific trees and dry wood are used. Notably, rural people collect the fresh logs and cover them with earth materials. This process takes two days to complete. This would allow the combustion to occur during production of charcoal rather than reduce the logs to ashes (Kaniki & Mphahlele, 2002:19).

### **3.3.4 Indigenous Knowledge (IK) in Education**

It is important to understand that indigenous knowledge is tacit in nature and therefore, rural people communicate through spoken word and signs to transfer the knowledge from one generation to another. In a study by the World Bank (1998), IK is defined as predominantly tacit or embedded in practices and experiences, it is most commonly exchanged through personal communication and demonstration: from master to apprentice, from parents to children, from neighbor to neighbor, from priest to parish. Several studies (IIRR, 1996; Kaniki and Mphahlele, 2002) have lamented that the traditional methods of education were (and continue to be) practiced through traditional initiation schools. For example, young community

members learn about tradition itself; which entails learning about various beliefs and about having respect for oneself and others, particularly for elders. A study by Ngara (2008), points out that any adult who happened to be free could enjoy teaching children traditional games including counting, puzzles, riddles and reciting children's poems (to the new moon, to the rain, to the sun, etc.). The author clarifies that among African people, grandparents are not relegated into seclusion by virtue of old age but they remained with the family, imparting their acquired wisdom and philosophical ideas of the community. That means children would congregate at the home of a well-known story-teller whose services they reciprocated by bringing firewood. On the other hand, Ilo (2012) argues that indigenous communities believe so much in imparting what is worth-while to the younger generation through imitation. It means aspect of culture is passed on to younger generations. They learn through observation and imitation, they learn respect for elders, weather forecasting, animal husbandry, wrestling, and building techniques. It is believed that girls imbibe the culture of personal hygiene, child-care, dancing steps, cooking and home care from their mothers. On the other hand, boys learn from their fathers and grandfathers how to curve and rear livestock etc. (Ilo, 2012). It must be mentioned that all these constitute education which is essentially outside formal school environment.

On the other hand, Ngara (2008) gives an example of certain information, which is imparted through taboos, initiation rites and apprenticeships. Taboos also originated from people's tacit knowledge. Information was also transmitted through song and poems. It is argued that through noticing the interactive and regular movement of the prey and the telltale signs of weather changes, the adolescence learn about the connectivity of the setting and humankind (Ngara, 2008). Kaniki and Mphahlele (2002) argue that a body of knowledge is constantly accumulating and conserved for use by successive generations. For instance, young teenage girls are taught never to enter the kraal, *lesaka*, lest they become barren. One of the main reasons for "closing off" females from the kraal is because it is often heavily strengthened to protect the animals mainly against theft (Kaniki & Mphahlele, 2002:19). According to Eyong (2007), today, indigenous societies in Africa rely on people with specialized powers to read natural signs and predict an event and subsequently warn the villagers. The author concludes by saying that, when elderly men hear dogs bucking too much, fowls crowing at mid-day, ants and flies moving in an unusual way, the signal being given is that a nearby river would overflow its banks and destroy crops. In that regard, domestic and wild animals notify people on the danger ahead.

### 3.3.4.1 Communication of Indigenous Knowledge

A study by Mundy and Compton (1991), define indigenous communication as an important aspect of culture in which culture is preserved, handed down and adapted. In other words, indigenous communication includes the transmission of entertainment, announcement of news, persuasion, announcements and social exchanges of every type. However, Meyer (2003), argues that IK is heavily reliant on the spoken word for transferring information from person to person, or from one generation to the next. It is thus argued that close contact between the speaker and the listener is required. In the study by IIRR (1996), cultural festivals were, and continue to be, organised in order to entertain, inform and educate through dance, song and drama.

It is further asserted that, in particular families, the elders would tell stories after supper and recite proverbs based on the customs of a particular ethnic group (IIRR, 1996). This view is corroborated by Zibani (2002), in his assertion that the Zulu people have different ways of passing on information to passers-by. It is further argued that when passing a village, one frequently sees some sort of flag flying from a tall pole. This flag has a social meaning attached for the community in question and it means that it is a place where something is being sold. For instance, a green flag is an indication that (vegetables, mostly cabbage, lettuce, spinach etc.) are being sold there; yellow indicates homemade beer called *hopose*, *ijuba* etc.; a red flag means meat. It is further argued that when an animal such as cow, goat, sheep, horse etc. has been slaughtered in the Basotho community, the owner simply puts up a red flag to let people know that meat is available (Meyer, 2003). In other words, this is the way in which African community informs and invites others to join the ceremony.

On the other hand, a study by Ilo (2012), points out that information relating life in the community such as farming, festivals, customs, taboos, etc. is often conveyed during well-organised feasts and communal festivals. In other words, it is taken as an important forum to pass relevant information across the community. Ilo (2012) highlights that poems, dram, music and songs are used in education and entertainment and they become means of passing information on the methods of cooking, better ways of living, dressing, peace keeping and all other information required for proper co-existence in the society. In that regard, communication is used by local communities; as a method for correcting some ills inherent in the society. A study by Meyer (2003) identifies three typical characteristics of communication (such as face-

to-face interaction, metaphorical speech and storytelling, dances, acting and role-play) in the oral tradition. These characteristics of communication are discussed as follows:

#### **3.3.4.2 Face-to-Face Interaction**

In an oral tradition, information exchange takes place between individuals who are in a face-to-face situation. The advantage of oral communication is that it allows for interaction. Possible confusion or misunderstanding can easily be cleared up with questions and answers. Body language and demonstrations can contribute to the meaning in a particular situation. The speaker normally varies his or her speech so that it is appropriate to a particular situation or audience (Meyer, 2003).

#### **3.3.4.3 Metaphorical Speech**

The use of parables to relate information with existing perceptions is common practice in traditional cultures, not only as an aid to memorization, but also as an aid to the exchange of information. For example, the weed that could ruin an entire crop is seen as the lion that kills the goats in the kraal. Additionally, in oral tradition, metaphorical speech and oblique references are often used to convey messages for a specific purpose. For example, when raising issues of dispute, the message is conveyed in such a manner that does not offend the person for whom it is intended (Meyer, 2003).

#### **3.3.4.4 Storytelling, Dances, Acting and Role-play**

In the oral tradition, storytelling and various other forms of verbal and ritual expressions are used to transfer information regarding norms, values and traditions. Dances, acting and role-play are often used to convey messages to change attitudes. Awareness of these methods of communication in the oral tradition may serve as an opportunity for outsiders to obtain information from the IKS (Isike, 2009; Meyer, 2003; Nompula, 2011; Shange, 2014). In a study by Isike (2009), it is argued that in many African cultures, storytelling is used to educate children about their history and customs. The author further states that elderly women are often responsible for passing down cultural values to their progeny, and to future generations through metaphoric and artistic expressions. A study by Linde (1993) concurs with the aforementioned views that African women perform these traditional educational methods during ceremonies and rituals in the form of dances, folktales, proverbs, poetry and songs. In a nutshell, children are taught these skills from a young age to enhance communication between males, females

and the community. In a recent study by Shange (2014), the ability to tell life stories and metaphor-rich narrative, gives plausible accounts of how the narrator understands his/her life, and how they have become the person they are. A good example on how to hand down accumulated experience from generation is explained by Mundy and Compton (1991:1) as follows:

*An elder in a Pacific island fishing village stands in a beached outrigger canoe. A circle of younger villagers sits in the sand around the boat. The old man peers beneath the canoe as if searching for fish, gestures, hauls on an imaginary net. Too old to go fishing himself now, he is explaining fishing techniques to the less experienced youths. The old man is passing on to the younger generation a lifetime of experience and knowledge. Knowledge of fish behavior, subtle changes in the sea and the sky, ways of handling nets and boats. Knowledge that means the difference between boats coming home full of fish and boats returning empty. Knowledge that represents the villagers' very survival.*

In conclusion, Ilo (2012), indicates that in African communities indigenous music and dance is characterized by powerful rhythms. Their rhythm and music emanates from indigenous instruments; which include the metal gong, drum, *ichaka* and the music pot. It is argued that music is performed during public functions, coronations, traditional marriage, funerals, naming festivals etc. (Ilo, 2012).

### **3.3.5 Indigenous Knowledge (IK) in Farming/Agriculture**

The understanding of local knowledge in farming or agriculture is seen from the perspective of the owners or custodians of IK in rural areas. This they have acquired over time, from one generation to another. Since IK is very fundamental in livelihood. Its application becomes relevant in farming practices and agriculture, especially in African communities. Thus, communities should be engage in the act of the indigenous knowledge used in farming. The farming could be in the forms of bedrock used in the collective wisdom. This wisdom can be generated, transferred, stored and disseminated from one individual to another (Madebwe, et al., (2005). In a recent study by (Buthelezi and Hughes, 2014), most rural communities, the world over, are largely dependent on agriculture. David and Ploeger (2014) define indigenous knowledge in the perspective of agriculture as the traditional knowledge product of the adaptation of farming practices to the local environment, creating unique indigenous farming

practices and food culture. The same notion is shared by Abioye, Zaid and Egberongbe, (2011); Buthelezi and Hughes, (2014) that rural farmers adopt a wide range of indigenous agricultural practices based on generations of experience, informal experiments and intimate understanding of their environments. According to Ilo (2012), with indigenous knowledge, local communities are able to decide the most appropriate time to clear the bush for farming and able to determine best periods for land clearing and other preparations that are required before planting crops.

A study by Mapara (2009) argues that farmers have cultivated agricultural farm land over time due to broad knowledge of indigenous practices that they possess. This they have done with their family, which serves as sources of livelihood. These experiences of farm land cultivation can be experimented in several ways. It can be noted that the potential of such exhibition dwell more on the power of know-how of agricultural practices. This can be proven in IK of indigenous people. The performance of this knowledge does not come by in one day, rather, from generation to generations as being recognized by elders and chief in the traditional rural setting (Abioye, Zaid & Egberongbe, 2011; Ngulube & Lwoga, 2009; Ocholla & Onyancha, 2005). The classification of local soil that yields crops today is the manifestation of the work of owners or custodians of IK in the African communities. The use of herbal medicines by traditional healers has also proven active when tested since they have used it in the healing of several diseases in the African communities. Indigenous knowledge people who have practiced intercropping did so due to the various crop rotations they were introduced to, thereby having varieties of plants in their farm land. The cultivation of some of these crops cut across mealie (maize or corn), mabele and beans. The intercropped rotation led to the retaining of soil nutrients for future crop productions. The essence of allowing the farm land to lie for a long time is to enable the farm land to have adequate nutrients. This would improve crop production whenever the land is cultivated. This when done, make the farm land to be covered with many ashes which serves as protection from erosion (Eyong, 2007; Kaniki & Mphahlele 2002:20; Ogen 2006). A study by Dlamini (2007), suggests that several crop rotation could exist in any indigenous farm land. The knowledge possessed by the farm owners is believed to enrich the systems often when applied. Though, there are situation where sequential soil elasticity has proven to be abortive. Dlamini (2007) further suggests that the characteristics of traditional agricultural farmers who are involved in intercropping or mixed farming has made or brought diversified crops in the farm land. Therefore, the utilisation of fertiliser is encouraged as it has some implication in crops cultivation in the soil nutrients.

A study by Magara (2002:41), argues that animals are held to be vital in the Basotho society. For example, horses present the best form of transport especially in the mountains and donkeys and oxen are often used for ploughing. On the other hand, cattle are also used to pay dowry (*lobola*) (Magara, 2002:41). In African communities, traditional farmers use local nutrient-rich foods; like blue-green algae, kraal manure from livestock, and legumes as sources of nutrients. They also depend heavily on diversity of plants and animals as a means of pest control is one way through which biodiversity is taken advantage of in the traditional farming system. Additionally, traditional farmers have developed and maintained vast networks of terraces to prevent soil erosion for the benefit of all communities (Buthelezi, Hughes & Modi, 2013; Dlamini, 2007). Kazemi, Shahvali and Zarafshani (2003:27) argued that indigenous knowledge is also good at soil conservation for the following reasons:

#### **3.3.5.1 Pre-Planting Operations**

This is really a managerial aspect of land preparation. It involves using cattle for tillage practices instead of tractors; tilling opposite to direction of slopes; surface tillage instead of deep tillage; plowing on the contours; and a combination of chisel plow and livestock (Kazemi, Shahvali & Zarafshani, 2003:28).

#### **3.3.5.2 Mixed Cropping**

Broadly speaking, traditional agriculture refers to cultivation of different varieties of mixed crops. It symbolizes production of food through traditional farming systems. Several studies (Kaya and Seleti, 2013; Nwonwu, 2007; Ramert, Lennartsson and Davis, 2002) have defined mixed cropping as the “the growing of two or more plant species in the same field in the same year and, at least in part, at the same time”. Mixed cropping, as clarified by (Beckford and Barker, 2007; Handayani and Prawito, 2010; Tikai and Kama, 2004), is an indigenous method of maintaining soil fertility because it creates favourable conditions for the soil, water and nutrients; and a good environment for conservation and sustainability. This clarify that mix cropping improves soil elasticity. The soil fertility provides and improves the production of plant growth on daily basis. The suggestion made by Dlamini (2007); Eyong (2007) was that soil management is very important, as it help to controls pests and diseases in plants. This does not only affect the plants or crops positively but as well as the ecosystems in the farmland. Dlamini (2007); Eyong (2007) further note that crops are usually of varied sizes and shapes from different plant families and species

The authors (Dlamini, 2007; Eyong, 2007) further point out that these harvests; when ripened offer ample ground cover thus guarding the soil loss and maintaining humidity in the soil. Dlamini (2007) highlights that for the mixed cropping, the harvests normally come from different species. In that regard, different types of measures of nutrients in the soil are used. In a nutshell, mixed cropping confuses insects and bugs; which can grow to disturb the soil and plants grown in the field. African communities believe that indigenous knowledge is a vital mechanism in controlling pests and diseases that disturbs the growth of plants. For instance, some other traditional plants are used in controlling weeds to ensure availability of nutrients in the soil (Abioye, Zaid & Egberongbe, 2011). Additionally, it can be concluded that traditional farming conserves and adds soil nutrients.

### **3.3.5.3 Weathering (Soil Fertility)**

African communities believe that some indigenous cultivation practices, which conserve soil and water and increase soil fertility for increased crop production in the area. For example, rural farmers let livestock lay on the soil; which helps to enhance the fertility of the soil. Farmers believe that animal manure increases the elasticity of soil and therefore, reduces soil erosion (Beckford & Barker, 2007; Eyong, 2007). In a study by Nwonwu (2007), for farmers to yield good harvest in maize production, they keep livestock; including cattle, goats, chickens and ducks; for the purpose of using the manure to fertilize the soil.

Another practice is mulching and inverting the crop residue into the soil. The residue eventually decays and turn into fertilizer that will be readily available to the soil and thus increase the soil's holding capacity (Abioye, Zaid & Egberongbe, 2011; Gana, 2003:53; Kazemi, Shahvali & Zarafshani, 2003:28). In a study by Gorjestani (2005), farmers in developing countries are using IK in order to increase agricultural production and conserve natural resources for soil nutrients. Gorjestani (2005) point out that indigenous knowledge in agriculture/farming provides local solutions to development challenges facing poor communities, and helping to alleviate poverty.

In a nutshell, this study considers indigenous knowledge as a powerful tool for poverty reduction in rural areas. Additionally, Handayani and Prowito (2010) further observed that farmers employ different indicators for knowing whether the soil is fertile or not, the major indicator being the amount of crop that is yielded. A study by Fenta (2009), argues that there are several indigenous methods used in soil fertility management and water conservation;

which includes the use of animal manure (cow dung, goat droppings and chicken waste), intercropping, mixed cropping, mulching, and shifting cultivation. On the other hand, Beckford and Barker (2007) further adds that local knowledge underpins the choice of farming techniques, allowing farmers (among other things) to manage soil fertility, to rotate crops effectively, to select appropriate crops, and crop combinations, for local conditions and specialized environmental niches; and to use traditional methods of pest control.

Furthermore, indigenous knowledge is highly used in the classification of soil and such factors use soil color and texture emerges as key common factors in indigenous soil knowledge (Makinde & Shorunke, 2013). It is recognizable that the use of indigenous knowledge has many advantages in agricultural production. In a study by Akullo, Kanzikwera and Barwogeza (2007), indigenous knowledge has several advantages which help in indigenous knowledge in agricultural production. They include, and are not limited to:

- Indigenous knowledge products are cheap and in most cases cost free in monetary terms.
- Indigenous knowledge creates social harmony and cohesion.
- Indigenous knowledge is easy to grasp the concepts and practices because knowledge can be passed on orally using the local language.
- Indigenous knowledge is available domestically e.g. urine, ash and hot pepper.
- Indigenous knowledge is not harmful to human health.
- Indigenous knowledge does not have side effects.
- Indigenous knowledge products are prepared and obtained on demand and problems associated with expired products are not of much concern.
- Indigenous knowledge products do not always demand specialist attention like veterinary doctors or extension workers.

#### **3.3.5.4 Food Technology Fermentation Techniques**

The acknowledgment placed on foods in African communities that have fermented is very serious, as it makes up the human diets. It is important to note that fermentation has contributed immensely to human existence. However, the technological implication is economical to the food that is to be preserved. This has also improved foods production and nutritional value (Aloys & Angelen, 2009). Several food storage mechanisms in African rural setting have been

developed and applied. A good example of such used was the mopani worms (*ifishimu*). It serves as protein sources for most preserved food. These set of foods are eaten not only in South Africa but to other part of eastern, central and Southern Africa countries. These set of food have shown to be cultivated in certain part of the year and harvested at another period of time as well. Therefore, the preservation becomes essential in order for its longevity to appreciate. The longevity is believed to appreciate due to the water, salt added and drying in the sun. This type of method is also used in the preservation of African spinach called morogo. According to Kaniki & Mphahlele (2002:20), it was established that traditional communities have also devised ways of preserving beer that is brewed. This have led to different ways through which food are preserved in most developed nations. The processes involved and preservation patterns by traditional rural entails a lot of efforts (Kaniki & Mphahlele, 2002:20). One of those patterns is the one among the Zulu people where beer brewed is grounded with mealies called (*impuphu*). It is soaked in water until it ferments (*amahewu*), thereafter, it is then cooked and sorghum grain (*amabele*) before addition of mixture with the fermented mealies (Govender, Mudaly & James, 2013).

### **3.4 The Importance of Indigenous Knowledge (IK)**

According to Ngulube (2002), local knowledge is very vital, as it can be used for the development of certain projects. The essence of the project is to solve problems or bring in new innovations. It is believed that this can bring in sustainable solutions to the society. Ngulube (2002) cautioned that, local knowledge of the people should not be underestimated. It ensures the development of the society and way of life of the people. Therefore, since IK is of key value to communities in terms of local-level development, its cornerstone to economic survival should be explored, in order to guarantee the faith of the people. The resource of economic development reduces fear of unknown since commodities are very scares and donors to poverty are limited. In light of this, technical expertise should strategize on the development of more ways on how to improve on indigenous knowledge in local communities. It would help to reduce uncertainty of rural people. Onyango (2002:250) corroborates this by clarifying the basis of why IK is self-sufficiency. It is a determination to planning for future of the individual. Onyango further note this exemplified assertion that:

a) Indigenous people should be familiar with their local practices, as it could help them learn more in the application of technologies. Hence they are better positioned to maintain these than the introduced Western practices and technologies.

b) Indigenous knowledge could be drawn from local resources. This makes people less dependent on outside suppliers, which can be costly, scarce and irregularly available. The manifestations of using IK are varied and assume different roles. Firstly, it provides effective alternatives to Western know how and secondly, Indigenous technologies are often cheaper than Western technologies, as they rely on locally available skills and materials. However, despite their effectiveness, they can be easily overlooked or undermined.

The importance of indigenous knowledge cannot be over-emphasised. For example, indigenous knowledge provides problem-solving strategies for individuals in local communities. It is also relevant for the process of development and contributes to global knowledge development. In the same manner, IK is used to be integrated into the development programmes for the people in fields like education and commerce, by commercializing indigenous knowledge on literacy forms, theatre and dance, visual arts and crafts, textiles, pottery, smith, agriculture, and medicine (Okorafor, 2010). A recent study by Sraku-Latey (2014), spells out that indigenous knowledge is important in several disciplines like ethno-veterinary medicine, anthropology, agricultural development, forest management, soil management among many others. It is also argued that in the field of medicine, indigenous knowledge is not only used in finding new drugs, but also to derive new concepts that may help people to and nuances. It is believed that indigenous knowledge is unmatched by technical experts. It is also exemplified by the fact that in natural resource management, IK features prominently in food production, climate change, use of medicinal plants, soil fertility as well as protection (Sraku-Latey, 2014).

Several studies (Chisenga, 2002, Cuddeford, 2001, Makinde and Shorunke, 2013) argue that there are other several examples of the application of IK in African communities, including but not limited to:

- Irrespective of modern scientific knowledge and western education, Africans, especially in rural setting still believe in the use and application of traditional medicinal plants, herbs and roots for solving health related problems. This has not only helped the African people but has opened up more business opportunities for transaction. The western people now strive to learn the mechanism used in the treatment of diseases through these herbs. The essence is that, very few of the indigenous people have the specialised knowledge that can be transmitted into present day livelihood for job specification.

- Most of the foot and mouth diseases treated today by Masai herdsman were as a result of indigenous knowledge acquired over time. This was done without any need of killing the animals in the rural areas. The treatment became effective as rural people continue to collaborate in sharing indigenous knowledge from one generation to another.
- IK remains the source of livelihood for most people living in rural Africa setting. These people remain the holders of IK in their different capacity. This has given them edge that foster livelihood through the services they render. The service can be categorised into the following areas: farming or healing.
- It is believed that certain areas of specialisation in IK are not easy to tap from the holder, especially the tacit nature of knowledge. The transfer of such knowledge could be when the holder is engaged in act of practices or execution of jobs, as such, people can now begin to learn from him/her. It can be noted that these type of IK resides in the owners of IK in a particular community. Factors such as, beliefs, religion and spirituality has enhance the acquisition of this knowledge. It can also be noted that the knowledge may not have much influence to those not in that setting considering what it is needed for. This makes it meaningless and useless to the community that does not know much about it.
- Farmers have used several fertilisers in control of the plants cultivated in their farmland. Although, the fertilisers/chemicals used have always been very expensive and ineffective at some point. Therefore, farmers who are more knowledgeable should be consulted on indigenous knowledge practices. The consultation would lead to them coming up with plans that could help if the caterpillars have not really help in the plants cultivated. Sometimes friends and families should be consulted as well. They must gently shake the caterpillars off the plants and be collected in a sheet or a large piece of cloth. These caterpillars must be given to other animals like chickens to feed on them.

The importance of indigenous knowledge in some of the African countries can never be over emphasized. The literature shows the power and importance of indigenous knowledge that has been extensively used in the different parts of the world to improve the quality of life especially in agriculture and medicine. Authors and organisations such as (Chabalala, 2008; Luzietoso et al., 2000; Makara, 2002:40; Mutula, 2002:135; Olatokun and Ayanbode, 2008; Rakoma,

2003:19; Statistics South Africa, 2008; World Bank, 1998) provide some examples where indigenous knowledge has been applied and played a pivotal role include the following:

- In Angolans, sugar cane is used to quench thirst. It is processed into sugar and sugar cane wine using “Bagasse” as the fermentation agent. The wine making process is an ancestral practice transmitted from generation to generation.
- In Botswana, natural resources materials like grass and clay are used to produce basketry and pottery from. The knowledge of designing and making basketry and pottery is passed down by well experienced women from generation to generation.
- In Lesotho, for elders and traditional healers to heal a headache, a bark of a peach tree is peeled and burned, then the patient is made to inhale the smoke, and the headache goes away.
- In Nigeria, when a woman has given birth, during the first four weeks after birth, the mother and the child are secluded and relieved of duties and are cared for by the grandmother of the new-born. The new mother is fed a stimulating hot soup made of dried fish, meat, yams, a lot of pepper and a special herbal seasoning called “udah”, which helps the uterus contract and helps in the expelling of blood clots.
- In South Africa, traditional healers and herbalists uses terms known as “intuma”. It has a rounded shaped used to cure toothache. In order for a patient to administer this, a dried mielie corn, is usually squeezed into the fruit when applying it. The mielie corn is then lit and the infusions are inhaled through the mouth. Additionally, there are over 24 000 indigenous plants used in South Africa to cure diseases. These plants are so peculiar to the IKS since they are not common in the world. It can be noted that about 300, 000 South Africans do consult traditional healers for in search of one help or the other. This is as a result of their information needs. The visitation paid to practitioners has shown that the herbs are very vital. Lastly, traditional medicines market in South Africa has become a multi-billion rand industry that contributes to the growth of the economy.
- In Swaziland, farmers use kraal manure, poultry litter and swines waste in the fields to prevent soil degradation.
- In Uganda, traditional knowledge is applied for cultural management of “matoke” crops to reduce harmful effects of the “Sigatoka” disease.

- In Burkina Faso and throughout the West African Sahel, for example rural women have real task to carefully collect the fruit, leaves and roots, of native plants like the baobab tree (*Adansoniadigitata*), red sorrel leaves (*Hibiscus Saddrifa*), Kapok leaves (*Ceiba pentandra*) and Tigernut tubers (*Cyperus esculentus L*) for use in diet of their families, supplementing the agricultural grains (Millet, Sorghum) that provide only one part of the nutritional spectrum and may fail in any given year.

The efficiency of IK within sub-Saharan Africa is reflected in many ways, such as traditional medicine, architectural design, music, governance and communal approach to solving local problems. In South Africa, communities around Bushbuckridge have used an indigenous fruit, the marula, in order to produce beer, jam, poultry feed, and juice for cooking and cosmetic oils. The fruit is also used to treat dysentery, diarrhoea, insect bites and burns, while the essence from its leaves is used to treat abscesses. The fruit's wood is used for carving furniture and other household items. Cattle feed is prepared from the fruit and leaves, which are said to contain high vitamin C. The stone within the fruit contains rich oil and oleic acid, which help to maintain a healthy skin. The oil is purified using simple local techniques with no solvents. This gives the oil derived from the fruit, a very high degree of purity (Mutula, 2002).

In African communities, plant products and their derivatives represent more than 50% of all drugs in clinical use worldwide. Additionally, South Africa's Cape aloes and buchu, Bostwana's devil's claw are some of the well-known herbs. In South Africa, it is estimated that 3000 plant species are used for medicine. In many countries in sub-Saharan Africa, such as Ethiopia, most people depend on medicinal plants as their only source of health care, especially in rural areas with limited or no access to health facilities (Mutula, 2002).

Indigenous knowledge has been widely used in different parts of sub-Saharan Africa to improve agricultural practices and transfer relevant technologies and cultural practices to farmers. In Uganda and Nigeria, for example, IK is being applied for cultural management of *matoke* crops, to reduce the harmful effects of the *Sigatoka* disease. In Burkina Faso, some local communities have taken responsibility of marketing their agricultural crops and managing farm credit and reinvestment. It is further argued that they did this largely by mastering accounting and administrative systems developed directly in the local language, Bambara (Makinde & Shorunke, 2013; Mutula, 2002).

Apart from Africa, some other countries like India are using traditional plants (herbs) and spices with therapeutic value to cure illnesses to their community members. The use of specific plants for medicinal purposes is known as traditional medicine and is an important component

of traditional knowledge. For example, Indians are using herbs like amla (*Phyllanthus ambluca*), black pepper (*piper nigrum*), etc. Amla (Indian gooseberry) is the most potent natural source of vitamins, which is an excellent anti-oxidant and contains as much vitamin C as two oranges. The author recommends that it helps maintain a stronger, healthier digestive system, improves overall immunity, detoxifies the body, purifies the blood, lower cholesterol, enhances vision, and strengthens the lungs, respiratory system and central nervous system (CNS). It is argued that Kali Mirch (black pepper) is used as a medicine to cure toothache, asthma, chronic indigestion, colon toxins, obesity, sinus congestion, fever, colic pain, cholera, gastric ailments, etc. (Chakravarty, 2010).

Other countries like Vietnam rural people are using their inborn knowledge to fight poverty by improving agricultural productions. For example, Trung, Quynh and Hieu (2007) highlight that in Vietnam, rural communities use traditional type of maize that villagers have planted for many generations which has a number of advantages. Among these is the fact that it is unique regardless of the soil type it grows on. This type of maize requires very little fertiliser. It also has thick and tough cornhusks and is usually called by local people or rural dwellers as lampshade husks. This is from the belief had from childhood, as it cover the cob until it dries up. The seed is made dry so as to make it effective. It is used to protect rain during rainy days. Sometimes, it can be used for insects and birds protection reared in the fields. The rocky nature of local people environment has often leads to the use of local/indigenous knowledge for inter-crop of farm land. The crop is rotated such that, it gives a better methods to cultivate, though dependent on the crop. The maize, beans and peas, and other vegetables are usually rotated for good yield. Lastly, in some Asian countries, some individuals rely more on traditional food, while others rely on herbs for treatment of diseases. All these serve as part of the cultural belief of indigenous people. It has always helped them to provide the basic needs of the people. This suggestion becomes relevant due to the high population density of the African communities. This is in reflection of what happened in China where, as population increases, between over 2, 4 billion Unites State Dollars of Chinese medicines are sold and over 400 million United State Dollars are exported out of the country (Elujoba, et al., 2005).

According to Mukabana (2004), there are some frequently used traditional rain indicators in Kenya. These traditional indicators include; plants, birds, insects ( bees, butterfly, red ants, termites (*ngwen*), stars (sun, milk way), hill shadows, moon, winds (direction, strength and time of starting and ending), clouds (position and movement), lightning (location and patterns),

springs and swamps, amphibians (frogs and toads), whirl wind (dust devils) and water spout. Mukabana (2004) argues that in the animal category, the absence of frogs and toads indicates a dry season. Thus, the African elders and “rain-makers” are more often than not better equipped to apprise the people of the impending dry season in the event of this being a possibility.

Additionally, in Angola, and the DRC, sugar cane for instance, is used to quench thirst. It is also processed into sugar and sugar wine, using bagasse as the fermentation substrate. The knowledge used is specific to the local populations of these countries, allowing entrepreneurs in these regions to enjoy a comparative advantage. Men hold knowledge of making sugar cane wine. The first method of transmitting the knowledge involves apprenticeship, usually in a family business, where a young person learns from an older person (Mukabana, 2004). Charyulu (2004) argues that indigenous knowledge has two powerful advantages over outside knowledge - it has little or no cost and is readily available. Indigenous knowledge systems and technologies are found to be socially desirable, economically affordable and sustainable and involve minimum risk to rural farmers and producers, and above all, they are widely believed to conserve resources (Charyulu, 2004).

### **3.5 The Use of Information and Communication Technology (ICT) Tools to Manage Indigenous Knowledge (IK)**

#### **3.5.1 The Role of ICT Tools in Managing IK**

A number of authors have found that it is possible to manage indigenous knowledge through ICT tools. As argued by Agrawal (2002) and Ilo (2012) there is a need to develop digital technologies to store, capture, and distribute knowledge. The adoption of a recording device that fits the target group’s oral tradition is highly required (Reitsma, Smith & Hoven, 2013). Thus, Ngenge (2003) states that ICT tools have the ability of handling information and facilitating different forms of communication between human sectors, between human beings and electronic systems, and between electronic systems. Similarly, Chisenga (1999) explains that ICT tools enable Africa to contribute to global information resources by translating indigenous knowledge into web content. It is therefore argued that ICT tools facilitate the rapid collection, collation, storage and dissemination of data; thereby assisting knowledge creation and diffusion process. Authors such as Awori, Vetere and Smith (2015) have noted that the preservation of audio recordings of endangered languages, the storage of video archives of

ritual ceremonies, or the creation of a digital herbarium of an indigenous people's flora; are all important.

It is important to understand that these ICT tools have a capability to record and store ritual ceremonies that can be used at a later stage by future generations. It is in this light, therefore, that Kennedy and Davis (2006) emphasise the use of digital technologies in the gathering, storage, evaluation, and retrieval of information. Akinde (2008) believes that ICT tools and indigenous ICT expertise have the potential to save, document, improve, digitize (to preserve for posterity etcetera) and transmit much of the invaluable traditional knowledge for use by communities within and outside a particular country.

The advantages of using new technologies include using digital video and audio recording devices and Internet technologies to capture, store and retrieve aspects of traditional knowledge; for example, the Arts (Oppenheimer, 2010). Ngulube and Lwoga (2009) state that since ICTs is very vital in managing information and knowledge. It is imperative to harness other opportunities that would be of advantage in the accessibility and use of new insight. This could improve the fast ways of service delivery to the rural people. It is in this light, therefore, that Ngulube and Lwoga (2009) conceive the use of ICTs as managing IK within and across local communities to improve cross-cultural understanding, which enhances the wellbeing of rural people and sustains their agricultural practices upon which they depend. Kargbo (2005) also adds that ICTs have made it possible for people all over the world to speedily have access to information resources for easy communication with each other and to handle information presented in such formats as text, graphics, video and sound recordings.

It is evident that ICT tools have the ability to manage IK. For instance, Agrawal (2002), Akinde (2008), Hunter, Koopman and Sledge (2003), Maina (2012), Nakata et al. (2014) opine that audio-visual digital recording technologies (e.g. tape recorders, mobile phones, video camera etc.) enable oral stories, songs, dances, ceremonies and practices to be captured in original indigenous languages. Zaman, Wee and Kulathuramaiyer (2013) add that digital tools have been widely developed for the preservation and improvement of access to indigenous knowledge. One of the advantages of using digital technology to store and disseminate IK is that it makes IK more appealing to young people who are fond of ICTs. Maina (2012) also concludes that digitised traditional knowledge is more appealing to the youth. In that regard, information available online, is more appealing to the younger generation as compared to face-to-face conversation.

### **3.5.2 Types of ICT Tools Used for Recording or Capturing IK**

ICT tools for recording or capturing IK are widely acknowledged. For instance, Dyson et al. (2007) and Ilo (2012) stated that digital and video cameras, camera phones (mobile phones) and tape recorders (voice recorders) are tools for capturing IK. These digital technologies make indigenous knowledge practices on healing, agriculture, mid-wifery practices and dances etcetera available to those who may want to know and learn more about traditional knowledge. The following discussion is about ICT tools for capturing IK.

#### **3.5.2.1 Digital Filming and Video Camera**

Digital filming and video cameras are accorded pre-eminence as ICT tools deemed effective in recording and/or capturing indigenous knowledge practices. According to Akinde (2007) and Fogwill et al. (2011), the use of digital filming and video cameras to record and/or capture IK is one of the most effective ways that ensures the availability of indigenous knowledge on ICT tools. Christie (2005), Okore, Ekere and Eke (2009) reiterate that these tools are used to record ceremonies performed by indigenous people like storytelling, games, healing, agriculture etc. According to Okore, Ekere and Eke (2009), captured videos during such initiatives are made accessible to people within and beyond the communities. Notably, ICT tools are not only capable of recording and capturing IK but are also capable of handling other issues pertaining to life. Digital cameras have an advantage to record data, copy it onto CD-ROMs, and view later; using either a computer or the Internet (Adetoun, 2007; Okore, Ekere & Eke, 2009). Christie (2005) posits that the use of digital videos is an extension of an established practice of recording performances for political and religious purposes.

Akinde (2007) notes that digital video cameras provide one of the best ways of capturing three-dimensional objects, whereas Ilo (2012) maintains that video cameras are vital in capturing different forms of arts and other physical objects. Akinde (2007) further asserts that digital cameras simultaneously produce photos and videos; moreover, images in digital cameras are visible immediately and may be duplicated at no extra cost. Akinde (2007), Okore, Ekere and Eke (2009) conclude that the advantage of using digital cameras is that recorded data is copied onto CD-ROMs and be latter can be viewed using either a computer or via Internet. This means that once local knowledge has been recorded or captured, it is downloaded onto CD-ROMs and viewed through computers using the Internet.

Kapuire and Blake (2011) reveal that flip cameras and mobile phones are handy in capturing indigenous knowledge. It means that digital cameras and mobile phones are vital tools in the acquisition and preservation of IK. Nickerson (2005) suggests the use of visual technologies such as video-conferencing; which can relay facial expressions of a storyteller and the intentions of his or her words. Kargbo (2005) states that indigenous knowledge systems such as folklore, customs, etiquette, and music are recorded on tapes. Ilo (2012) argues that information on indigenous marriage as carried out by different cultures like initial negotiations, dowry and wine carrying is captured by means of an audio recorder, video camera and digital cameras. In other words, these are relevant devices needed for capturing indigenous information. Chisita (2011) also states that tape recorders assist in capturing traditional knowledge in agriculture.

### **3.5.2.2 Mobile Phones**

Mobile phones use either audio or camera to record or capture, store and disseminate indigenous information. As pointed out by Flor (2013), Owiny, Mehta and Maretzki (2014), mobile phones are able to capture knowledge in the place where said knowledge is generated. The three authors add that camera-enabled cell phones enable users to capture an image; which adds a visual dimension to knowledge. These authors further add that having both audio and video capability enriches the knowledge-sharing experience.

Ilo (2012) moreover argues that mobile phones, audio tapes with recording devices are used to record music, stories, tales and idioms, all of which constitute an integral part of indigenous knowledge. In other words, audio recorders, including mobile phones with recorders play pivotal roles in recording indigenous knowledge. According to Owiny et al. (2014), the advent of social media and mobile technologies offers libraries, in partnership with local communities, the opportunity to document, disseminate, and raise awareness about indigenous knowledge. According to Flor (2013) and Ilo (2012), mobile phones capture indigenous knowledge practices like agricultural practices; food preparation and healing practices. Mobile phones also communicate IK wider. For instance, Ilo (2012), Ngulube and Lwoga (2009) argue that mobile phones have a greater impact on the overall vulnerability, particularly because of its immediacy, interactivity and ability to secure assistance from afar. Furthermore, Ilo (2012) states that cell phones are helpful in communicating ideas on agricultural practices between a librarian and custodian of agricultural information in the indigenous community. According to

Ilo (2012), information on agricultural practices like farm tools, weeding methods, crop propagation, farm practices etcetera is recorded on audio recorder as well as camera.

### **3.5.3 ICT Tools Used for Storing Indigenous Knowledge**

It is worth repeating that the emergence of ICTs has brought tools and/or devices for capturing and accessing important information like indigenous knowledge. These include video-tapes, magnetic tapes, USBs, CDROMs, DVDs, VCDs, etc. It is believed that these ICT tools are able to store large volumes of still moving images. Ilo (2012) argues that documented indigenous knowledge can also be stored in mp4 devices, mobile phones and computers. In other words, computers are used as major equipment to access storage devices. For example, storage devices like CDROM, VCD, audiotapes; databases all depend on computer and wired equipment for accessibility (Ilo, 2012). For Ilo (2012), where the computer and mobile phones have internet facilities; stored information can be sent as attachments to the mail boxes. The author adds that information can also be converted to 'YouTube' file(s) and thereafter placed on 'YouTube' for anyone to access it while video and audio-tapes also serve as relevant storage devices. Ilo (2012) concludes that pictures are also stored and preserved in video CDs while music, folktales, riddles are preserved in audio tapes.

