The potential of information and communication technologies in collecting, preserving and disseminating indigenous knowledge in Africa

Agnes Chikonzo*

College of Health Sciences Library, University of Zimbabwe, Box A178, Avondale, Harare, Zimbabwe

Summary This paper first gives an outline of the importance of African indigenous knowledge. After that it gives the definition of information and communication technologies (ICTs) and indigenous knowledge (IK). It then goes on to highlight examples in which information communication technologies have been used to preserve IK successfully. The paper further lists projects which are still underway, in which information communication technologies are being harnessed in the collection and preservation of the IK. Lastly the paper looks at the challenges faced by African countries in harnessing information communication technologies in preserving IK and gives recommendations on the way forward.

Background and introduction

African indigenous knowledge (IK) is an important resource which must be preserved. There is need for people in African countries to participate as both contributors and users of knowledge. There is also need to learn about IK from African countries. IK is the basis for local-level decision making in agriculture, health care, food security, education, natural-resource management and a host of other activities in communities. More importantly, there is need for African countries to collect, preserve and disseminate the IK for the benefit of policy and decision makers so as to improve the benefits of development assistance in the above activities.

Information and communication technologies (ICTs) are defined as "the building blocks of the Networked World." As noted by the United Nations Development Program (UNDP), "ICTs represent the combination of microelectronics, computer hardware and software, telecommunications, and optoelectronics such as microprocessors, semiconductors and fibre optics, that enable the processing, and storage of huge amounts of information, and its rapid dissemination through computer networks. These innovations enable the processing and storage of enormous amounts of information, along with rapid distribution of information through communications network" (UNDP Human Development Report, 2001, p. 30).

*Tel.: +263 4 791631; fax: +263 4 795019.
E-mail addresses: Chikonzo@yahoo.com,
achikonzo@healthnet.zw.

From the above, ICTs include telecommunications technologies such as telephony, cable, satellite and radio, as well as digital technologies, such as computers, information networks and software.

There is no doubt about the profound impact made by ICT on our professional and non-professional life. Tertiary institutions in particular, are not only faced with the challenge of trying to be competitive and equip people to make the transition to an information economy, they have had to make the changes under increasingly stringent economic conditions due to continual reduced funding from government (Macchiusi & Trinidad, 2001, p. 1).

Uhegbu (2000) asserts,

Communication networking is increasingly becoming the trend in the information world, whether it is done among groups or persons sharing more or less the same circumstances or among organizations sharing more or less the same functional activities. The major benefits to be derived from networking are improvement to the existing services; the speedier transfer of information, improved management effectiveness and increased staff productivity.
The Internet, which is today the most sophisticated and modern way of interactive networking, has offered global access to all kinds of information generation and sharing across the world, thus reducing the world to a global village. Through the Internet, one can record, access, search and retrieve information anywhere in the world in minutes (Uhegbu, 2000).

IK is "the unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area. Communities have their own indigenous ways of deriving a livelihood from the environment. Information, insight and techniques that are passed down and improved from one generation to the next, cover such topics as medicine, animal breeding and production, water management, soil conservation and pest management." (Unites.org., n.d.).

Traditional knowledge (TK), IK, and local knowledge generally refer to the matured long-standing traditions and practices of certain regional, indigenous, or local communities. TK also encompasses the wisdom, knowledge, and teachings of these communities. In many cases, TK has been orally passed for generations from person to person. Some forms of TK are expressed through stories, legends, folklore,

rituals, songs, and even laws. Other forms of TK are often expressed through different means. Such knowledge typically distinguishes one community from another. In a sense, it becomes their "identity." For some communities, TK takes on a personal and spiritual meaning. TK can also reflect a community's interests. Some communities even depend on their TK for survival. Subsequently, communities argue that TK warrants respect and sensitivity. (Traditional knowledge, 2006).

Warren (1991) defines IK as local knowledge—knowledge that is unique to a given culture or society. IK contrasts with international knowledge systems generated by universities, research institutions and private firms. It is the basis for local-level decision making in agriculture, health care, food preparation, education, natural-resource management, and a host of other activities in rural communities.