### **3.5.4 Broadcasting as an Important Means of Communicating and Preserving IK**

#### **3.5.4.1 Use of Radio and Television to Communicate IK**

The use of modern information and communication technology (ICT) for the exchange of IK is particularly exceptional. As countries establish connectivity to reach rural people, modern ICT could become a powerful enabler for the dissemination of IK.

Depending on the availability of infrastructure, accessibility and connectivity of communities in a country, radio and television broadcasting in local languages could be used as channels to disseminate IK practices in rural areas. Radio station gives some African communities a voice. Radio reaches people who cannot read or write. Even in very poor communities, radio penetration is vast. Thus, an average of one in ten people has a radio, which makes the global dissemination of indigenous knowledge possible (Chapman, et al, 2003; Charyulu, 2004; Chisita, 2011).

Therefore, all activities related to community cultures, beliefs, norms and traditions should be recorded and disseminated electronically for it to be shared globally (Meadows, 1995). According to COSTECH (2005), information on indigenous agricultural practices which is

useful in farming like the use of organic manure is shared through community radio and website. For example, Owiny et al. (2014) posit that most rural residents have radios. So, recorded or live information on how to grow and market local indigenous vegetables might be featured on a radio program using the language of the area. In other words, radios in rural communities are used to broadcast information that empowers those (for example) involved in farming.

By broadcasting stories on the use of traditional farming knowledge, one can help rural people realize that they can often find their own solutions to their problems and, therefore, do not need to rely on outside help. For example, local people have probably learned from their parents and grandparents how to collect and use plants to treat livestock diseases. Therefore, broadcasting information on indigenous livestock husbandry that will be relevant to listeners within a community and globally is important (Developing Countries Farm Radio Network, 2003).

Ngulube and Lwoga (2009) point out that radio is effective in delivering knowledge on agricultural production in many developing countries. In a nutshell, farmers in rural areas listen to those who have vast experience in farming through ICT tools, for example, radio stations. It is argued that information on farming is circulated among other farmers by means of radio; instead of travelling long distances looking for a particular remedy. For Ngulube and Lwoga (2009), experience from other developing countries also shows that the radio has been effective in improving food security. The two authors state that in Uganda, agricultural programmes in Radio Apac and Radio Uganda improved agricultural productivity; which led to increased food consumption of maize in the household level as well as income gains from the sale of milk and beans. Chisita (2011) concurs with Ngulube and Lwoga (2009) that radio and television channels are used to broadcast agricultural programmes. It is argued that topics ranging from crop to animal productions are broadcasted in local languages. As observed by Chisita (2011), experts draw knowledge from both traditional and formal scientific knowledge systems; for example, the advantages and disadvantages of organic and inorganic fertilisers to agricultural production.

#### **3.5.4.2 The Internet as a Store House and Distributor of Indigenous Knowledge (IK)**

It is worth noting that in this age of information and communication technology (ICT), the use of the Internet has become the norm. It is noted that the internet is used to obtain information by individuals or groups of people. Authors such as Behrens (2000), Bothma et al. (2011), Rao and Babu (2001) define Internet as an international network of computer networks. In other

words, it is a network of networking. For Nathan (1997), the Internet is a connection infrastructure, like a road network. Like the road transport system, Internet provides point-to-point connection (email) while also supporting mass transport where many can share the same experience simultaneously (the Web). In this sense, the Web is a kind of broadcasting as it allows sharing and accumulation of cultural 'capital' and cultural 'memory'.

Notably, through ICT connection, the Internet links together thousands of individual computer networks all over the world (Behrens, 2000; Ilo, 2012). Thus, these interconnected networks do not only make up the Internet (or the Net) but also communicate with each other almost instantly to share information. It is also notable that the Internet exists merely as the combination of all the linked networks and thus includes all the computer terminals where people sit and work. As argued by Behrens (*ibid*), there is no single organisation that runs or controls the Net and neither does it have headquarters for central administration, since it is run by all the networks together for a common good. According to Ilo (2012), the Internet is a global network which connects millions of computers and databases. Dreyfus (2009), Ilo (2012), Kurose and Ross (2013), asserted that the Internet is important in sending and receiving mails, file transfer, education research activities and the sharing of ideas and resources.

According to Weber (2004), the Internet allows users to receive text, images, video and sound on their computer from computers located anywhere in the world. Arguably, the Internet can be regarded of as a rich, multi-layered, complex, ever-changing textual environment. It is a mechanism for collaborative interaction between individuals and their computers without the geographic limitations of space (Leiner et al., 2012; Singh, 2002). Kurose and Ross (2013) state that increasingly, new Internet ends systems such as laptops, smart phones, tablets, TVs, gaming consoles, Web cams, automobiles, environmental sensing devices, picture frames, and home electrical security systems are being connected to the Internet.

The presence of indigenous knowledge on the Internet is a recent phenomenon because IK has recently started to intrigue many people. In this light, the internet can be regarded as a tool for communicating and preserving IK. Le Roux (2003) and Tihapi (2004: 161) explain that indigenous knowledge is normally stored in a database on the Internet. The two authors maintain that these databases are not always related to each other, but to some extent they contain similar information on IK resources from various geographic regions of the developing world. For example, URL is a reference to UNESCO's IK database; which contains

information from various areas of the developing world: [www.unesco.org.org/most/bpikreg.htm](http://www.unesco.org.org/most/bpikreg.htm) (Tihapi, 2004).

Lor (2004) suggests that as Internet connectivity spreads throughout communities, the worldwide web is considered as a means of promoting awareness and appreciation of IK nationwide and worldwide. In other words, the Internet plays a pivotal role in globalizing IK. The Internet has unprecedentedly revolutionised the computer and communications world-wide. The introduction of telegraph, telephone, radio, and computer set the stage for unprecedented integration of capabilities. The internet is a world-wide broadcasting service, a mechanism for information dissemination and a medium for collaboration and interaction between individuals and their computers without regard for geographic location. Thus, today, the Internet is known as a widespread information infrastructure. It is the initial prototype of what is often called the National (or Global or Galactic) information infrastructure.

The influence of the Internet reaches not only to the technical fields of computer communications but throughout society as we move toward increasing use of online tools to accomplish electronic commerce, information acquisition, and community operations (Leiner et al., 2009). In other words, the Internet makes the world real to everyone connected to it. It removes all the boundaries that infringe on people's right to information. Maina (2012) posits that the capacity of the Internet has removed physical (geographical) barriers and has also greatly increased cultural interaction. Thus, the Internet is accessible to everyone who believes in it. The advantage of the Internet is its usability in the sharing of information with others so that everyone benefits from it.

#### **3.5.4.3 World Wide Web and Indigenous Knowledge (IK)**

The term 'World Wide Web' (or WWW) is often used interchangeably with the term 'Internet', although they are not synonymous. The World Wide Web is used to transmit and disseminate information to a wider audience (Bothma et al., 2011: 25). Scholars such as Le Roux (2003), and Rao and Babu (2001) argue that the World Wide Web is the distribution of heterogeneous collaborative multimedia information systems. Thus, there is evidence in the growing presence of IK and IK-related information on the Web.

Chisenga (2002) argues that in order for the Web to be relevant to Africa's cultural and environmental information needs, it must have appropriate content information from Africa. It is suggested that the Web should store IK; as this would go a long way in ensuring that adequate

African content on the Web is accessible to Africans using Internet. Lor (2004) concurs with Chisenga that more and more libraries use websites or web portals, which are devoted to the promotion of indigenous knowledge. In other words, the World Wide Web is recommended for the storing of indigenous knowledge for future generations.

Lor (2004) recommends that repositories of IK not only be located in universities but also in community centres; where IK can be used and added as a community resource. It must be mentioned, however, that if IK is to be shared and added to the global information infrastructure, it has to be captured and preserved in a format suitable for the Web. Thus, Chisenga (2002) suggests the use of both audio and video formats to capture and preserve the valuable knowledge and to make it accessible to a wider community and on the global information infrastructure.

#### **3.5.4.4 Social Media Technologies and Indigenous Knowledge (IK)**

The World Wide Web allows the storing and broadcasting of any information, particularly indigenous knowledge using social media technologies as exemplified by YouTube, Facebook, Google Docs, Twitter, and etcetera. According to Kietzmann, et al., (2011), nowadays, social media technologies employ mobile and web-based technologies to create highly interactive platforms through which individuals and communities share, co-create, discuss, and modify user-generated content. Erlandson and Erb (2013) define social media technologies as channels of electronic communication that are used to create and distribute content that allow for interaction between content creator and end users-like blogs and wikis. Social media networking refers to online sites such as Facebook and Twitter where members exchange information, ideas, personal messages, and content. In other words, social media technologies are content driven while social networking focuses on connections people make online to form communities.

According to Owiny et al. (2014), social media technologies are critical in the preservation and provision of indigenous knowledge. The three authors expand that the introduction and expansion of social media technologies create new opportunities for development agencies, business, NGOs, and information agencies, including schools and libraries, to partner with rural communities, national governments, and social entrepreneurs. The forging of such relationships is geared towards creating, managing, and preserving knowledge and skills that are unique to communicate in East Africa. Social media is emerging as an important technology

for disaster response and it consists of tools that enable open online exchange of information through conversation and interaction.

Furthermore, the management of online information content depends largely on the environment in which artifacts are preserved. Therefore, social media remains relevant due to the collective nature of co-authors building of textual and visual interface. These are shown on the websites of the social media. Wikis and Google Doc sites help to manage documents shared in social media. These have been shown in different spread-sheets and file computing. This environment allows users to register, upload and share documents among varied users in different context. Another social media that has always displayed a unique interface is the YouTube (<http://www.youtube.com>), Video and photo-sharing. The information in these sites is replicated through photo sharing. Flickr (<http://www.flickr.com>) has also demonstrated a great feature in the life of the social media. It uses videos and images to create conversation interaction between several people. Therefore, social network sites which include Facebook among others should be promoted. The Facebook (<http://www.facebook.com>) have always represented diverse links and nodes during network with another. The conversation made is a threshold of information that can be retrieved at any point in time. While social media remain an interface for communication, it is recommended that, it should be widely adopted, accepted and utilized for conversation and advertisement (Kietzmann et al, 2011; Yates & Paquette, 2010). The justification is enriching and cannot be quantified due to the potential accrued to it, both to organisation, individualistic and the world at large (Kietzmann et al, 2011; Yates & Paquette, 2010).

Social media tools are widely discussed. For example, Owiny, et al., (2014), the types of social media used to store and disseminate IK fall into the following four categories:

- **YouTube** in the context of uploading and disseminating indigenous knowledge allows users to upload, share, and view videos. In other words, recorded videos of indigenous knowledge (music, dance, agricultural practice) are uploaded on YouTube and viewed by local communities in a library setting or anywhere in the world. An example of a successful YouTube forum is BETUMI: The African Culinary Network (<http://www.betumi.com/>), a space “to discover, document, and share information on the vast and fascinating culinary heritage of Africa.” Created by Fran Osseo-Asare, BETUMI has been connecting scholars, professionals, and others who delight in African cuisine and food history.

- **Facebook** on the other hand allows individuals to post videos, share interests, make connections, and join groups with similar interests (Essoungou, 2011). In other words, Facebook allows posted videos and photos of indigenous knowledge to be uploaded and shared locally, nationally and internationally.
- **Google Docs** (<http://docs.google.com>) allows users to create documents, spreadsheets, forms, and presentations within the application itself or to import them through a Web interface. It is also a collaborative tool for editing among users and nonusers in real time, and it can be shared, opened, and edited by multiple users simultaneously. Google Docs lowers barriers to collaboration and is a boon for communities in East Africa that may not have access to popular, but expensive, word processing packages like Microsoft Office. The Google Docs platform is popular with students and urban populations. To help users in Africa enrich and shape the content about Africa, engineers at Google created Google Baraza ([http://wn.com/google\\_baraza](http://wn.com/google_baraza)) in 2010. Baraza, which means “task force” or “council” in Swahili, allows people in countries across Africa to share knowledge with each other by asking questions and posting answers that may be of local or regional interest.
- **Twitter** is a real-time information network where individuals can send 140-character text messages (tweets) to their followers. In addition to connecting with families and friends, Twitter can be used by businesses and farming communities to broadcast their merchandise or commodities for sale, check prices and interact with customers and suppliers.

### **3.6 Challenges Encountered in the Use and Availability of ICTs in Managing IK**

Despite the fact that new technologies have been part of managing IK worldwide, at the same time there are challenges it posed. Thus the challenges of documenting indigenous knowledge through ICTs are well documented ALAwadhi and Morris (2009), Ilo (2012), Harris and Harris (2011), Molawa (2009), Ngcobo and Eyono, Obono (2013), Ngulube and Lwoga (2009), Lwoga, Ngulube and Stilwell (2010) identified the following as factors: poverty, lack of electricity supply infrastructure, lack of infrastructure, absence of ICT policy or its implementation, few trained or skilled ICT personnel, cost, sustainability and maintenance of ICTs, poor knowledge of ICT at all levels, from suppliers to users, lack of knowledge of the English language, financial constraints, under-utilisation of existing technologies, attitudes towards ICT, lack of local content, incessant power failure, lack of ICT awareness, ICTs’ influence on IK transmission, geographical environment and communication preferences. The chapter further discusses some of the challenges as follows:

### **3.6.1 Lack of Infrastructure Provision**

An ICT infrastructure is the backbone through which ICT applications run. Thus, it is notable that sufficient infrastructure should consist of equipment, carrier technology, functionality, accessibility and operating systems with each having the relevant variables. These equipment include stand alone and/or networked computer hardware, modems, local area networks, intranets or campus wide backbone connecting LANs, and multi-campus networks, while carrier technology depicts wireless radio/television, fibre-optic technology, unshielded twisted pair and coaxial technology (Okore, Ekere and Eke, 2009; Rural Women and ICTs, 2004; World Summit on the Information Society, 2002). Moreover, functionality technology such as email, internet access, conferencing tools and multimedia tools are also essential resources in this regard. However, Kapuire and Blake, (2011) and Molawa (2009) state that some African rural communities suffer from limited Internet connection while usage of mobile phone is poor because of shortage of satellite coverage. It is suggested that connectivity should be for all and need not create a gap between the poor and the rich.

Manson (2015) argues that the internet is now plagued with websites that are not being used or maintained because of lack of infrastructure. This means that the main issues impeding the broader use of ICTs are connectivity, the availability and affordability of telephones and electricity. However, World Summit on the Information Society (2002) suggested that telecom infrastructure must be recognized as an essential backbone and a prerequisite in bringing about information technology (IT) revolution in any society.

### **3.6.2 Education and Training on ICT**

The notion that sufficient infrastructure depends on human capacity or expertise in order to develop, implement and manage ICTs cannot be over emphasised. For instance, Africa's capacity, in human skills, is still inadequate partially due to 'brain drain' and partially due to inadequate training opportunities (Chikonzo, 2013:15; Adeya, (2001:12). Unlike (Chikonzo, 2013 and Adeya, 2001), Ilo (2012), Okore, Ekere and Eke (2009) and Pigato (2001), all lament the lack of literacy and technical skills and support as factors that prevent certain groups of users from using the Internet and other forms of ICTs. This means there is lack of skills among African people when it comes to the use of ICT tools particularly in the management of indigenous knowledge. Jensen (2002), for instance, observes that only few scholars mainly found in South Africa and Botswana are familiar with the online teaching environment. Rural

Women and ICTs (2004) argues that small rural communities are not served by computer resellers who would normally be one source of training. Consequently, when training becomes unavailable there is often no access to alternative and appropriate personnel.

### **3.6.3 Cost, Sustainability and Maintenance of ICTs**

It is widely acknowledged that even when ICTs initiatives are successful and have been seen to have brought measurable benefits, there remain issues of financial sustainability; and how to ascertain what value users attach to services that have been provided (Chikonzo, 2013; Ilo, 2012; Karbo, 2005; Munyua, 2000; Pigato, 2001). It can be deduced that Africa is faced with financial constraints; and as a result of this cannot effectively contribute to the global market through ICTs. Ilo (2012) and Mason (2015) posit that money in Africa is scarce because economies have been crippled by external debt; and these are as a result of desperate attempts to cut back social sector spending. It is noted that infrastructure equipment is limited and, when available it is costly. For example, many African countries lack the availability of funds for the purchase of devices needed for the documentation of IK. Owiny, Mehta and Marezki (2014) reiterate that with poor infrastructure, and without an operating budget, many African libraries are unable to afford the cost of documentation, preservation and dissemination of indigenous knowledge.

The three authors give an example of East African libraries and information centers; which are not able to afford the cost of maintaining digital resources and, hence, cannot make a meaningful contribution to the digital environment. In a similar vein, Chikonzo (2013), Kargbo (2005), Rural Women and ICTs (2004) have identified the following problems regarding cost and maintenance:

- Cost and affordability of new communications technology equipment; which derive from issues such as the rural downturn and the continual need to upgrade and replace obsolete equipment;
- high cost of internet connectivity and services;
- high cost of computer hardware as a major issue which requires the largest component of the budget;
- ICTs need telephone lines which are quite expensive to purchase and maintain;

- costs associated with training in information technologies which include not the cost of the course itself, but also the cost of travelling to get the training and the cost of children (if applicable).

#### **3.6.4 Attitudes towards ICT**

It is widely recognised that indigenous people have a negative attitude towards the use of ICT tools in documenting and disseminating indigenous knowledge (Adeya, 2001; Ilo, 2012). It is stated that indigenous communities tend to monopolise some information that are relevant to libraries. In other words, rural communities view specific knowledge as a cult and as such must circulate only within the members of such a group. Ochieng (2004:1) argues that poor culture, political influence, age and gender have strong influence towards the use of ICTs. Meyer (2009) contends that “information flow in an oral context is controlled by attitudes, perceptions, norms, values and belief systems inherent to indigenous people”.

For example, when people experience an information need, they will approach a knowledgeable person whom they trust. Similarly, Rural Women and ICTs (2004) identify the following issues as worthy of consideration:

- Africans resist change, especially those in rural areas.
- The fear of unwelcome resultant social change.
- Africans perceive that the new technologies are irrelevant to their lives.
- Africans are unwilling to invest the necessary time, money and effort to new technologies.
- Fear of the unknown is another factor.

#### **3.6.5 Incessant Power Failure**

The incessant power outage causes a great setback in the use of computer and its peripherals in the acquisition and distribution of indigenous information (Ilo, 2012). It means shortage of power in rural areas is a great concern especially where locals depend heavily on ICT tools for the availability of information like indigenous knowledge. Thus the provision for standby generators especially in information centres where indigenous knowledge is stored and disseminated for use by the community members is imperative (Ilo, 2012). It is thus argued that

standby generators are needed to provide power and sustain computers and internet in order to increase the accessibility of indigenous information.

### **3.6.6 Lack of ICT Awareness**

It is argued that there is no evidence that indigenous people have any specific problems with learning and the use of technology, but the big problem is awareness (Dyson, 2004). It is arguable, therefore, that if indigenous communities are to become informed of the availability of ICTs suitable for capturing, preserving and disseminating IK, they would be more willing and aware to use these tools. This argument finds support in Williamson's (2004) argument that individuals need firstly, to be aware of the availability of these tools and then be motivated to want and use ICT and, subsequently, that it is important that individuals and groups are able to identify value in ICTs and its ongoing use. In a nutshell, indigenous communities need to be informed of the availability of ICT tools and its potential in harnessing indigenous knowledge.

### **3.6.7 ICTs Influence in IK Transmission**

It must be mentioned that even though information and communication technology tools are available, their influence on traditional knowledge is inconsistent. This view is corroborated by Harris and Harris's (2011) argument that social interactions, including church attendance, have emerged as the principal means of transmitting culture to the younger generation and as a result have more influence than the media channels. In this regard, churches have taken a center stage in influencing the community.

### **3.6.8 Geographical Environment**

The geographical area is a critical factor in the adoption of ICTs especially in the capturing, storage and dissemination of information. As argued by Williamson (2004) that the geographical isolation of many indigenous communities and the poor telecommunications infrastructure in many of the rural and remote communities affect ICT adoption. However, Harris and Harris (2011) argue that as many indigenous peoples live in isolated rural areas, they lack convenient access to developmental support and to the means of communication that can provide such support.

### **3.6.9 Communication Preferences**

It must be known that people who are not aware of the importance of ICTs prefer face to face transfer of information rather than use information and communication technologies like television and mobile phone etcetera. As argued by ALAwadhi and Morris (2009) that some people prefer face to face communication rather than information obtained from the internet. This view is attested to by Radoll's (2011) assertion that face-to-face communication is the preferred form of communication, and is considered vital to indigenous individuals and as such it can reduce the likelihood of ICT adoption by indigenous knowledge households.

### **3.7 Strategies Used to Improve the Use and Availability of ICT Tools in Managing IK**

It is widely recognised that, indigenous knowledge can be managed effectively if drastic steps are taken to ensure its proper documentation in African developing countries. Authors and organisations such as Adam (2007), Chetty (2003), Chisenga (2002), IIDC (2009), Kaddu and Nyumba (2006), Mason (2015), Munyua (2000), Ngulube and Lwoga (2009), Ngulube et al. (2010), Owiny et al. (2014), Radoll (2011), Ukwueze (2012), Broadband Commission, (2013), The Civil Society Content and Themes Working Group (CSCTWG) (2003), United Nations Educational, Scientific and Cultural Organisation (UNESCO) (2014) and UNESCO Institute for Information and Communication Technologies in Education (2011), recommended education, connectivity, electricity and telecommunication facilities, capacity building (training and development), telecentres, availability of sufficient ICT infrastructure and participation of non-profit organisations (NGO's) in the improvement of the status of availability of ICT tools in order to manage IK effectively. Some of the recommendations are discussed below.

#### **3.7.1 Education and Capacity Building**

Authors and organisations like Harris (2003), Rathgeber (2002) and World Summit on the Information Society (2002) contend that education, training and capacity-building deserve full and adequate support. In other words, the recognition of education and capacity building is believed to facilitate full utilisation of information and communication technologies at all levels in society. This, it is argued, will enable the sharing of social and economic benefits for all people; through ubiquitous access to information networks; whilst still preserving diversity and cultural heritage.

Radoll (2011) and The Civil Society Content and Themes Working Group (CSCTWG) (2003) suggest that rural people should be enabled to acquire requisite skills in order to participate actively and understand the information society and benefit in full from the possibilities it offers. Additionally, the use of ICTs in everyday life influences its adoption by indigenous households. In a nutshell, children who use ICTs in education exert a motivational force on their indigenous households. What transpires from this is that training on the usage of ICTs must be encouraged in schools among educators and students. Thus, Majanja (2004) argues that technologies alone without the human know-how are often underutilized. UNESCO Institute for Information and Communication Technologies in Education (2011) suggests that there must be recognition of the right of indigenous people to access all ICT applications for educational purposes and for teaching language. Ngulube and Lwoga (2009) posit that ICTs have contributed to e-literacy. The two authors add that, like tele-centres, training provided by the Sengerema tele-centres in western Tanzania have assisted rural people to increase their productivity through the use of modern technologies which are accessed from the Internet or tele-centres' website. It is argued that the advantage of tele-centres is that they equip rural people with ICT skills; which then enable them to browse and get information on their own.

### **3.7.2 Connectivity, Electricity and Telecommunication Facilities**

It must be noted that, many initiatives, in rural communities, in Africa, are contemplating the possibility of leapfrogging many stages of development by deploying more advanced wireless or satellite technologies. However, organisations like Broadband Commission (2013) and UNESCO (2014) state that connectivity comprise the physical and material access to telecommunications infrastructure and services, and to ICT hardware, software and networking capabilities. Thus, UNESCO (2014) argues that telecoms connectivity is typically provided through traditional landlines, fibre-optic cables or satellites. Moreover, Ngulube et al. (2010) recommend that telecommunication infrastructure in rural areas be improved urgently. UNESCO (2014) further posits that rural and remote areas, which frequently have greater dependency on broadband Internet; especially given the unequal distribution of physical media (e.g. CD-ROM, DVD, etc.); and present a significant challenge since this is more frequently making use of analogue telephone lines with slow data transmission speeds unsuited to the transfer of information. The "satellite revolution" holds considerable promise since, theoretically, every point on the globe can be instantaneously reached without further need for expensive and protracted infrastructural projects.

According to UNESCO (2014), ICT-assisted instructional approaches need to be implemented ranging from the use of radio or television to computers, Internet and newly-emerging mobile devices. The organisation further posits that newer battery operated ICTs are emerging, in addition to mobile devices that may be recharged off site. Notably, the majority of ICTs, including television, computers and the Internet continue to require a more stable energy source. Broadband Commission (2013), Lwoga, Ngulube and Stilwell (2010) and UNESCO (2014) suggest that there is a need for electricity (for example, grid/mains connection, wind, water, solar or fuel-powered generator etcetera) that is regularly and readily available.

### **3.7.3 Tele-Centres as a Storehouse of IK**

Though tele-centres seem to be fading away, authors and organisations like Chetty (2003), Chisenga (2002), Manson (2015), Ngulube and Lwoga (2009) and IIDC (2009) still consider tele-centres as very important in the management of indigenous knowledge. Chetty (2003), defines a tele-centre as an institution providing public access to the internet and other telecommunications services (telephone, fax, photocopying) in small, and usually marginal places. In other words, tele-centres serve as a catalyst for constructing a digital database of information, to be used by local officials and citizens for public matters like digitisation and management of indigenous knowledge. Chisenga (2002) and IIDC (2009) consider tele-centres as public places where people can access ICT tools; such as computers, the Internet and other digital technologies. According to Ngulube and Lwoga (2009), in African countries like Tanzania, tele-centres are used to manage indigenous knowledge. In their study, they cite the example of Sengerema tele-centres in Western Tanzania, which are used by sector experts to collect local content in various fields including agriculture. Chisenga (2002) highlights some of the organisations like the UNESCO, ITU, the World Bank, NRF, WHO, UNDP etc., which promote the use of tele-centres to preserve IK for future use. Manson (2015) states that many non-governmental organisations, including human rights organisations, have welcomed the Internet as a means of exchanging, gathering, and disseminating information rapidly and economically.

Adam (2007) states that multipurpose community centres are increasingly becoming the main venues for organising IK and disseminating it using digital technologies. Thus, access to indigenous knowledge databases, audio and video footages can be made to members of communities through tele-centres. Adam (ibid) suggests that technologies, and tools, ranging from speech to text, text to speech, mobile phones, PDAs, and community radios can be

installed and tried out for suitability in the sharing of indigenous knowledge. It is argued that community centres that may have radios can also serve as a hub for broadcasting and exchange of information among members. Adam (2007) concludes that participatory videos and radio programming initiatives can be launched at community centres to capture indigenous knowledge and exchange it within and beyond the communities.

Chetty (2003) identified few examples of how ICTs are leveraged to improve food security, health conditions, promote environmental sustainability and enhance social integration. One of the examples is Herbal remedies' databases used in India by villagers who have vast knowledge of herbal remedies in their areas. A tele-centre initiative helps villagers build a database of such (indigenous) remedies by recording the characteristics of the plant, methods for collecting the herbs, techniques for preparing the remedy, applicability and dosages. The database is seen as a valuable resource because it is used by anyone who recognizes its importance.

#### **3.7.4 Community Radio**

In Africa, radios are used to share stories about communities coping with HIV-AIDS through Internet based programme swap. One of the advantages of using a community radio, as indicated by Munyua (2000), is that it is effective in disseminating information to all types of audiences who might want to up-date themselves on the experiences of other countries.

#### **3.7.5 Availability of Sufficient ICT Infrastructure for IK**

Authors and organisations like Adam (2007), Ukwueze (2012) and UNESCO (2014) state that a reliable and accessible infrastructure (such as radio, TV, telecommunications, Internet) is a prerequisite for modern information exchange. This chapter advocates the view that the starting point for economic development in the information age is the existence of a suitable ICT infrastructure. Adam (2007) also suggests different software tools and platforms ranging from database management systems, Geographic Information Systems to text and speech and character recognition tools, graphical touch screens, audio and video editing tools to be used for the management and dissemination of IK.

Furthermore, it is suggested that more advanced and new tools like wiki, Facebook, YouTube, Yookos (collaborative authoring); blogging (personal journal, commentary and online diaries) and podcasting (syndication of digital media for playback on portable players and computers) could also be adapted to capture and disseminate indigenous knowledge. Ukwueze (2012) opines that the availability of knowledge management tools and platforms ranging from content

management systems to group collaboration tools, synchronous and asynchronous communication can also help capture and share indigenous knowledge. Ukwueze (2012) identifies two major groups of media technology; which are most relevant in capturing and disseminating indigenous knowledge. The two major groups include the following.

### **3.7.6 Backup and Archiving**

Owiny, Mehta and Marezki (2014) state that from simple flash disks and rewritable Compact Disks, DVDs, memory cards, mass storage and archiving devices can be of tremendous usage. Recently, web-based tools that have been used very significantly for educational purposes are the Wiki, YouTube, Facebook, Google Docs etcetera. These, according to Owiny et al. (2014), are interlinked WebPages based on the hypertext system of storing and modifying information. It is argued that each page can store information and is easily viewed, edited and commented on by other people using a web browser". Ukwueze (2012) posits that mass shared storage devices are used to share, organize, and archive digital media collections (photos, music, and video). These devices include built-in support for media streaming to set top devices.

### **3.7.7 Data Capture and Transfer**

These groups of technologies enable the capturing (or live recording) of events, and transfer of data, to storage media; where it can be used for educational purposes. The technologies in this area include those that use high speed USB, HD digital video recorder with notebook or desktop PC, converting video for portable media player; capturing from VCR or camcorders; combo tuners that watch analogue TV while recording digitally; video transfer devices such as consumer webcams; which deliver video over USB connection to computer (Ukwueze, 2012).

### **3.7.8 Participation of NGOs and National Government in the Implementation and Use of ICTs**

It is widely recognised that, non-governmental organisations fully take part in the implementation of ICTs and in the management of indigenous knowledge. As argued by Mason (2015), Owiny et al. (2014), the involvement of public and public organizations, as well as nongovernmental organisations becomes essential. This would help in diverse ways, especially in assisting communities to reserve manuscript used and as well disseminate the local indigenous knowledge beyond community boundaries. The United Nations has carried out projects of such in Africa context. This therefore requires the participation of nongovernmental

organisations through the project on the use information and communication technologies by rural communities. The use of the tools would enhance and promote awareness of new developments that could contribute to the economy of their countries in one way or the other. Kaddu and Nyumba (2006) highlight the success of telecom-centres in East Africa (Uganda, Kenya, and Tanzania) that provide rural and peri-urban communities with access to information and communication technologies with the support of international organizations like UNESCO, the International Development Research Center (IDRC), and the International Communication Union (ICU). Additionally, some African countries like South Africa and Uganda are examples of innovative projects like rural “telecom-centres” kiosks that offer everything from computers to telephones and email services.

Marcelle (2002) contends that African governments should be encouraged to establish programs to develop the relevant skilled personnel in ICT related disciplines. For example, Molawa (2009) highlights; that the national government of South Africa implemented the establishment of public access facilities to give access to people who have no access to ICTs through governmental departments. It is also notable that the purpose of public access facilities is to provide free access to the Internet with time limited to allow sharing. For Molawa (2009), the government of South Africa has promoted the use of Public Libraries and the National Library by enabling the public to access the Internet.

Leshiba Wilderness (2003) argues that, the South African Government puts emphasis on the development of IKS Policy and Legislation which significantly protects, develops and promotes IKS and help improve the livelihood and economic well-being of the indigenous and local communities by ensuring equitable and fair sharing. Leshiba Wilderness is seen as a centre that is responsible for the contribution towards nation building by empowering local communities; with indigenous knowledge that exists, however is rarely applied. According to Owiny et al. (2014) the advantages of NGOs and information agencies including schools and libraries is to partner with rural communities, national governments, and social entrepreneurs to create, manage, and preserve knowledge and skills that are unique to communities.

### **3.8 Implications and Application of ICTs in Managing Indigenous Knowledge**

This section discusses the implications of the study; and this derives in particular from the literature on ICT tools for managing IK. The literature revealed that IK is stored in the minds of its holders and displayed through actions. It was indicated that indigenous knowledge is transferable from generation to generation through storytelling, imitations, rituals, and

observations, just to mention a few. Notably, due to Westernisation; and large-scale migration of community members; this mode of knowledge transferal; has been rendered minimally relevant as a result of reduced one-to-one contact. In light of this, there is a need to preserve culturally unique knowledge for future generations through technology (Ngulube, 2003 & Ponge, 2013).

It is widely acknowledged that tacit indigenous knowledge can be managed through the application of relevant ICT tools (Ngulube, 2003). For example, the use of audio-visual digital recording technologies (e.g. mobile phones, video recording camera, tape recording devices, computers, Internet, YouTube, Facebook, Twitter and Google Docs) enable oral stories, songs, dances, ceremonies, healing, farming, carving, and other IK practices to be captured and stored in original indigenous languages (Hunter, Koopman & Sledge, 2003; Maina, 2012; Akinde, 2008). These tools can be used to make IK available to a wider audience. As recommended by Reitsma, Smith and Hoven (2013) that adoption of a recording device that fits the target group's oral tradition is required. In that regard, the adoption of new technological devices would enable Africa to contribute to global information resources by translating indigenous knowledge into web content (Chisenga, 1999; Charyulu, 2004).

The literature on ICT tools has demonstrated that, managing IK is not only limited to text documents; it could also include devices for capturing, storing and disseminating indigenous knowledge practices. It is evident that devices of managing IK are available; however, selecting the most effective tools is pivotal in this case. Additionally, even though the devices are not permanent, safeguarding indigenous knowledge through ICT tools cannot be over emphasised.

Even though the benefits of managing IK are widely sung by authors, organisations, institutions, information centres, to mention a few. However, ICT tools have shortfalls. In that regard, Adam, (2007), Okore, Ekere, & Eke, (2009) observed that not all aspects of IK are capturable. In other words, even though indigenous knowledge can be managed successfully through ICTs, custodians of IK should still be recognized as they keep IK alive with new wisdom. It is also argued that sometimes "ICTs are ill-equipped to handle indigenous cultures (Oppenheimer, 2010). This shortcoming may lead to digital preservation challenges. In this article, some challenges faced by ICTs for IK preservation are discussed. While it seems sensible to utilise ICTs and online databases to store facts and knowledge, "there is a difference between how westernised cultures and most indigenous cultures view these concepts" of computers and online databases (Oppenheimer, 2010). This challenge may require further

exploration to gauge how these ICTs respond to the nature of IK digital preservation initiatives. While good at preserving tangible knowledge, ICTs have difficulty with regard to treating tacit knowledge. This is because the output, however well presented, is largely one-dimensional (Michael and Dunn, 2006: 173). It tends to disregard embedded concepts of creativity and the use of figurative speech and symbolism to articulate and share insights and intuitions in the recording of tacit knowledge (Nonaka, 1998). Innovative ICT approaches are required for the digital preservation of IK since existing arrangements may not be applicable to the specifics of IK. For example, traditional IK is usually preserved through oral tradition rather than documentation. Semali and Kincheloe (1999) suggest that the design of ICTs does not accommodate IK since the nature of which is cast in terms not typically set with western knowledge (such as local and holistic). Michael and Dunn (2006: 173) point out that cultural IK preservation cannot be achieved by ICT alone; it requires a spiritual element entrenched in the community to ensure a long-lasting presence.

### **3.9 Summary**

The literature review on indigenous knowledge discussed the following issues: the nature of indigenous knowledge and its characteristics, the overview of the types of indigenous knowledge, the overview of the importance of indigenous knowledge in general; and the types of indigenous knowledge systems. Previous studies that concern IK in developing countries, including South Africa, were deeply discussed. The literature on IK showed that indigenous knowledge is a very useful source of information to indigenous people. It is highly used for their survival and can never be separated from their way of life. It was also observed that so much has been covered on IK, however, very little substantial or detailed research has analyzed the management of IK through ICTs in the province of KwaZulu-Natal. Broadly, the study has bridged the knowledge gap in the area by assessing how the knowledge is generated and shared in local communities. It can be concluded that the literature review on indigenous knowledge narrowed the research problem, highlighted possible research methodologies and pointed out how data can be interpreted and established the degree to which the research findings related to previous studies of a similar nature.

The empirical findings of the reviewed literature, regarding the role of ICT tools in managing indigenous knowledge cannot be over emphasised. Firstly, it was established that ICT tools, provide a platform that creates a mechanism for capturing, storing and disseminating indigenous knowledge. For example, most studies showed that digital video cameras, mobile

phones and tape recorders are major ICTs used to record/capture indigenous knowledge practices (Flor, 2013; Fogwill et al., 2011; Owiny et al., 2014). These findings show that it is possible to safeguard indigenous knowledge using ICT tools. Secondly, the literature findings showed that documented indigenous knowledge can also be stored in mp4 devices, mobile phones and computers (Ilo, 2012). In other words, computers are used as major equipment to access the storage devices. For example, storage devices such as the CDROMs, VCDs, audiotapes, and databases all depend on computer and wired equipment for accessibility. Thirdly, literature findings revealed that both old and new technologies such as radio, television, internet, social media tools (e.g. YouTube, Twitter, Facebook, and Google Docs are major ICT tools used to disseminate IK in local communities, nationally and globally. Unfortunately, there is no study in the province of KwaZulu-Natal has covered the depth of the application of ICT tools in managing indigenous knowledge.

It was noticed that there were few gaps in the chapter. Firstly, in spite of the increased number of research on the application of ICTs in managing IK, there is still no much application among IK-centres, information-centres, institutions researching on IK, etc.; in order to use ICT tools in managing tacit indigenous knowledge. Secondly, some of the new technologies used to capture, store and disseminate IK are not user-friendly among ICT users and indigenous people. Thirdly, challenges in the use and availability of ICT tools were noticed among ICT users and indigenous people. Lastly, it was noticed that lack of adoption of ICT tools that fits well in managing IK was a serious problem.

Reviewing a number of studies in this chapter, the researcher noticed several novelties: Firstly, it was revealed that more recent technologies of ICT tools, such as digital cameras, tape/voice recorders, computers, internet (YouTube, Facebook, Twitter, Google Docs, databases etc.) are often utilized for effective management of IK. Secondly, proper training on the use of ICT tools in recording, storing, and distributing IK remains important for effective management of IK. Lastly, it is established that reskilling become a prerequisite for implementation and practice of ICT tools in managing IK.

The chapter has contributed in diverse ways especially with knowledge of different stakeholders in the province of KwaZulu-Natal. First, it has bridged the knowledge-gap in the area by assessing the effectiveness of ICT tools in managing IK in KwaZulu-Natal. Secondly,

it has demonstrated a road map for the use, adoption and application of ICTs in managing indigenous knowledge (IK).

The next chapter provides an account of the research methodology that guided the study's terms of formulating data collection instruments.

## **CHAPTER FOUR: RESEARCH DESIGN AND METHODOLOGY**

### **4.1 Introduction**

This chapter discusses the research design and methodology employed by the study. The chapter starts by providing an outline of what research methodology is. Methodology is a research plan of action (Kumar, 2014:122; Neuman, 2003:68). A research methodology analyses the procedure that the researcher will use in carrying out his/her study. On the other hand, a research methodology is considered as the logic a researcher employs to answer research questions (Mason, 2002). Mason (2002) also points out that methodology underpins the way a research project is designed to answer and give meaning to the research questions. In that regard, it can be concluded that research methodology, focuses on the whole process of gathering data and the methods used to gather those data. Additionally, it focuses on the kind of tools that must be used and the manner in which they should be used (Babbie and Mouton, 2001). Based on the definitions given above, research methodology is therefore concerned with the methods of understanding and giving meaning to an environment. It is hoped that this study will attempt to interpret the meaning the participants attach to the use of ICTs in managing indigenous knowledge in the province of KwaZulu-Natal.