Grenier (1998) defines IK as the unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area. IK, also referred to as traditional or local knowledge, is embedded in the community and is unique to a given culture, location or society. The term refers to the large body of knowledge and skills that has been developed outside the formal education system, and that enables communities to survive. The dominance of the western knowledge system has largely led to a prevailing situation in which IK is ignored and neglected. It is therefore easy to forget that, over many centuries, human beings have been producing knowledge and strategies enabling them to survive in a balanced relation with their natural and social environment.

Learning from IK, by investigating what local communities know and have, can improve understanding of agriculture, healthcare, food security, education and natural-resource management issues. It is therefore vital that this IK is preserved. There is great potential in harnessing ICTS for preservation of IK. This can only be achieved if ICTS are put to good use:

There have been major efforts by multilateral organization on issues of IK and development, for example, in 1998 World Bank published a framework for action on IK focusing on information dissemination, facilitation of exchange of IK among developing countries communities application of IK in the development of process and building partnership. There is a consensus about the relevance and importance of IK in development with most initiatives emerging around the

World Bank framework. The emphasis up to now has been on social cultural description of IK and awareness about the importance of IK. Some of these initiatives led to the establishment of resource centre for IK in some regions of the world, for example, African Resource Centre on indigenous knowledge (ARCIK), etc. However, there are relatively few resources that employ the capability of ICT in preservation of IK and there is only a limited understanding of the influence of digital achieve and electronic libraries in the implementation of the frame-work for action on IK (World IT Forum, 2005).

Information and communication technology is having a transformative impact on our everyday economic social and cultural lives. The hope for the future is that ICT can be effectively and appropriately harnessed to preserve IK.

According to Nickerson (2005), connectivity offers the potential for enhancing cultural continuity and rejuvenating, community ties. Nickerson (2005, p. 2) further argues, "If there is a starting point, cultural continuity and community renewal lie in the preservation and learning of Aboriginal languages. As the primary articulation of culture, language connects individuals to their community. As vehicles for culture, Aboriginal languages reflect a worldview and connect individuals to a system of values. Language retention and new speakers have decreased dramatically in recent decades and cultural knowledge and traditions have become threatened."

According to UNESCO (1996), approximately half of Canada's 50 Aboriginal languages are facing extinction or are endangered. Part of this can be attributed to the passing of elders, who act as the gatekeepers of Aboriginal wisdom and knowledge, and by means of oral traditions and customs, pass on cultural information to younger generations. In this respect, personal and collective interactions are as important in the transmission of culture as the use of language itself.

Nickerson (2005, p. 2) goes on to say, "Given the subtleties and nuances of language and dialect, one of the challenges arising from the use of ICT is to ensure the intricacies of Aboriginal cultures are not lost. If used appropriately, ICT can play a key role in cultural and linguistic preservation and promotion in new and exciting ways." Thus, Nickerson sees a great potential in harnessing ICT in the preservation of IK.

Cultural continuity lies in the preservation of IK and its transfer to future generations. As we move from one generation to the other, the risk of losing IK makes preservation a critical priority. ICTs, therefore, become a vital thread in the process of preserving and retaining IK.

In bringing out the potential ICTs have in collecting, preserving and disseminating IK, a few examples of successful projects that have been implemented worldwide are outlined below.

Implemented projects

Traditional knowledge digital libraries (TKDL)

India created its library after fighting a successful but costly legal battle in 1999 to revoke a US patent for the use of turmeric to heal wounds—a property well known in India for generations.

The Indian library contains information on 36,000 formulations used in *Ayurveda*- India's 5000-year-old system of traditional medicine. The information—presented in English, French, German, Spanish and Japanese—was created in a format accessible by international patent offices to prevent the granting of inappropriate patents (SciDev.net, 2006).

The database set international standards for registries of TK, which were adopted by the intergovernmental committee of the World Intellectual Property Organization (WIPO, 2003):

South Asia possesses significant TK that affects biotechnology, agriculture, pharmaceuticals and health care. More than 80% of its 1.4 billion population have no access to modern health care services and medicine, and rely on traditional medicine.