Having defined and motivated the use of research methodology, this chapter lists and discusses the research paradigm underpinning the study by looking at its ontology, epistemology and methodology. Here, the chapter also discusses a case study, sample size, ethical considerations, methods of data collection and data analysis follows, paying particular attention to issues of quality research (reliability and validity), and also the limitations of the study as well as the summary.

### **4.2 Research Paradigms/Paradigm Wars**

It is widely acknowledged that social scientists use paradigms to describe how they view and perceive the social world (Mertens, 1998). De Vos, Strydom, Fouché and Delport (2005) regard paradigms as pattern by which scientists study the subject of their research, within the discipline of their interest. Paradigms are also fundamental frameworks through which researchers organise their observations and reasoning (Babbie, 2010). It is also argued that a research paradigm is the underlying set of beliefs about how research elements are pieced together to make meanings of research discoveries (Johnson & Christensen, 2012; Whisker, 2001). It can be said paradigms are influenced by realist or objectivist and constructionist

ontology (Fraser, 2014; Sarantakos, 2013). In that regard, paradigms have an ontological dimension (concerns with nature of reality), an epistemology dimension (concerned with knowledge about that reality), and methodological dimension with methods for building knowledge to reality. Additionally, a paradigm encompasses a view of nature of reality (ontology) whether it is external or internal to the knower; a related view of the type of knowledge that can be generated and standards for justifying it (epistemology); and a disciplined approach to generating that knowledge (methodology).

As such, paradigm guides the process of inquiry and forms the basis for the practice of science by directing the researcher towards appropriate research methods and methodologies, depending on the nature of the phenomenon being investigated (Clarke, 1999). It must be mentioned that there are three main paradigms namely: positivism, interpretivism/constructivism and post-positivism (Pickard, 2013; Cohen, Manion & Morrison, 2000). The chapter discusses the three main paradigms as follows.

#### **4.2.1 Positivism**

It is believed in this paradigm that the social world can be studied in the same way as the natural world (Mertens, 1998). In that regard, researchers view scientists as observers of social reality (Cohen, Manion and Morrison, 2000). It is argued that the social world can be studied by employing a value-free method of data collection (Mertens, 1998). A study by Oakley (2000) argues that positivism research is seen as an expert because it considers objectivity as the truth and subjectivity as lies. Positivism as a type of research paradigm is widely used and well established in universities worldwide. It strives to investigate, confirm, and predict law-like patterns of behavior; commonly used in natural sciences, physical science, physical science and, to some extent, in the social sciences, especially where large sample sizes are involved. In a nutshell, the focus of this research paradigm is on the objectivity of the research process (Creswell, 2014).

#### **4.2.2 Interpretivism/Constructivism Paradigm**

In employing an interpretive paradigm, researchers view people and the meaning they attribute to the world, as well as their perceptions, as fundamental data sources (Mason, 2002). Interpretivism holds the notion that individuals seek to comprehend the world they live and work in. it focuses on the specific contexts in which people live and work in order to understand the historical and cultural settings of participants involved in a study (Creswell, 2014). In other

words, interpretivism seeks to understand the entire context, at the macro and micro environment level. Additionally, interpretivism is seen as a philosophical notion that people bring meanings to situations, and uses these meanings to understand their world and influence their behaviour (Creswell, 2014).

### **4.2.3 Post-Positivism**

This research paradigm refers to the thinking after positivism which challenges the traditional notion of the absolute truth of knowledge. It recognises that human beings cannot be “positive” about their claims of knowledge when studying their behaviour and actions (Phillips & Burbules, 2000). The post-positivism paradigm acknowledges the influence of values and theories in research. It advocates rigorous methods of qualitative data collection and analysis (Creswell, 2007).

The current study adopted a post-positivist research approach. It was adopted because it allows multiple perspectives from participants rather than a single reality. Post-positivism advocates methodological pluralism (mixed methods) which is built on the assumption that the choice of a research method is based on the types of research questions posed by the research, with the view that each research approach can contribute to the understanding of a general research problem by addressing different specific research problems (Wildemuth, 1993). In that regard, Pickard (2013) posits that post-positivism is rooted in the premise that any perception of reality cannot be an objective picture but is drawn from empirical observation and existing theory. In a nutshell, the concepts of quantification and generalisation taken from original positivism remain predominant (Pickard, 2013).

### **4.3 Research Approach**

Researchers use different types of research approaches, namely; quantitative, qualitative or mixed research methods (Creswell, 2014). The quantitative research approach is used in academic studies to gather data in various forms such as figures or numbers forms (Awang, 2014:84; Braun & Clarke, 2013; Hammond & Wellington, 2013: 173; Neuman, 2011; Remenyi, 2011:35). It is argued that the quantitative research approach is based on the generation and manipulation of numbers using statistical analysis. Thus, it is typically deductive in nature (Teddlie & Tashakkosri, 2009). This means that researchers plan experiments to either confirm or reject a pre-determined hypothesis. Additionally, quantitative research leans towards positivists view and as such uses experiments, quasi-experiments,

correlations and survey studies. On the other hand, quantitative research begins with a theoretical framework established from the literature review. From this framework a hypothesis will emerge and the variables within that hypothesis can be identified (the notion of the hypothesis can also be translated into research aims and objectives) (Pickard, 2013).

The advantage of using quantitative research approach is that it tests objective theories by examining the relationship among variables. The variables are then measured, typically on instruments, so that number data can be analysed using statistical procedures (Creswell, 2014). Thus, the final written report is consisting of the introduction, literature review, theory, research methods, results and discussion.

Qualitative research approach is commonly used in academic research to gather data which can be in various forms such as words, pictures, objective and host of others (Hammond & Wellington, 2013:173; Nueman, 2011:171; Piaw, 2013:53; Remenyi, 2011:35). It consists of material that is difficult to quantify such as interview transcripts, observations of non-verbal communication, drawings, or film. Qualitative research concerns itself with meaning, social context and personal experience (Denzin & Lincoln, 2005). The qualitative approach uses interpretative paradigm. Thus the essential components of a qualitative research are namely literature review, the theoretical framework, fieldwork in a natural setting, using human instrument, purposive sampling, appropriate data collection techniques, emergent design, analysis, iteration of activities, negotiated outcomes, and leading to transference of findings based on contextual applicability (Pickard, 2014). It must be mentioned that qualitative research is concerned with exploring and understanding the meaning individuals or groups ascribe to a social or human problem. It also involves emerging questions and procedures, data typically collected in the participant's setting, data analysis inductively building from particular to general themes, and the researcher making interpretations of the meaning of the data. Qualitative research has a final report which has a flexible structure and those who engage in this form of inquiry focus on individual meaning and the importance of rendering the complexity of a situation (Creswell, (2014). It must be mentioned that qualitative researchers collect data through interviews, and questionnaires, observation, documents and text, and the researcher's impressions and reactions (Myers, 2013).

Another widely used research method is the mixed method. Mixed method is a combination of, typically, quantitative and qualitative methods in order to provide complementary and

perhaps contrasting perspectives on a phenomenon (Hammond & Wellington, 2013:137). Mixed method is used by researchers to collect and analyse data, integrate the findings, and draws inferences using both qualitative and quantitative approaches in a single study of inquiry (Tashakkori & Creswell, 2007). It can be said that mixed research method does not rely on only one method but it uses many combination of methods. In that regard, mixed method research is an inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks (Nulube, 2015; Creswell, 2014). Additionally, mixed methods research (MMR) is in the realm of multi-paradigms since it employs both the positivist and interpretivist paradigms. Thus, it goes beyond the boundaries of triangulation which utilises a number of research techniques in the same research design (Romm and Ngulube, 2015).

The proponents of mixed methods research appreciate the value of both qualitative and quantitative worldviews to develop a deep understanding of a phenomenon of interest. For example, an investigator may use interviews (a qualitative data collection approach) and surveys (a quantitative data collection approach) to collect data about new tools for managing indigenous knowledge. Irrespective of the type of research design employed, the key characteristics of mixed methods research is the sequential or concurrent combination of qualitative and quantitative methods (data collection, analysis, and presentation) within a single research inquiry (Venkatesh, Brown & Bala, 2013).

Based on the above explanations, the study adopted the mixed method research. The advantage of using MMR is that it combines the strengths of the qualitative and quantitative methodology to produce a comprehensive and broad-based research (Ngulube, 2015). Additionally, mixed method approach is also able to handle a wider range of research questions because the researcher is not limited to one research design. Furthermore, it presents a more robust conclusion; offers enhanced validity through triangulation (cross-validation); adds insights and understanding that might be missed when only one research design is used. Lastly, it increases the capability to generalise the results compared to using only quantitative study designs (Venkatesh, Brown & Bala, 2013)

Broadly speaking, the core reason for using mixed methods (qualitative and quantitative research designs) is to maintain the strengths and ameliorate the silent weaknesses in both designs (Ngulube, 2015; Creswell, 2013; Neuman, 2011). Additionally, the combination of the

two research approaches presents a more enhanced insight into the research problem(s) and question(s) than using one of the methods independently (Creswell, 2014; Neuman, 2011).

A number of studies have successfully used the mixed method research approach in their studies on the management of IK using information and communication technologies. Lwoga (2009) in the study on “the extent to which knowledge management (KM) approaches and information and communication technologies (ICTs) can be used to manage agricultural indigenous knowledge (IK)” used a mixed method, in which qualitative and quantitative data were incorporated to answer the research questions which were based on the research objectives. The study findings showed that radio was the major ICT used to access exogenous and indigenous knowledge in the local communities. Naanyu’s (2013) study titled “Integration of indigenous knowledge with information and communication technologies in coping with effects of climate change and variability on agriculture in Kajiado County, Kenya” used mixed method approach combining both qualitative and quantitative data to answer the research questions which were based on the research objectives. The study found that ICT tools such as radios and mobile phones are emerging as viable avenues for acquisition and dissemination of agricultural production related information. It was also found that such tools are highly preferred because they are affordable and use local languages to disseminate information.

#### **4.4 Research Design**

The research designs are types of inquiry within the qualitative, quantitative, and mixed methods approaches that provide specific direction for procedures in a research design (Creswell, 2014). A study by Denzin and Lincoln (2011) called it strategies of inquiry. In other words, the research design is used to guide and direct the collection and analysis of data. The research design ensures that the study fulfils a particular purpose and that the research can be completed with the available resources (Durrheim, 2006). It is highly used as a plan for gathering and analysis proof that makes it possible for the researcher to answer whatever question he/she has posed. The research design ensures that it touches all aspects of research, from data collection to the selection of the techniques of data analysis (Flick, 2009). In that regard, the research design was used by the researcher as a master plan that guided on choosing a research paradigm, research method, sampling technique and statistical procedure for data analysis and interpretation of research findings. The research design is wider in scope than research method, as we may have quantitative or qualitative research design, survey research design or experimental research design, cross-sectional research or longitudinal research

design (Neuman, 2011). The study employed survey research design which helps the researcher to collect and analyse data and draw conclusions.

The survey method was used in this study to establish what perceptions, opinions and attitudes ICT users and owners of IK have in relation to the management of IK through ICTs tools. Since this method finds application capacity in both quantitative and qualitative research approaches, it is the most widely used technique for the collection of primary data and the establishment of the beliefs, opinions, attitudes, motivation, expectations, characteristics and behaviour of the respondents. This view propounded above is also corroborated by Hammond and Wellington (2013:137); Wegner (2000:73); Mugenda and Mugenda (1999:165) stated; in their proposition; that the survey method provides a speedy and economical means of determining facts about an economy and about people's knowledge, attitudes, beliefs, expectations, and behaviors. It involves collecting data by putting a set of pre-formulated questions, in a pre-determined sequence in a structured questionnaire, to a sample of individuals drawn so as to be representative of a given population, (Fox & Bayat, 2007). In a study by Neuman (2003), surveys are widely used in social science research whereby researchers seek to explain the causes of phenomenon by comparing the attributes of each variable within the phenomenon, as well as identifying and examining other characteristics that are systematically linked to the phenomenon.

In this study, several survey data collection methods were used to collect data that assisted the researcher in answering the study objectives. This involved, mainly the use of interviews and a questionnaire which were both open and closed-ended questions. These were used to ascertain the main issues; which are germane to indigenous knowledge (IK) and ICTs. The principal issues that concerned IK were:

- (a) The nature of Indigenous Knowledge.
- (b) The types of Indigenous Knowledge.
- (c) Categorisation of traditional roles and practices.
- (d) The type of IK practices inherited
- (h) The reasons that make IK to survive.
- (i) The types of ICT tools for the management of IK.
- (j) The problems encountered in the use and availability of ICT tools for managing IK.

Also captured in the self-administered questionnaire are questions on ICT users. The following are some of the key issues captured:

- (a) Awareness of custodians and or sources of various types of indigenous Knowledge in the respective communities sampled for the study.
- (b) Level of consultation with the owners of IK aimed at securing their insights relating to their success in the dissemination of indigenous knowledge.
- (c) Types of ICT tools used for the management of IK.
- (d) The ability in rating the effectiveness of ICT tools in the management of IK.
- (e) The problems encountered regarding the availability and use of ICT tools in the management IK.

## **4.5 Population and Sampling**

### **4.5.1 Study Area**

The study area was the Province of KwaZulu-Natal. The population of the study was divided into two, namely, owners or custodians of IK and ICT users/beneficiaries for the management of IK through ICT tools. KwaZulu-Natal is the largest province here in South Africa with eleven District Municipalities, namely:

- Uthukela District Municipality (Ladysmith);
- Amajuba District Municipality (Newcastle);
- Umzinyathi District Municipality (Dundee);
- Sisonke District Municipality (Ixopo/ Kokstad);
- Zululand District Municipality (Ulundi);
- Umkhanyakude District Municipality (Mkhuze);
- iLembe District Municipality (Kwa-Dukuza, Stanger);
- Ugu District Municipality (Port Shastone);
- Umgungundlovu District Municipality (Pietermaritzburg), and
- Metro Ethekwini Metropolitan (Durban).
- Uthungulu District Municipality (Empangeni and Richards Bay)

It must be noted that some of the district municipalities do not have cities as they are based in rural areas. The study used those districts; which are rurally based to interview the owners or custodians of indigenous knowledge. This was motivated by a preliminary survey by the researcher whose results showed that there were no ICT users involved in the management of IK using ICT tools in rural municipalities. Questionnaires were distributed to organisations and individuals who manage IK through ICT tools. Additionally, the spread of districts across the province gives a clear indication on the vast amount of experiences and/ or local knowledge of indigenous knowledge and those organisations and individuals that use ICTs to preserve and protect IK. The table below shows those district municipalities based in rural and urban areas.

**Table 4.1: Sample of District Municipalities that are Based in Urban and Rural Areas**

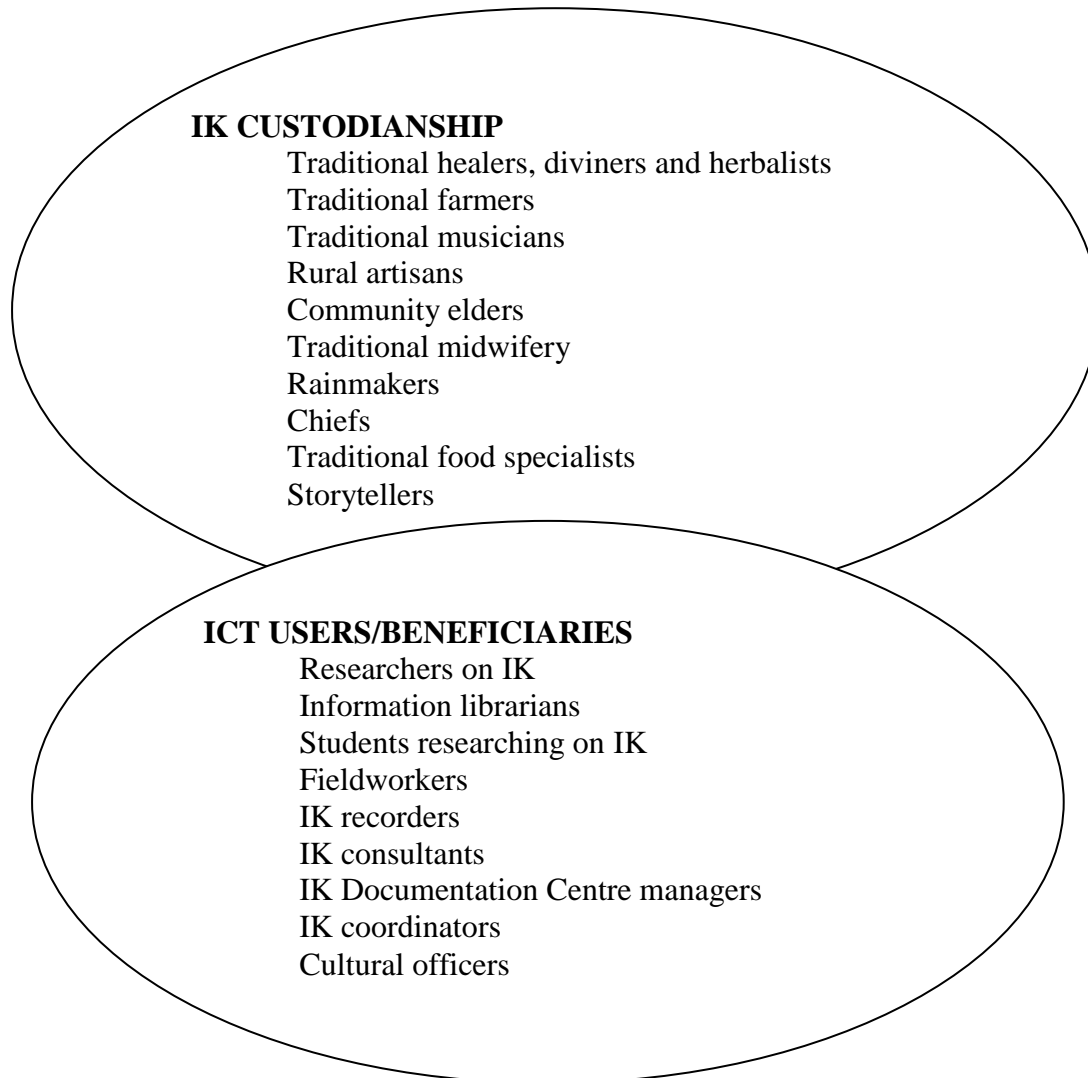
<b>Urban Based District Municipalities</b>	<b>Rurally Based District Municipalities</b>
Metropolitan Municipality (Durban)	Zululand District Municipality (Lundi)
Umgungundlovu District Municipality (Pietermaritzburg)	Umkhanyakude District Municipality (Mkhuze) Ugu District Municipality (Port Shapstone)
	Sisonke District Municipality (Ixopo/ Kokstad) iLembe District Municipality (Kwa Dukuza/ Stanger)
	Umzinyathi District Municipality (Dundee)
	Uthukela (Ladysmith)
	Amajuba district Municipality (Newcastle)

Table 4.1 above represents the ten district municipalities where the main study was carried out in KwaZulu-Natal. uThungulu District Municipality was singled out and studied not only as a basis for testing and improving the research instruments but also to familiarise the researcher with fieldwork. The other ten district municipalities were used for the main study.

#### **4.5.2 Study Population**

Notably, a study population represents the total collection of all units of analysis about which the researcher wishes to make specific conclusions (Hammond & Wellington, 2013: 173; Neuman, 2011:224). However, Neuman (2011) defines a population, as the process when a researcher specifies the unit being sampled, the geographical location, and the temporal

boundaries of the population. In this research, the study population included the following two categories of respondents, which were the owners or custodians indigenous knowledge and ICT users/beneficiaries. The conceptual model below shows the type of population that was targeted.



**Figure 4.1: General Conceptual Model of ICT Users/Beneficiaries and Custodians for Indigenous Knowledge**

The first cluster of population is owners or custodians of IK. The study chose them because their livelihood depended on indigenous knowledge for their survival. Thus, they have an extensive base of local knowledge that has accumulated over generations through local innovations and experimentations. By involving the owners or custodians of IK, the study gained a great understanding on the nature of IK, types of IK practices and the type(s) of ICT tools used for the management of IK in the rural areas of KwaZulu-Natal. Thus, the categories

of owners or custodians of IK included the following: traditional healers; traditional farmers; herbalists, elders, rural artisans, musicians, traditional food specialists, chiefs; traditional midwifery specialists, and rainmakers and storytellers.

Secondly, ICT users/beneficiaries were selected to participate in the study because they are involved in the management of IK through ICTs in the province of KwaZulu-Natal. They are considered ICT users/beneficiaries because they are active in the use of ICTs in managing IK (Department of Science and Technology, 2008-2018; Department of Science and Technology, 2016). By involving the ICT users/beneficiaries, the study gained a great understanding on whether owners or custodians of IK are sociable, the management of IK in general and the role of ICT tools in the management of IK in the province of KwaZulu-Natal. This category included the following: researchers on IK; Information Specialists/Librarians; Fieldworkers, IK recorders, IK consultants, IK documentation Centre Managers, IK Coordinator, and Cultural Officers.

#### **4.5.3 Sampling**

It must be mentioned that sampling is very important in every research project undertaken. A sample for example, is considered as a segment of the population that is selected for investigation (Neuman, 2011; Bryman 2004:87). Additionally, a sampling procedure is used to select a sub-set, of people or social phenomena to be studied, from the larger universe to which they belong, in one of several ways so as to be either non-representative or representative (Neuman, 2011). Kumar (2014) describes sampling as the way of selecting inclusion in a study which is often done in a systematic manner. It is also used in selecting participants for a piece of research (Finn, Elliotte-White and Walton, 2000). Notably, the implication of a sample is that sample is smaller than the population from which it is drawn. The principal objective in sampling is to obtain a representative selection of the sampling units within the population, the sample needs to free from element of bias (Finn et al, 2000). Effective sampling in research is manageable and provides adequate information that can be stored and at the same time manipulated as well as analysed statistically (Kumar, 2014:382; Moule & Goodman, 2014:291; Nation, 1997; & Smith, 1997).

For the purpose of this study, the sampling assisted the researcher to select manageable size of respondents. Not only that effective sampling method in this study saved the researcher a lot of money but time was also saved. In addition, good sampling technique in this research

enabled the study to be representative and allowed the research to be free from bias which gave room for the results obtained not to be dissimilar to other potential data sets obtained from simultaneous of the same population. In other words, the result from the research is reliable.

#### **4.5.3.1 Types of sampling**

There are two main types of sampling. This includes probability sampling and non-probability sampling. Probability sampling is the type of sampling that refers to whether or not each unit in the population has an equal opportunity to be a part of the sample (Pascoe, 2014; Sarantakos, 1993). This implies that in a probability sampling every item in the sampling frame has an equal chance of being included in the sample. There are several different types of probability sampling to include: simple random sampling, systematical sampling, stratified sampling, cluster sampling, multi-stage sampling, area sampling, and multi-phase sampling (Pascoe, 2014; Sarantakos, 1993).

Non-probability sampling is used when it is very difficult to determine who the entire population is or when it is difficult to gain access to the entire population (Pascoe, 2014; Sarantakos, 1993). Goddard and Melville (2004), Finn et al (2000) and Pascoe (2014) listed various types of non-probability to include: accidental sampling, purposive sampling, quota sampling, and snowball sampling.

For the purpose of this research both probability and non-probability sampling techniques were used. Probability sampling was used in the study because it removes human bias from sampling process by using methods that are random and systematic which encourage step-by step procedures (Neuman, 2011). For the purpose of this study the type of probability that was used was cluster sampling. Purposive sampling was used to select those district municipalities based both in rural and urban areas. The researcher's approach in this regard was informed by Hammond and Wellington (2013: 173) and Neuman's (2003:213) assertion that purposive sampling uses the judgement of an expert in selecting cases with specific purpose in mind. Neuman (2003) in particular argues that purposive sampling enables a researcher to obtain a sample to satisfy specific needs of the study. Notably, since the Province of KwaZulu-Natal has eleven district municipalities, cluster sampling was used in clustering the districts within the province into two categories as follows:

- (a) Districts with high and medium ICTs infrastructure are accorded reliable status by ICTs users/beneficiaries.

(b) Districts in rural areas with relatively poor infrastructure are exclusively designated for villagers and are thus relevant custodians and/ or owners of IK.

Notably, cluster sampling is used when no sampling frame is available for all units of the target population and when either the population is very large or scattered over a large geographical area (Pickard, 2013:63; Mugenda & Mugenda, 1999:49). It is further contended that cluster sampling is used to group elements of a population in accordance with their shared characteristics which may range from ecological zones, villages to families (Aina, 2002; Mugenda & Mugenda 1999). Arguably, the advantage of cluster sampling is that it is used when a population is widely dispersed and large, requiring great deal of effort and travel to acquire the desired survey information (Robson, 1997:139).

Drawing insights from the views propounded above on cluster sampling, it enabled the researcher to group the districts into two categories according to their exhibited similar characteristics. This clustering significantly reduced the cost of reaching the dispersed population of both owners and/or custodians of IK and ICT users in managing IK through ICTs. It is notable, therefore, that the researcher purposively selected those districts whose access to ICTs infrastructure (The Metropolitan in Durban) is high and those districts populated by owners and/ or custodians of indigenous knowledge.

Along the line the target population of the study turned out to be on large side and the researcher discovered that he might not be able to handle it effectively. In addition, to that fact that the geographical area was becoming more widely spread out than originally planned and the resources were inadequate, the use of a sample was thus necessitated.

#### **4.5.3.2 Cluster Sampling**

In large scale studies, where, the population is geographically widespread, sampling procedures can be difficult and time consuming. In addition, it may be difficult or even impossible for the researcher to obtain a total listing of some populations. Then cluster sampling may be appropriate. The main advantage of cluster sampling is that it is considerably more economical in terms of time and costs than other techniques of probability sampling, particularly when the population is large and geographically dispersed.

Kumar (2014) stated the various advantages of using cluster sampling technique in academic research to the fact that it is very useful for a research that does not have a reliable sampling frame due to dispersed nature of his research population. In addition, cluster sampling is very useful when the population is very large.

- The researcher found cluster sampling technique very relevant for the study, since the researcher lacked adequate knowledge on the owners or custodians of indigenous knowledge and the ICTs users/beneficiaries for managing IK through ICTs. Therefore, the first cluster was to draw a list of owners and/ or custodians of IK and to identify their roles they play in the community as follows: traditional healers; traditional farmers; herbalists, elders, rural artisan, musician, traditional food specialists, rainmakers; chiefs; traditional midwifery, rainmakers and storytellers was the first cluster.
- The second cluster was identified as the ICT users/beneficiaries who were managing IK through ICTs, they include: Researchers on IK; Information Librarians, Field workers, IK recorders, IK consultants, IK managers, IK coordinators, Cultural officers, Collections officers etc.

The clusters identified above are supported by Aina (2002:39) and Kumar (2014:240), by asserting that cluster sampling involves dividing a population into clusters or groups and then drawing a sample of those clusters. The researcher chose this sampling technique because the population is scattered in different districts, thus having them clustered makes it easier for the researcher to know very well those that are required by the study.

The researcher took an advantage of non-probability sampling because he does not know the size of the population to be used. The advantage of non-probability is that it helps researchers who rarely know the sample size in advance and have limited knowledge about the larger group or population from which the sample is taken (Moule & Goodman, 2014:298; Neuman, 2003:211).

#### **4.5.3.3 Purposive/Judgmental Sampling**

Purposive sampling is sometimes called ‘judgmental’ sampling (Brink & Wood 1998, Burns & Grove 2011). It is another type of non-probability sampling. Thus this technique is based on judgment of the researcher regarding participants or objects that are typical or representative of the study phenomenon or who are especially knowledgeable about the question at hand.

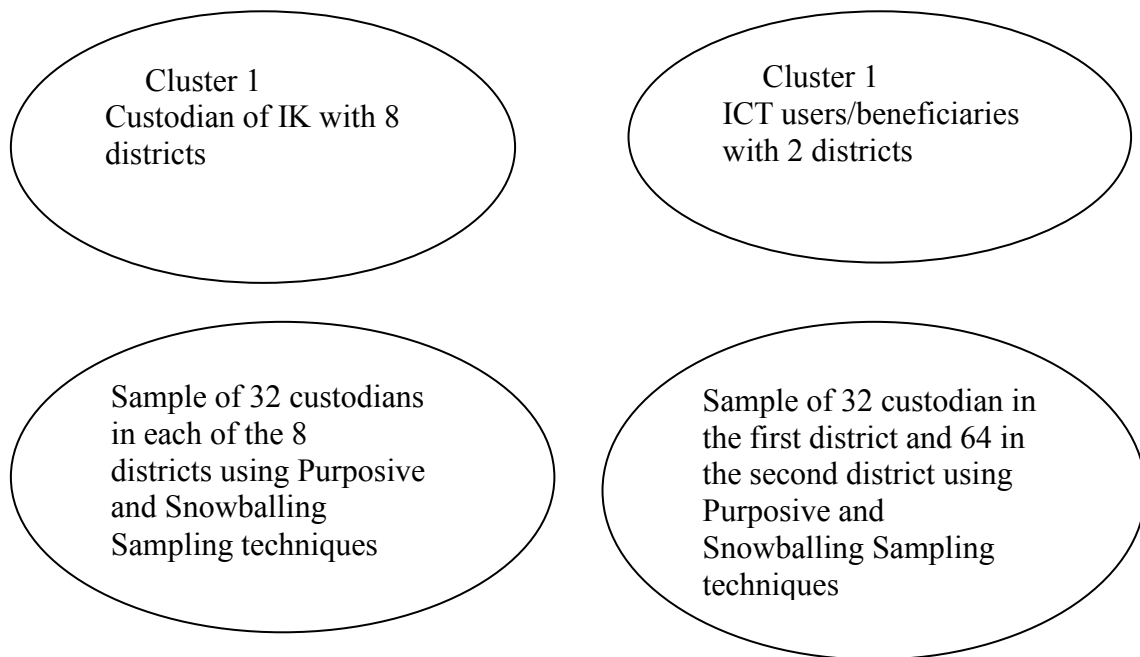
Alternatively, the researcher may have to interview individuals who reflect different ends of the range of a particular characteristic.

This type of sampling is commonly seen in qualitative research. As the qualitative researcher using this method does not know in advance how many participants are needed, he/she samples continuously until data saturation occurs. Data saturation is the point at which new data no longer emerge during the data-collection process. The advantage of purposively sampling is that it allows the researcher to select the sample based on the knowledge of the phenomena.

The purposive sampling technique was also used to minimize the number of districts to be the object of enquiry. Insights in this regard were drawn from related studies (Aina's 2002:39; Hammond and Wellington', 2013: 173; Kumar 2014:244); that concur that handpicking a certain group or individuals for their relevance to the issue being studied is an invaluable strategy. Its advantage is that it assures the researcher that he or she gets the most relevant information from the sampled respondents because their responses were very important to the study.

#### **4.5.3.4 Snowball Sampling**

Snowball sampling involves the assistance of the study participants in obtaining other potential participants, especially where it is difficult for the researcher to gain access to the population. This type of sampling consists of stages. Firstly, the researcher identifies few people who have the required characteristics. They then help him/her to identify more people, who also possess the desired characteristics and who are included in the next stage (Neuman, 2011). The process continues until the researcher is satisfied that the sample is sufficiently large (Neuman, 2011). Thus snowball and purposive sampling techniques were used. In fact snowball sampling technique is used when the researcher builds up a sample of a special population by asking an initial set of informants to supply names of other potential sample members. The researcher met some sources of IK who refer him to other IK experts in the province.



**Figure 4.2: Representation of Clusters according to Population and Districts**

The list of the owners or custodians of indigenous knowledge is summarised on table 4.2 below. The original target population as shown in Table 4.2 was a sample of 224 owners or custodians of IK from the eight district municipalities where the final study was conducted. In other words, 32 owners or custodians of IK were supposed to be interviewed in each district municipality, however, some chiefs and traditional midwives were not interviewed as they had a busy schedule. The researcher and his assistants could not interview them as they were always not available in their homes to be interviewed. Table 4.3 shows the distribution of questionnaires among the ICT users/beneficiaries who are managing IK through ICT tools. Thus, the original sample size of ICT users/beneficiaries was 96 from the two district municipalities, namely: The Metropolitan in Durban and Umgungundlovu District Municipality in Pietermaritzburg. Notably, 4 questionnaires were distributed per category of ICT users/beneficiaries at Umgungundlovu District Municipality in Pietermaritzburg while 8 questionnaires were distributed per category among ICT users/beneficiaries at The Metropolitan in Durban. There was a larger sample size of ICT users/beneficiaries in The Metropolitan because the researcher was laboring under the presumption that since Durban Metropolitan is the main head of all the municipalities, and its ICTs infrastructure is better which then translates into the figure that is representing the high density of ICTs infrastructure. However, the researcher was able to receive 57 distributed questionnaires from ICT users. The researcher tried all in his power to follow up to those ICT users/beneficiaries who did not return the questionnaires, but with no

success. The researcher used what he received as it was above fifty percent of the total sample. The samples designed are presented in the following tables:

**Table 4.2: Representation of Owners/Custodian of IK in the Eight Districts**

Districts	District Municipality								Total
	Traditional midwife	Traditional Healers	Traditional Farmers	Chiefs	Traditional storyteller	Clan elders	Traditional Musicians	Traditional Artisans	
Ugu District	4	4	4	4	4	4	4	4	28
Amajuba District	4	4	4	4	4	4	4	4	28
Uthukela District	4	4	4	4	4	4	4	4	28
Umzinyathi District	4	4	4	4	4	4	4	4	28
Umkhanyakude District	4	4	4	4	4	4	4	4	28
iLembe District	4	4	4	4	4	4	4	4	28
Sisonke District	4	4	4	4	4	4	4	4	28
Zululand District	4	4	4	4	4	4	4	4	28
<b>TOTAL</b>	<b>32</b>	<b>32</b>	<b>32</b>	<b>32</b>	<b>32</b>	<b>32</b>	<b>32</b>	<b>32</b>	<b>224</b>

**Table 4.3: Representation of ICT Users/Beneficiaries in the Two Districts**

Districts	District Municipality								TOTAL
	Researchers on IK	Information Librarians	Fieldworkers	IK recorders	IK consultants	IK managers	IK coordinators	Cultural officers	
Umgungundlovu District	4	4	4	4	4	4	4	4	32
Metropolitan Ethekwini	8	8	8	8	8	8	8	8	64
<b>Total</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>96</b>

#### 4.6 Data Collection Instruments

In mixed methods, data collection is defined as the gathering of a mixture of qualitative and quantitative data in a single study (Pickard, 2013; Teddlie & Tashakkori, 2009). Thus, the current study used simultaneous strategy to collect both qualitative and quantitative data simultaneously (Creswell and Plano-Clark 2007:118). Quantitative data was then embedded within the dominant qualitative approach. Both qualitative and quantitative data were also mixed during the analysis and discussion phase of the study (Creswell 2003:218; Creswell and Plano-Clark 2007:118).

It must be emphasised that obtaining access to the research field can vary to a considerable extent, depending on the kind of cases being investigated (Johl, & Renganathan, 2009). For example, firms or organization with sensitive information in most times are difficult to access

and also find it problematic to release the information required (Creswell & Plano-Clark 2007). In most cases, access is denied due to sensitive and unauthorized areas, and also to some people who have something to protect or have busy schedules (Neuman, 2011). Thus, approval to collect data might be gained through individuals in authority (gatekeepers) to provide access to study participants at a research site (Creswell 2013; Neuman, 2011). Moreover, gaining access to the research site also requires writing a letter to inform the participants about the extent of time, the potential impact, and the outcome of the research (Creswell 2003:65).

The familiarity of the research assistants with the community leaders in the local communities where owners and/or custodians of IK resided was used to gain access to the research area in this study without even getting a letter of approval from the authorities. Further, the introduction letters obtained from the University of Zululand was also used to get permission to conduct research in the selected institutions in Durban and Pietermaritzburg (see Appendix A).

A data collection technique allows us to systematically collect information about our objects of study (people, objects, phenomena) and about the settings in which they occur. In other words, it is the way in which empirical evidence will be harvested from the source. It normally refers to questionnaires, interviews, observations, just to mention a few (Pickard, 2013). Because the study is a mixed method, data was collected in both qualitative and quantitative data from the semi-structured interviews and self-administered questionnaires where open-ended and closed-ended questions were posed. Additionally, the open-ended questions which were meant for owners and/or custodians of IK were translated into isiZulu language since most Zulu people are more comfortable in speaking isiZulu than the English language. The data collection techniques are briefly described below as follows.

#### **4.6.1 Self Completed Questionnaire**

The aim of the questionnaire was to obtain information regarding the types of ICT tools used for managing indigenous knowledge in KwaZulu-Natal. Additionally, this questionnaire was meant for ICT users/beneficiaries.

The open-ended or unrestricted questionnaire calls for free response on the part of the respondents. The study employed both closed and open-ended questions to permit the respondents to answer the questions on their own.

The questionnaires for the ICT users/beneficiaries were divided into various parts (4) sections. Section one comprises questions on personal information such as demographic variables information and institution to which the respondent belonged. Section two comprises questions on consulting owners or custodians of IK. Section three comprised the types of ICT tools that are currently used to manage IK. Section four comprises problems encountered in the use and availability of ICT tools in capturing IK. Lastly, section five is about suggesting a strategy for improving the use and availability of ICT tools to effectively manage IK (see appendix A).

These subject areas were in agreement with the research questions in chapter one of the thesis. Moreover, the questionnaires were both open-ended and closed-ended questions. They were administered to the respondents by the researcher and his research assistance. 96 copies of the questionnaire were distributed in academic libraries, public libraries, cultural offices and IK centres in tertiary institutions. However, only 57 copies of questionnaires were returned which made 59% of response rate. This was used for the analysis of the study.

#### **4.6.2 Semi-Structured Interview**

An interview refers to a short-term, secondary, social interaction between two strangers with the explicit purpose of one person obtaining specific information from the other (Hammond & Wellington, 2013:170; Neuman, 2003:267; Richards, 2015:47. Aina (2002:84), on the other hand, state that, in an oral questionnaire the interviewee answer the questions orally which may be done through face-to face or through the use of technology such as telephone. It is also argued that the interviews allow participants to debate their interpretations of the world in which they live, and to express how they regard situations from their own point of view (Cohen, Manion & Morrison 2007:349). The study used semi-structured interviews because they are based on written lists of questions or topics that need to be covered in a particular order although some questions may arise during the semi-structured interviews (Pretty & Vodouhe 1997).

The researcher used interviews because the respondents were more willing to talk than to write and this enabled the researcher not only to explain more explicitly the purpose of the investigation but also to make some adjustments relating to the kind of information that was sought at any given time. It is noted that interview schedules normally have structured, semi-structured and unstructured questions and makes it easier for researcher to gather information that would be useful in achieving the research objectives (Mugenda & Mugenda, 1999:86). The

study used semi-structured interviews to collect data from the owners or custodians of indigenous knowledge.