The Indian digital library of TK has also attracted attention from other regions. Representatives from South Africa, the Commonwealth West African Education Delegation, the African Regional Industrial Property Organization and International Property Office in Singapore have discussed with India the possibility of creating similar databases (SciDev. net, 2006).

Some countries in Africa could also come up with their own TK digital libraries for collecting, preserving and disseminating the IK and follow the Indian example. The challenge, however, is sourcing funds. Information specialists in African countries can write proposals to be submitted to organizations in developed countries which are willing to partner and collaborate with African countries in implementing projects such as the Indian traditional digital libraries.

Crossing boundaries: Aboriginal Voice

Aboriginal Voice is a Crossing Boundaries National Council project. This is a collaborative initiative between several federal departments and National Aboriginal Organizations designed to engage Aboriginal peoples in a multi-stakeholder discussion on how ICTs can or should be used by their communities, organizations and governments. Aboriginal Voice was launched in March of 2004 with a National Forum. To date, there have been regional forums in the Atlantic, Ontario, Alberta, and Manitoba. In addition, Aboriginal Voice has created an online space where discussions on Aboriginal issues can be fostered 〈http://www.crossingboundaries.ca/aboriginalvoice〉 (KTA Centre for Collaborative Government, 2006).

Below are examples of how Aboriginal Voice has harnessed ICTs in collecting, preserving and disseminating Aboriginal IK. The same concepts can be applied in different African countries and by so doing the vital African IK is collected and preserved for future generations and use.

Language preservation

Nickerson (2005) gives an example in Iqaluit, where a former schoolteacher has recorded popular English children's songs on CD in the style of Inuit *ayaya* singing, using songs to recount stories about the past in entertaining and engaging ways. Nickerson (2005, p. 2) asserts, "what is pertinent is that technology has been employed to reintroduce the dwindling cultural tradition of *ayaya* singing while at the same time acting as a device for language learning."

Nickerson (2005, p. 2) goes further to say, "What must be kept in mind is that the Elders retell events in a language that is rich in nuance as it is in detail. While it will never replace face-to-face contact with Elders, teachers and peers, ICT may serve as tools to reinvigorate language usage, especially with the younger generations who, by and large, have experience with technology and a high level of comfort with it. For example, visual technologies such as video-conferencing can relay the facial expressions of a storyteller and the intonations of his or her words."

The above example clearly demonstrates the potential ICTs have in collecting, preserving and disseminating IK. In the same manner African countries can employ the same strategy and by so doing the vital IK is collected and preserved for future generations and use.

Cultural preservation

Nickerson (2005, p. 3), writing on the preservation of culture, argues "The early years are particularly important in the formation of values and language development. The intergenerational transfer of culture has to start here, in providing Aboriginal children wherever they live with opportunities to learn their culture and language. ICT has a powerful role to play in ensuring that Aboriginal children and young people can grow in a culturally rich environment that helps instill in them a sense of pride and knowledge about who they are." As a result, the First Nation Help Desk 〈www.firstnationahelp.com〉 was created, and it provides online cultural resources such as talking books, language lessons and children songs.

Continuing the discussion, Nickerson (2005, p. 3) writes "The Internet can also greatly increase the capacity for cultural interaction by removing physical barriers. Most post-secondary education and employment opportunities exist outside Aboriginal communities, and as a result, younger generations have become increasingly mobile and more removed from the communities that are traditionally the nurturing places for Aboriginal culture. As a tool for communication, ICT has the potential to remove "distance" and keep individuals connected with family and other community social supports through online cultural forms, chat rooms and email, thereby allowing for cultural transfer on an informal or formal basis."

As a result, 〈www.Metisradio.fm〉 was launched. The role of 〈www.Metisradio.fm〉 is archiving historic recordings, soliciting and promoting new artists across the Metis homeland. This is an excellent example of how scattered Metis populations are kept informed of cultural activities. By so doing, the Internet keeps connecting Metis community members' cultural practices and their IK is preserved and not lost.

Most countries in Africa are now connected to the Internet. Funds permitting the above concept can be adopted by African countries and by so doing they are in a position to collect, preserve and disseminate their precious IK.

Native web

This is an international, nonprofit, educational organization dedicated to using telecommunications including computer technology and the Internet to disseminate information from and about indigenous nations, peoples, and organizations around the world; to foster communication

between native and non-native peoples; to conduct research involving indigenous peoples' usage of technology and the Internet; and to provide resources, mentoring, and services to facilitate indigenous peoples' use of this technology is a project of many people. Its resource centre provides an excellent database of online resources for and by indigenous peoples, from information about sustainable economic development projects to sample native newspapers.

Indigenous knowledge homepage

A comprehensive site created by the Centre for International Research and Advisory Networks (CIRAN) to facilitate and improve the exchange of information within the International IK Network. Information and documentation is presented by topic, geographical region, and source of information, such as projects and programmes, best practices, organizations and networks, calls, conferences, journals, articles, mailing lists, databases and tool kits and audio–visual materials.

To further support the fact that there is great potential in harnessing information communication technologies in preserving IK, a few examples of projects that are underway are also outlined below.

The above projects are mainly concerned with collecting and disseminating IK and once collected this information can be archived, and by so doing, the IK is preserved. African countries can also take this route to ensure that their heritage is not forgotten and lost.

Examples of projects underway

Digital library to protect IK

According to Padma (2005), South Asian countries will create a digital library of the region's TK and develop laws to prevent such knowledge being misappropriated through commercial patents. The plan was announced at a 2-day workshop held in Delhi, India, by the South Asian Association for Regional Cooperation (SAARC). Participants at the workshop have begun drawing up a technical framework for classifying the region's TK and linking it to the international patent classification system.

The aim is to create a composite digital library comprising individual TKDL from each country in South Asia:

Accessible using the Internet, the library will contain information on traditional medicine,

foodstuffs, architecture and culture. The meeting's delegates said South Asian nations could use the digital library to fight contentious patent claims by providing the prior existence of knowledge, as well as promoting research on novel drugs, enhancing the region's share of the global herbal medicine market and helping set the international agenda on intellectual property rights. The planned initiative follows the success of India's own TKDL which has been discussed above under successful implemented projects (Nickerson, 2005, p. 3).

Internet-based digital archive for IK

The aim of this project is to create an Internet-based digital archive/library for the preservation and dissemination of African IK. The purpose of the digital library would be to bring together existing digital resources and to implement specific community-based projects to record IK (languages, narratives, rituals, artifacts, etc.). The digital library will then provide the infrastructure to preserve, disseminate and protect this IK. The project will be community driven and will initially focus on existing resources and on indigenous *cultural* knowledge that is easy to record and catalogue with minimal technology, such as aboriginal narratives. The project will collaborate with existing initiatives elsewhere such as the 'FirstVoices' project in Canada (http://www.firstvoices.ca/).

The project will research issues that relates to the extinction of IK and what role can ICT play in reversing the situation. The research will be built upon the success of existing initiative and a case study will be used to present a possible approach. Finally, an action project will be implemented based on the findings from the research and the lessons from the case study (World IT forum, 2005).

Below is a description of the components of the Internet-based Digital Archive for IK in more details:

Preservation of IK through ICT: exploration of the role of digital archives and electronic library

This project will attempt to answer the following questions:

- What are the available IKs that can be digitized?
- What are the existing ways of IK preservation, sharing and transfer across generations?

- What is the role of ICT in IK transfer over generations?
- How could ICT enable IK for development?
- Is digital archive an effective way to preserve and share IK?
- What is the appropriateness of a digital archive of IK to a rural audience?
- What are the ethical implications of digitizing IK?

This research will take the existing research into consideration and will specifically focus on digital archives and electronic libraries, starting with the materials available in the existing centres.

FirstVoices

FirstVoices is a suite of web-based tools and services designed to support Aboriginal people engaged in language archiving, language teaching and culture revitalization. The FirstVoices Language Archive contains thousands of text entries in many diverse Aboriginal writing systems, enhanced with sounds, pictures and videos. A companion set of interactive online games is designed to present the archived FirstVoices language data in creative learning activities. Some language archives at FirstVoices are publicly accessible, while others are password protected at the request of the language community (World IT Forum, 2005).