However, in semi-structured interview allows for structured questions to be included with open ended questions. The researcher seeks for the permission of interwar to record the conversation and at the same time notes being taken. This is line with submission of Mugenda and Mugenda (1999:87) who stated the various advantages of note taking during research interview, that note taking during interview promotes better data analysis because the information is already accessible and it becomes easy for the researcher to classify them accordingly. Secondly, it allows for accurate capture of the interview discussion. The study employed the use of self-completed questionnaire and semi-structured interviews due to the benefit and the strength of both types of data collection methods (Mugenda & Mugenda 1999:87).

#### **4.6.3 Data Collection Strategy**

Since the data to be collected was in dispersed areas of study, research assistants were identified and trained. A letter that seeks permission for data collection was prepared, however, it was not used as targeted institutions and individuals did not ask for it.

Because of the dispersed area of the study and massive respondents, the researcher had to take four research assistants for training. These were persons were born and resident in the districts of the study and those who were studying at the University of Zululand who come from these districts. The research assistants were trained in order to achieve several objectives. The training covered translation of the interview schedule into the local language and the methods of interviewing and recording data. The English interview schedule was translated into Zulu as the local language.

In applying this instrument, each research assistant was given a set of the interview schedule to take along to the interviews. In each interview section, the interviewees were allowed to communicate in any language that is suitable for them.

Research assistants were mandated to read the questions or statements to the respondents and afford the respondent time to think about the question prior to providing an answer. The research assistant would then write the answer in the English language in cases where the questions or statements were in the local language. The interview schedule for the custodians

and/or sources of IK was meant to gather information on the role they play in their communities. For instance, this entailed, among other things, imparting their experiences and/or local knowledge to ICT users/beneficiaries and those community and/or family members that consult them for a particular problem.

#### **4.7 Pilot Study**

It should be stated that the pilot study is always carried out before the main study is conducted. Doing that helps to test, redefine and strengthen the instruments before the actual research investigation. In that regard, Leedy and Ormrod (2011:111) emphasised that pilot studies in academic research basically save the researcher effort and at their precious time. Authors such as De Vos et. al (2005:206) state that pilot study guide the researcher to identify the best approaches that would provide better answers to research objectives.

Marshall and Rossman (2016:105) opine that pilot studies are useful to buttress the argument and rationale for a genre strategy. Thus a pilot study was undertaken by the researcher and the four research assistants from Kwadlangewa township. The current study used the University of Zululand IK Centre and Ongoye rural community under uThungulu District Municipality as a pilot study before embarking on the main study.

The researcher with the support of research assistants carried out the pre-test with the same instruments of questionnaire and interview regarding the use of ICT tools in managing indigenous knowledge (IK) in the province of KwaZulu-Natal. This was done in order to ensure reliability of the instruments before administration. Notably, the outcome of the pilot study was used to improve in the modification of the questionnaire used for the study. For example, the researcher learned that it was important to ask for help from the chief (Induna) of the community who will introduce the researcher and his assistants to the community members. This reduced un-certainty among community and were able to give the researcher and his assistants the information required. The results of the pilot study was analysed for observation but was never used in the main study as explained that it was meant for testing and improving the main field-work.

## **4.8 Validity and Reliability of Instruments**

It is widely acknowledged that validity and reliability are of major concern for data quality control measures in research (Ndunguru 2007:89). Thus, they help to establish the truthfulness, credibility and believability of findings (Neuman 2011:188). The researcher must categorise how the measurement should follow, based on the instrument used. In that regard, the instrument is validated either through face or content in order to get rid of unnecessary materials that are not needed. Moreover, the instrument needed for collection of data must have evidence of degree of validity and reliability before use (Leedy & Ormrod, 2010).

### **4.8.1 Validity**

Neuman (2011:208) argues that validity means truthfulness. In other words, it is about how well ideas are reflective of actual reality. In that regard, validity is the extent to which the research findings accurately represent what is really happening in the situation.

Validity helps to identify if the research instrument measure what it is design to measure (Neuman 2011:208). For the purpose of the study, the research instrument was matched with the operational subject area. The validity of the research instrument used for the study was tested by giving it to the supervisor and various researchers in IK and information studies in the university. The essence of this was to make sure that the research instrument measure what is expected to measure. Various methods were employed to ensure that validity of the findings was achieved in this study, which include: Confirmation of the research instruments with related studies and professional expert suggestion on the instrument, and conducting the pilot study to test the validity of the instruments.

### **4.8.2 Reliability**

The term reliability refers to the degree to which a measure can give dependable and unchanging results in a measurement process (Neuman 2011:208). In that regard, for a research tool to be dependable, it requires reliability and dependability (Neuman, 2011:208). In other words, reliability shows that instruments are without bias and/or error free. Leedy and Ormrod (2010:29) are of the view that when there is consistency with the measuring instrument bringing results without any change that can be termed reliability. Before the actual study commenced, the pilot study was carried. Thus, authors such as Teijlingen and Hundley (2001:1) opined that conducting a pilot study gives advance warnings about where the main

research project could fail, where research protocols may not be followed, or where proposed methods or instruments are inappropriate or too complicated. In that regard, the pilot study was meant to establish the questionnaire's and interview's effectiveness, reliability and validity before the actual study. It was used to examine various aspects of the research which include population, research questions and host of others.

Notably, the used of both close ended and open-ended questions in the study encouraged dependability of the thesis. For effective reliability of the research instruments the study used simple and direct words that would be easily understood by the respondents and would promote effective communication. The pilot study took place during the month of June, 2010.

#### **4.9 Ethical Considerations**

The importance of ethical consideration cannot be over-emphasised in academic research. This implies that ethical concerns must be part of the fundamental design of any research (Hammond & Wellington, 2013:59-60; Mugenda & Mugenda 1999:190). Arguably, for research freedom not to violate the rights of those involved in the research process, research must be guided by unwritten standards and principles (Hammond & Wellington 2013:60; Mugenda & Mugenda, 1999:190). Therefore, ethical consideration was kept in mind when the field-work was conducted. Additionally, the standards and ethics of research of all institutions involved were adhered to. In that regard, the Ethics Committee of the University of Zululand assessed and approved the study (with reference number: UZREC171110-030). An informed consent, a letter introducing the researcher and stating the purpose of the study was issued to secure permission to do the project.

The researcher was granted permission from the gatekeepers to collect data without any hindrance. The respondents were assured the confidentiality and privacy of their information. Apart from this the respondents were educated on their rights of consent form participating in this research (Corbin & Strauss, 2015:13; Neuman, 2003:127). Another ethical issue considered was the integrity of the researcher. Notably, there are eight elements a researcher must follow to do faithful and thorough work (Ikoja, 2002:188). This includes accuracy in data collection and processing of the data, application of appropriate methodology and accurate data analysis.

#### **4.10 Data Analysis**

Broadly speaking, data analysis is a systematic method and synthesis of data that involves the application of one or more statistical techniques. One of the advantages of data analysis is that it gives meaning to data collected during research in a way that permits the researcher to accurately answer the research question (Gay, Mills & Airasian, 2006). It is argued that data must be organised in detailed form and must be categorised. In other words, data must be interpreted in single instances, but patterns must also be identified. In addition, data must be synthesised and generalisations must be made (Leedy & Ormrod, 2005).

In this study, data analysis in mixed methods research involves analysis of the quantitative data using quantitative methods and qualitative data using qualitative methods (Creswell and Plano-Clark 2007:128). Thus, knowing the steps in both forms of qualitative and quantitative analysis is necessary in mixed methods questions since both qualitative and quantitative approaches deal with data analysis differently (Creswell and Plano-Clark 2007: 128). It must be mentioned that the study collected primary data using questionnaires and the secondary data was collected using the semi-structured interviews.

For quantitative data, it is basically analysed using statistical methods, and results can be displayed using tables, charts, histograms, and graphs (Neuman, 2011). The quantitative data was analysed using the Statistical Package for Social Sciences (SPSS). The study chose this program because of its ability in allowing large quantities of data processing by computer with organisation and interpretation of data. Moreover, this software or program saves time and also performs complex data manipulation with accurate and reliable instructions (Neuman, 2011; Larson-Hall, 2010). Through the use of SPSS, the study was able to create frequency tables, graphs and pie charts and subsequent presentation. On the other hand, data collected through interviews were analysed using the content analysis. Notably, content analysis is defined as words, meanings, pictures, symbols, ideas, themes or any message that can be communicated (Neuman, 2003:310). Content analysis involves logical groupings of the data with similar message (Kumar 2014:318; Mugenda & Mugenda, 1999:174). As such, open-ended questions are scanned to determine words or phrases that are frequently used by the respondents. The qualitative data analysis was used to prepare and organise the data for analysis, by reducing the data into themes through a process of coding and condensing the codes, and finally representing the data in tables or discussion (Creswell 2007:148). The researcher categorised all themes

contained in data, followed by linking of the themes and ideas and exploring new ideas. The study found content analysis as a suitable approach for collecting and organising information systematically in a standard format as it allows the researcher or analyst to draw conclusions about the characteristics and meaning of the recorded material (Alreck & Settle, 1995; Neuman, 2011).

#### **4.11 Summary**

This chapter provided the research design and methodology of the study. This chapter, broadly discussed various issues including the research paradigms, research approaches, study population, sampling procedure, data collection procedure and instruments, data analysis, pilot study, validity, reliability and research ethics.

The chapter highlighted some silent issues that are vital to the present study. Firstly, the main theme that appeared in the chapter was that when conducting a study on the use of ICT tools to manage IK, it is imperative to use mixed methods in order to enable the local people to express themselves and generate a lot of data. Secondly, the use of both quantitative (survey-questionnaires) and qualitative (semi-structured interviews) enabled the study to unveil unbiased findings. Thirdly, the other important theme was that issues of validity and reliability were paramount important in confirming the trustworthiness of the research findings. The limitation of this chapter was that it did not use observation as the other instrument for collecting data. The data that was collected in the study addressed the research objectives.

The current study sampled 224 owners or custodians of IK and 96 ICT users/beneficiaries. Notably, of the 224 sampled respondents, 196 were interviewed and 57 copies of questionnaires were returned. In that regard, the data obtained from both interviews and questionnaires were used for the analysis of the study. It must be mentioned that the research instruments played a pivotal role on the results that would help establish the findings obtained in this study. Additionally, the Statistical Package of Social Sciences (SPSS) contributed significantly to the findings on the use of ICT tools to manage IK. The content analysis also contributed heavily in the nature, types and importance of IK in KwaZulu-Natal. Lastly, the data that was collected in the study was based in the research objectives.

The researcher noted with concern that the districts surveyed were very dispersed from one another. Therefore, a lot of money was required travel and pay research assistants. The researcher had to rely on his bursary in order pay the research assistants and for petrol and tollgates. Most of the challenges that the researcher faced were discussed under Section 7.4 (in Chapter 7).

The next chapter presents the research findings.

## **CHAPTER FIVE**

### **DATA PRESENTATION, ANALYSIS AND INTERPRETATION: ICT USERS/BENEFICIARIES AND OWNERS OR CUSTODIANS OF IK**

#### **5.1 Introduction**

The purpose of this chapter was to report the results of the data analysis; which transformed the raw data, obtained from the study, into meaningful facts. This chapter is divided into two parts. Part one of the chapter presented the data that was obtained from the questionnaires distributed among ICT users/beneficiaries. Thus the ICT users/beneficiaries consisted of researchers, information librarians, fieldworkers, IK recorders, IK consultants, IK documentation-centre managers, IK coordinators, cultural officers, government employees and collection officers. Part two of the chapter analysed the data collected through semi-structured interviews from the owners or custodians of indigenous knowledge in the province of KwaZulu-Natal. The owners or custodians of indigenous knowledge consisted of traditional healers, herbalist, diviners, traditional farmers, traditional midwifery practitioners, traditional musicians, traditional storytellers, traditional artisans, community elders, traditional food specialists, the chieftaincy, and rainmakers.

Part one of the chapter analysed fifty seven (57) questionnaires from ICT users/beneficiaries. The questionnaires addressed the questions one to twenty five (1-25), as presented in appendix A of this research project. The study's results are presented as symbolic representations; which included tables. The chapter is organised as follows:

- 5.2 Demographic profile of respondents,
- 5.3 Visiting and consulting owners or custodians of IK,
- 5.4 Importance of recording or capturing, storing and disseminating IK through ICT tools,
- 5.5 Problems encountered in the use and availability of ICT tools in managing IK.
- 5.6 Strategies for improving the effective use of ICT tools in recording or capturing, storing and disseminating IK and

Notably, part two of the chapter analysed data that was collected by means of interviews from the owners or custodians of IK. One hundred and ninety six (196) interviews were conducted and reported in the chapter. The interview questions addressed the questions one to twenty nine, as presented in appendix B of this research project (see appendix B). Moreover, part two of the chapter was analysed using the content analysis. Part two is organised as follows: 5.7 demographic profile of respondents; 5.8 nature of indigenous knowledge (IK); 5.9 types of indigenous knowledge (IK) practices; 5.10 using ICT tools to record or capture, store and disseminate IK; 5.11 problems encountered in the use and availability of ICT tools in recording, storing and disseminating IK; 5.12 recommended strategies for improving the use and availability of ICT tools in managing IK. Lastly, 5.13 is the summary.

### **Part One: Data Analyses of ICT Users/Beneficiaries**

#### **5.2 Demographic Profile of the Respondents**

Respondents were required to respond to structured questions relating to personal information such as their gender, status, age and the highest academic qualification. These structured questions were meant to determine the relationships between the demographic characteristics and the purposes and uses of ICT tools in managing indigenous knowledge.

**Table 5.1: Demographic Profile of the Respondents**

<b>Variables of Biographic data</b>		
<b>Variables</b>	<b>Frequency</b>	<b>%</b>
<b>Gender</b>		
Female	30	52.6
Male	27	47.4
<b>Total</b>	<b>57</b>	<b>100</b>
<b>Age</b>		
31-40yrs	31	54
21-30yrs	15	26
41yrs and above	11	19
<b>18-20yrs</b>	<b>Nil</b>	<b>Nil</b>
<b>Total</b>	<b>57</b>	<b>100</b>
<b>Status</b>		
Researcher	14	24.5
Information Librarians	10	17.5
Field worker	8	14
IK recorder	8	14
IK consultant	6	10.5
IK documentation centre Manager	4	7
IK coordinator	3	5
Cultural officer	2	3.5
Government employee	1	1.7
Collections officer	1	1.7
Student	Nil	Nil
Academic	Nil	Nil
Journalists	Nil	Nil
Artisans	Nil	Nil
<b>Total</b>	<b>57</b>	<b>100</b>
<b>Work Experience</b>		
1-5yrs	22	38.5
6-10yrs	23	40
11-15yrs	8	14
16 -20yrs	4	7
21-25yrs	Nil	Nil
26yrs and above	Nil	Nil
<b>Total</b>	<b>57</b>	<b>100</b>

### **5.2.1 Classification of the Respondents According to Gender**

The results in Table 5.1 indicate that slightly (52.6%) more females than males (47.4%) respondents were in the sample group. Interestingly, both women and men are involved in managing IK through ICT tools in the province of KwaZulu-Natal. It can be concluded that this study is fairly represented by men and women.

### **5.2.2 Distribution of the Respondents by Age**

The majority of the ICT respondents (54%) were between the ages of 31-40 years while (26%) of the respondents was between the ages of 21-30 years, and only 19% were 41 years and above. The ages between 18-20 years recorded nil.

### **5.2.3 Distribution of the Respondents by Position**

The majority of the ICT respondents (24.5%) were recorded to be researchers, whereas only 17.5% of the respondents comprised of information librarians. Additionally, 14% of the respondents comprised field workers, and another 14% comprised indigenous knowledge recorders. While 10.5% comprised indigenous knowledge consultants, 7% was indigenous knowledge documentation centre managers. Five percent (5%) of the ICT respondents comprised indigenous knowledge coordinators whereas 3.5% comprised cultural officers. The government employee constituted 1.7% and another 1.7% was a collections officer. Students and academics recorded nil.

### **5.2.4 Distribution of the Respondents by Work Experience**

What is shown in Table 5.1 is that the majority of the respondents (40%) had worked for a period of 6-10 years and this was closely followed by 38.5%, which indicated that they had worked between 1-5yrs. Additionally, 14% of the respondents worked between 11-15yrs and only 7% had worked for between 16-20yrs. Lastly, the work experience between 21-25 years and 26 years and above recorded nil. The respondents had adequate work experience.

## **5.3 Visiting and Consulting Owners or Custodians of IK**

The terms 'indigenous knowledge holders' or 'custodians' refers to the primary sources of community knowledge, consisting of individuals in the community, who are not necessarily elders, and who exemplify the accumulated knowledge, values and life ways of the local culture (Department of Science and Technology, 2015). They are considered retainers of indigenous knowledge. Their experiences are expressed in the form of actions, objects and sign language.

The study sought to establish whether ICT users visited and consulted owners or custodians of IK to capture IK. The respondents were asked to state whether they visited and consulted custodians of IK. A summary of the responses is captured in table 5.2 below.

**Table 5.2: Visiting and Consulting Custodians of IK [N=57]**

<b>Visiting and Consulting Owners of IK</b>		
<b>Variables</b>	<b>Frequency</b>	<b>Percentage %</b>
Yes	50	87.7
Sometimes	7	12.0
No	Nil	Nil
<b>Total</b>	<b>57</b>	<b>100</b>

Fifty (87.7%) respondents indicated that they visited and consulted owners or custodians of IK, whilst 7 (12%) visited and consulted sometimes. These findings revealed that owners or custodians of indigenous knowledge are frequently consulted.

### **5.3.1 Categories of Owners or Custodians of IK Visited and Consulted by ICT Users/Beneficiaries**

It was significant for this study to unearth the different types of owners or custodians of IK who were visited and consulted by ICT users/beneficiaries. The respondents were asked a question pertaining to the different types of owners or custodians of IK who were visited and consulted. Using a close-ended questionnaire, appropriate multiple answers were selected. It is worth mentioning that the respondents were allowed to choose more than one option and were asked to provide any other that was not listed. Multiple responses were generated, as summarized in Table 5.3 below.

**Table 5.3: Custodians of IK Visited and Consulted by ICT Users/Beneficiaries in KZN**  
[N=57]

<b>Categories of custodians visited, for their indigenous knowledge</b>		
<b>Variables</b>	<b>Frequency</b>	<b>Percentage %</b>
Traditional healer	51	89
Traditional farmer	35	61
Herbalist	27	47
Elder	25	43.8
Rural artisan	15	26
Traditional musician	12	21
Prophet	11	19
Traditional food specialist	10	17.5
Chief	8	14
Storytellers	2	3.5
Traditional midwife	1	1.7

*The table above represents multiple responses*

As on the table, fifty-one (89%) respondents visited and consulted traditional healers, while 35 (61%) traditional farmers. Furthermore, twenty-seven (47%) respondents visited herbalists, followed by elders, with a score of twenty-five (43.8%) respondents. Rural artisans were less frequently visited, with a score of fifteen (26%) respondents, whilst traditional musicians numbered as twelve (21%). Other custodians of IK who were also less visited and consulted included prophets (11; 19%), traditional food specialists (10; 17.5%), chiefs (8; 14%), storytellers (2; 3.5%) and the least visited and consulted IK custodian was the traditional midwife (1; 1.7%). It can be inferred from the table above that, owners or custodians of IK are recognisably visited and consulted. Furthermore, most people visit and consult with traditional healers (89%).

### 5.3.2 Frequency of Visiting and Consulting with the Owners or Custodians of IK

The study sought to establish how regular the owners or custodians of IK were visited and consulted by ICT users/beneficiaries. Regular use of a service indicates necessity or importance of that service. Table 5.4 below summarises the findings.

**Table 5.4: Frequency of Visiting and Consulting with the Owners or Custodians of IK**

[N=57]

<b>Frequency of Visiting and Consulting Owners or Custodians of IK</b>		
<b>Frequency of visiting and consulting custodians of IK</b>	<b>Frequency</b>	<b>Percentage %</b>
Monthly	19	33
Anytime when dealing with IK project at work	10	17.5
Very often	10	17.5
Once a year	8	14
Three times a month	4	7
Once a week	4	7
Once in three months	2	3.5
<b>Total</b>	<b>57</b>	<b>100</b>

The responses highlight again the predominance of the monthly, anytime when dealing with IK project at work, very often, once a year, three times a month, once a week and once in three months as primary times of frequently visiting and consulting as depicted in Table 5.4. The frequencies were 19 (33%) for monthly, 10 (17.5%) for anytime when dealing with IK project related to work, another 10 (17.5%) for very often, 8 (14%) for once a year 8 (14%), 4 (7%) for three times a month, another 4 (7%) for once a week 4 (7%) and 2 (3.5%) for once in three months 2 (3.5%). Overall, there is a significant visitation and consultation of the owners or custodians of IK among the sampled population in the province of KwaZulu-Natal.

### 5.3.4 Purpose of Visiting and Consulting Owners or Custodians of IK

The respondents were required to give their personal views on an open-ended question regarding their purpose and/or reason for visiting and consulting the custodians of IK. It was essential to gather information on whether ICT users/beneficiaries value the uses and importance of gathering IK. Moreover, the researcher wanted to gather information on whether ICT tools are used for recording, storing and disseminating IK in the province of KwaZulu-Natal. The table below shows the number of responses for each reason and the corresponding percentages.

**Table 5.5: Purpose of Visiting and Consulting with the Owners or Custodians of IK**  
[N=57]

<b>Purpose of visiting and consulting</b>		
<b>Variables</b>	<b>Frequency</b>	<b>Percentage %</b>
Recording or capture IK on ICT tools	49	86
Storing IK through on ICT tools	49	86
Disseminating IK through ICT tools	44	77
Research purposes	37	64.9
Personal growth	25	43.8
Integrate knowledge into museum lecture and display	1	1.7

*The table above represents multiple responses*

The results revealed that an overwhelming majority of respondents (49; 86%) visited and consulted with the custodians of IK in order to record or capture tacit indigenous knowledge practices through ICT tools, whilst another 49 (86%) for storing IK through ICT tools. Forty-four (77%) respondents visited and consulted the owners or custodians of IK for disseminating IK practices through ICT tools and 37 (64.9%) did it for research purposes. Notably, 25 (43.8%) visited and consulted owners of IK for personal growth and only 1 (1.7%) integrated knowledge into museum lectures and displays. The findings above illustrated that there is a strong sense of purpose attached to the visiting and consulting with the custodians of IK. Even though capturing and storing IK on ICT tools scored very high, what is more significant is that some ICT users/beneficiaries gathered local knowledge for capacity building and/or personal growth.

## 5.4 Importance of Recording or Capturing, Storing and Disseminating IK through ICT Tools

The respondents were asked to agree or disagree on whether it was important to manage indigenous knowledge through ICT tools. The respondents were provided with five options to choose from and they were instructed to choose only one option as the final one. The results in this regard are summarised in table 5.6 below.

**Table 5.6: The Importance of Recording, Storing and Disseminating IK Using ICT Tools [N=57]**

<b>Importance of recording or capturing, storing and disseminating IK using ICT tools</b>		
<b>Variable</b>	<b>Frequency</b>	<b>Percentage %</b>
Strongly agree	55	96
Agree	2	4
Undecided	Nil	Nil
Strongly disagree	Nil	Nil
Disagree	Nil	Nil
<b>Total</b>	<b>57</b>	<b>100</b>

An inquiry into whether ICT users/beneficiaries recognised the importance of recording or capturing, storing, and disseminating IK on ICT tools in KZN showed that an overwhelming number of the respondents 55 (96%) strongly agreed that it was important to record or capture, store and disseminate IK through ICT tools, while only 2 (4%) agreed moderately. These findings suggest that there is a need for recording, storing and disseminating indigenous knowledge using ICT tools.

### 5.4.1 Types of ICT Tools Used for Recording or Capturing Indigenous Knowledge (IK)

The 57 (100%) respondents who indicated strongly agreed and agreed that it was important to record or capture IK were asked to indicate the types of ICT tools they used for recording or capturing IK. The main aim here was to establish the availability and possibility of using ICT tools to manage indigenous knowledge for future use. The respondents were, therefore, provided with a list of ICT tools to choose from and to add others; which they felt were not in the list (see Table 5.7 below).

**Table 5.7: ICT Tools Used for Recording or Capturing Indigenous Knowledge [N=57]**

<b>ICT Tools For Recording or Capturing Indigenous Knowledge</b>		
<b>Variables</b>	<b>Frequency</b>	<b>Percentage %</b>
Video/camera	52	91
Video/recording/filming	39	68
Tape/sound recording	37	64.9
Cellphone recording	34	59.6

*The table above represents multiple responses*

The table above shows that video/camera (52; 91%), was the predominant tool used by ICT users/beneficiaries to record or capture indigenous knowledge. Other major ICT tools were video/recording filming with a score of 39 (68%) and tape/sound recording (37; 64.9%). Mobile phone recording was less used to record or capture IK, with a score of thirty-four (59.6%) but still scored above 50%. These findings suggest that ICT users/beneficiaries recognise the value and importance of managing IK through ICT tools in the Province of KwaZulu-Natal. However, the use of video/camera is very high compared to other tools.

#### **5.4.2 ICT Tools Used for Storing or Preserving Indigenous Knowledge**

The 57 (100%) respondents were asked to provide details of ICT tools used for storing or preserving IK in their areas of location. The main aim here was to solicit views or insights on those ICT tools used to store or preserve IK compared to those used for recording or capturing IK. Again, the researcher wanted to establish what it is that ICT users/beneficiaries do once they have recorded or captured IK. The respondents were, therefore, provided with a list of ICT tools to choose from and add others; which possibly might not have been in the list (see Table 5.8 below).

**Table 5.8: ICT Tools Used for Storing or Preserving Indigenous Knowledge [N=57]**

<b>ICT Tools For Storing or Preserving Indigenous Knowledge</b>		
<b>ICT Tools</b>	<b>Frequency</b>	<b>Percentage %</b>
Computer	57	100
Internet (e.g. Facebook, YouTube, Google Docs, Twitter etc.)	42	73.6
USB	40	70
DVDs	38	66.6
E-Mail	31	54
Cellphone	16	28
Tape/voice recorder	12	21
Video/digital camera	6	10.5
Intranet	Nil	Nil

*The table above represents multiple responses by the respondents*

The table above shows that all the respondents, 57 (100%), used computers to store or preserve indigenous knowledge. Again, a very large number of the respondents, 42 (73.5%), used the internet to store or preserve IK, while 40 (70%) used USB. Thirty eight (66.6%) indicated that they used DVDs, 31 (54%) emails, 16 (28%) cellphones and 12 (21%) tape/voice recorders. Video/digital cameras were less used to store or preserve IK, with a score of six (10.5%). Surprisingly, intranet recorded nil. These findings suggest that ICT tools are not only capable of recording or capturing IK but also able to store and preserve IK for future use.

#### **5.4.3 Views on Using ICT Tools to Disseminate IK**

The ICT users/beneficiaries were asked if they disseminated IK through ICT tools. Their responses were summarised in Table 5.9 below.

**Table 5.9: Views on Using ICT Tools to Disseminate IK [N=57]**

<b>Views on Using ICT Tools to Disseminate IK</b>		
<b>Variables</b>	<b>Frequency</b>	<b>Percentage %</b>
Yes	48	84
Sometimes	9	16
No	Nil	Nil
<b>Total</b>	<b>57</b>	<b>100</b>

Table 5.9 revealed that an overwhelming majority of 48 (84%) replied affirmatively, that they had used ICT tools to disseminate IK, while only 9 (16%) sometimes disseminated IK through the use of ICT tools. These findings suggest that indigenous knowledge is widely disseminated through ICT tools in the province of KwaZulu-Natal.

#### **5.4.4 ICT Tools Used for Disseminating Indigenous Knowledge**

In Table 5.10 below, the respondents were required to identify those ICT tools they used to disseminate IK. The respondents were therefore provided with a list of ICT tools that can possibly be used in disseminating IK to choose from. Using an open-ended questionnaire, appropriate multiple answers were selected. The respondents were also asked to indicate any other ICT tools that were not listed (see table 5.10 below).

**Table 5.10: ICT Tools Used for Disseminating Indigenous Knowledge [N=57]**

<b>ICT Tools Used for Disseminating Indigenous Knowledge</b>		
<b>ICT Tools</b>	<b>Frequency</b>	<b>Percentage %</b>
Internet (e.g. YouTube, Facebook, Twitter, databases etc.)	57	100
Cellphone	37	65
Telephone	19	33
Radio	3	5
Television	3	5
e-mails	1	1.7

*The table above represents multiple responses*

Table 5.10 above shows that all the respondents 57 (100%) disseminated indigenous knowledge using the internet; which similar to scores on table 12 regarding storage and preservation of IK. Other major ICT tools included mobile phones (37; 65%), telephone (19;

33%), radio and television (3; 5%) each. Surprisingly, e-mails recorded the lowest ranking in terms of disseminating IK; which is (1; 1.7%). Notably, the use of mobile phones (65%) in the dissemination of IK is higher than its use for storage and preservation (16; 28%); which is quite logical.

#### 5.4.5 Rating the Effectiveness of ICT Tools in Recording or Capturing IK

In Table 5.11, the respondents were required to give their personal views to a closed-ended question regarding the effectiveness of ICT tools in recording or capturing IK. The aim of this question was to capture the varying opinions of the respondents related to ICT tools in capturing IK. The respondents were provided with possible options to choose from and asked to rate each on a scale of 1 to 4 (1 = very effective, through 4 = not effective). Using a close-ended questionnaire, appropriate multiple answers were selected. The researcher combined 1 and 2 to calculate effective ICT tools in recording or capturing IK. Additionally, 3 and 4 were also combined to measure not effective ICT tools in recording and capturing IK. The table below shows the number of responses for each rating and the corresponding percentages.

**Table 5.11: Rating the Effectiveness of ICT Tools in Recording or Capturing IK [N=57]**

Types of ICT Tools	Very Effective		Effective		Less Effective		Not Effective	
	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%
Video/camera	39	68	19	33	nil	nil	nil	Nil
Video/recording/filming	34	59.6	19	33	4	7	nil	Nil
Cellphone recording	9	15.7	28	49	18	31.5	2	3.5
Tape/voice recording	24	42	28	49	5	8.7	nil	Nil

*The table above represents multiple responses*

As mentioned above, 1 and 2 on the Likert scale were combined to calculate effective ICT tools. All the respondents, 57 (100%), were of the view that video/camera was very effective in recording or capturing IK. Additionally, 53 (92.6%) of the respondents revealed that video/recording/filming was very effective in recording or capturing IK, while 52 (91%) tape/voice recording. Cellphone recording was considered the lowest in terms of effectiveness in recording or capturing IK, with a score of 37 (64.7%). In a nutshell, the findings suggest that all the listed ICT tools are effective in recording or capturing indigenous knowledge.

#### 5.4.6 The Effectiveness of ICT Tools in Storing IK

The respondents were asked to identify ICT tools effective in storing or preserving indigenous knowledge. The respondents were provided with a list of ICT tools and asked to rate them on a Likert scale of 1 to 4 (1 = very effective; 2 = effective; 3 = less effective; and 4 = not effective). Using a close-ended questionnaire, appropriate multiple answers were selected by the respondents. The table below summarises the findings.

**Table 5.12: Rating the Effectiveness of ICT Tools in Storing IK [N=57]**

Types of ICT Tools	Very Effective		Effective		Less Effective		Not Effective	
	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%
Computer	36	63	21	36.8	nil	Nil	nil	Nil
Internet	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
Cellphone	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

*The table above represents multiple responses*

In all the instances, 1 and 2 on the Likert scale were combined to calculate effective ICT tools in storing IK. The survey results indicated that the highest cited ICT tools effective in storing IK were computer, Internet (i.e. YouTube, Twitter, Facebook, Google Docs etc.), video, intranet, DVDs, cellphones, and CDs, with a score of fifty seven (100%) respondents each. Other effective ICT tools in storing IK were tape/voice recorder, fifty-four (95%), and USB (48; 84%). The least cited ICT tool effective in disseminating IK is film-reels, with a score of sixteen (23%) respondents. As a whole, these findings suggest that ICT tools are capable of storing or preserving IK for future use. The findings also suggest that ICT users/beneficiaries increasingly use the tools for the said purpose.

### 5.4.7 The Effectiveness of ICT Tools in Disseminating IK

The study sought to identify the effectiveness of ICT tools in disseminating IK. Effective, in this context, means that ICT tools are able to strongly support the availability of IK to the targeted or intended audience. The respondents were required to rate the effectiveness of ICT tools they were using to disseminate IK. Respondents were provided with a list of ICT tools they use to disseminate IK and asked to rate them on a Likert scale of 1 to 4 (1 = very effective; 2 = effective; 3 = less effective; and 4 = not effective). Again, using a close-ended questionnaire, appropriate multiple answers were selected by the respondents.

**Table 5.13: Rating the Effectiveness of ICT Tools in Disseminating IK [N=57]**

Types of ICT Tools	Very Effective		Effective		Less Effective		Not Effective	
	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%
Internet (i.e. YouTube, 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
Cellphones	13	22.8	32	56	12	21	nil	Nil
Film reels	4	7	8	14	44	77	1	1.7

*The table above represents multiple responses*

In all the instances, 1 and 2 on the Likert scale were combined to calculate effective ICT tools in disseminating IK. The survey results indicated that the highest cited ICT tools effective in disseminating IK were Internet (i.e. YouTube, Twitter, Facebook, Google Docs etc.), computer, video, television and radio, with a score of 57 (100%) respondents each. Other very effective ICT tools in disseminating IK were intranet (47; 82%) and cellphones (45; 78.8%) respectively. The least cited ICT tool effective in disseminating IK were film reels (12; 21%) respondents.

#### 5.4.8 Views on Passing IK by Word of Mouth

The respondents were asked to give their personal views on a closed-ended question on whether passing IK by word of mouth is better than storing it on ICT tools. The aim of this question was to capture varying opinions and attitudes to the use of the mind as a database to store IK. Additionally, the aim of the question was also to determine whether ICT tools are highly favored compared to the mind of the custodians of IK in passing IK by the word of mouth other than storing it through ICT tools. The respondents were given five options to choose from, 1 to 4 (strongly agree, agree, strongly disagree, disagree, and undecided). Additionally, 1 and 2 (strongly agree and agree) were combined, while 3 and 4 (strongly disagree and disagree) were also combined, while undecided stood alone. The results are summarized in the table below.

**Table 5.14: Views on Passing IK by Word of Mouth [N=57]**

<b>Views on Passing IK by Word of Mouth</b>		
<b>Variables</b>	<b>Frequency</b>	<b>Percentage %</b>
Strongly agree	18	31.5
Agree	2	3.5
Strongly disagree	21	36.8
Disagree	16	28
Undecided	Nil	nil
<b>Total</b>	<b>57</b>	<b>100</b>

The table above shows that 37 (64.9%) of the respondents strongly disagreed or disagreed that passing IK by word of mouth is better than ICT tools, 20 (35%) strongly agreed and/or agreed. The findings suggest that ICT tools were better in storing IK than transmitting it by mouth. This also suggests that ICT tools are also able to make IK accessible to everyone who recognises it even in the absence of the person owning the valuable knowledge.

##### 5.4.8.1 Views by the Respondents who Strongly Disagreed that IK should be Passed by Word of Mouth

The 37 (64.9%) respondents who strongly disagreed were asked to indicate reasons which made ICT tools better in storing and communicating IK compared to oral techniques. ICT tools store or preserve indigenous knowledge permanently was the major reason (26; 70%). Other

reasons were that word of mouth is limited to where custodians of IK live but ICT tools disseminate IK globally (23; 62%), young people believe that IK is out of fashion (19; 51%), old people die because of old age and incurable diseases (11; 29.7%), and old people forget easily and their minds lapses (9; 24%), and parents do not have time to teach their children norms and cultural values (2; 5%).

#### **5.4.8.2 The Respondents who Strongly Agreed that IK should be Passed by Word of Mouth**

The 20 (35%) respondents who strongly agreed were asked to indicate reasons which made word of mouth recommendable compared to ICT tools. It was revealed that word of mouth reduces illiteracy and increases wisdom among young people (12; 60%), followed by that, word of mouth allows young generation to get fresh information direct from parents (9; 45%). Other reasons were that rural people do not have access to ICT tools (5; 25%), and rural people believe in learning from their elders (4; 20%).

### **5.5 Problems Encountered in the Use and Availability of ICT Tools**

It must be mentioned that the problems are captured under sections 5.5.1 to 5.5.3

#### **5.5.1 Views on Whether ICT Users/Beneficiaries Encounter Problems in the Use of ICT Tools in Recording or Capturing, Storing and Disseminating IK**

The respondents were asked to indicate whether there were any challenges faced in the use and availability of ICT tools to record, store, and disseminate IK. Three options were given to the respondents to choose from. Again, 1 and 2 were combined to establish the number of those who faced problems. Notably, 36 (63%) of the respondents encountered problems in the use of ICT tools, while 16 (28%) sometimes encountered problems. Only 5 (8.7%) indicated that they did not encounter problems at all. Even though ICT users/beneficiaries were fully involved in managing indigenous knowledge through ICT tools, however, they were posed with diverse challenges. The 52 (91%) respondents who reported that they faced with problems were further asked to provide details of the problems they were faced with and the problems were classified according to the use and availability.

### 5.5.2 Problems Encountered in the Use of ICT Tools when Recording or Capturing, Storing and Disseminating IK

The first part on the problems encountered dealt with the use of IC tools. The 52 (91%) were asked to provide details of the problems they were faced with, in the use of ICT tools to capture, store and disseminate IK. The responses were as follows.

**Table 5.15: Problems Encountered in the Use of ICT tools [N=52]**

<b>Problems Encountered in the Use of ICT Tools</b>		
<b>Problems Encountered</b>	<b>Frequency</b>	<b>Percentage %</b>
Low battery	29	55.7
Lack of digital skills among field workers	22	42
Recorded data sometimes gets lost	14	26.9
Memory of ICT tools too small to contain recorded data	8	15
ICT tools like digital cameras are sensitive to carry and affected by dust due to long distances	4	7.6
Some ICT tools have viruses	3	5.7
USB gets lost in many cases	2	3.8

*The table above represents multiple responses by the respondents*

The table above shows that 29 (55.7%) of the respondents suffered shortage of power due to low batteries. Another pressing problem included lack of digital skills among the field workers (22; 42%). Other problems included recorded data sometimes gets lost (14; 26.9%), memory of ICT tools are too small to contain recorded data (8; 15%), ICT tools like digital cameras are sensitive to carry and are affected by dust due to long distances walking and some ICT tools are affected by viruses (3; 5.7%). USB gets lost was the least problem faced, with a low score of 2 (3.8%).

### 5.5.3 Views on Whether ICT User/Beneficiaries Encountered Problems in the Availability of ICT Tools

Again, all respondents were asked to indicate whether they were faced with problems in the availability of ICT tools in capturing, storing and disseminating IK. Three options were given

to the respondents to choose from. Again, 1 and 2 were combined to establish the number of those who face problems. The table below summarises the findings.

**Table 5.16: Views on Whether ICT Users/Beneficiaries Encountered Problems in the Availability of ICT Tools in Recording, Storing and Disseminating IK or not [N=57]**

<b>Views on Problems Encountered in the Availability of ICT Tools</b>		
<b>Variables</b>	<b>Frequency</b>	<b>Percentage %</b>
Yes	28	49
Sometimes	12	21
No	17	29.8
Total	57	100

When asked to indicate whether there problems that hindered the availability of ICT tools or not, 40 (70%) of the respondents revealed that they faced problems in the availability of ICT tools, while 17 (29.8%) did not. Even though ICT users/beneficiaries are fully involved in managing IK through ICT tools, they face diverse challenges regarding the availability of ICT tools in recording, storing and disseminating IK. The 40 (70%) respondents were asked to provide details of the problems that they are faced with.

#### **5.5.4 Problems Hindering the Availability of ICT Tools**

The 40 (70%) respondents who reported that they faced problems in the availability of ICT tools, were asked to provide details of the problems faced in the availability of ICT tools in order to manage indigenous knowledge. The main aim of this question was to establish the reasons that hinder the availability and/or accessibility of ICT tools by its users. Using an open-ended questionnaire, appropriate multiple answers were solicited and elicited. Data was analysed using content analysis strategy and this is reflected on the table below.

**Table 5.17: Problems Hindering the Availability of ICT Tools [N=40]**

<b>Problems Encountered in the Availability of ICT Tools</b>		
<b>Types of Problems Encountered</b>	<b>Frequency</b>	<b>Percentage %</b>
ICT tools are expensive to purchase	15	37.5
ICT tools are expensive to maintain	15	37.5
ICT tools are not enough, therefore we keep borrowing	12	30
Batteries are few and shared among us	6	15
There is no budget for ICTs	6	15
We do have internet access and computers	2	5

*The table above represents multiple responses*

The findings in Table 5.17 revealed that the availability of ICT tools was hindered by many factors as cited by the respondents. The major problem was that ICT tools were expensive to purchase and maintain, 15 (37.5%) each, whilst 12 (30%) used borrowed ICT tools because they were not enough. Another pressing matter was that batteries were scarce and made more scarce by being shared among ICT users or beneficiaries, 6 (15%), reported that there was no budget for ICTs, 6 (15%), and there was no internet access and computers (2; 5%).

### **5.6 Strategies for Improving the Effective Use of ICT Tools in Recording or Capturing, Storing and Disseminating IK**

The respondents were required to discuss and indicate contextual conditions that needed to be adapted in order to enhance the use and availability of ICT tools in recording, storing and disseminating IK. The findings were summarised in the table below.

**Table 5.18: Strategies for Improving the Use and Availability of ICT Tools in Managing IK [N=57]**

<b>Recommended Strategies</b>		
<b>Types of Recommendations</b>	<b>Frequency</b>	<b>Percentage %</b>
Encourage participation of NGOs in funding IK projects	53	92.9
Increase ICT budget	49	85%
Encourage tertiary institutions to open IK centres	47	82
Purchase ICT tools such as digital cameras and USBs with large memory and of good quality	44	77
Purchase ICT tools that are user friendly	41	71.9
Purchase voice recording ICT tools	41	71.9
Purchase backup ICT tools	39	68
Basic training of fieldworkers and IK recorders in operating ICT tools	39	68
Engaging government in opening IK centres in rural and urban areas	33	57.8
Use smartphones as the primary tool for recording or capturing IK	33	57.8
Maintenance of ICT tools is essential	31	54
Balance network in rural and urban areas	27	47
Recorded data must be stored in DVDs and mp3	27	47
Balance electricity in rural and urban areas	24	42
Fieldworkers and IK recorders should be given incentives	21	36.8
Qualified photographers are required in museums	5	8.7

*The table above represents multiple responses by the respondents*

The study sought to discuss recommendations that would help improve the effective use of ICT tools in recording, storing and disseminating indigenous knowledge. The recommendations that emanated from the respondents included the following: encouraging NGO's to fund IK projects (53; 92.9%), while an increase of ICT budget is also necessary (49; 85%); as well as encouraging tertiary institutions to open IK centres (47; 82%). Purchasing ICT tools such as digital cameras and USB with large memory and of a good quality (44; 77%), followed by purchasing ICT tools which are user friendly (41; 72.9%), purchase voice recording ICT tools

(41; 71.9%), purchase backup ICT tools and basic training of fieldworkers and IK recorders in operating ICT tools (39; 68%) each, engage government in opening IK centres in rural and urban areas and use of smartphones as the primary ICT tool for recording or capturing IK (33; 57.8%) each. Other major recommendations were maintenance of ICT tools is essential (31; 54%), there is a need to store recorded data on DVDs and mp3, and balance network in rural and urban areas (27; 47%) each, balance electricity in rural and urban areas (24; 42%) and fieldworkers and IK recorders should be given incentives (21; 36.8%). The least recommendation was that qualified photographers are required in museums (5; 8.7%).

## **Part Two: Data Presentation and Analysis of Owners/ Custodians of IK**

### **5.7 Demographic Profile of the Respondents**

Even though the respondents' characteristics were not part of the study objectives, it was pertinent to present these data because the background of the respondents could partly explain the indigenous knowledge related practices and types ICT tools used in the sample under study. The study described the characteristics of the respondents who participated in the semi-structured interviews in terms their gender, marital status, age and level of education. These structured questions were also meant to determine the relationship between demographic characteristics and the attitude of the respondents using ICT tools for recording or capturing, storing and disseminating indigenous knowledge (IK).

**Table 5.19: Distribution of the Demographic Data of the Respondents [N=196]**

<b>Variables of Biographic Data: N=196</b>		
<b>Variables</b>	<b>Frequency</b>	<b>%</b>
<b>Gender</b>		
Female	100	51
Male	96	48.9
<b>Total</b>	<b>196</b>	<b>100</b>
<b>Marital Status</b>		
Married	92	46.9
Divorced	22	11
Single	82	41.8
Never married	<b>Nil</b>	<b>Nil</b>
<b>Total</b>	<b>196</b>	<b>100</b>
<b>Age</b>		
18-20yrs	10	5
21-30yrs	11	5.6
31-40yrs	54	27.5
41-50yrs	61	31
51 and above years	60	30.6
<b>Total</b>	<b>196</b>	<b>100</b>
<b>Level of education</b>		
Preschool	30	15
Primary school	25	13
Secondary school	65	33
College	17	9
University	4	2
Never went to school	55	28
<b>Total</b>	<b>196</b>	<b>100</b>

### 5.7.1 Distribution of the Respondents by Gender

Information on gender was required to determine the proportionality of male and female respondents in the sample. There was slightly (51%) more females than male (48.9%) respondents in the sample. It is notable that both women and men are involved in indigenous knowledge practices. It is also noted in this study that the representation of male and female is fairly balanced.

### 5.7.2 Distribution of the Respondents by Marital Status

A further probing question required respondents to indicate their marital status. The findings revealed that an average 46.9% of the respondents recorded as married followed by those who were single (41.8%). Eleven (11%) were divorced. Lastly, there was no respondent who was never married. The ratio between married and unmarried respondents was insignificant.

### **5.7.3 Distribution of the Respondents by Age**

In this question, the respondents were required to establish their age group. An examination of the data reflected that the highest number of the respondents was between the ages of 41 - 50 years (31%), followed by the respondents in the 51 year bracket and above years (30.6%). Respondents between 31 – 40 years were 27.5%. Respondents between 21 – 30 years and those between 18 – 20 years ranked third, fourth and fifth respectively. The practice was dominated by older people, who were considered to be the custodians of indigenous knowledge. This meant they were reasonably experienced and could have valuable as well as in-depth knowledge of IK. The results indicated that not only aged people are possessors of the IK, but the youth as well.

### **5.7.4 Distribution of the Respondents by Level of Education**

The role of education in understanding the importance of indigenous knowledge among the Zulu people in the study area was important. Six categories of the level of education were used to describe the educational characteristics of the respondents. These categories were never attended school and preschool, primary school, secondary school, college and university. The aim behind this question was to establish whether the educational level had any influence on one becoming a custodian of indigenous knowledge. A summary of the responses is captured in Table 5.19 above.

The level of education clearly indicated that of the entire respondents 33% had achieved secondary school education, followed by 28% who had never gone to school before. The findings also revealed that 15% had reached preschool, while, 13% had reached primary school. Those with college (9%) and university education (2%) also existed. Majority of the owners/custodians of IK had limited education.

### **5.8 Nature of Indigenous Knowledge (IK)**

The first study objective sought to discuss the nature of indigenous knowledge (IK) in general in the local communities. The responses obtained from owners or custodians of IK were further compared and interpreted through content scrutiny method, as is shown below.

### **5.8.1 The Nature of Indigenous Knowledge (IK)**

For indigenous knowledge to be appreciated as beneficial for the sustainability of rural communities, it was important that it should be well understood by communities that recognised it. In this regard, respondents were asked whether they had an understanding of the nature of indigenous knowledge they were dealing with or not. This question was aimed at establishing whether the nature of indigenous knowledge is well understood by the respondents as they were considered as the custodians of IK. Table 5.20 below shows the findings.

**Table 5.20: Nature of Indigenous Knowledge [N=196]**

Theme	Selected Narratives
Nature of IK	<ul style="list-style-type: none"> <li>• It is a composed of knowledge from previous generations passed through mouth (storytelling) and actions;</li> <li>• Knowledge that explains particular events in the local community;</li> <li>• Knowledge used by indigenous people to predict certain climatic events;</li> <li>• Knowledge that connects an individual to his/her culture or society;</li> <li>• It is a rich knowledge (local wisdom) only known by community elders in the villages and is used in decision making;</li> <li>• Knowledge used by indigenous people to survive and conquer life challenges without the aid of modern knowledge e.g. use of oxen to till the ground without the use modern machines; application of animal manure to improve soil fertility;</li> <li>• Specialised knowledge received from ancestors by traditional healers and diviners through dreams;</li> <li>• Specialised knowledge that is personal and only available in indigenous people living in that particular community;</li> <li>• Special knowledge that is tacit in nature;</li> <li>• Specialised knowledge embedded in practices of indigenous people;</li> <li>• Special kind of knowledge stored in indigenous people’s mind;</li> <li>• Special kind of knowledge gained through spending quality time with custodians of IK;</li> <li>• Special kind of knowledge that is rooted and grounded in culture and ritual of the community;</li> <li>• Special kind of knowledge built up by a group of indigenous people through generations and through nature;</li> <li>• It concerns critical issues of human and animal life: primary production, human and animal life as well as natural resource management;</li> <li>• Special kind of knowledge used by community elders to cut and handle meat as well distributing the parts of the meat as they are fully informed which meat belong to a particular gender and age group; and</li> <li>• Special kind of knowledge known by community elders that women are not allowed to enter the kraal because it makes ancestors angry and they will become infertile.</li> </ul>

It can be observed in Table 5.20 that the majority of owners or custodians of IK had almost similar explanation of the nature of indigenous knowledge. Their response on the question on the nature of indigenous knowledge was tied together to avoid repetition. From the narrations,

it was evident that owners or custodians of indigenous knowledge understood the nature of IK as knowledge gotten from generation to generation through community/cultural norms and values of traditional elders. It was deduced also that indigenous people use their inborn and inherited knowledge to survive and do day-to-day activities. Noticeably, local knowledge was found in medicine, agriculture and artwork etc. Lastly, to demonstrate the power behind the use of local knowledge, was that IK is a special knowledge that stands the test of time. In other words, it is the special knowledge that stands on its own without relying in any other knowledge to work effectively.

### **5.9 Types of Indigenous Knowledge (IK) Practices Inherited**

The second objective of the study sought to evaluate the types of indigenous knowledge (IK) practices inherited in local communities. The responses obtained from owners or custodians of IK were further compared and interpreted through content scrutiny method, as is shown below.

#### **5.9.1 The Types of Indigenous Knowledge Practices Inherited**

As indicated earlier on, for indigenous knowledge to be appreciated as beneficial for the sustainability of rural communities, it was important that it be well understood by the community that recognised it. In this regard, the respondents were asked whether they know the types of indigenous knowledge practices they are owners or custodians of. This question sought to establish whether there are different types of indigenous knowledge practices for which the respondents are custodians in their respective areas or not. The tables below summarised the findings.

**Table 5.21: Belief as the type of Indigenous Knowledge Practice Inherited [N=196]**

Theme	Selected Narratives
<b>Beliefs</b>	<ul style="list-style-type: none"> <li>• It is our belief that the ancestors are the community’s intermediaries with God;</li> <li>• We believe that during wedding ceremony and child birth, the ancestors are informed of the wedding or child birth to ensure that they are protected and an animal like a cow or goat is slaughtered in the yard in order for the ancestors to pave a way for the newly-wed and new born baby;</li> <li>• We Zulu people have a belief that men are not allowed to see a newly born child for a period of three months, as the child may contaminate evil spirits because men use harmful concoction (muti) to protect themselves;</li> <li>• We believe that traditional midwives is practiced by women who bore more than 2 children in the society;</li> <li>• Community elders believe that young men must bath with cold water because it keeps the manhood strong and hard; and</li> <li>• It is our belief that if we notice a cat being restless and hiding itself under chairs or bed, it is an indication of a very bad weather like storm.</li> </ul>

The narration of owners or custodians of IK on table 5.21 above shows that belief is a type of IK practice inherited. It was observed that there are certain rituals performed if a child is born, in marriages, death etc. Moreover, owners or custodians of indigenous knowledge have a strong relationship with ancestral worship.

**Table 5.22: Traditional Medicine as the Type of Indigenous Knowledge Practice Inherited [N=196]**

Theme	Selected Narratives
<b>Traditional Medicine</b>	<ul style="list-style-type: none"> <li>• In traditional medicine, we herbalists, traditional healers, diviners and elders in the community collect herbs on the mountain as key sources of traditional African medicine to heal certain illnesses. For example, the yellow star, which is commonly known as the African potato and aloe, is used for building the immune system and controlling high blood pressure; bitter aloe is also used for cleansing the body from toxins and free radicals.</li> <li>• We were taught that some animal parts like skin, tail, fat, urine, hooves, bile, eye, bones, tongue are used to cure and prevent illnesses;</li> <li>• We were taught that some herbs are used to strengthen manhood, instead of using tablets from clinics;</li> <li>• Traditional medicine is used for the maintenance or restoration of physical or mental health;</li> <li>• We were taught to use herbs as preventative medicine. For example we chew a special bark of a specific tree for cleansing teeth and for protecting it against dental problems;</li> <li>• We were taught that only traditional healers and herbalists are considered doctors of the community;</li> <li>• We inherited a special skill that when a person has broken his/her bone, elders, traditional healers or herbalists use a special bark of a special tree known as (Umhlabelo) to grind it to powder and let the patient drink it and expect the bones to be joined within a month; and</li> <li>• Traditional medicine is used for the rehabilitation of a person to enable that person to resume normal functioning within the family or community.</li> </ul>

The narration of the owners or custodians of IK as represented in Table 5.22 regarding the type of IK inherited had almost similar explanation. Thus, their response on the question on the types of IK practices inherited was tied together to avoid repetition. It was observed that the use of traditional medicine was largely inherited by owners or custodians of IK. It was evident that traditional healers, diviners, herbalists and community elders used natural trees and local

herbs to cure and prevent certain illnesses. Interestingly, it was observed from the findings that some parts of an animal such as fat, skin, urine, hooves, tail, tongue, bile, and bone etc. were used to treat and prevent certain diseases. It was also noticed that other medicinal plants and parts of an animal are used to join broken bones without the aid of modern medicine from professional doctors and nurses. Specifically, it was noticed that some owners or custodians of IK such as traditional healers, diviners, herbalists and community elders were called doctors of the local community.

**Table 5.23: Human Resource and Indigenous Knowledge as the Type of IK Practice Inherited [N=196]**

Theme	Selected Narratives
<b>Human resources and indigenous knowledge</b>	<ul style="list-style-type: none"> <li>• In human resources we as Zulu women have earned ourselves the reputation of being masters of pottery craft; grass brooms; sleeping mats; candles; girdles and beaded necks;</li> <li>• As Zulu women, we have earned ourselves a good reputation in our community and nationally in using ordinary grass to make baskets and coloring them with ordinary plastics that people use to carry their groceries from shops;</li> <li>• We as elderly women in the community specialises in making Zulu traditional attires;</li> <li>• We as women used cow dung to decorate walls and floors of our houses, and also to seal the lids of baking pots to keep an oven temperature in the pot, when baking bread; and</li> <li>• We as young and old men in the community specializes in making shields from animal skins; use natural trees (indigenous plants) to make wooden spoons, forks and meat plates from indigenous trees; make spears from iron.</li> </ul>

Findings in Table 5.23 affirmed that owners or custodians of IK inherited human resource and indigenous knowledge skills. It was observed from the narratives that owners or custodians of IK had several roles to play in craftwork. For example, it was observed that women use their inherited knowledge and talents for pottery craft, bracelets, girdles, sleeping mats, grass baskets, just to mention a few. Men on the other hand, use the inherited or inborn knowledge to make wooden spoons, spears, shield, assegai etc.

**Table 5.24: Indigenous Knowledge in Education as the Type of IK Practices Inherited**  
[N=196]

Theme	Selected Narratives
<p><b>Indigenous Knowledge in the Education</b></p>	<ul style="list-style-type: none"> <li>• Members of the community are taught various beliefs like respecting one another particularly community elders;</li> <li>• Yung people in the community are taught to observe the behavioural and seasonal migration of prey like white big birds as a sign of winter; thick and black clouds, is an indication that heavy rain accompanied with storm is on the way; when birds make a loud noise, it is normally an indication of the presence of a snake or it is a sign of a heavy rain;</li> <li>• Grandmothers often tell stories after supper and recite proverbs based on the customs of a particular ethnic group;</li> <li>• Indigenous people use various symbols/signs to communicate a particular message to neighbors; for instance a green sign/leaves is an indication that (vegetable, mostly cabbage, spinach, lettuce etc.) are being sold there; yellow indicates homemade beer called (Ijuba) and a red means meat;</li> <li>• Young women are educated not to enter the kraal because it causes them to be infertile and have tumors all over the body; and</li> <li>• Young people in the community are taught that when they see a domestic cat restless in the house and hiding itself from the people, it is an indication that heavy rain accompanied with storm is coming.</li> </ul>

Results in Table 5.24 revealed that local knowledge is highly passed from generation to generation through teaching each other. From the narration, it was observed that owners or custodians of IK inherited communication skills through informal education. For example, respecting elders in the community is important in the community. Additionally, elders in the community teach young generation to observe the nature in order to understand occurrences of the day. Thus, seeing migration of white birds is a sign that winter is at hand, observing thick black cloud is an indication that storm is coming, just to mention a few. On the other hand, elderly women narrate stories to children before they sleep.

**Table 5.25: Indigenous Knowledge in Agriculture/Farming as the Type of IK Practices Inherited [N=196]**

Theme	Selected Narratives
<b>Indigenous Knowledge in Agriculture/Farming</b>	<ul style="list-style-type: none"> <li>• In farming/agriculture, pre-planting operations are used to increase soil fertility;</li> <li>• In increasing fertility of the soil, cattle, goats and sheep are let lay on the field, which enhances the fertility of soil; and intercropping is practiced to retain soil nutrients e.g. use of mabele, maize, potatoes, sweet potatoes, beans; and animal manure is used to increase the elasticity of the soil;</li> <li>• When the land lies idle between 2 and 4 months, the soil is covered with ash to protect it from unwanted insects;</li> <li>• In agriculture, oxen are often used for ploughing in order to avoid soil erosion;</li> <li>• We practice mulching and inverting the crop residue into the soil;</li> <li>• We have vast knowledge in rearing chickens and cattle; and</li> <li>• We inherited cross breeding of animals and plants.</li> </ul>

It was noted in Table 5.25 that owners or custodians of IK inherited farming skills. It was observed that traditional farmers used their local and specialised skills in retaining soil nutrients through intercropping with legumes which increases soil fertility to yield high productions of peanuts, maize, vegetables, just to mention a few. It was also observed that animal manure was used to increase the elasticity of the soil. It was observed from the narrations that indigenous knowledge is not limited in any way when it comes to farming.

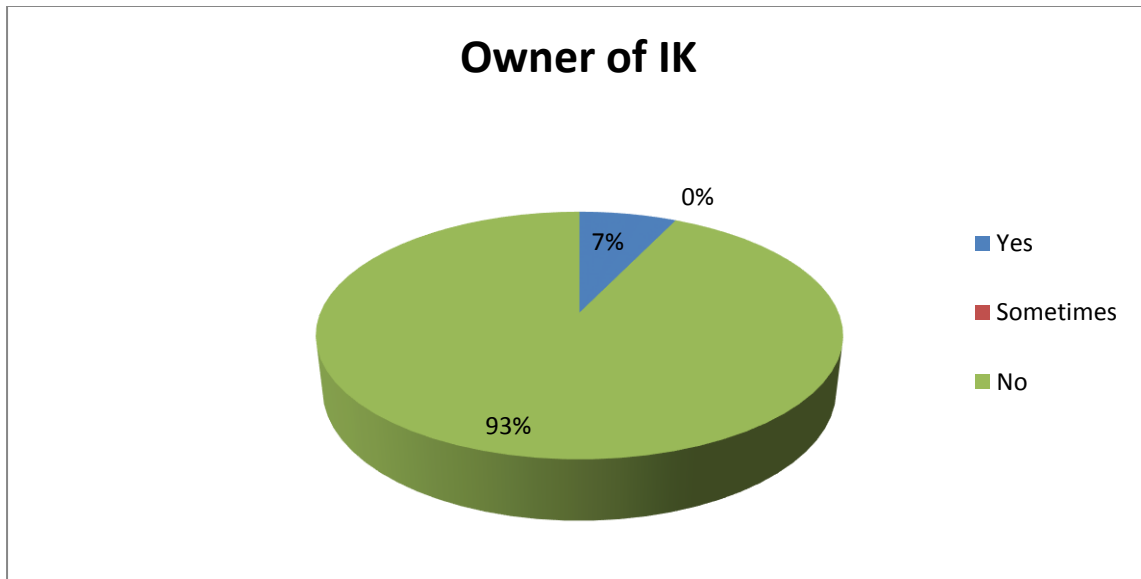
**Table 5.26: Indigenous Knowledge in Food Processing as the Type of IK Practice Inherited [N=196]**

Theme	Selected Narratives
<b>Indigenous Knowledge in Food Processing</b>	<ul style="list-style-type: none"> <li>• We have inherited a special skill in brewing traditional beer (e.g. mixing maize mealie and imithombo yamabele with warm water to allow it to be brewed) which is kept for 5 days before it becomes traditional beer;</li> <li>• Meat is boiled and smeared with vinegar or salted to avoid butterflies from laying eggs in the meat and get spoiled. The meat is then sun dried then brought in the house and hanged in the house for some days because there are no refrigerators;</li> <li>• We learned that harvested food is kept for months without getting spoiled. For example maize meal, beans and peanuts are sun dried and preserved for many months; green vegetables (imifino) is boiled for 2 minutes and salted then sun dried and then kept in a dry place to be used in future; and</li> <li>• “I learned from the elders that raw maize is boiled and crushed with smooth stones and eaten with spinach or sour milk (amasi).</li> </ul>

It was observed that there are owners or custodians of IK who specialises in traditional food preparations and preservation. For example, they have personalised experience on how to prepare meat and vegetables and keep it for many months without being spoiled. The narration also showed that indigenous knowledge food specialists have a special kind of knowledge on how to keep harvested food for a longer period time. For example, food crops such as maize, beans, peanuts, vegetables are harvested and sundried in order to be stored for many months without being spoiled.

### 5.9.2 Knowledge Whether Indigenous People were the Custodians of IK

The respondents were asked to indicate whether they were owners or custodians of indigenous knowledge or not. The aim behind this question was that the researcher wanted to establish how the rich knowledge was inherited by those who called themselves owners or custodians of IK. Figure 5.1 summaries the findings.



**Figure 5.1: Owner of Indigenous Knowledge [N=196]**

The findings of the study revealed that 182 (93%) of the respondents were not owners of indigenous knowledge and a total of 14 (7%) of the respondents reported that they were owners of IK. These findings suggested that those who were not owners of IK inherited or learnt the valuable knowledge from somewhere else; it was genetically inherited.

### 5.9.3 Ways in which Indigenous Knowledge (IK) Practices were Acquired

The respondents were asked to comment on how they acquired indigenous knowledge practices. On that note, Table 5.27 indicated various ways in which IK practices were acquired. The narration was summarised as follows:

**Table 5.27: Ways in which IK Practices were Acquired [N=196]**

Theme	Narrative
Acquiring IK by owners	<ul style="list-style-type: none"> <li>• As a traditional healer, diviner or an elder, you normally get healing powers from ancestors; (e.g. <i>“I dreamt my grandmother who spoke to me on how to heal people, she then put saliva in my tongue and said go and heal them now”</i>); at other times the ancestors would just guide you to use herbs to heal people,</li>   <li>• One female respondent who is a diviner said it came in a form of a dream, <i>“I was in a serious argument with my husband and in that dream I would see many people worshipping me and asking for my help. Then I would heal them in the dream and then I started it, and it worked well”</i>;</li>   <li>• Few of indigenous people said they were born with the knowledge (e.g. it is a gift);</li>   <li>• Got impartation from a friend. For example, <i>“a close friend of mine who was a diviner would take me to the mountain to spend the whole night worshipping ancestors and would put her hands on my head as a sign of impartation”</i>;</li>   <li>• As young men in the village, we would always observe how our grandfathers and fathers devoted themselves in farming, and then we got an opportunity to be taught how to become successful farmers and today we have vast experience in farming even though our parents and grandparents died long time ago;</li>   <li>• A number of women said <i>“My parents trained me how to prepare and cook traditional food”</i>;</li>   <li>• Some elderly women said <i>“Being together with my mother made me indigenous knowledge specialists especially in making beads and sleeping mats”</i>;</li>   <li>• Sharing experiences with elders in adhering to the beliefs and customs of the community made us custodians of this valuable knowledge;</li>   <li>• Observing the movement of pray like white birds enabled us to know when winter and summer approaches;</li>   <li>• Observing our parents using their hands in making sleeping mates, wooden spoons, shields, baskets, etc. made us IK specialists in the community; and</li>   <li>• Keeping cultural values and performance of certain rituals by our parents empowered us with local knowledge.</li> </ul>

It was observed from the narratives of the respondents that those who considered themselves owners or custodians of indigenous knowledge were born with the knowledge, while others

got it from their ancestors and dreams respectively. The responses from the respondents prove that those who were not born with the knowledge inherited the IK practices from different sources. For example, some received the valuable knowledge from the elders of the community; which includes both men and women. Those who are traditional healers got impartation from traditional healers, for those who are farmers received the knowledge from other farmers etc. These findings suggest that being together for a long time builds stronger relationship and trust.

#### 5.9.4 Categories of Traditional Roles they belong to or Practice

It was significant in this study to establish the role played by each person who considered him/herself as a custodian IK. Therefore, the respondents were asked the categories of traditional roles and/or practices they belonged to. This question sought to establish whether there are different traditional roles played by owners or custodians of IK plays in the community or not. The respondents were at liberty to mention more than one traditional role(s) they belonged to. The following roles were cited as the ones; which were applicable to different respondents. The table below summarises the results.

**Table 5.28: Categories of Traditional Roles you belong to and Practice [N=196]**

<b>Categories of Traditional Roles you belong to and Practice</b>		
<b>Type of Category Belonged to</b>	<b>Frequency</b>	<b>Percentage %</b>
Traditional healer	51	26
Traditional farmer	48	24
Traditional artisan and/or artwork	41	20.9
Traditional musician	38	19
Elder	34	17
Diviner	21	10.7
Traditional storyteller	20	10
Herbalists	15	7.6
Traditional food specialists	13	6.6
Traditional midwife	12	6
Chief	7	3.5
Rainmaker	2	1

*The table above represents multiple responses*

The categories of traditional roles to which each owner, or custodian, of IK belonged were recorded in the order of their frequencies. The category that featured most was that of the traditional healers (51; 26%). This category was closely followed by the traditional farmers (48; 24%), the traditional artisans and/or the artworks that followed (41; 20.9%).

Other traditional roles include traditional musicians (38; 19%), community elders (34; 17%), diviners (21; 10.7%), traditional storytellers (20; 10%), herbalists (15; 7.6%), traditional food specialists (13; 6.6%), traditional midwifery practitioners (12; 6%), and chiefs (7; 3.5%). Rainmakers were the least (2; 1%) of the total sample. It was evident from this data that different categories of traditional roles of IK exist in the province of KwaZulu-Natal.

These traditional roles of the custodians of indigenous knowledge indicated in no uncertain terms that indigenous knowledge is still recognized and used for different reasons especially in traditional medicine where traditional healers and herbalists excel and also in farming/agriculture and traditional artwork. The results showed that the province of KwaZulu-Natal is still rich in indigenous knowledge because all the traditional roles of IK are still maintained to ensure its survival. Additionally, even though modernisation has made its presence felt, the owners or custodians of IK still recognize and maintain their valuable resource. Lastly, the findings showed that the owners or custodians of IK were not completely affected by modern western culture as they are still rooted to some extent in their traditional practices.

#### **5.9.5 Visiting and Consulting Owners/ Custodians of Indigenous Knowledge (IK)**

It was important in this study to establish whether the owners or custodians of IK were visited and consulted for their local experiences. This question was aimed at establishing whether there were community members, organisations or individual persons that visited and consulted the owners or custodians of indigenous knowledge.

When asked to state whether they are visited and consulted for their local experiences or not, all respondents, 196 (100%), indicated that they were visited and consulted. The findings suggested that the owners or custodians of indigenous knowledge were highly visited and consulted for their local knowledge.

### 5.9.6 People who Visit and Consult the Owners or Custodians of IK

The respondents in this study were asked to identify the types of people that normally visited and consulted owners or custodians of IK. Table 5.29 below summarises the findings according to their frequencies as emanated from the respondents.

**Table 5.29: People who Visit and Consult the Owners or Custodians of IK [N=196]**

<b>People who are Visiting and Consulting the Custodians of IK</b>		
<b>Type of People Visiting and Consulting</b>	<b>Frequency</b>	<b>Percentage</b>
		<b>%</b>
Community members	157	80
Students conducting research on IK	117	65
Researchers on IK	113	57.6
Information specialists/librarians	87	44
Tourists	77	39
Artisans	57	29
Trainees on IK	43	21.9
Media industry (press and broadcasting)	12	6
Cinematography/Film industry	4	2

*The table above represents multiple responses*

The people who are visiting and consulting owners or custodians of IK were recorded in the order of their frequencies. Thus, the people that featured most were community members (157; 80%). These people/respondents were closely followed by the students conducting research on IK (117; 65%). The researchers conducting research on IK followed (113; 57.6%). Other people visiting and consulting owners or custodians of IK include information specialists/librarians (87; 44%), tourists (77; 39%), artisans (57; 29%), trainees on IK (43; 21.9%) and media industry (press and broadcasting) (12; 6%). Cinematography/film industry were the least numerous (4; 2%) of the total sample.

These findings suggested that not only rural people visited and consulted each other with regard to the use of traditional knowledge, but also, individual persons, industry and professional people recognised and used indigenous knowledge for various purposes. The results also

suggested that even though western life has taken a centre stage in the whole universe, indigenous knowledge is still vital and usable in the modern era.

### 5.9.7 Consulting Times

Based on the question above, the respondents were asked to indicate specific time(s) in which they were visited and consulted for their experiences. Table 5.30 shows the timeframes as cited by the respondents of the owners or custodians of IK in the study.

**Table 5.30: Consultation Times [N=196]**

Theme	Narrative
<b>Consultation times</b>	<ul style="list-style-type: none"> <li>• We are visited and consulted at any time; e.g. Mondays and Fridays only, once a week, once in two weeks, once a month, last week of every month, every after two months,</li> <li>• One herbalists said <i>“I am visited and consulted once a month because I am busy”</i>;</li> <li>• One traditional healer said <i>“I am visited and consulted at least three times a month because I am always out of my home to other countries where my local experience is heavily used”</i>;</li> <li>• We are highly visited and consulted when students and researchers dealing with indigenous knowledge have projects on indigenous knowledge farming;</li> <li>• One traditional healer said <i>“I distribute fliers with my phone number and they call me and make appointments”</i>;</li> <li>• One herbalists said <i>“They visit and consult me every month-end because when I deliver my service, I require payment instantly”</i>;</li> <li>• One diviner said <i>“I am consulted at 21h00 because that is when my ancestors who work in me are strong and show me clearly what is required in ones life”</i>;</li> <li>• One traditional food specialists said <i>“I require them to make an appointment because I am always busy with people who pay for my services unlike those who want to milk my knowledge and not pay at all”</i></li> <li>• One traditional healer said <i>“I am visited and consulted at night because the majority of those who consult me are people from parliament who does not want to be seen by the public”</i>;</li> <li>• Whenever people need me;</li> <li>• They consult me anytime at night especially those who want healing powers;</li> <li>• One diviner said <i>“I am visited and consulted in winter because that is when I function effectively”</i>;</li> <li>• I am consulted on weekends only; and</li> <li>• They consult me when it is time for gardening plants like winter.</li> </ul>

The researcher took it into consideration that the respondents might have similar ideas when narrating times in which they were visited and consulted. It became evident that majority of the owners or custodians of IK were visited and consulted at different times. Even though owners or custodians of IK were visited at different times, it was observed that owners or custodians of IK were open and friendly to people who uses their valuable knowledge. It was also noticed that some owners or custodians of IK who are not always available for consultation because of busy schedule, time schedule was created to accommodate everyone with or without a special need.

#### **5.9.8 Reasons of Visiting and Consulting Owners or Custodians of IK**

The respondents were required to give their personal views to an open-ended question regarding the reasons prompting them being visited and consulted. This was done in order to establish the reasons why the owners or custodians of indigenous knowledge are visited and consulted in the area. It was established that there were many reasons why owners or custodians of IK were visited and consulted. Table 5.31 below summarises the findings.

**Table 5.31: Reasons of Visiting and Consulting [N=196]**

Theme	Narrative
Reasons for Consultation	<ul style="list-style-type: none"> <li>• People from our community want us as diviners to foretell their future;</li> <li>• Men want us as diviners to bring back their intimate partners;</li> <li>• One traditional diviner said “<i>those who want to become traditional diviners come to be trained by me as I am fully experienced in this field</i>”;</li> <li>• Those whose cars and items and/or properties got stolen come to us as diviners to foretell the whereabouts of their lost properties;</li> <li>• Community members whose protection depend on ancestors come to us to strengthen their relationship with their ancestors;</li> <li>• Community members come to us as diviners to get water that we have prayed for in order to chase away evil spirits and cleanse their homes;</li> <li>• Professional people such as both local and international coaches consult us as traditional healers to get concoction (muti) in order to win league sport;</li> <li>• Men and women consult us as traditional healers and herbalists to revive their marriage;</li> <li>• Community members and professional men consult us as traditional healers and herbalists to boost their manhood with herbs;</li> <li>• Professional people who work in different organisations come to consult us as traditional healers, herbalists, and diviners in order to get concoction (muti) for promotion at work and to be loved by their bosses;</li> <li>• A large number of professional people such as doctors, researchers on IK, students, tourists, to mention a few, consult us as owners of IK on how we heal certain diseases like cancer, HIV/AIDS, how we design artwork, how we prepare traditional food, how midwifery is conducted, how stories are narrated and while interviews are going on, new technologies like cellphones, video cameras, to mention a few, are used to record our demonstrations;</li> <li>• Other professional people consult us in order to observe how traditional food is prepared; and</li> <li>• We are consulted in order for traditional farming techniques to be blended with modern farming to improve elasticity of soil, and this is recorded on new technologies and notebooks.</li> </ul>

It must be noted that those respondents who had almost similar explanation on the reasons why they are consulted were merged together to avoid repetition. From the narrative, it is observed

that there are different reasons why owners of indigenous knowledge are consulted. It can be deduced from the findings that 60% of the people who consult owners or custodians of IK are from the same community and they consult for personal problems. It was observed in the narrations that those who come from the same community normally come for healing, foretelling, divine impartation, good lucky, skills development, rituals, divination, counseling, child delivery assistance, etc. It was deduced that less than 50% of professional people visit and consult owners of IK for various reasons. It was noted that the main reason for consultation was for recording or capturing IK using new technologies. Others among professional people also consulted owners or custodians of IK for personal problems such as healing and health, promotion at work, farming skills.

#### **5.9.9 Types of Indigenous Knowledge Practices Imparted to those who Visit and Consult Owners or Custodians of IK**

The respondents were also asked to disclose the types of indigenous knowledge practices imparted to those who visited and consulted them. This question was aimed at establishing the type of IK practices imparted to those people who recognised and used indigenous knowledge services in KwaZulu-Natal Province. The following views emanated from the respondents.

**Table 5.32: Types of Indigenous Knowledge Practices Imparted [N=196]**

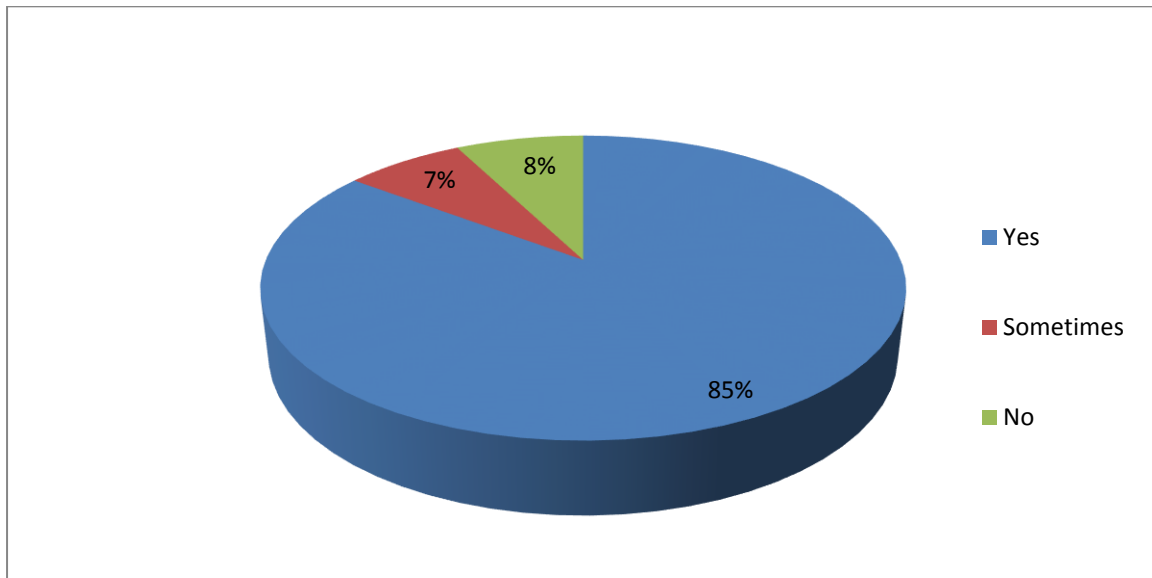
<b>Type of Indigenous Knowledge Practices Imparted</b>		
<b>IK practices imparted</b>	<b>Frequency</b>	<b>Percentage %</b>
Agriculture/Farming experience	45	22.9
Local songs	43	21.9
Healing	42	21
Ancestral worship	36	18
Preparing traditional food	34	17
Local dances	29	14.7
Artworks	28	14
Midwifery practices	27	13.7
Storytelling	12	6
Environmental resource management	10	5
Plant species	9	4.5
Hunting	5	2.5
Fishing	5	2.5
Rainmaking	2	1

*The table above represents multiple responses*

The types of indigenous knowledge practices imparted to those who visited and consulted owners or custodians of IK were recorded in the order of its frequencies. The type of IK practice imparted that featured most was agricultural/farming experience (45; 22.9%). This was closely followed by local songs (43; 21.9%). Other IK practices that were imparted included healing (42; 21%), ancestral worship (36; 18%), preparing traditional food (34; 17%), local dance (29; 14.7%), artworks (28; 14%), midwifery (27; 13.7%), storytelling (12; 6%), environmental resource management (10; 5%), plant species (9; 4.5%), hunting and fishing (5; 2.5%) each. Rainmaking was the least (2; 1%) of the total sample. From these findings, it was concluded that there were many forms of indigenous knowledge practices imparted to different people who visited and consulted owners or custodians of IK. The findings also suggested that indigenous knowledge is harvested by all means to ensure that it is not wasted but kept in ICT tools for future use. Lastly, the province of KwaZulu-Natal is very rich with indigenous knowledge in this present day society.