How FirstVoices works

At the core of the FirstVoices Web application is an online language archiving tool. Each language collection consists of an alphabet, dictionary and phrase book. The alphabet provides the written character set for a language, with sample sound files for each character. The dictionary provides a word list, with translations, definitions, sounds, images and video. FirstVoices Phrase Books contain everyday conversational language with related text, sound, image and video files to support language learning. Using the latest digital technology, aboriginal communities can accurately document their language data and manage their own language resources. Data can then be repurposed in a variety of Web-enabled language activities designed for self-directed learning. Students customize their choice of language activity and degree of linguistic challenge while connected live to ⟨FirstVoices. com⟩. Each new activity is populated with text and sound files directly from the FirstVoices database. FirstVoices makes creative use of the Internet with a unique set of tools providing

access to the language and culture of the Elders for all Aboriginal students, whether close to their traditional territory or far away in an urban setting (World IT Forum, 2005).

FirstVoices fosters community collaboration in the revitalization of indigenous languages. Through mentorship programs for young people and their Elders, the knowledge and wisdom of fluent speakers is passed along to future generations. Young people use their technical expertise to help their elders build media-rich language archives for their entire language community.

The FirstVoices online language archive represents an opportunity for governments, corporations, senior educational institutions and NGOs to combine their resources in one educational vehicle designed to reverse the loss of Aboriginal languages and cultures.

Design and implementation of digital archive and electronic library for indigenous knowledge (DIDAELIK)

The aim of this project is to design and implement a digital archive for IK and subsequently build an electronic library or IK resources available at various institutions in Africa. While this project will be similar to the FirstVoices, it will be extended beyond language archives to other IK. Other IK to be archived will be determined from the findings from the research aspect of this project.

The initial phase of the project will be to develop tools (where they are not available, e.g. specific language tools, etc.). There will be collaboration with national information technology development agencies on the related resources and implementation at centres within a country (World IT Forum, 2005).

African countries should embark on projects such as the ones above. If properly planned and resources are available, Africa will be successful in collecting and preserving the vital IK for future dissemination.

Challenges

There are however challenges with harnessing information communication technologies for collecting, preserving and disseminating IK in Africa. The challenges include the following:

- low levels of penetration of the infrastructure and supporting environment necessary to effectively use ICTs in developing countries;

- high cost of Internet connectivity and services;
- high cost of computer hardware is a major issue as this is often the largest component of the budget;
- inadequate funding of organizations dealing with information or libraries by their governments might make it difficult for some African countries to effectively harness ICTs for the collection, preservation and dissemination of IK;
- some African countries continue to face the challenge of diminishing budgets;
- lack of proper training on ICTs in some African countries; and
- lack of resources, for example computers, servers, scanners and equipment for digitizing.

Recommendations

Below are some recommendations on how some of these challenges can be met:

- Governments in developing countries should take the collection, preservation and dissemination of IK seriously, hence government should make available reasonable amounts of money to organizations willing to undertake collection, preservation and dissemination of IK projects in order for them to do good.
- Organizations dealing with information, such as libraries, willing to undertake programmes to do with collecting, preserving and disseminating IK should have well planned approaches to ICT issues to capture funding from either internal and external sources.
- Critical to planning any adoption of ICTs is ensuring trained staff is available to keep the computers and any equipment running.
- Organizations in African countries should develop good strategies to implement projects on harnessing ICTs for IK collection, preservation and dissemination, and they should get politicians and people capable of funding such projects to listen to their needs.
- African countries should establish cooperation and links with external partners and international organizations for funding of programmes like the TKDL in India, and countries should aim to have vibrant organizations concerned with harnessing ICTs for collecting, preserving and disseminating IK like Aboriginal Voice Culture Working Group.

From the above discussion, it can be deduced that it is important that everything that can be done is done to collect, preserve, and disseminate the vital African IK. It is essential that African countries capitalize on the potential offered by ICTs in collecting, preserving, and disseminating African IK.

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