### 5.9.10 The Survival of Indigenous Knowledge (IK) in KwaZulu-Natal

The respondents were required to respond if there were chances for indigenous knowledge to survive in the province of KwaZulu-Natal. This question was aimed at identifying the reasons from the owners or custodians of IK regarding why IK will survive or not. The following views emanated from the respondents.



**Figure 5.2: Perception of IK Surviving in KZN [N=196]**

This figure above clearly revealed that 167 (85%) of the respondents were of the opinion that indigenous knowledge will survive in KwaZulu-Natal, while 14 (7%) said IK might sometimes survive. The least 16 (8%) indicated that IK would not survive in the province of KwaZulu-Natal. These findings suggested that IK cannot die and/or diminish because it is managed through ICT tools and is orally imparted to family and community members.

### 5.9.11 Reasons that Make Indigenous Knowledge Survive in KwaZulu-Natal

Again as a follow-up question on the above question, the respondents were asked to mention the reasons why indigenous knowledge would survive in the province. Most important to note is that the 181 (91.8%) who reported that indigenous knowledge would survive in the province of KwaZulu-Natal attended this question. Table 5.33 discussed the results.

**Table 5.33: Reasons for the Survival of Indigenous Knowledge in KZN [N=181]**

Theme	Narrative
Reasons for IK to Survive	<ul style="list-style-type: none"> <li>• The Department of Health always consult us as traditional midwife for our skills on child delivery;</li> <li>• Young people who are professionals in midwifery consult us as a traditional midwife for my experiences and this is an indication that indigenous knowledge will not disappear;</li> <li>• Rural people and some professional people prefer to consult us for a number of reasons: they no longer rely on machines and drugs which assist during child delivery, but prefer the natural way of giving birth where we have vast experience, hospitals and clinics in rural areas are too far to be used during child delivery, our experience as traditional midwifery is utilised by the whole community without the aid of professional nurses, women in rural communities when they are pregnant, they do not go to hospitals and clinics for check-up but follow our advice and experience until a child is born;</li> <li>• Professional doctors and nurses consult us 4 times a year on traditional midwifery practices and to observe our traditional practices during child delivery. In the process of observations, some technologies like digital cameras and cellphones are used to record and store all the process;</li> <li>• In South Africa, indigenous knowledge owners especially traditional midwife are recognised and are asked to work in conjunction with professional nurses during child delivery for the benefit of professional people who are also keen to use our local skills;</li> <li>• As long as doctors and nurses consult us for experiences as traditional midwife, it means our local knowledge has come to stay;</li> <li>• Traditional way on farming is blended with modern ways of farming to increase elasticity of the soil. For example, professional farmers are consulting traditional farmers on the ways of preventing soil erosion using local knowledge; they also apply <i>intercropping and mulching in their fields</i>;</li> <li>• Traditional food specialists said “<i>Rural people and professional people consult with us for to be educated in the preparation of traditional food preparation and cooking</i>”. While this exercise is on, ICT tools are used to record or capture all the process.</li> <li>• We as storytellers “<i>are invited overseas and in our local schools to perform storytelling and while doing that some tools are used to record our performances</i>”;</li> <li>• Local music is showcased worldwide. For example, some traditional musicians said “<i>with local music, we inform the whole world who we are as Zulu people and we express our feelings to the whole world</i>”;</li> <li>• We see our local knowledge surviving because libraries are supplied with DVDs and videos where our knowledge has been recorded and stored by professional people researching on indigenous knowledge;</li> <li>• We ensure that we impart our local knowledge to the younger generation for sustainability of our knowledge; and</li> <li>• The availability of IK on the internet is an indication of attracting and empowering even younger generation for survival of IK.</li> </ul>

The narrations in Table 5.33; which were similar, were tie together in order to avoid redundancies. It was deduced that 85% of the views of the respondents were of the opinion that IK will never completely disappear. In that regard, one of the reasons that makes IK to survive

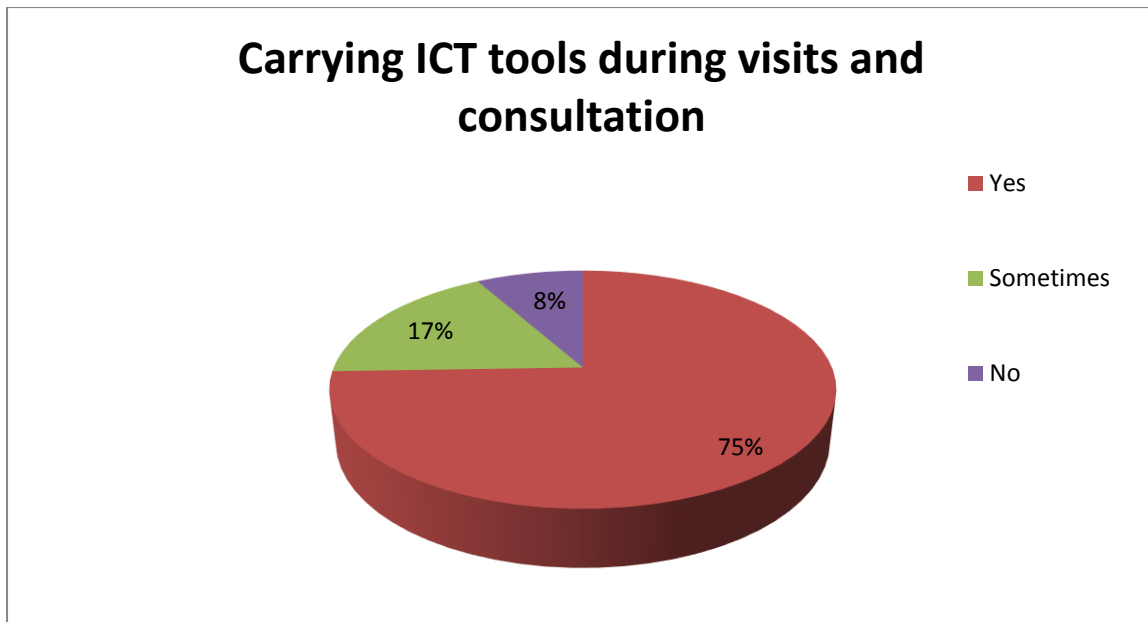
according to the respondents was that professionals (e.g. researchers, tourists, students etc. use new technologies to record or capture, store and disseminate the valuable knowledge for future use. Apart from professionals who use ICT tools, in the health and farming, IK is still valuable. Additionally, IK is also imparted to young people who do not undermine the valuable knowledge.

### **5.10 Using ICT Tools to Record or Capture, Store and Disseminate IK**

The third study objective sought to discuss the types of ICT tools used in managing indigenous knowledge in the province of KwaZulu-Natal. The results were summarised in the following figure.

#### **5.10.1 Knowledge Whether those People who Visited and Consulted Owners or Custodians of IK Carry/Use ICT Tools**

The respondents were asked to indicate whether those who visited and consulted them carried any ICT tool(s) to record or capture, store and disseminate indigenous knowledge or not. The main aim here was to identify those ICT tools used to record, capture and store IK. Figure 5.3 shows the findings.



**Figure 5.3: Carrying ICT Tools During Visits and Consultation with the Custodians of IK [N=196]**

Figure 5.3 above indicates that the majority of the respondents 147 (75%) agreed that ICT tools are used to record or capture, store and disseminate IK, while 34 (17%) said ICT tools were sometimes carried. There was only 15 (8%) that indicated that those who visited and consulted them carry no ICT tools at all. These findings suggested that a large amount of indigenous knowledge is managed through ICT tools by ICT users/beneficiaries. It was notable, though, that the least people who visited and consulted the owners or custodians of IK did not carry any ICT tools; which might suggest that indigenous knowledge is used to solve personal problems and increase skills development.

### **5.10.2 Types of ICT Tools Carried During Visitation and Consultation**

The owners or custodians of IK were asked to provide details of ICT tools carried during visitation and consultation. Notably, those who indicated yes and sometimes were the only ones who attended this question. In that regard, 180 (97.8%) respondents attended this question because they were the only ones who indicated that those who consulted them carried ICT tools. The table below summarises the findings as indicated by respondents.

**Table 5.34: ICT Tools Carried During Visitation and Consultation [N=180]**

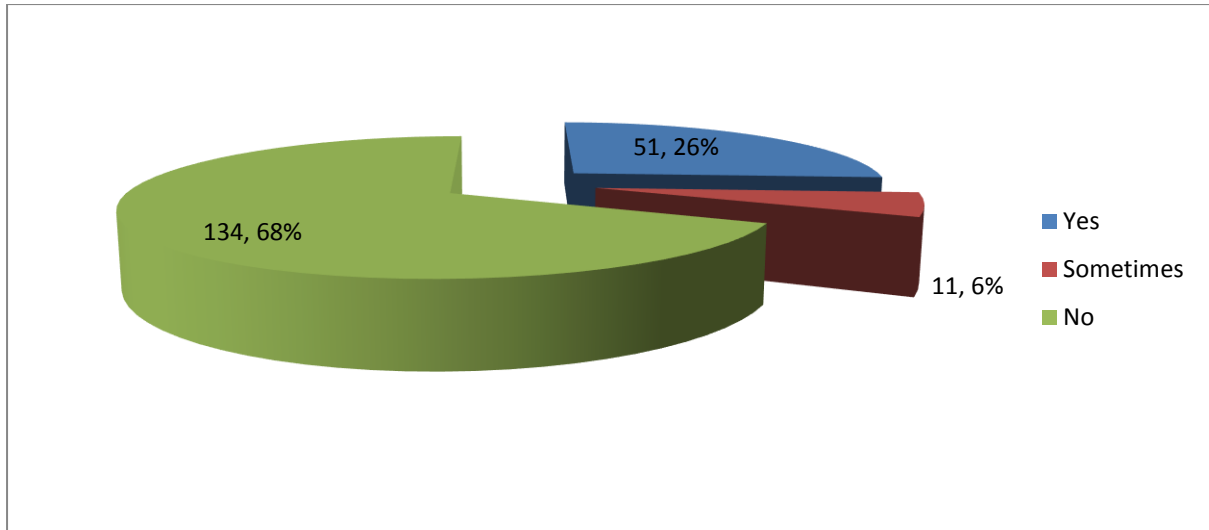
<b>ICT Tools Carried During Visitation and Consultation</b>		
<b>Types of ICT tools</b>	<b>Frequency</b>	<b>Percentage %</b>
Cellphone	159	88
Video/recording	146	81
Video/camera	135	75
Tape/sound recording	84	46.6
Laptops	9	5
CDs	4	2

*The table above represents multiple responses*

Table 5.34 above illustrates that cellphone recordings were carried whenever owners and custodians were visited and consulted (159; 88), video/recording (146; 81%), video/camera (135; 75%), tape/sound recording (84; 46.6) and laptops (9; 5%). Finally, the least 4 (2%) ascribed that CDs were used during visitation and consultation. From the above findings, it was concluded that the management of indigenous knowledge with ICT tools was high in the province of KwaZulu-Natal. These findings informed that ICT tools can also be used as a point of reference in the management of IK.

### **5.10.3 Knowledge of Using ICT Tools to Record, Store and Disseminate IK by Owners or Custodians of IK**

It was important for this study to uncover whether owners or custodians of IK used ICT tools to record or capture, store and disseminate IK. The findings were summarised as follows.

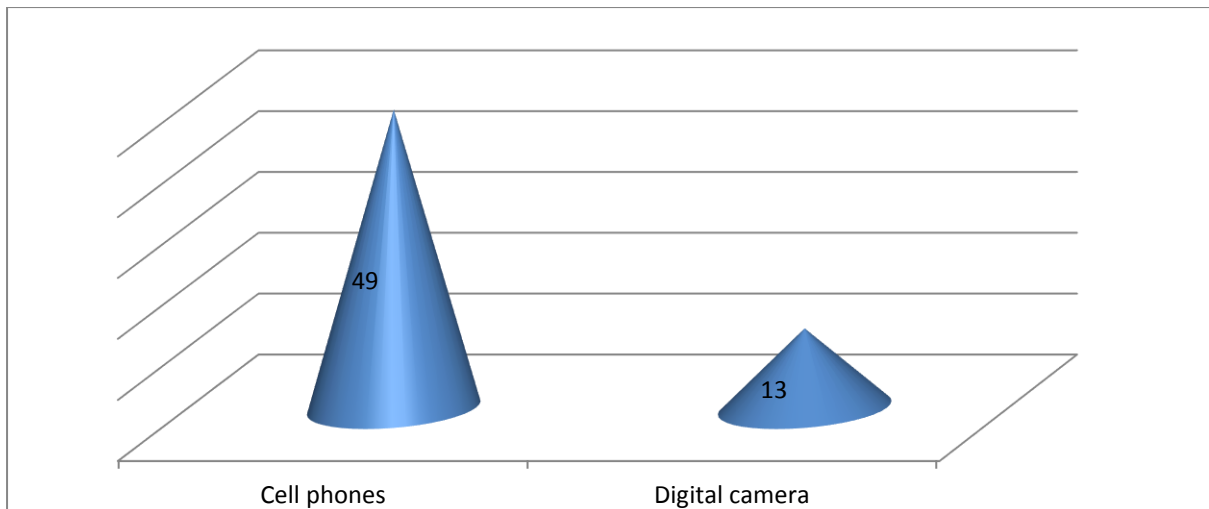


**Figure 5.4: Using ICT Tools to Record, Store and Disseminate IK [N=196]**

When the owners or custodians of IK respondents were asked to indicate whether they used ICT tools to record or capture, store and disseminate IK, no was the most number which do not use ICT tools (134; 68%), while 51 (26%) agreed that they use ICT tools. The least sometimes used ICT tools to manage IK (11; 6%) as depicted in Figure 5.4. In a nutshell, 62 (32%) of the owners or custodians of IK had used ICT tools to manage IK. These findings suggested that a large number of owners or custodians of IK do not use ICT tools to manage indigenous knowledge. It means indigenous people relied in passing IK by word of mouth than ICT tools. On the other hand, the average number of owners or custodians of IK who used ICT tools to manage IK means they rely on both oral and ICTs.

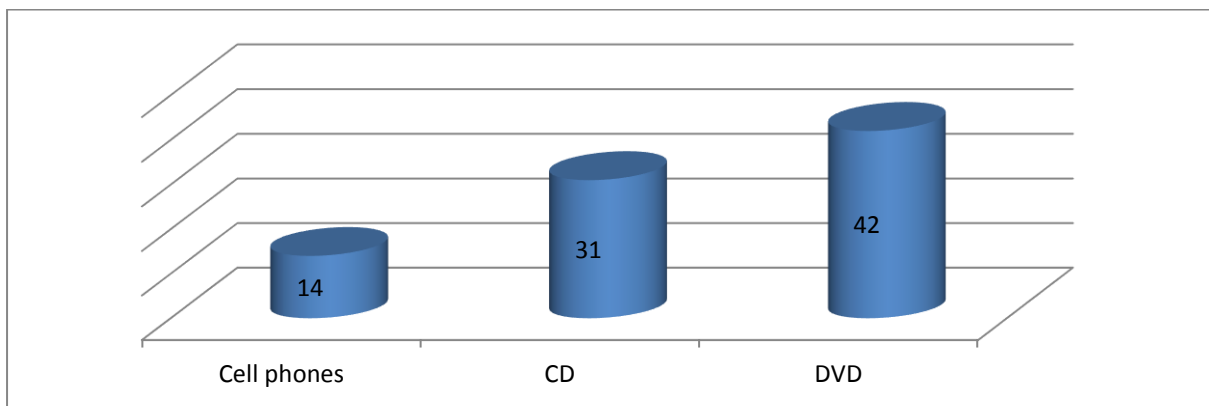
#### **5.10.4 Types of ICT Tools used to Record or Capture, Store and Disseminate IK**

The 62 (32%) of owners or custodians of IK respondents were asked to provide details of those ICT tools; which they had used to capture, store and disseminate IK. The results are presented in Figure 5.5 below.



**Figure 5.5: Types of ICT Tools Used to Record or Capture IK [N=62]**

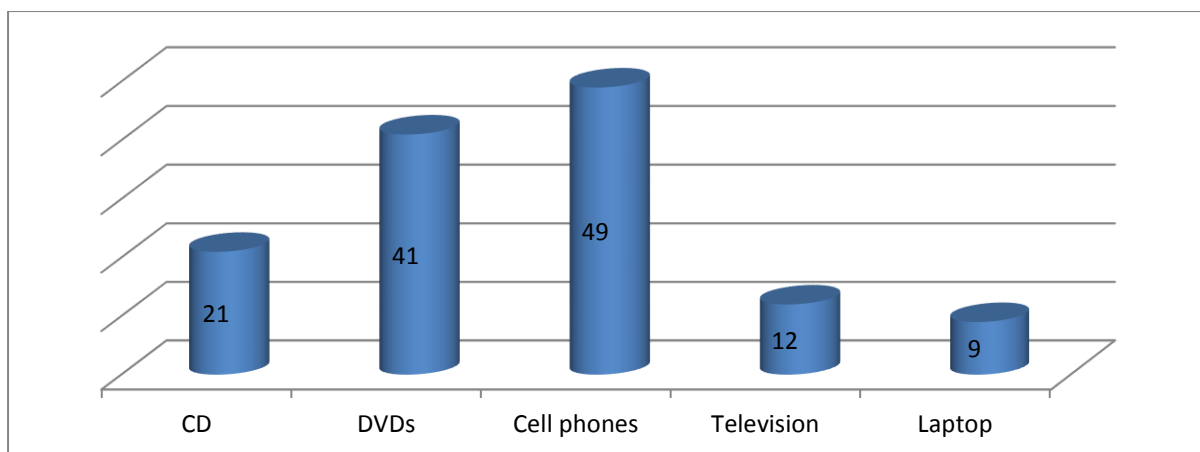
The figure above reveals that cellphones 49 (79%) were the predominant tool used by owners or custodians of IK to record or capture IK in the surveyed communities. The least used tool was the digital cameras (13; 21%). The findings showed that cellphones and digital cameras were the main used tools to record or capture IK.



**Figure 5.6: Types of ICT Tools Used to Store IK [N=62]**

*The figure above represents multiple responses*

The 62 (32%) respondents were also asked to establish the types of ICT tools they used to store indigenous knowledge. Figure 5.6 above shows that DVDs 42 (63%) was the predominant tool used by owners or custodians of IK to store or preserve IK in the surveyed communities, while 31 (50%) used CDs. Cellphones were less used among owners or custodians of IK, with a score of fourteen (22.5%) respondents.



**Figure 5.7: Types of ICT Tools Used to Disseminate IK [N=62]**

*The figure above represents multiple responses*

When the 62 (32%) respondents were asked to indicate the types of ICT tools used to disseminate IK, cellphones was the most used tool to disseminate IK practices, with the score of 49 (79%) respondents, followed by DVDs 41 (66%) as depicted in Figure 6.7. Other major ICT tools were CDs 21 (33.8%), television 12 (19%) and laptop 9 (14.5%). In this regard, ICT tools play a pivotal role in disseminating indigenous knowledge to a wider audience.

### **5.11 Problems Encountered in the Use and Availability of ICT Tools in Managing IK**

The fourth study objective sought to discuss the problems that hindered the use and availability of ICT tools to record, store and disseminate IK.

The 62 (32%) respondents who indicated that they used ICT tools to record, store and disseminate IK were also asked to state if they faced any challenge(s) in the use and availability of ICT tools. It was revealed that all 62 (100%) of the respondents of owners or custodians of IK faced challenges in the use and availability of ICT tools. The 62 (32%) respondents were also asked to provide details of those problems that hindered the use and availability of ICT tools to record or capture, store and disseminate IK. The table below summarises the results.

**Table 5.35: Problems Encountered in the Use of ICT Tools [N= 62]**

<b>Problems Encountered</b>	<b>Frequency (No)</b>	<b>Percentage %</b>
Lack of proper skills to capture and store quality data	47	75.8
Cellphones and digital cameras had less space to accommodate data	38	61
Lack of electricity to charge cellphones and digital cameras	32	51.6
Some cellphones and digital cameras are complicated to operate	21	33.8
ICT tools are operated in English thus it is difficult to understand	17	27

*The table above represents multiple responses*

Table 5.35 indicates that most owners or custodians of IK had different problems encountered, and the predominant problem was lack of proper skills to capture and store quality data (47; 75.8%). Other major problems reported were that cellphones and digital cameras had less space to accommodate recorded data (38; 61%), lack of electricity to charge cellphones and digital cameras (32; 51.6%) and some cellphones and digital cameras are complicated to operate (21; 33.8%). The least problem cited was that ICT tools are operated in English thus it is difficult to understand them (17; 27%).

**Table 5.36: Problems Encountered in the Availability of ICT Tools [N=62]**

<b>Problems Encountered</b>	<b>Frequency (No)</b>	<b>Percentage %</b>
Lack of funds to purchase proper ICT tools to record and store IK	62	100
Poor network in the community	47	75.8
Lack of electricity in the community	41	66
Lack of awareness of proper tools to record and store IK	41	66
Poor infrastructure	37	59.6
No shops in the community to purchase batteries	21	33.8

*The table above represents multiple responses*

The 62 (32%) respondents who reported that they encountered problems in the availability of ICT tools to capture, store and disseminate IK were also asked to indicate the types of problems encountered. Table 6.36 indicates that all 62 (100%) respondents had a problem of lack of funds to purchase proper ICT tools to record and store IK. Other major problems included poor network in the community (47; 75.8%), lack of electricity in the community (41; 66%), lack of awareness of proper tools to record and store IK (41; 66%) and poor infrastructure (37;

(59.6%). The least cited problem was that there were no shops in the local community to purchase batteries (21; 33.8%).

### 5.12 Recommended Strategies for Improving the Use and Availability of ICT Tools in Managing IK

The last objective of study sought to discuss strategies for improving the use and availability of ICT tools in managing IK in the province of KwaZulu-Natal. It must be noted that a large number of owners or custodians of IK reported that they were not using ICT tools to manage IK. This question was therefore directed to only those who were using ICT tools. The 62 (32%) respondents were also required to give their recommended strategies for improving the use and availability of ICT tools in managing IK. This question drew a lot of responses and comments from the respondents. These responses are summarised in the table below.

**Table 5.37: Recommended Strategies for Improving the Use and Availability of ICT Tools in Managing IK [N=62]**

Recommended Strategies	Frequency	Percentage %
Government must fund IK projects and owners or custodians of IK who are interested in managing IK through ICT tools	62	100
Budget for ICTs is essential	60	96.7
Basic education skills in using and operating ICTs are required	60	96.7
Supply rural areas with electricity	58	93.5
Connectivity is essential in rural areas	55	88.7
Roads creation is important	49	79
Backup and durable ICT tools to store or preserve IK are essential	41	66
Instructions of operating ICT tools must also be in Zulu	41	66
ICT tools must be user friendly	38	61
Balance infrastructure between rural and urban areas	32	51.6
The public must purchase our local products so that we can purchase proper ICT tools	19	30.6

*The table above represents multiple responses*

An inquiry into the recommended strategies for improving the use and availability of ICT tools in managing IK was essential. Thus, all 62 (100%) of the respondents indicated that government must fund indigenous knowledge projects and owners or custodians of IK who were interested in managing IK through ICT tools. Other highly recommended strategies were

that budget for ICTs was essential and basic education skills in using and operating ICTs was required (60; 96.7%) each, supply rural areas with electricity (55; 93.5%), connectivity was essential in rural areas (55; 88.7%), roads creation was important (49; 79%), backup and durable ICT tools to store or preserve IK are essential and instructions of operating ICTs must also be in Zulu (41; 66%) each, ICT tools must be user friendly (38; 61%), balance infrastructure between rural and urban areas (32; 51.6%). The least cited recommended strategy was the need for the public to purchase local products so that indigenous people would purchase proper ICT tools (19; 30.6%).

### **5.13 Summary**

The chapter has organised and presented the analysed data in accordance with the research objectives. Broadly, the key themes; which emerged from the findings, firstly, were that owners or custodians of IK had full understanding of their local knowledge. The chapter showed a great level of understanding of the nature of IK, types of IK, categories of IK, ways of acquiring IK and impartation of IK. Notably, these areas have shown some harmonies in their understanding of expression.

Secondly, the findings showed that all the ICT users/beneficiaries (57; 100%) visited and consulted owners or custodians of IK. However, traditional healers were mostly visited and consulted by ICT users/beneficiaries. The findings also revealed that these owners or custodians of IK were visited and consulted on regular basis. The majority of the ICT users/beneficiaries indicated that the purpose of visiting and consulting owners or custodians of IK was to capture, store and disseminate IK through ICT tools. Interestingly, the findings also established that some ICT users/beneficiaries visited and consulted owners or custodians of IK for research purposes, personal growth, and to integrate knowledge into museum lectures and displays.

The findings also showed that the majority (134; 68%) of the owners or custodians of IK was not using ICT tools to manage IK. Despite the availability of ICT tools to manage IK nowadays, it was found that a high number of owners or custodians of IK relied on oral communication. Interestingly, the few owners or custodians of IK who managed IK through ICT tools used both old and new technologies to manage IK. These technologies include cellphones, digital cameras, CDs, DVDs, laptops and television. The researcher believed that the availability of

the latest technologies will help broaden our awareness and possibility to effectively manage IK through ICT tools in this present day information.

The findings also revealed that some ICT tools are effective in the management of indigenous knowledge such as computers, internet and mobile phones. Despite the effectiveness of ICT tools, there were many challenges experienced by ICT users/beneficiaries and owners or beneficiaries in the access and use of ICT tools in managing indigenous knowledge. These problems encompass shortage of power due to low batteries; lack of digital skills; lack of funds to purchase proper ICT tools and poor network in the community. However, there were recommendations suggested to improve the use of ICT tools. The major recommendations were that there is need to encourage NGO's to fund IK projects and the need to increase ICT budget.

These findings were further discussed and presented in Chapter Six.

## **CHAPTER SIX: DISCUSSION OF FINDINGS**

### **6.1 Introduction**

The previous chapter presented the results of this study. The purpose of this chapter is to provide perspectives and insights into the results. This chapter collates and discusses data obtained from interviews, questionnaires and studies on the research themes that have been reported elsewhere in the thesis. The discussions are represented in sections 6.3 to 6.6 and organised by main research questions derived from the research objectives outlined in chapter one. Section 6.2 provides the demographic profiles of the respondents.

### **6.2 Demographic Profile of the Respondents**

The characteristics of respondents used in this study are comprised of gender, age, owners of IK, years of experience, marital status and educational qualifications. The respondents were drawn from different parts of the province of KwaZulu-Natal, in South Africa. The study targeted ICT users/beneficiaries and owners (or custodians) of indigenous knowledge (IK) as the chosen populations from the sampled cities and villages. Ninety six (96) ICT users/beneficiaries were given questionnaires, and 224 owners (or custodians) of IK were interviewed. Of the 96 ICT users/beneficiaries, only 57 returned their questionnaires giving 59% response rate. Additionally, of the 224 owners or custodians of IK, only 196 were interviewed giving 87.5% response rate. All these responses were used for the analysis in the current study (see Chapters 5).

The study included more females than males (see Table 5.1 in Chapter 5). This could have occurred because of the sampling strategy which did not cluster the respondents and/or because the sector could still be run by females. The age range shows that respondents were more mature in age which suggests that to manage IK someone requires maturity and experience. It was also revealed that, among ICT users/beneficiaries, the majority of respondents were researchers, information librarians and field workers. The minority was indigenous knowledge recorders and indigenous knowledge consultants (see Table 5.1 in Chapter 5). Regarding years of work experience, the ranges between 6-10 years and 1-5 years were the highest, while the lowest were between 11-15 years and 16-20 years (see Table 5.1 in Chapter 5) suggesting that respondents were not engaged with IK for a very long time.

The results from the owners or custodians of IK, however, showed that more women were willing to participate in the study than men (see Table 5.19 in Chapter 5). The marital status of

respondents revealed that the majority were married. Regarding age group, the highest percentage of respondents was between the ages of 41 - 50 years and above 51 years. The lowest was between 31 – 40 years (see Table 5.19 in Chapter 5). The level of education of the respondents showed that the majority had secondary school level education, followed by those who never went to school at all. Notably, about 9% had college education, while only 2% had university degree qualification. This sector seems to be dominated by less educated people. Interestingly, it was revealed that both women and men were fully involved in indigenous knowledge practices. In other words, indigenous knowledge belongs to everyone in rural communities. The possession of knowledge of IK is more with elderly people than with the youth. It can be deduced that indigenous knowledge (IK) takes time to acquire. Notably, the interview results showed slight differences in terms of level of education compared to the questionnaire results obtained. It is observed that ICT users/beneficiaries are more educated than owners or custodians of IK.

### **6.3 What is the Nature of Indigenous Knowledge Owned?**

The results show that owners or custodians of indigenous knowledge (IK) have similar explanations and understandings of the nature of indigenous knowledge. For example, the findings revealed that the majority of owners or custodians of IK inherited their knowledge from their fore-fathers/older generations. The findings also showed that IK is inherited through spending time together and building a sense of trust with elders/owners. Thus, IK is transferred from one generation to another by word of mouth and generated through community/cultural norms and values held by traditional elders (see Section 5.8.1 and Table 5.20 in Chapter 5). These findings are in line with Nonaka's (1994) SECI model where emphasis is placed on sharing tacit knowledge through a medium called socialisation. It suggests that IK is stored in the mind and transferred to others through interactions. Related studies reiterate that IK is largely stored in people's memories, activities and practices (Sraku-Lartey, 2014; Zaman, Wee & Kulathuramaiyer, 2013; Adeniyi & Subair, 2013; Dixit and Goyal, 2011; Gupta, 2015; Ogbebor, 2011; Ibnouf, 2012). Thus, tacit knowledge is not easily codified, rather, it can be expressed as knowledge and skill when a task or responsibility is assigned.

The findings also revealed that owners or custodians of IK used their inborn and inherited knowledge to survive on a day-to-day basis. This was demonstrated in their ability to predict certain climatic conditions and conquer life challenges without the aid of modern knowledge. Similar observations by Gupta (2015); Forsyth (2013); Materer, Valdivia and Gilles (2002);

and Langill and Landon (1998) suggest that indigenous knowledge is composed of knowledge from previous generations. The findings were also consistent with the characteristics of IK mentioned by Madebwe, et al. (2005) that indigenous knowledge systems (IKS) used in farming within communities form the bedrock of collective wisdom that is passed from one generation to another. The findings are consistent with Mapara's (2009:151) argument that "a wide range of indigenous agricultural land use practices by farmers are based on generations of informal experiences and experiments". Mapara (2009:151) goes on to say that "these experiences and experiments provide a deeper understanding of biophysical and social environments".

In addition, the study findings indicated that a few owners or custodians of IK received their knowledge through practices of ancestral communication. For example, some traditional healers said "*while I was asleep, my mother who died years ago came to me in the dream and put saliva in my tongue and said go and solve every problem people come with*". The finding suggested that performed rituals activate power and encourage the ancestors to speak and give instructions through dreams.

#### **6.4 What Type(s) of Indigenous Knowledge Practices are Inherited?**

This study has identified many types of indigenous knowledge (see Section 5.9.1; Tables 5.21, 5.22, 5.23, 5.24, 5.25 and 5.26 in Chapter 5). It was revealed that owners or custodians of IK inherited different types of indigenous knowledge practices from their fore-fathers and/or ancestors. Thus, the different types of indigenous knowledge practices inherited helped the sustainability of the rural communities. Notably, it was indicated that belief was one of the types of IK inherited by owners or custodians of IK. For example, owners or custodians of IK believed that the ancestors were intermediaries between the community and God. Thus, during wedding ceremonies, it was a common practice for the community to have an animal such as a cow or goat slaughtered in the yard as a sacrifice. It was revealed that such practices enabled the ancestors to pave a way for a healthy marriage and partnership between the newly-weds (see Table 5.21 in Chapter 5). The findings agreed with Sobiecki, (2014); Charyulu (2004); Kaniki and Mphahlele (2002); Langill and Landon (1998); IIRR (1996); and Ilo (2012) which emphasized that indigenous knowledge reflects the beliefs of a community. This causes communities to primarily base their religion and culture on the practices inherited from their fore-fathers. Similar observations by Ilo (2012); and Kaniki and Mphahlele (2002) also

reported that rural communities believe that ancestors can communicate with individuals therefore they know that they can receive assistance in solving their problems.

The study findings further showed that beliefs were not only practiced in wedding ceremonies, but also by women who were expecting children. For example, a pregnant woman was given specific herbs to drink to ensure that the child grew well and free from evil spirits. It was believed that the herbs cleansed and chased away all the unwanted spirits. These findings concurred with those of Naidu (2013) who reported that the traditional medicinal drink called 'isihlambezo' is commonly taken by women during pregnancy. The purpose here is to stave off fears of ill health around their pregnancy. The researcher of the current study also made reference to the birth of a child, as described by the key informants interviewed. The description was that the Zulu people were of the conviction that a newly born child must be confined to the care of only women. Men were not allowed to see the newly born child because they used dangerous herbs and animal parts which may be harmful to the child (see Table 5.21 in Chapter 5). Thus, these study findings were in line with Abrahams, Jewkes and Myo (2002); and Naidu (2013) who unveiled that when women are pregnant, they should be protected from witchcraft and demonic forces.

The findings of this study also revealed that owners or custodians of IK inherited the use of medicinal plants and animal parts for the healing of illnesses. Thus, herbalists, traditional healers, diviners and elders in the community were normally called community doctors. It was revealed that inherited skills and knowledge has helped them to cure certain illnesses affecting community members (see Table 5.22 in Chapter 5). It can be concluded that rural people rely on medicinal plants and animal parts for their health. These findings agreed with the findings of Coleman (2013); Eyong (2007); and the National Reference Centre for African Traditional Medicine (NRCATM, 2010) who reported that over "60% - 80% of the world's population depends on indigenous healthcare based on medicinal plants". Similarly, Sraku-Latey (2014) also reported that the use of traditional medicine therapies in meeting health needs globally is receiving significant attention internationally. It can be concluded that the recipes used for healing comprise of herbs and animal parts, namely, the skin, tail, legs, eye, liver, urine, hooves, bile and the tongue.

The study also revealed preventative medicines, namely: African potato and aloe for building the immune system and controlling high blood pressure, and bark of a specific tree chewed for

not only cleaning one's teeth but also for protecting them against dental problems. The study showed that a special bark called 'Umhlabelo' was ground to powder and then mixed with water for the patient to drink. It was revealed that the powder was used to heal broken bones. It was concluded that medicinal plants were not only for healing illnesses but also for cleansing the blood and sustaining manhood. For example, men were taught to use special herbs to preserve and boost their manhood instead of pharmaceutical tablets (see Table 5.22 in Chapter 5). These findings agree with the statements of Charyulu (2004); Ilo (2012); Kaniki and Mphahlele (2002:18); Makara (2002:40); and Nakapipi, Shalyefu and Mushaandjan's (2011) that herbs collected in the wild are key sources of traditional African medicine. Similarly, Kaniki and Mphahlele 2002; and the National Reference Centre for African Traditional Medicine (NRCATM, 2010) stated that herbs are used as key or primary medicinal plants for treatments. Specifically, Nakapipi, Shalyefu, and Mushaandjan (2011) suggest that medicinal healing plants are mainly for external use. The National Reference Centre for African Traditional Medicine (NRCATM, 2010) confirmed that, presently, humans rely heavily on plants to treat all manner of illnesses. This ranges from minor to major problems, such as coughs and colds to life-threatening diseases like tuberculosis and malaria. The commonly used traditional medicinal plants are not only used in African communities, but world-wide (Van Wyk, 2011; Eyong, 2007; Anani et al, 2000; Hutchings et al., 1996).

It was revealed that owners or custodians of IK also inherited traditional craft. Thus, women, for example, have earned themselves a good reputation in their community by producing artwork such as baskets, girdles, clay pots, candles, etc. These findings concurred with the findings of James and Nettleton (2010) who affirmed that Zulu women use their traditional knowledge and skills to create commercially viable products. Magara (2002) reported that in African countries, like Lesotho, women make clay pots and candles. Similar observations by Sirika (2008) stated that women completely dominate in pottery or clay pot making. The findings also established that men also used their local experience to craft wooden spoons and manufacture spears, shield, assegais, plates for meat, etc. (see Table 5.23 in Chapter 5). The findings were in line with Zibani's (2002) report that the Zulu people have their own way of making spoons from indigenous trees. Similarly, Nettleton (2010) and Sirika (2008) supported the study findings that handicraft is normally owned and run by artisans. Artisans are involved in pottery making, iron smiths, jewellery, weaving, woodcarving, tannery and basketry. It can be concluded that the making of clay pots, wooden spoons, spears, to mention but a few, was

a result of the different types of indigenous knowledge practices that were inherited from previous generations.

These findings suggested that indigenous knowledge practice was inherited from generation to generation through vigorous training. Thus, elderly women and young girls in the community manufactured sleeping mats with different decorations, while elderly men and young boys carved wooden spoons and meat plates from strong indigenous trees. It is important to note that the impartation of skills and knowledge begins at infant stage to ensure continuity of skills and knowledge. The researcher established from the interviews that young people in the community were initiated into activities of the community. This helped them to learn how to apply local knowledge for proper use. For example, members of the community were taught various beliefs which related to a code of conduct. A good example of such conducts was how to show respect to elderly people, and to one another. Also, young people were taught to observe the behavioural and seasonal migration of animal species, and patterns in nature generally. For example, big white birds signified imminent winter, thick and black clouds indicated imminent rain, and when birds made a loud noise it was normally understood as indicative of the presence of a snake or danger. The findings also showed that children were taught that when they saw a cat restless, and hiding under chairs or blankets/skin, it symbolised that heavy rain accompanied by a storm was about to come (see Table 5.24 in Chapter 5). Eyong (2007) noted that when elderly men heard dogs howl too much, fowls crow at mid-day, and saw ants and flies move in an unusual way, it signified that a nearby river would overflow its banks and potentially destroy crops. It can be concluded that indigenous people relied on nature, domestic and wild animals, for decision making.

The study findings also showed that grandmothers in the community often told stories after supper; reciting proverbs based on the customs of their particular ethnic group. It was concluded that such stories served a valuable educative role in the community. For example, young women were educated not to enter a kraal since their entering of a kraal might result in them becoming infertile (see Table 5.24 in Chapter 5). Studies by Kaniki and Mphahlele (2002) supported this finding that young girls must not enter the kraal in order to avoid becoming infertile.

Findings further revealed that some owners or custodians of IK inherited agriculture/farming skills. For example, it was revealed that owners or custodians of IK practiced pre-planting

which was mainly for increasing elasticity of the soil, while intercropping was mainly used to increase soil nutrients (see Table 5.25 in Chapter 6). Several studies by (Eyong, 2007, Kaniki and Mphahlele 2002:20, and Ogen 2006) acknowledged that indigenous people practice intercropping, that is, they plant different crops in the same field in order to retain soil nutrients. Traditional farmers use local nutrients like blue-green algae, kraal manure from livestock, and legumes as sources of nutrients. They also depend heavily on diversity of plants and animals as a means of pest control is one way through which biodiversity is taken advantage of in the traditional farming system (Buthelezi, Hughes & Modi, 2013; Dlamini, 2007).

Finally, the current study further showed that owners or custodians of IK inherited a specialised knowledge in traditional food preparations. The findings revealed that owners or custodians of IK have vast skills in brewing local beer, preserving food for future use like meat, maize, vegetables, just to mention a few, (see Table 5.26 in Chapter 5). IK in food processing and preservation is highly developed in many communities (Kaniki & Mphahlele, 2002). Indigenous people use their local skills in brewing local beer (Govender, Mudaly & James, 2013; Kaniki & Mphahlele, 2002).

#### **6.4.1 Knowledge on whether Owners of Indigenous Knowledge are Custodians of IK**

In the current study, despite the fact that owners of IK are called custodians of IK, the findings of the study showed that the majority of the respondents, 182 (93%), did not own IK from birth as part of genealogy but inherited the knowledge through interaction with people (e.g. elders) and environment. However, 14 (7%) of owners or custodians of IK (see Figure 5.1 in Chapter 5) indicated that they were born with the IK they possessed. The inheritance by the majority of the IK owners/custodians could have come from their parents, nature or ancestors and largely learnt. The findings are closely linked to with studies by Akullo, Kanzikwera and Barwogeza (2007); Anyira, Onoriode, and Nwabueze (2010); Rajasekaran (1993) who reported that all indigenous people are the custodians of indigenous knowledge systems in some way. Rajasekaran (1993) further informed that the custodians of local knowledge are well informed about their own situations, their resources, what works and what does not work in their communities. The researcher was of the view that tacit indigenous knowledge is associated with skills and practices developed over time. These are passed down through generations, and eventually become entrenched in the people's cultures (Ibnouf, 2012).

#### **6.4.2 Ways in which Indigenous Knowledge (IK) Practices were Acquired**

This study has shown several ways from which IK is acquired but largely through learning from people and the environment. There are few instances reported in the study where IK acquisition originated from supernatural powers conveyed through ancestral spirits, premonition and other un-explainable ways. This occurs more often with traditional healers.

The findings from this section support Nonaka's (1994) SECI model. In Nonaka's (1994) theory, it was established that socialisation is the process through which creation of knowledge takes place. Common tacit knowledge deposited in people's minds can be shared through activities and experiences mentioned in the findings of this study. It was discovered that indigenous knowledge practices were acquired in many different ways. For example, some owners or custodians of IK believed they received it from their ancestors, dreams, through healing and observation, through learning by doing from their parents, an inborn knowledge, amongst others (see Table 5.27 in Chapter 5). It can be inferred that those who received it from ancestors manifested such gifts as a natural talent in the process of healing someone who was sick. It was found that apart from receiving the knowledge of healing from ancestors, other owners or custodians of IK acquired the knowledge through association with traditional healers, diviners or herbalists, just to mention a few (see Table 5.27 in Chapter 5). The researcher noticed during the narration of the interview process that some of the community elders, and other community members, cited specific moments when they spent quality time with traditional healers or herbalists to help them collect herbs and animal parts from the mountain. It was revealed that such times were viewed as a training process that enabled them to learn. These findings supported Hoegl and Schulze (2008); and Marley (2012) acknowledgment that socialisation yields new tacit knowledge that is built through informal interactions.

It was also revealed that farming skills and knowledge were learnt through socialisation. For example, the acquisition of farming skills by young men in the village resulted from them observing how their grandfathers and fathers performed farming tasks in the field. Thus, the observation methods afforded young men the opportunity to learn, imitate and apply what they had observed. It can be concluded that for anyone to become a successful farmer he/she needed accumulated farming skills that is acquired over years. Similarly, it was revealed that young men and young girls acquired artwork skills through observing community elders making

baskets, spears, shields, clay pots, sleeping mats, meat plates, beads, etc. (see Table 5.27 in Chapter 5). A remark made by Mosoti and Masheka (2010) was that in socialisation, the conversion of knowledge is tacit to tacit. This implies watching somebody and then doing what he/she has done (learning by doing and through drilling). Similarly, observations by Ngulube (2003); and Lwoga, Ngulube and Stilwell (2010) reported that in socialisation, face-to-face conversations, social interaction, storytelling, music and dance take place. Most importantly, emphasis is on the process of imparting tacit knowledge. The researcher concludes that for socialisation to be effective, people need to build a field of interaction and trust.

#### **6.4.3 Categories of Traditional Role(s) of Owners or Custodians of IK**

The current study established that ICT users/beneficiaries and owners, the custodians of IK, were well informed of categories of indigenous people in rural communities. Thus, the indigenous people had similar categories as indicated by respondents. These categories included traditional healers, traditional farmers, herbalists, and more (see Table 5.3 in Chapter 5 and Table 5.28 in Chapter 5). It was revealed that owners or custodians of IK were more aware about the specific categories as they also mentioned rainmakers. The findings concur with the findings of Akullo, Kanzikwera and Barwogeza (2007); Anyira, Onoriode and Nwabueze (2010); Rajasekaran (1993) who reported that indigenous people, including farmers, landless labourers, women, rural artisans, cattle rearers and tribes, are the custodians of indigenous knowledge systems. Rajasekaran (1993) observed that custodians of local knowledge are well informed about their own situations, their resources, what works and what does not work in their local communities. It can be concluded from these findings that different categories of traditional roles of IK exist in the province of KwaZulu-Natal and play a significant role. Even though modernisation has made its presence felt, the custodians of IK still recognise and maintain their valuable resource.

#### **6.3.4 Visiting and Consulting Owners or Custodians of IK**

This study concurs with related studies reported in the thesis that most people in the community do visit and consult with IK owners, particularly the traditional healers, in Africa. In this study, it was revealed that owners or custodians of IK were often visited and consulted for specific and general purposes (see Table 5.2 in Chapter 5 and see Section 5.9.6 in Chapter 5). This was based on the findings from both ICT users/beneficiaries and owners or custodians of IK. For example, all respondents acknowledged that owners or custodians of IK were visited and consulted. More specifically, community members, students conducting research on

indigenous knowledge, researchers on IK, information specialists/librarians, tourists, amongst others regularly visited and consulted owners or custodians of IK (see Table 5.29 in Chapter 5). These findings suggested that IK was still essential in these contemporary days. A Tanzanian study by Lwoga (2009) also reported that knowledge intermediaries consulted owners or custodians of IK in order to collect IK in the local communities. The collective IK was based on their willingness to share their experiences with one another for certain reasons or activities in place. These findings also agreed with the findings of Nonaka (1994) who placed emphasis on sharing tacit knowledge through the medium of socialisation, externalisation, combination and internalisation. It can be emphasised at this stage that even though western ideologies are the norm, indigenous knowledge is still vital and usable in this modern era. This is so because the knowledge acquired helps to improve the economy in multifarious ways. Similar observations by Lwoga (2009) admitted that owners or custodians of IK are highly consulted by intermediaries/beneficiaries of indigenous knowledge systems. It can be deduced that indigenous knowledge is vital, relevant and usable in African countries.

#### **6.4.5 Consulting Times of Owners or Custodians of IK**

The findings of the current study showed that there were no strict rules and regulations followed when visiting and consulting owners or inheritors of IK. Thus, people who visited and consulted owners or inheritors of IK were at liberty to arrive at any time they preferred. The flexibility makes it easy for IK to be accessed and used by the beneficiaries. The findings also established that even though some owners or custodians of IK were busy, time schedules were created to accommodate everyone with or without a special need (see Section 5.9.7 and Table 5.30 in Chapter 5). There were unique cases – reported, when scheduled time for visitations occur at night in order to make the healing process work or conceal the identity of the beneficiary.

#### **6.4.6 Purpose of Visiting and Consulting the Owners or Custodians of IK**

This segment responds to questionnaire and interview data sets. The study has revealed many reasons why IK owners/custodians are consulted. The study findings established that owners or custodians of IK were visited and consulted for the purpose of recording or capturing, storing, and disseminating indigenous knowledge practices through ICT tools (see Table 5.5 in Chapter 5; see Section 5.9.8 and Table 5.31 in Chapter 5). It was revealed that the advantages of ICT tools are immense as they facilitate the rapid collection, collation, storage and dissemination of data in many forms. These findings corroborate the statements of Agrawal's

(2002) observation that digital technologies have been used to capture, store and distribute knowledge. This also supported Ilo's (2012) acknowledgement that ICT tools are currently used for the acquisition, preservation and accessibility of IK. Kennedy and Davis (2006) also stated that digital technologies are very important in the gathering, storing, evaluating and retrieving of information in present day rural and urban environments. These findings indicated that owners or custodians of IK also wanted to see their valuable knowledge managed through ICT tools. The findings also suggested that ICT tools could play a pivotal role in managing and safeguarding indigenous knowledge since humans are vulnerable to memory loss, sicknesses, diseases, death, etc.

In the present study, a few ICT users/beneficiaries and owners or custodians of IK also revealed that, apart from using ICT tools to manage IK, owners or custodians of IK were also consulted for personal problems (see Table 5.5 in Chapter 5 and see Tables 5.31 in Chapter 5). The study findings concurred with the findings of Lwoga (2009) who reported that there are many reasons why people visit and consult owners of IK. One of the reasons is for research purposes and managing IK using ICT tools. It can also be deduced that those who visited and consulted owners or custodians of IK for personal problems were community members and ICT users/beneficiaries. The study findings identified the following personal problems: healing, foretelling, divine impartation, good luck, skills development, rituals, divination, counselling, child delivery assistance, promotion at work, good life, to be free from demonic attacks, and winning sport league cups. It can be said that not only rural people use local knowledge to solve personal problems, but also those who lived in urban areas.

#### **6.4.7 Types of IK Practices Imparted to those who Visit and Consult Owners or Custodians of IK**

The study findings showed that various types of IK practices were imparted to those who visited and consulted owners or custodians of IK. These IK practices included, but were not limited to, the following: farming techniques, local songs, healing, ancestral worship, preparing traditional food, local dances, artworks, and midwifery practices (see Section 5.6.9 and Table 5.32 in Chapter 5). These practices are reported in related studies, for example, Eyong (2007); Beckford and Barker (2007) observed that indigenous cultivation practices, when applied carefully, would conserve the soil for increased soil fertility and the production of a good harvest. Van Wyk (2011); Eyong (2007); Anani et al. (2000); and Hutchings et al. (1996),

affirmed that tree trunks were used as medicine for back pain and treating toothache. The stem and juice were also used to treat coughs, sore throats, and eye infections. Also, Geraniaceae roots were used to treat gonorrhoea, diarrhoea, dysentery, colds and lung infection.

The findings showed that ordinary people and ICT users/beneficiaries harvested local knowledge for various purposes. Additionally, the researcher concluded that the impartation of IK practices was usually performed in the presence of community members with ICT users/beneficiaries. It can be deduced that there are different types of indigenous knowledge practices available for use in KwaZulu-Natal. The researcher observed that the owners or custodians of IK were generous and sociable as they imparted their local knowledge to people who recognised and were willing to use their skills for personal use and for dissemination purposes.

#### **6.4.8 The Survival of IK in KwaZulu-Natal Province**

The study found that indigenous knowledge would survive in the province of KwaZulu-Natal because almost all owners or custodians of IK strongly believed that tacit indigenous knowledge practices would continue. Fewer respondents attested that tacit indigenous knowledge would not survive (see Figure 5.2 in Chapter 5). The findings further established various reasons as to why tacit indigenous knowledge would survive. Firstly, it was established that those who visited and consulted owners or custodians of IK use various tools to record, store and disseminate IK (see Tables 5.33 in Chapter 5). Secondly, it was also found that indigenous knowledge is still important in the areas of agriculture/farming, medicine and education, to mention a few (see Tables 5.33 in Chapter 5). It can be concluded that the fact that indigenous knowledge is harvested through ICT tools it will survive. Additionally, it can be concluded that since indigenous knowledge is still very important in agriculture, medicine and education it is essential to survival and thus here to stay.

#### **6.5 What ICT Tool(S) are Currently Available for Recording, Storing and Disseminating IK?**

It was discovered that there were ICT tools used for managing IK. Thus, the owners or custodians of IK revealed that some ICT users/beneficiaries carried ICT tools whenever visiting and consulting them (see Figure 5.3 in Chapter 5). Furthermore, it was established that various tools such as mobile phones, video/recordings and video cameras were carried and used

by ICT users/beneficiaries whenever visiting and consulting owners or custodians of IK (see Section 5.10.1 and Table 5.34 in Chapter 5). It was deduced that institutions, information centres and individual researching on indigenous knowledge recognised the importance of managing IK through ICT tools.

The study found that ICT users/beneficiaries and some owners or custodians of IK used ICT tools for capturing, storing and disseminating IK. The study findings showed that all ICT users/beneficiaries realised that ICT tools were essential in present day IK systems (see Table 5.6 in Chapter 5). Additionally, even though a large number of owners or custodians of IK did not use ICT tools to manage IK, 62 (32%) used ICT tools to manage IK (see Figure 5.4 in Chapter 5). It was deduced that a lack of awareness, culture, skills and financial constraints may have also contributed to the lack of use of ICTs in managing IK. The importance of ICT for IK is widely known and reported (Oppenheer 2010; Molawa 2009; Adam (2007; Akinde 2007). This study found that large amounts of tacit indigenous knowledge was recorded or captured and stored with the aid of ICT tools. Notably, the present study suggested that ICT tools could safeguard the management of tacit indigenous knowledge in African communities.

The findings showed that there were certain ICT tools used by owners or custodians of IK and ICT users/beneficiaries for recording or capturing IK. Cellphones and digital cameras were largely used by owners or custodians of IK, while ICT users/beneficiaries used multiple tools for recording or capturing IK (see Figure 5.5 in Chapter 5 and Table 5.7 in Chapter 5). A study by Lwoga (2009) also affirmed these findings that cellphones and digital photographs have been used to capture IK. The findings of the study also agreed with the findings of Adetoun (2007); and Fogwill et al. (2011) who reported that the use of digital film/video cameras to record and/or capture IK is one of the most effective ways that ensures the availability of indigenous knowledge on ICT tools. Other authors who recommended the use of digital cameras to record or capture IK were Adetoun (2007); Christie (2005); Ilo (2012); and Okore, Ekere and Eke (2009). Similarly, Ilo (2012) noted that video cameras have become vital tools used today to capture different forms of arts and other physical objects. Chista (2011) and Kargbo (2005) observed that tape recorders also assist in capturing traditional knowledge in agricultural environments. The views of these authors reinforce the possibility of managing IK using new technologies in this present era.

The findings were also affirmed by Kapuire and Blake (2011) who reported that flip cameras and mobile phones are handy in capturing indigenous knowledge. Adetoun (2007); and Okore, Ekere and Eke (2009) also suggested the advantage of using digital cameras to record data, copy it onto CD-ROMs to re-view later using either a computer or the Internet. Studies by Ilo (2012); Flor (2013); Owiny, Mehta and Maretzki (2014) conclude mobile phones are a vital tool for capturing knowledge. Digital cameras and cellphones are used to generate and capture images. However, the researcher 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. However, Oppenneer (2010) believed that ICT tools are ill-equipped to manage IK successfully because not all IK is “capturable”. Semali and Kincheloe (1999) also reported 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 of using ICTs for cultural preservation and revitalisation is the reality of obsolescence. It means any digitised knowledge become a problem simply because of obsolescence (Oppenneer, 2010). It is evident that ICT tools are capable of managing IK, however, there is need to change with time in the application of ICTs in present day technology to avoid obsolete technology. There is a need to specify how far ICT tools can go in managing IK and be ready to change with time.

#### **6.5.1 ICT Tool(S) Used for Storing or Preserving and Disseminating IK**

The study findings showed that there were ICT tools used by ICT users/beneficiaries and owners or custodians of IK to store or preserve and disseminate tacit indigenous knowledge. It was evident that some ICT tools can do a multipurpose job. These ICT tools include internet, emails CDs and cellphones (see Tables 5.8 and 5.10 in Chapter 5 and Figures 5.6 and 5.7 in Chapter 5). The findings indicated that the Internet (which houses Facebook, YouTube, Google Docs, Twitter etc.) was the predominant multipurpose tool for storing and disseminating IK among ICT users/beneficiaries. Moreover, DVDs was the most predominant multipurpose tool for storing and disseminating IK among owners or custodians of IK. The study findings also agreed with the findings of Maina (2012) and Nickerson (2005) who reported that the capacity of the Internet has moved beyond physical (geographical) barriers. This has also greatly affected the increased cultural interaction. The Internet is also used in the sharing of information with others so that everyone can benefit from it. Similarly, Leiner et al. (2009) also disclosed that the Internet, a world-wide broadcasting service, is a mechanism used for information dissemination and collaboration with individuals. Owiny, Mehta and Maretzki’s

(2014) argued that the Internet is used to upload and disseminate indigenous knowledge globally. Websites like YouTube allow users to upload, share, and view videos anywhere in the world. Essoungou (2011) also reported that Facebook is another tool that most individuals use to post video messages, share their interests, make connections, and join groups with similar interests. 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 Marezki, 2014). A study by Owiny, Mehta and Marezki (2014) suggested that information on how to grow and market local indigenous vegetables can be featured on radio programmes, thus using the language of the area.

The study findings also showed that there are some ICT tools which do not function as multipurpose tools but only store or preserve IK. These tools include computers, USBs, tape/voice recorders and video/digital cameras. The findings indicated that computers were the predominant tool used by ICT users/beneficiaries to store or preserve IK (see Table 5.8 in Chapter 5). These findings confirmed the statement of Ilo's (2012) that documented indigenous knowledge can also be stored in mp4 devices, mobile phones and computers.

Internet was the most effective tool used for communicating and preserving IK (Le Roux, 2003). A similar observation by Chisenga (2002) suggested that the use of audio and video formats to capture and preserve valuable knowledge makes it accessible to a wider community. The researcher concludes, in relation to Owiny, Mehta and Marezki's (2014:5) study, that social media technologies are critical tools used today to preserve indigenous knowledge for future generations. It must be noted that these authors recommend the use of different types of ICT tools to manage IK for future generations. The findings of the study disagreed with the findings by Oppenheimer, (2010) who reported that sometimes "ICTs are ill-equipped to handle cultural knowledge. Similarly, Michael and Dunn (2006) also reported that ICTs have difficulty interpreting tacit knowledge since the output, is largely one-dimensional. The study found that not all indigenous knowledge practices can be managed through ICT tools as there are various challenges faced due to the nature of IK. However, it can be concluded that ICT tools are generally effective in the management of indigenous knowledge.

There were also ICT tools used not for multipurpose but only for disseminating IK in the province of KwaZulu-Natal province. It was evident that multiple tools such as telephone, television, laptop and radio were used only for disseminating IK. It was also noted that

television and laptop were tools used primarily by owners or custodians of IK, while telephone, radio and television were used by ICT users/beneficiaries. A Tanzanian study by Lwoga (2009) showed that knowledge intermediaries used different tools to disseminate indigenous knowledge. Indications were that indigenous knowledge was available for use to anyone who recognised it. A study by Chistina (2011) concurred with this finding, i.e. that radio and television channels are used for the broadcast of agricultural programmes in developing countries.

Notably, the study found that ICT users/beneficiaries were strategic when it came to the storing and dissemination of IK in present day environments. Furthermore, the use of social media tools such as YouTube, Facebook, Twitter and Google Docs has the possibility to attract the young generation in becoming more involved in the use and preservation of IK. The findings suggested that the dissemination of IK was crucial in the present day environment.

Despite the possibility of disseminating IK through ICTs, Michael and Dunn (2006) argued that there is information which must not be disseminated through ICTs such as the secrets that remain between males and females. The two authors believed that the secrets must only be passed down orally to other selected members of the community. Michael and Dunn (2006) further argued that it is not machinery that reforms society, repairs institutions, builds societies or produces democratic culture; it is people who make this happen. In that regard, there is need for custodians of IK to be actively involved in their communities in order to make their local knowledge alive and ever-changing. In other words, ICT users/beneficiaries, namely organisations, institutions, information centres, to mention but a few, need to work collaboratively with the custodians of IK for the benefit of all.

### **6.5.2 Effectiveness of ICT Tools Used in Recording or Capturing IK**

It was found that ICT users/beneficiaries ranked ICT tools as effective tools for recording or capturing indigenous knowledge in the communities. The findings revealed that videos/cameras were the predominant tool used to record IK (see Table 5.11 in Chapter 5). Lwoga (2009) also found that multiple ICT tools are either effective or very effective in disseminating indigenous knowledge. It can be seen that these tools are used significantly for recording and filming IK from the custodians of IK in this study, a testament to their effectiveness. These findings agreed with the findings of (Fogwill et al., 2011) who 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 were used in ceremonies performed by indigenous people. Adetoun (2007); and Okore, Ekere and Eke (2009) admitted that the advantage of using digital cameras cannot not be quantified. It can be used to record data, copied onto CD-ROMs, and later viewed using either a computer or via the Internet. Similarly, Kargbo (2011) and Chisita (2005) reported that tape/voice recorders assist in capturing traditional knowledge in agriculture. Ilo (2012); Ngulube and Lwoga (2009); Flor (2013), and Owiny, Mehta and Marezki (2014) also supported these findings. They established 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. However, Okore et al. (2009) and Adam (2007) slightly disagreed with these findings and the views of the authors above. The two authors revealed that while it is possible to manage IK through ICTs, not all aspects of IK can be captured. The study therefore concludes that ICT users, particularly institutions, information centres and individuals dealing with IK, need to work amicably with custodians of IK for the effective management of this intangible resource.

### **6.5.3 Effectiveness of ICT Tools in Storing or Preserving IK**

The study findings showed that ICT users considered ICT tools very effective in storing or preserving IK. The most highly effective tools in storing or preserving IK, for the participants, were computers, Internet (YouTube, Facebook, Twitter and Google Docs, Wikis), video, television and radio. Other ICT tools effective in this regard were intranet and mobile phones (see Table 5.12 in Chapter 5). Few ICT users indicated that film reels were very effective in storing IK (see Table 5.12 in Chapter 5). It was established that the level at which ICT tools were used to store tacit indigenous knowledge practices depended largely on the usage of the tools by the individuals. Therefore, there is a need to encourage the ongoing use of the ICT tools that can manage indigenous knowledge. It can be concluded that multiple, and a variety of, ICT tools could be identified and used in the future since there is increasing awareness and growing interest in the use of ICTs to store indigenous knowledge in KwaZulu-Natal province. Furthermore, any documented indigenous knowledge practices can be retrieved and used effectively even in the absence of the person who owns the knowledge. The findings of the present study concurred with the findings of Ilo (2012) who affirmed that ICT tools are effective in documenting IK. The storage of the IK largely depends on the availability of databases (Ilo, 2012). In a situation where the computer and mobile phones are connected to the Internet, with every facility, the stored information can be sent as attachments to the mail

boxes of the e-mail (Ilo, 2012). The literature showed that the accessibility of the information stored in video and audio tapes served as appropriate storage devices of IK. Ilo (2012) further noted that pictures are also stored and preserved in video CDs, while music, folktales, riddles are preserved in audio tapes. The researcher concludes that multiple tools are used for the effective storage of such knowledge.

#### **6.5.4 Effectiveness of ICT Tools in Disseminating IK**

Effectiveness here means those ICT tools used to disseminate IK to reach a targeted or intended audience. The study found that ICT tools were effective in disseminating indigenous knowledge. The highest cited ICT tools in disseminating indigenous knowledge were the Internet (i.e. YouTube, Twitter, Facebook, Google Docs etc.), computers, video, television and radio. Other very effective ICT tools in disseminating IK were intranet and mobile phones. The least cited ICT tool effective in disseminating IK were film reels, with only 12 (21%) of respondents using this method (see Table 5.13 in Chapter 5). These findings suggest that multiple tools are effective and reliable in disseminating IK. Lwoga (2009) also found that ICTs are effective tools for disseminating exogenous knowledge in the communities. These findings agreed with the findings of Le Roux (2003) and Tihapi (2004) who reported that the use of the Internet in disseminating IK is crucial and does not only disseminate but also communicate and preserve IK. Lor (2004) also affirmed that Internet connectivity spread throughout communities can promote the awareness and appreciation of IK nationwide. Other authors who supported the current study are Maina (2012); and Owiny, Mehta and Marezki (2014). They emphasised that the Internet has removed physical (geographical) barriers, thus, there's a significant increase in cultural interaction. The researcher suggests that the availability of these tools depends largely on funds to acquire them. The study findings also suggested that there is hope for the survival of IK through the use of ICT tools in managing IK. This is in line with the findings of Ngulube (2003) who reported that it is possible to manage IK using knowledge management approaches and new technologies.

#### **6.5.5 Passing Indigenous Knowledge (IK) by Word of Mouth or Storing it on ICT Tools**

It was evident that ICT users preferred the use of ICT tools over word of mouth in the transmission of IK. Thus, the majority of respondents attested to storing and transmitting tacit indigenous knowledge through ICT tools, while the minority preferred word of mouth (see Table 5.14 in Chapter 5). These findings were corroborated by Nonaka (1994) who was of the view that KM models like Knowledge Creation should be applied in documenting tacit

knowledge. Thus, Nonaka and Takeuchi's (1995) observation was that knowledge exists within a four-way mode and is transferred and converted based on socialisation, externalisation, combination and internalisation. These have helped in the knowledge theory where knowledge is transformed from one form to another. The findings of the current study support Nonaka's views that tacit knowledge needs to be documented for its usability or any benefit of it. Moreover, these findings suggest that the management of IK using ICT tools is preferred.

The study findings further indicated various reasons why indigenous knowledge should be stored through ICT tools. For example, ICT tools transmit IK globally, while word of mouth is limited to where custodians of IK live; young people no longer have an interest in IK, they consider it old fashioned; and the number of holders of the knowledge are diminishing, due to old age and incurable diseases, threatening the perpetuation of the knowledge that would die with them (see Section 5.4.8.1 in Chapter 5). Similar observations were made by Mosoti and Masheka (2010) who reported that the drive to manage knowledge in African culture is characterized by an old African proverb that states "in Africa, when an old man dies, the entire library is burnt." To this end, knowledge management models of Knowledge Creation (Nonaka, 1995) approve and encourage the use of ICT tools to manage IK. A South African study by Ngulube (2003) also supported the findings of this study. Studies by Marley (2012); Mosoti and Masheka (2010); and Ngulube and Lwoga (2007) equally supported the findings of this study by reporting that knowledge management models are useful tools developed as strategies for managing and integrating IK into other knowledge systems.

The findings from a minority of ICT users/beneficiaries supporting word of mouth had various reasons as to why transmitting IK by word of mouth was important. One of the reasons was that word of mouth in the form of speech did not only reduce illiteracy but also increased wisdom to the young ones (see Section 5.4.8.2). This meant, for them, the rendering of speeches of IK was the better option for rural people, as they preferred to learn from the local people more than via technology. This finding agreed with the findings of Ngulube (2003) who suggested that tacit indigenous knowledge need not be separated from the individuals who hold it. This literature and the associated study findings suggested that indigenous knowledge practices should be circulated mainly among custodians of IK and close family members only. A further argument is that the spirituality of IK makes it difficult for ICTs to effectively manage IK. Thus, the current study concludes that whatever can be captured should be captured through ICTs and the rest should be shared orally among community members. This current study also

concludes that institutions, libraries and individuals acquiring, storing and making IK accessible through ICT tools should collaborate with indigenous people to show that they are equally important as custodians of IK.

### **6.6 What Challenges are Encountered in the Use and Availability of ICT Tools in Managing IK?**

It was evident that ICT users/beneficiaries and owners or custodians of IK faced various challenges when recording, storing and disseminating IK through ICT tools. Thus, almost all respondents encountered problems in the use and availability of ICT tools in the management of IK (see Section 5.5.1 in Chapter 5 and Section 5.11 in Chapter 5). Lwoga (2009) also unveiled that several problems are faced by knowledge intermediaries in using ICTs to manage agricultural indigenous knowledge. This study's findings suggested that managing IK through ICT tools was highly practiced in KwaZulu-Natal, however, there were challenges. For example, the most predominant challenges faced by ICT users/beneficiaries was power supply (low batteries power supply duration), while among owners or custodians of IK lack of proper skills to capture and store quality data was an issue (see Table 5.15 in Chapter 5 and Table 5.35 in Chapter 5). The findings from ICT users/beneficiaries suggested that the budget was not enough to ensure that enough batteries for the power supply were available for quality work. It can be concluded that owners or custodians of IK lacked proper training on the effective use of ICT tools in managing IK. Similar observations were made by Chikonzo (2013); Ilo (2012); Karbo (2005); Munyua (2000); and Pigato (2001) who attested that even when ICTs initiatives are successful and have brought measurable benefits, there remain issues of financial sustainability. The literature showed that lack of finances to purchase strong and durable tools was still a big challenge in Africa. The study findings concurred with the findings of Adeya (2001) and Chikonzo (2013) who reported that Africa's capacity in such skills is still inadequate partially due to a brain drain and partially due to inadequate training opportunities.

The study findings also revealed problems encountered by ICT users/beneficiaries and owners or custodians of IK which were related to un-availability of ICT tools to manage IK. These problems included the following: ICT tools are expensive to purchase and maintain; lack of awareness of proper tools; lack of electricity in the community; poor network in the community; some ICT tools are shared among many IK recorders, etc. (see Table 5.16 in Chapter 5 and Table 5.36 in Chapter 5). It can be concluded that all these factors limited both ICT users/beneficiaries and owners or custodians of IK from properly managing IK through

ICT tools. Lwoga (2009) also reported that knowledge intermediaries and farmers were faced with a variety of problems in the use and availability of ICT tools. The problems included: inadequate trained personnel, lack of facilities, lack of funds, and inadequate training on the management of IK (Lwoga, 2009). Similar observations were made by Chikonzo (2013); Kargbo (2005); and Rural Women and ICTs (2004) who reported that the cost and maintenance were very serious issues in the availability of ICT tools. The findings of the study agreed with the findings of Ilo (2012); and Mason (2015) who stated that in an African context, the release of money related to ICTs is always complicated. Besides, there is the complaint that money in Africa is always scarce. Ilo (2012); and Mason (2015) further noted that people in Africa lack the accessibility to funds to purchase devices needed for the documentation of IK. Another significant remark made was by Kapuire and Blake (2011); and Molawa (2009). They argued that most rural communities in Africa suffer from limited Internet connection while the usage of mobile phones is poor because of a shortage of satellite coverage (Kapuire and Blake 2011; Molawa 2009). Chikonzo (2013); Kargbo (2005); and Rural Women and ICTs (2004) also attested to the high cost of computer hardware, which is a major issue in the component of budgeting. These findings suggested that sharing ICT tools among ICT users/beneficiaries was an option if there was not enough budgetary allocation. These findings suggested that a drastic step should be taken in the provision of equipment and tools in institutions, libraries and individuals dealing with ICT tools in the management of IK.

### **6.7 Strategies for Improving the Use and Availability of ICT Tools in Managing IK**

ICT users/beneficiaries and owners or custodians of IK were required to comment on the contextual conditions that needed to be adopted in order to improve the use and availability of ICT tools in managing indigenous knowledge in the province of KwaZulu-Natal. The study findings revealed various strategies or recommendations that ICT users/beneficiaries and owners or custodians of IK had in mind. The recommendations were classified according to their subject coverage. Interestingly, the most predominant strategies or recommendations from owners or custodians was that government must fund IK projects and owners or custodians of IK who are interested in managing IK through ICT tools, while ICT users/beneficiaries recommended that there is need to encourage participation of NGOs in funding IK projects and, additionally, efforts should be made to encourage tertiary institutions to open IK centres (see Theme 5.6; Table 5.18 in Chapter 5; Theme 5.12 and Table 5.37 in Chapter 5). Studies by Mason (2015); and Owiny, Mehta and Maretzki (2014) recommended that efforts' involving the public is very necessary. The public sectors as well as non-governmental organisations and

the United Nations would be vital to help communities preserve, document and disseminate indigenous knowledge for the adaptation within and beyond their community boundaries. Kaddu and Nyumba (2006) highlighted the success of telecentres in East Africa (Uganda, and Kenya, and Tanzania). This provided rural and peri-urban communities with access to information and communication technologies through the support of international organisations like UNESCO, the International Development Research Centre, and the International Communication Union. Similar observations were made by Chisenga (2002) who found that organisations like UNESCO, ITU, NRF, WHO, UNDP are pivotal in funding and promoting the use of telecentres to preserve IK for future use. Owiny, Mehta and Marezki (2014) recommended that NGOs and information agencies, including schools and libraries, should partner with rural communities, national governments, and social entrepreneurs to create, manage, and preserve knowledge and skills that are unique to communities. Similar observations were made by Adam (2007); Chetty (2003); Chisenga (2002); Manson (2015); Ngulube and Lwoga (2009); IIDC (2009); and Leshiba Wilderness (2003).

The findings also revealed that owners or custodians of IK and ICT users/beneficiaries had an urgent need for the availability and increase of ICT budget. It was noted that the availability and increase of budget would benefit owners or custodians of IK and ICT users/beneficiaries in many different ways. Firstly, the availability and increase of budget would enable the purchasing of ICT tools such as digital cameras and USBs with large memory and of good quality. Secondly, it would enable the purchasing of ICT tools which are user friendly and voice recording tools. Thirdly, it would enable purchasing of backup and durable ICT tools. Fourthly, it would help in the maintenance of ICT tools. Fifthly, it would enable ICT users/beneficiaries namely fieldworkers and IK recorders to get incentives. This recommendations above suggest that ICT users/beneficiaries and owners of IK believe that long-lasting ICT tools would preserve IK for years even though there might be new tools recommended (see Table 5.18 in Chapter 5 and Table 5.37 in Chapter 5). It can be concluded that user-friendly tools would enable everyone who wants to access IK on any device to do it without difficulties. Thus, the use of smartphones and quality videos is considered essential in this regard. It is evident that to have quality devices, one requires an increased budget for ICT tools. The recommendations above agreed with the findings of Adam (2007); Ukweweze (2012); and the United Nations Educational, Scientific and Cultural Organisation (2014) who also recommended the need of ICT budget.

It was also noted that recorded data should be stored in DVDs and mp3 (see Table 5.18 in Chapter 5). These recommendations agreed with that of Owiny, Mehta and Marezki (2014) who recommended that simple flash disks, rewritable compact disks, DVDs, memory cards, mass storage and archiving devices could be of tremendous usage. Adam (2007); Ukwewe (2012); and the United Nations Educational, Scientific and Cultural Organisation (2014) equally recommended the use of high speed USBs, HD digital video recorders with notebook or desktop PCs which help to convert videos for portable media players.

The present study recommended that owners or custodians of IK and ICT users/beneficiaries namely fieldworkers and IK recorders should get basic training on operating ICT tools. It can be deduced that the training would enhance their skills so that the use of the tools would be more effective than before. The effectiveness of the use of ICT tools to capture, store and disseminate indigenous knowledge is significant in present IK systems (see Table 5.18 in Chapter 5 and Table 5.37 in Chapter 5). The recommendations of the current study also agreed with Harris (2003); Rathgeber, 2002); The Civil Content and Themes Working Groups (2003); and the World Summit on the Information Society (WSIS) (2002) which suggested that education, training and capacity building require full and adequate support. As noted by Molawa (2009), grants and other forms of donations should be contributed to the training and skills development of IK systems. Similarly, Majanja (2004) admitted that the technologies without the human know-how are often underutilised.

Other recommendations were that there is need to supply electricity to rural areas; balance infrastructure and network in rural and urban areas; roads creation is essential in rural areas; instructions of operating ICT tools must also be in Zulu and the public must purchase local products so that in return owners or custodians would purchase proper ICT tools. It was revealed that qualified photographers are required in museums (see Table 5.18 in Chapter 5 and Table 5.37 in Chapter 5). Similar observations were made by Broadband Commission (2013); Ngulube, Lwoga and Stilwell (2010); and the United Nations Educational, Scientific and Cultural Organisation (2014) who reported that there is a need for an electricity supply in all areas. Similarly, Ngulube, Lwoga and Stilwell (2010) recommended telecommunication infrastructure in rural areas so as to harness and improve the urgent drive for the use of ICT tools. The study findings also concurred with the findings of Harris (2003); Rathgeber, 2002); The Civil Content and Themes Working Groups 2003; and the World Summit on the Information Society (WSIS) (2002) which affirmed that education which is given in the form

of training and capacity building requires full and adequate support. Ngulube and Lwoga (2009) also stated the need to use smartphones as a primary ICT tool and the necessity of buying digital cameras and USBs with large memory. Another remark made by Owiny, Mehta and Marezki (2014), which also supported these findings, was that simple flash disks and rewritable compact Disks, DVDs, and memory cards, are essential for the storage of information and knowledge. In other words, information and knowledge must be archived in devices of tremendous capacity.

## **6.8 Summary**

Broadly speaking, diverse insights emerged from this study. Firstly, it was established that the understanding of IK by owners or custodians depends on the local environment they lived or found themselves. Secondly, IK is not all about personal issues, it is a spectrum of knowledge imparted to those who believe and recognize it. Thirdly, IK is not only used by community members but also by professional people, using it for personal and other needs.

The potential, and necessity, of ICT tools in managing IK for the future generations cannot be overemphasised. This makes it important to address different issues related to the provision of ICT tools in capturing, storing and disseminating feasible knowledge, information, experience and practices for the benefit of mankind. Presently, ICT users/beneficiaries and few owners or custodians of IK are committed in the management of IK through ICT tools.

It was revealed in this chapter that most indigenous people now depend largely on the use of ICT so as to manage IK. This results into the greater awareness and exposure of the users who became committed to their IK practices. The management of IK has resulted in the use of new technologies in the current information age; this compared to old technologies; the presence of which had gradually disappeared in the province of KwaZulu-Natal.

However, as new technologies emerge, ICT users/beneficiaries and owners or custodians of IK thrive to acquire current knowledge and ICT skills. This would allow them to become conversant with best practices.

Existing literature on ICT tools demonstrated that managing IK is not only limited to text documents, it encompasses other ICT devices used to capture, store and disseminate indigenous knowledge. It was found that managing IK through ICTs has some challenges. These include:

the application of tacit nature of IK, personal communication, just to mention a couple. The utilisation of modern tools could be used, while in other circumstances it may be appropriate to rely on more traditional methods (e.g. taped narration, drawings). The literature also revealed that not all IK practices could be captured. In other words, owners or custodians of IK cannot be completely separated from their IK resource. There is a need for mutual understanding between ICT users/beneficiaries and owners or custodians of IK for the effective management of IK through ICT tools.

It was established that managing IK through ICT tools proved to be a success. However, there was also a need for frequent ICT training among ICT users/beneficiaries and owners or custodians of IK. Ongoing training is essential in this regard because new technology tools are always coming up in the market. This becomes important, even urgent, as ICT users/beneficiaries and owners or custodians of IK need to be acquainted with ICT skills for effective ICT utilisation. This would dramatically increase the know-how and effective use of these tools in the management of IK. The limitation and gap this study points out is that, though ICT tools have been proven to enhance the management of indigenous knowledge in the KwaZulu-Natal province, there is no demonstration of owners or custodian of IK training acquiring new knowledge and skills in ICT application. Inadequate funds to acquire relevant and recent ICT tools were noticed. Another limitation shown is that, there is no provision for tracking and backing up recorded IK knowledge, such that when it gets lost, it can still be found. Owners or custodian of IK should advance to educate and inculcate local knowledge into young generation as a means of preserving IK. However, western education and modern life has drifted this focus. There is the awareness of IK among individuals and owners of IK but the IK is gradually dying, as they do not see it as something too important. Therefore, this study supports and promotes the filling of the gap of training in knowledge and skills of owners or custodians of IK. Finally, the promotion of the use of IK (on daily basis) as a livelihood among local and western people is another gap that could be filled to the benefit of individuals and the collective.

The next chapter, Chapter 7, provides the summary of findings, conclusions and recommendations.

## **CHAPTER SEVEN: SUMMARY, CONCLUSION AND RECOMMENDATIONS**

### **7.1 Introduction**

This chapter is based on the data presented and interpreted in the two previous chapters. It presents a summary of the key findings, implications of the study, conclusions and recommends strategies for improving the use of ICT tools in the management of IK. The summary of the findings of the study is presented based on the research objectives (see Chapter 1, Section 1.6). Additionally, the conclusions are derived from the data presented in Part One and Part Two in Chapter 5. The study sets out to discuss the types of ICT tools used in the management of indigenous knowledge in the province of KwaZulu-Natal.

In order to achieve this aim, the following specific research objectives were formulated:

- Discuss the nature of indigenous knowledge (IK) in general;
- Evaluate the types of indigenous knowledge practices in the province of KwaZulu-Natal;
- Discuss the types of ICT tools currently used for the management of indigenous knowledge;
- Discuss problems encountered in the availability and use of ICT tools in managing IK; and
- Discuss strategies for improving the use and availability of ICT tools in the management of indigenous knowledge.

### **7.2 Summary on Research Findings Based on Research Objectives**

The summary of the findings is organised based on the research objectives and research questions presented in Chapter 1 and Section 9.1 of this study. The research objectives correspond to each of the research questions below.

#### **7.2.1 Objective 1: Discuss the Nature of Indigenous Knowledge (IK) in General and in KwaZulu-Natal (KZN) in Particular**

- What is the nature of indigenous knowledge?

The current study showed that respondents had a full understanding of the nature of indigenous knowledge (IK) and had similar explanations of the nature of indigenous knowledge (see Table

5.20). The findings also indicated that indigenous knowledge was well understood and appreciated by the communities that recognised it as benefiting and sustaining its local communities. The majority of the respondents indicated that indigenous knowledge was knowledge which was transferred from one generation to another by word of mouth. Few owners or custodians of IK indicated that indigenous knowledge was an inborn knowledge. Most respondents indicated that IK was generated through community/cultural norms and values of traditional elders. The respondents also revealed that IK was knowledge found in traditional medicine, agriculture/farming and artwork, etc. It can be concluded that indigenous knowledge is knowledge associated with the traditional or indigenous culture or community which is transmitted between generations.

### **7.2.2 Objective 2: Evaluate the Types of Indigenous Knowledge Practices**

- What type(s) of indigenous knowledge practices have you inherited?

The question regarding types of indigenous knowledge practices inherited revealed that owners or custodians of IK inherited various types of indigenous knowledge practices from the community (see Tables 5.21, 5.22, 5.23, 5.24, 5.25 and 5.26). The most commonly inherited IK practices were beliefs, traditional medicine (use of local herbs), human resources and indigenous knowledge, (artwork) indigenous knowledge in the education, indigenous knowledge in agriculture/farming, and indigenous knowledge in food processing. It can be concluded that the province of KwaZulu-Natal is still very rich with indigenous knowledge practices, thus, various types of IK practices still exist.

The question regarding the knowledge whether indigenous people were custodians of IK revealed that the majority of respondents were not owners of IK. Also, only a few indicated that they were born with the knowledge. This meant, they did consider themselves as owners or custodians of IK (see Figure 5.1 in Chapter 5. Primarily, it can be concluded that IK is inherited from elders of the community.

Findings from the present study further established that there were various ways in which indigenous knowledge practices were acquired. The majority of the respondents indicated that they were trained by their fore-fathers and community elders to become specialists in IK. A few respondents revealed that they acquired IK skills from their ancestors through dreams and that it was a gift from God. Interestingly, very few respondents indicated that they were born with the knowledge (see Table 5.27). These findings suggested that a majority of owners or

custodians of IK were imparted with IK skills as they spent quality time with community elders who were considered custodians of IK. It was also established that it was possible for any person in local communities to be born with indigenous knowledge skills and to receive it as a gift from God or ancestors.

Findings from the present study revealed that different types of traditional roles were held by owners or custodians of IK in the province of KwaZulu-Natal. The most common categories of traditional roles were traditional healers, traditional farmers, herbalists, traditional artisans, traditional musicians and community elders. The least cited categories of traditional roles were chiefs, rainmakers, storytellers and traditional midwifery (see Table 5.3 in Chapter 5 and Table 5.28 in Chapter 5). Traditional roles of IK are engines or building blocks that make up the existence and survival of IK in local communities in the present day society.

The question regarding visiting and consulting owners or custodians of IK revealed that there was a high communication between indigenous people and those who acquired or harvested local knowledge (see Section 5.9.6 in Chapter 5). The majority of owners or custodians of IK indicated that they were highly visited and consulted by community members, students and researchers on IK. The people cited least for visiting and consulting owners or custodians of IK were cinematography/film industry people (see Table 5.29). These findings suggested that indigenous knowledge is still very essential in the lives of people even though modernisation has spread across the world.

The results of the present study revealed that there were various reasons that made community members and professional people visit and consult owners or custodians of IK. These reasons included recording or capturing, storing, disseminating IK through ICT tools, and research purposes, amongst others (see Tables 5.5 and 5.31). Few respondents visited and consulted for museum lectures and displays. The findings further revealed that community members, as well as professional people, visited and consulted owners or custodians of IK for personal problems related to healing, foretelling the future, bringing back lovers, winning cup games, strengthening manhood, etc. (see Table 5.31).

Findings from the present study established that the majority of owners or custodians of IK saw indigenous knowledge surviving in the province of KwaZulu-Natal in the present day. A minority of respondents indicated that they believed tacit indigenous knowledge would not

survive in KwaZulu-Natal (see Figure 5.2). However, it was revealed that tacit indigenous knowledge would probably survive because it was being managed through ICT tools by both owners or custodians of IK and other professional people, e.g. researchers, tourists, information specialists, students, etc. Also, tacit indigenous knowledge would survive because it was blended with modern knowledge in hospitals and agriculture/farming (see Table 5.33).

### **7.2.3 Objective 3: Discuss the Types of ICT Tools Currently Used for the Management Indigenous Knowledge**

- What ICT tools are currently available for recording or capturing, storing and disseminating indigenous knowledge?

The present study found that all ICT users/beneficiaries used ICT tools for recording or capturing, storing and disseminating IK (see Table 5.6). The study showed that ICT users/beneficiaries used multiple ICT tools to record or capture IK practices. These tools included video/camera, video/recording/filming and tape/sound recording and cell phones respectively. The study also showed that only a few owners or custodians of IK used ICT tools to record or capture IK (see Figure 5.4). These ICT tools were namely cell phones and digital cameras. A lack of awareness of other ICT tools among owners or custodians of IK might have led them to use minimal tools to record or capture IK. However, it was interesting to note that the use of multiple ICT tools to record or capture IK showed that indigenous knowledge was available in audio and in video form. Thus, the management of IK through ICT tools in the province of KwaZulu-Natal is promising.

Findings from the present study revealed that different types of ICT tools were used to store or preserve indigenous knowledge practices. The study established that both ICT users/beneficiaries and owners or custodians of IK used multiple ICT tools for storing or preserving indigenous knowledge. These tools included: computer, Internet, USB, DVDs and emails, cell phones, tape/voice recorder and video/digital camera. It was revealed that computers and DVDs were the dominant ICT tools used by ICT users and owners or custodians of IK to manage IK (see Table 5.8 and Figure 5.6). ICT tools present an opportunity to store or preserve value-added information and knowledge services for the next coming generation.

A variety of ICT tools have been used by ICT users/beneficiaries and owners or custodians of IK with the intention to improve the dissemination of indigenous knowledge widely. These tools include Internet (YouTube, Facebook, Twitter, Google Docs, and databases), cell phones,

telephone, radio, television, emails, DVDs, CDs and laptops. Some ICT tools, such as the Internet (YouTube, Facebook, Twitter, Google Docs, and databases), radio and emails were not used and accessible among owners or custodians of IK. In that regard, owners or custodians of IK lacked knowledge of, and access to, new technologies used for managing IK. In a nutshell, the study showed that ICT tools present an opportunity to provide value-added information services and access to a wider audience for the benefit of all societies.

The question regarding the effectiveness of ICT tools in recording or capturing IK revealed that all the ICT users felt that all ICT tools were quite effective in recording or capturing IK. These included video/camera, video/recording/filming, tape/voice recording and cell-phones (see Table 5.11). The effectiveness of ICT tools was highly recognised when they were capable of recording or capturing data in the form of text, pictures and videos.

Findings from the study established that the most effective ICT tools in storing or preserving IK were computers, Internet (YouTube, Facebook, Twitter and Google Docs, Wikis), video, mobile phone, intranet, DVDs, CDs, tape/voice recorders and USBs. Conversely, there were ICT tools that were considered to be less effective, such as film reels (see Table 5.12).

Furthermore, it was established that ICT tools were preferred for storing or preserving IK than by word of mouth. The majority of ICT users/beneficiaries attested to storing and transmitting tacit indigenous knowledge through ICT tools because ICT tools were capable of storing or preserving indigenous knowledge permanently (see Table 5.14). Most respondents indicated that young people considered IK out of fashion and that IK was threatened due to the loss of custodians because of old age and incurable diseases (see Section 5.4.8.1). It was also revealed that word of mouth was limited to the areas where custodians of IK lived, which limited other people to have access to the rich knowledge. Conversely, a few ICT users/beneficiaries indicated that the storing and transmission of indigenous knowledge by word of mouth was still important nowadays. It was established that word of mouth increased wisdom of the young generation (see Section 5.4.8.2). These findings showed that there is need for collaboration between institutions, information centres, and individuals dealing with IK with IK holders.

#### **7.2.4 Objective 4: Discuss Problems Encountered in the Use and Availability of ICT Tools in the Management of IK**

- What problems are encountered in the use and availability of ICT tools in recording or capturing, storing and disseminating IK?

The current study revealed that the most voiced out challenges that affected the use and availability of ICT tools in recording or capturing, storing and disseminating IK were diverse in nature. In that regard, the study established that both ICT users/beneficiaries and owners or custodians of IK were faced with various challenges in the use and availability of ICT tools to manage indigenous knowledge. The most popular problems cited by the ICT users/beneficiaries and owners or custodians of IK included

- shortage of power (batteries run out);
- lack of digital skills;
- ICT tools are expensive to purchase and maintain;
- ICT tools are borrowed and shared among field workers or IK recorders;
- lack of proper skills to capture and store quality data;
- cell-phones and digital cameras have less space to store or preserve IK practices;
- lack of electricity;
- lack of funds to purchase proper ICT tools;
- poor network;
- lack of awareness of proper tools;
- and poor infrastructure

(see Table 5.15, 4.16 and 5.17 in Chapter 5; Section 5.11; Table 5.35 and 5.36 in Chapter 5).

Even though the study did not ask owners or custodians of IK and ICT users/beneficiaries about awareness of IK policy in South Africa, the study can emphasise that while the use and availability of ICT tools had many potholes, the policy that addressed the management of IK

through ICT tools, however, determined how well problems could be minimised. Additionally, a lack of awareness of IK policy could hinder institutions, IK centres and individuals from proper management of IK through ICT tools.

#### **7.2.5 Objective 5: Discuss Strategies that Would Improve the Use and Availability of ICT Tools in the Management of IK**

The owners or custodians of IK were asked to comment on the recommendations that need to be adapted for the proper management of IK through ICT tools. The study showed that the respondents cited various recommendations; namely,

- the need for government to fund IK projects and owners or custodians of IK who are interested in managing IK through ICT tools;
- the need for ICT budget;
- the need for basic education skills in using and operating ICTs;
- the need to supply rural areas with electricity;
- connectivity is essential in rural areas;
- the need to create roads in rural areas;
- the need to purchase backup and durable ICT tools to store or preserve IK;
- Instructions of operating ICT tools must also be in Zulu;
- ICT tools must be user friendly;
- the need to balance infrastructure between rural and urban areas; and
- the need for the public must purchase our local products so that we can purchase proper ICT tools.

The ICT users/beneficiaries were also asked to comment on the strategies that need to be adapted in order to improve the effective use of ICT tools in managing IK. The respondents cited the following needs:

- the need to encourage participation of NGOs in funding IK projects;
- the need to increase ICT budget;

- effort should be made to encourage tertiary institutions to open IK centres;
- the need to purchase ICT tools such as digital cameras and USBs with large memory and of good quality;
- the need to purchase ICT tools that are user friendly;
- the need to purchase voice recording ICT tools;
- the need to purchase backup ICT tools;
- the need for basic training of fieldworkers and IK recorders in operating ICT tools;
- effort should be made to engage government in opening IK centres in rural and urban areas;
- the need to use smartphones as the primary tool for recording or capturing IK;
- the need to maintain ICT tools; the need to balance network in rural and urban areas;
- the need to store recorded data in DVDs and mp3;
- the need to balance electricity in rural and urban areas;
- the need to give fieldworkers and IK recorders incentives; and
- the need for qualified photographers in museums.

### **7.3 Conclusion**

This study has achieved its objectives. This was affirmed in the various problem statement, aim and objectives of the study, research questions, variables and diverse sets of ICT tools used to harness and manage indigenous knowledge in the province of KwaZulu-Natal. The study found that indigenous people are known as custodians of IK. They also had full understanding of the local community's knowledge. These became extremely valuable knowledge that has been inherited from generation to generation in the province of KwaZulu-Natal. This province is believed to be very rich in indigenous knowledge practices as all the types of IK are still available.

Different types of categories of traditional roles of custodians of IK have brought about the sustainability of indigenous knowledge practices in KwaZulu-Natal (see Section 5.3.1; Table

5.3 in Chapter 5; Table 5.28 and Section 5.9.4 in Chapter 5). The indigenous knowledge practice is still vital in these modern times and highly relevant in the areas of medicine and agriculture as shown in Table 5.31 and Table 5.33 in Chapter 5.

KwaZulu-Natal has proven to possess very rich indigenous knowledge practices. But as long as the knowledge is not stored on any device and left only in the mind, it can still get lost. Therefore, ICT now play a crucial role in the preservation and storage of IK for easy access and use by future generations. The study identified and discussed different types of ICT tools that are currently used in the management of indigenous knowledge in the province of KwaZulu-Natal.

The present study showed that indigenous knowledge is not only used by indigenous people, however, it is also being used by professional people for their own benefit. With regard to the use of ICT tools in managing indigenous knowledge, multiple ICT tools are now being used by institutions, IK centres and individuals to record or capture, store and disseminate indigenous knowledge. However, both ICT users/beneficiaries and owners or custodians of IK need to up-date their ICT skills as ICT tools are changing rapidly. It can be said that these tools require specialised knowledge and skills in order to be used effectively in the management of IK.

Conclusively, the study has identified and discussed the possible strategies for improving the use and availability of ICT tools in the management of IK in the province of KwaZulu-Natal. Government, NGOs, institutions and IK centres as well as individuals dealing with IK have been admonished not to overlook, but to be involved in the management of IKS through ICT tools. However, in spite of the possibility of managing IK through ICT tools, there are various challenges posed. These challenges vary between ICT users/beneficiaries and owners or custodians of IK. Most crucial one among ICT users/beneficiaries and owners or custodians of IK was related to the availability of ICT tools which is lack of funds to maintain and purchase ICT tools. Most crucial problem in the use of ICT tools among owners or custodians of IK was lack of digital skills and among ICT users/beneficiaries was shortage of power in the tools. Furthermore, the South African Department of Science and Technology (DST) came up with IKS policy which also supports the collection, recording, storing and disseminating indigenous knowledge.

The current study encountered various challenges which are discussed as follows.

- **Translation of Research Questions.** Various concepts such as 'indigenous knowledge', 'information and communication technology tools' and 'film reels' were in many cases very difficult to translate into the local language and this made it difficult for the researcher to finish the study at the stipulated time frame. The researcher had to hire a research assistant to descriptively explain the research questions in the local language to be more understandable for the population of the study.
- **Rain and Chilly Weather.** Often, discussions with owners or inheritors of IK took place in open air venues such as kraals or temporary shelters. It also happened that data collection of the research coincided with the rainy and chilly season, February - July 2013. Whenever it rained or was too cold, scheduled interviews were postponed which resulted in delays in interviews.
- **Un-availability of Roads, Bad Roads and Mountains.** Rural people stay or live in unbearable places, thus the researcher had unpleasant experiences travelling by car. The roads in rural areas were extremely dusty and had potholes or at times had no road at all. Often the car the researcher was travelling with would get stuck in mud and require assistance from the local people. In some cases, the researcher had to walk long distances because of the non-availability of roads. The researcher would eventually arrive exhausted and require a place where he could sleep and, as a result, would only start interviewing the following day.
- **Unwillingness to Participate by Owners or Custodians of IK in the Research.** The researcher was not aware that rural people who were considered owners or custodians of IK were regularly consulted for their valuable knowledge. They complained that they were tired of being milked for their knowledge yet not recognized by researchers. Some of the responses the researcher received while engaging in field work in KZN included: *"You are recognized for carrying out this project yet we don't get any recognition"*, *"What is the use of giving out our information and don't get feedback?"*, *"Tell me Sir, how do I benefit from your research project?"*, *"Don't disturb me Sir please!"*. In some cases, the researcher was forced to buy bread, sugar and milk to offer to the owners or custodians of IK as a token of appreciation. That was the only way to encourage those that were not willing to participate.

- **Demand for Some Incentives before Interviews.** *"Please give us money or buy us bread and sugar then you get what you want"*. This expression shows how valuable their knowledge is in the society. Rural people were not ashamed to ask to be paid for their services before any information was shared with those that requested it. Even though the amount asked for was little, it indicated a dangerous trend. The way information is valued today by means of money is likely to jeopardise the efforts of future researchers. The researcher had no option but to do what they asked.
- **Interview Questions Too Long.** The interview questions required sufficient time in order to be effectively answered, however, it was not so. Some responses included the following: *"My son, I am giving you 10 minutes to answer your questions and after that I am gone"*, *"Please ask sir, I want to go and I have a serious business than this thing"*. They were willing to offer 10 minutes and not more. The researcher had to offer them more incentives as a token of appreciation, thus, 30 more minutes was granted per interview. The researcher had to add 2 more research assistants to speed up the process.

### 7.3.1 Contributions of the Study

As for contributions of the study are concern, the current study findings were of significance as it provided possibilities of how ICT tools could be used to manage indigenous knowledge for future generations. Furthermore, this study contributed to the body of existing knowledge by discussing the types of ICT tools that are relevant in the managing IK. Although much has been done in South Africa with regards to managing IK through ICTs, identifying accurate, reliable and effective tools has not been sufficient. For example, previous studies have focused on the methods used for the documentation and preservation of indigenous knowledge (Le Roux 2003; Lor 2004; Ngulube 2002). This study contributed to the existing body of knowledge by identifying different types ICT tools and how they are used in the management of tacit indigenous knowledge.

The possibility and applicability of knowledge management theories demonstrated by the current study was in line with other studies conducted in South Africa and Tanzania (Ngulube, 2003; Lwoga, 2009; Lwoga, Ngulube and Stilwell, 2010). The study adopted knowledge creation theory as the core theoretical framework of the study. However, a study by Nonaka (1991) reported that knowledge creation is applicable in organisations to manage tacit knowledge of that organisational environment. The current study demonstrated how the four

key elements (e.g. socialisation, externalisation, combination and internalisation) can be used to support the management of tacit knowledge like indigenous knowledge through ICT tools. Additionally, because knowledge creation theory shows that ICTs should be used to manage tacit knowledge in an organisation, this study crafted knowledge creation theory in the support of the application of ICT tools in the management of indigenous knowledge.

Additionally, the study's contribution was also significant in providing solutions to the problems encountered when capturing, storing and disseminating indigenous knowledge through ICT tools. Moreover, the study's contribution was also confirmed the recommendations made by various IK studies carried out in Africa (Chisenga, 2002; Chisita, 2011; Ilo, 2012; Kargbo, 2005; Lwoga, Ngulube & Stilwell, 2010). These studies proposed a need for ICT users to be up-to-date with ICT skills as nowadays new ICT tools are quickly put in place. The findings of the study identified various ways that can be used to improve the skills of ICT users in the use and management of IK through ICT tools.

#### **7.4 Recommendations**

The following recommendations emanate from the study.

##### **7.4.1 Objective 1 and 2: Discuss the Nature, Types and Importance of Indigenous Knowledge (IK) in General**

The study combined objectives 1 and 2, since they required almost similar information from owners or custodians of IK. The findings established that indigenous knowledge is not only said to be tacit but also embedded in the practices of rural communities where oral traditions occupy centre stage, in the transmission of indigenous knowledge. Thus, most owners or custodians of IK received the knowledge through sharing experiences with community elders. This study recommends that government and NGOs should play a pivotal role in encouraging all members of the community to value informal education from community elders as IK is a necessity for community development. Thus, through such exercise, more new knowledge generate would be generated and revive IK practices within local communities.

It is also recommended that ICT users/beneficiaries should consider building a strong mutual understanding with indigenous people. This would arose ways that could lead to the receiving of accurate and relevant information on IK. Additionally, ICT users/beneficiaries should make greater efforts in explaining the importance of placing IK on ICT tools in a modern day society

and how that would benefit the society and a country as a whole. In that regard, this would enable both the local communities and ICT users/beneficiaries to understand each other's knowledge systems, and thus the sharing and integration of knowledge would be possible.

#### **7.4.2 Objective 3: Discuss the Types of ICT Tools Used for the Management Indigenous Knowledge (IK)**

The study recommends that indigenous people should continue to be flexible in the use of ICT tools to manage IK as described in the Knowledge Creation model (Nonaka and Konno, 1998). The study findings showed that owners or custodians of IK relied heavily on oral or face-to-face communication rather than storing or preserving IK on ICT tools. This study therefore recommends a combination of oral face-to-face communication with ICT tools (such as cell phones, digital cameras, digital/video camera, digital/filming camera, tape/voice recording, internet etc.) to capture, store and disseminate IK. Government and NGOs should also take full responsibility of training and supplying rural communities with reliable and user- friendly tools where IK practices can be stored for future use.

Despite the availability of IK policy in South Africa to promote the use of ICT tools to capture, store and disseminate IK, few owners or custodians of IK use ICT tools to manage their local knowledge. The study recommends that government departments such as Arts, Culture, Science and Technology should put focus on awareness creation and training programmes to enable the owners or custodians of IK in local communities to use advanced ICT tools such as video cameras, video/recording/filming, tape/sound recording, computers, Internet (YouTube, Twitter, Facebook, Google Docs, databases) and email to record or capture, store and disseminate indigenous knowledge practices. Funding rural communities should be encouraged in order to purchase highly advanced and reliable ICT tools for the effective management of indigenous knowledge.

Yet, the findings also showed that there was high use of ICT tools among ICT users/beneficiaries to capture, store and disseminate IK in the local communities. Thus, this study recommends that the ICT users/beneficiaries should also create awareness and conduct training on the use of ICT tools to record or capture, store and disseminate IK for a wider audience. Efforts should be put in equipping owners or custodians of IK with basic skills in managing IK through ICT tools in local communities.

The study also recommends that the ICT users/beneficiaries should bring back copies of ICT tools used to record or capture and store IK practices so that rural people may see the possibility of managing IK through ICTs. The study believes that this could promote the use of ICT tools to manage IK among all owners or custodians of IK.

The study findings also showed that there was low use of ICT tools among owners or custodians of IK due to lack of electricity and poor connectivity in rural areas. This study recommends that government and NGOs should improve the availability of an electricity supply and network connectivity in the rural areas to enable local communities, especially owners or custodians of IK, to manage IK across a wide range of ICTs as previously recommended.

#### **7.4.3 Objective 4: To Discuss Problems Encountered in the Availability and Use of ICT Tools in the Management of IK**

ICT users/beneficiaries and owners or custodians of IK attest to have faced diverse problems in the availability and use of ICT tools to capture, store and disseminate IK. The problems as noticed in the findings ranges from personal to social problems. These are:

- lack of digital skills,
- lost recorded data,
- ICT tools affected by viruses,
- expensive nature of ICT tools,
- poor maintain culture,
- inability to share ICT tools for use,
- batteries are shared,
- lack of awareness of proper ICT tools,
- ICT tools are operated in English,
- infrastructure problems such as
  - lack of water and electricity,
  - lack of connectivity,

- lack of roads and
- lack of awareness of IK policy.

This study recommends that the following issues should be addressed for effective management of IK practices through ICT tools: basic skills on ICTs, networking, language, infrastructure, awareness of IK policy, and funding. The policy on protection of IK through capturing, storing, disseminating and funding should be made aware to all rural communities in order to guide the planning and implementation of ICTs development in such areas. There is an urgent need for the implementation of adequate funds for empowering rural people with ICT skills.

The government and NGOs should also encourage ICT users/beneficiaries to help uplift rural communities with basic skills in managing IK using ICTs. This can be achieved through the awareness of IK policy in rural areas which should address the funding of IK projects, protection of IK, management of IK and the capacity building issues for owners or custodians of IK and the ICT users/beneficiaries.

#### **7.4.4 Objective 5: To Discuss Strategies for Improving the Use and Availability of ICT Tools for the Management of IK**

The findings showed that ICT users/beneficiaries and owners or custodians of IK had many strategies in mind which could be used for improving the use and availability of ICT tools in managing IK in the province of KwaZulu-Natal. These strategies included:

- encouraging NGOs to fund IK projects,
- involving tertiary institutions to open IK centres,
- purchasing ICT tools which are user-friendly and of good quality,
- investing in voice recording ICT tools,
- backing up ICT tools,
- training fieldworkers,
- engaging government in opening IK centres and
- budgeting for ICT tools.

This study recommends an urgent need to implement the aforementioned recommendations which would help in improving the use and availability of ICT tools in the management of IK in the province of KwaZulu-Natal. The study also believes the implementation of the recommended strategies would eradicate the gap between urban and rural in terms of the supporting the use of ICT tools in managing IK.

#### **7.5 Recommendations for Future Research**

The current study discussed the use and types of ICT tools in the management of indigenous knowledge in the province of KwaZulu-Natal. However, authors such as Adam (2007) in his study reported that there is no specific software designed for indigenous knowledge. It is also revealed that attempts have been made by different projects to set-up open resource software tools to enable indigenous communities to protect their unique cultures and knowledge through digitisation. Additionally, since indigenous knowledge is based on orality and oral traditions, it should be captured, stored and disseminated through ICT tools, just like any other documentary material. This study recommends the implementation of strategies as indicated by the literature and the findings of the study and make Africa contribute to global information resource. This study also 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 to 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;
- ICT services should not add additional burdens but must make IK more sustainable and manageable;
- ICTs need to support documentation and improve adaptation, adoption and experimentation;
- Focus should be on tools that promote oral interaction such as audio-visual technologies; and
- ICT services should be designed to enhance systematic integration of modern and traditional knowledge.

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## APPENDICES

### APPENDIX A: Questionnaire for ICT users/beneficiaries



Faculty of Arts

Questionnaire for ICT Users/Beneficiaries

**The use of Information and Communication Technologies (ICTs) to Record or Capture,  
Store and Disseminate Indigenous Knowledge (IK) in KwaZulu-Natal**

Department of Information Studies  
University of Zululand, P/Bag X1001,  
Kwadlangezwa, 3886, South Africa

Dear Respondents,

I am Petros Dlamini doing a PhD at the University of Zululand, currently carrying out a study on the use of information and communication technologies (ICT) tools in managing indigenous knowledge in KwaZulu-Natal. The purpose of the study is to critically examine the effectiveness of ICT tools in managing indigenous knowledge in KwaZulu-Natal. The outcome of this study is intended to benefit, the owners and/or sources of IK and users of IK in South Africa, particularly in KwaZulu-Natal. Additionally, students, academics, researchers, institutions, the donor community and the government are expected to gain from this study. Further, this study will benefit those who are researching on capturing, storing, processing, retrieving and disseminating IK on ICT tools. Lastly, this is part of the requirement for the award of the degree of Doctor of Philosophy in Library and Information Science.

I kindly ask for your time to complete the questionnaire based on your knowledge and experience in ICT tools and indigenous knowledge. Please note that your feedback will be taken as a pivotal contribution to this research study.

Your assistance is therefore highly appreciated.

Thank you in advance for your time

Yours sincerely

Petros Dlamini

Email address: [dlaminip@unzulu.ac.za](mailto:dlaminip@unzulu.ac.za)

Cell number: 0834024975

## SECTION ONE: PERSONAL INFORMATION

1. Please indicate your gender

Male [     ]

Female [     ]

2. Please indicate your status

Researcher [     ]

Academic [     ]

Student [     ]

Information Specialists/Librarian [     ]

Journalists [     ]

Artisans [     ]

Other (specify) [     ]

3. Please indicate your age group

18-20 years [     ]

21-30 years [     ]

31-40 years [     ]

41 and above years [     ]

4. How long have you served in your work place?

(i) 1 - 5 yrs [     ]

(ii) 6 - 10 yrs [     ]

(iii) 11 - 15 yrs [     ]

(iv) 16 - 20 yrs [     ]

(v) 21 – 25 yrs [     ]

(vi) 26 yrs and above [     ]

## SECTION TWO: CONSULTING OWNERS OR CUSTODIANS OF INDIGENOUS KNOWLEDGE

5. Do you visit and consult owners or custodians IK?

Yes [     ]

Sometimes [     ]

No [     ]

6. Which of the following people do you consult for indigenous knowledge (IK)?

- |                      |   |   |
|----------------------|---|---|
| Traditional healer   | [ | ] |
| Traditional farmer   | [ | ] |
| Elder                | [ | ] |
| Traditional musician | [ | ] |
| Rural Artisan        | [ | ] |
| Chief                | [ | ] |
| Prophet              | [ | ] |
| Herbalist's          | [ | ] |
| Other.....           |   |   |

7. How often do you visit and consult them?

.....

8. For what purpose do you visit and consult them?

- |                   |   |   |
|-------------------|---|---|
| Recording IK      | [ | ] |
| Capturing IK      | [ | ] |
| Storing IK        | [ | ] |
| Disseminating IK  | [ | ] |
| Research purposes | [ | ] |
| Other.....        |   |   |

### **SECTION C: TYPES OF ICT TOOLS CURRENTLY IN USE FOR CAPTURING, PROTECTING AND DISSEMINATING INDIGENOUS KNOWLEDGE**

9. Do you think it is important to capture, store and disseminate experiences and or local knowledge of owners of indigenous knowledge on ICT tools?

- |                   |   |   |
|-------------------|---|---|
| Strongly agree    | [ | ] |
| Agree             | [ | ] |
| Undecided         | [ | ] |
| Disagree          | [ | ] |
| Strongly disagree | [ | ] |

10. Which of the following ICT tool (s) do you use for recording or capturing indigenous knowledge?

- |                            |   |   |
|----------------------------|---|---|
| Video/camera               | [ | ] |
| Tape/sound recording       | [ | ] |
| Video/recording/filming    | [ | ] |
| Mobile phone recording     | [ | ] |
| Other, please specify..... |   |   |

11. Which of the following ICT tools are you currently using for storing or preserving indigenous knowledge that you have gathered?

- Computer [       ]
- Tape/Voice recorder [       ]
- Video/digital camera [       ]
- Internet [       ]
- Intranet [       ]
- E-mail [       ]
- Cell phone [       ]
- USB [       ]
- CDs [       ]
- DVDs [       ]
- Other, please specify.....

12. Which of the following ICT tools do you use for disseminating IK?

- Telephone [       ]
- Radio [       ]
- Television [       ]
- Computer (e.g. internet and databases) [       ]
- Mobile phone [       ]
- Other, state.....

13. In your view, do you think ICT tools are effective in disseminating the experiences and/or local knowledge globally?

- Yes [       ]
- Sometimes [       ]
- No [       ]

14. How do you rate the effectiveness of the following ICT tools in recording or capturing IK?

ICT Tools	Very Effective	Effective	Less Effective	Not Effective
Video camera				
Video/recording/filming				
Cell phone recording				
Tape/Voice recording				
Other, please specify				

15. How do you rate the effectiveness of the following ICT tools in storing IK?

ICT Tools	Very Effective	Effective	Less Effective	Not Effective
Computer				
Tape/Voice recorder				
Video				
Intranet				
Mobile phone				
CDs				
DVDs				
Film reels				
USB				
Internet				
Other, please specify				

16. How do you rate the effectiveness of the following ICT tools in disseminating IK? Other, please specify

ICT Tools	Very Effective	Effective	Less Effective	Not Effective
Computer				
Internet				
Intranet				
Mobile phone				
Radio				
Television				
Other, please specify				

17. Do you think passing experiences and/or local knowledge from one generation to another by word of mouth is better than storing it on ICT tools?

- Strongly agree [     ]
- Agree [     ]
- Undecided [     ]
- Disagree [     ]
- Strongly disagree [     ]

18. If you strongly agree and or agree, why?

.....

.....

.....

19. If you do not agree, why?

.....

.....

.....

.....

**SECTION D: PROBLEMS ENCOUNTERED IN THE USE AND AVAILABILITY OF ICTs TOOLS IN RECORDING, STORING AND DISSEMINATING IK**

20. Do you encounter problems in the use of ICT tools for recording, storing and disseminating indigenous knowledge?

- Yes [     ]
- Sometimes [     ]
- No [     ]

21. If yes, what kind of problems do you encounter in the use of ICT tools? (list three only)

- 1.....
- 2.....
- 3.....

22. Do you encounter problems in the availability of ICT tools for recording, storing and disseminating indigenous knowledge?

- Yes [     ]
- Sometimes [     ]
- No [     ]

23. If yes, what kind of problems do you encounter in the use of ICT tools? (list three only)

- 1.....
- 2.....
- 3.....

23. If yes, what kind of problems do you encounter in the availability of ICT tools? (list three only)

- 1.....
- 2.....
- 3.....

24. In order to minimise these problems, what can be done?

- 1.....
- 2.....
- 3.....

25. What strategies would you give/suggest for improving the use of ICT tools in order to manage indigenous knowledge successfully?

- 1.....
- 2.....
- 3.....

**APPENDIX B: Interview Schedule for Owners or Custodians of Indigenous Knowledge  
in KwaZulu-Natal Province**



**Faculty of Arts**

**Interview Schedule for Owners or Custodians of Indigenous Knowledge**

**The Use of Information and Communication Technologies (ICTs) to Record or  
Capture, Store and Disseminate Indigenous Knowledge (IK) in KwaZulu-Natal**

**Section A: General Information/Personal Information:**

1. Gender

Male	[	]
Female	[	]

2. Marital Status

Married	[	]
Divorced	[	]
Single	[	]
Never Married	[	]

3. Age

18-20	[	]
21-30	[	]
31-40	[	]
41-50	[	]
51 and above	[	]

4. Level of Education:

- |            |     |
|------------|-----|
| Preschool  | [ ] |
| Primary    | [ ] |
| Secondary  | [ ] |
| College    | [ ] |
| University | [ ] |
| None       | [ ] |

**Section B: Nature, Types and Importance of Indigenous Knowledge**

5. What is the nature of indigenous knowledge (IK) owned?

.....  
.....  
.....  
.....

6. What type of indigenous knowledge practices have you inherited?

.....  
.....  
.....

7. Are you the owner or custodian of this knowledge (indigenous knowledge)?

- |           |     |
|-----------|-----|
| Yes       | [ ] |
| Sometimes | [ ] |
| No        | [ ] |

8. If yes, how did you acquire the knowledge?

.....  
.....  
.....

9. If, no who owns the knowledge?

.....  
.....

10. What category of traditional role(s) do you belong to and or practice?

1.....  
2.....  
3.....

11. Do ordinary and professional people consult you for your experiences and/or the local knowledge you possess?

Yes	[	]
Sometimes	[	]
No	[	]

12. Which people are visiting and consulting for your experience or local knowledge?

1.....  
2.....  
3.....  
4.....

13. When do they consult you?

.....  
.....  
.....

14. For what purpose are they visiting and consulting you for?

1.....  
2.....  
3.....

15. What type of indigenous knowledge do you impart to them?

1.....  
2.....  
3.....

16. Do you see indigenous knowledge surviving in your province?

Yes	[	]
Sometimes	[	]
No	[	]

17. If yes, how do you see it surviving?

.....  
.....  
.....

18. If no, what is the reason for not surviving?

.....  
.....  
.....

**SECTION C: USING ICT TOOLS TO RECORD OR CAPTURE, STORE AND DISSEMINATE IK**

19. When these people consult you, do they carry any ICT tool (s)?

Yes	[	]
Sometimes	[	]
No	[	]

20. If yes, what kind of ICT tool(s) do they carry?

1.....  
2.....  
3.....

21. Do you use any ICT tool(s) to record or capture indigenous knowledge?

Yes	[	]
Sometimes	[	]
No	[	]

22. What type of ICT tool(s) do you use to record or capture IK?

1.....  
2.....  
3.....

23. Which ICT tool(s) do you use to store or preserve IK?

1.....  
2.....  
3.....

24. Which ICT tool(s) do you use to disseminate IK?

- 1.....
- 2.....
- 3.....

**SECTION D: PROBLEMS ENCOUNTERED IN THE USE AND AVAILABILITY OF ICT TOOLS IN RECORDING, STORING AND DISSEMINATING IK**

25. Do you encounter problems in the use and availability of ICT tools to capture, store and disseminate IK?

- Yes [     ]
- Sometimes [     ]
- No [     ]

26. If yes, what kind of problems do you encounter in the use of ICT tools?

- 1.....
- 2.....
- 3.....

27. What problems do you encounter in the availability of ICT tools?

- 1.....
- 2.....
- 3.....

28. In order to minimise these problems, what can be done?

- 1.....
- 2.....
- 3.....

29. What strategies could improve the use and availability of ICT tools suitable for effective recording or capturing, storing and disseminating indigenous knowledge?

- .....
- .....
- .....