Empowering Africa's development using ICT in a knowledge management approach

Priti Jain

University of Botswana, Gaborone, Botswana

Abstract

Purpose – The purpose of the paper is to explore the role of information and communication technology (ICT) using a knowledge management (KM) approach. The knowledge in the context of this paper refers to indigenous knowledge.

Design/methodology/approach – The paper is based on a literature review.

Findings – The discussion suggests that, in spite of various infrastructural limitations in Africa, KM applications can still play a vital role in indigenous knowledge management and consequently empowering Africa's development.

Research limitations/implications – The major hindrance is the fact that Africa has thus far achieved little on its own; rather it has been emulating the progress made in the developed world. Because of this, there is a scarcity of in-depth knowledge related to an African context. In truth, some areas in which ICT has the potential to change, pertaining to the economy and society, have not been observed in any way. More research is required to identify specific needs of a country.

Practical implications – The paper supposes that in spite of all these variations and implications KM can be adapted for indigenous knowledge. The paper contributes in terms of the literature review to showing how tacit knowledge can be managed using ICT. It can be useful for the researchers and knowledge workers. Recommendations are made concerning what needs to be done to improve ICT conditions in Africa such as: ICT policy formulation; literacy programs; legal and regulatory framework; manpower training; and empowerment of local people.

Originality/value – Little has been done in Africa to explore the potential of using ICT as a mechanism with a knowledge management approach, in the thrust of Africa's development. This paper proposes how it is possible to use ICT to manage and disseminate indigenous knowledge.

Introduction

Knowledge management (KM) is defined by different authors in different ways. For example, Skyrme (2001) has defined knowledge as a "process or practice of creating, acquiring, capturing, sharing, and using knowledge, wherever it resides, to enhance learning and performance in organizations". KM is also defined as "a process of knowledge creation, validation, presentation, distribution, and application" (Bhatt, 2001, p. 58). KM is therefore the creation of relevant knowledge, and the use of knowledge in a positive way, to achieve organizational goals. In the context of this paper KM is based on the generic model of Nicholas and Rowlands (2000), who has clearly illustrated the evolution of the concept of KM through the model shown in Figure 1.

The model depicts the process of KM as having evolved through four stages. Initially, it starts with *data*, which is defined as "raw facts or observations,

Figure 1.
Concept of knowledge
management
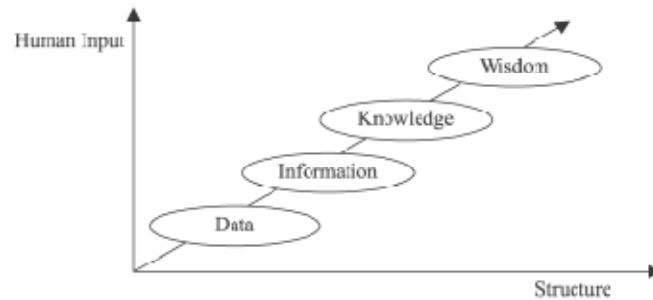
Source: Nicholas (2000)

typically about physical phenomena or business transactions" (O'Brien, 1993, p. 20). Data is processed to the information stage, information is defined as "an assemblage of data in a comprehensible form capable of communication" (*Harrod's Librarians' Glossary & Reference Book*, Prytherch (2000), p. 319). The third stage is knowledge, which is defined as "information that is relevant, actionable, and based at least partially on experience" (Leonard and Sensiper, 1998), which is a more personal term, being acquired to some extent through experience and/or observation. In this stage the user has accessed the needed information, which will create knowledge; and finally the last stage that emerges is wisdom, which is referred as the "ability to perceive or determine what is good, true or sound" (Halsey, 1986, p. 1142). This is the stage when the knowledge is used for a specific purpose and this is the knowledge which we today talk of managing. This is how data proliferates to KM, in other words, KM is built from data. To make it more comprehensible, "if information is processed data, then knowledge is processed information. The gap between knowledge and information is usually bridged by experience" (www.knowledge-africa.com/signup/). So, knowledge is obtained by the continuous processing and refining of data.

For the purpose of this paper knowledge refers to indigenous knowledge (IK) and it is defined as "the unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographical area" (Grenier, 1998). It is also known as "traditional" or "local" knowledge, which is implanted in a particular community and is rare to their culture, location or society. IK's main characteristics are: community generated; location specific; oral and rural by nature; dynamic and based on innovation, adaptation, and experimentation; basis of decision making and mean of survival for indigenous people; and not systematically documented. With this understanding of IK and KM, this paper will focus on how information and communication technology (ICT) can be used for Africa's development by proper documentation using a KM approach. As mentioned earlier, KM is progressively gaining higher repute today because of the recognition of the importance of human capital and ICT evolution. We cannot talk of KM without talking of humans.

Humans and knowledge management

From a resource-based perspective, KM can be considered as a mechanism to gain a competitive advantage. "With the dawn of knowledge management intellectual capital is gaining increasing recognition as the only true strategic asset" (Meso and Smith, 2000, p. 224). Hence, the more an organisation has in terms of the intellectual capacity of its humans, the more likely it is to excel above other organisations, even though these rival organisations may boast of superiority in other areas. "To say that knowing is a human act is to highlight the fact that knowledge involves humans who do the knowing" (Lang, 2001, p. 44). This highlights that knowledge is a somewhat intrinsic resource, and therefore people are the only true source of knowledge, making them the centre of the knowledge management process.

In the past, the management and development objectives of an organisation centred around physical or material resources, the focus is now shifting towards development of a less tangible resource: the development of knowledge. "The traditional methods of managing human capital, creativity, innovation, and the learning culture within an organization have long over shadowed the management of the professional intellect" (Smith and Rupp, 2002, p. 250).

It is ironic that while it has been established and re-established that people are central to any process involving knowledge, they still have been disregarded. As discussed, systems tend to focus on mechanical or technological aspects while the people side of things is largely ignored. But the companies "which join the KM bandwagon with a focus on IT, in order to reap some quick benefits without having focus on human side and long-term strategy, fail" (Arora, 2002, p. 241).

Definitely, "IT has its intended usage in the context of KM; human's motive and willingness are the underlying factors that dictate the actual IT usage" (Yahya and Goh, 2002, p. 460). It is the motivation of the employee more than the method of training that really will drive any kind of training home. If you start shoving training down people's throats, they are going to resist. Since humans are inseparable from KM, it is important to manage knowledge creating workers in order to encourage them to create and share knowledge.

Here, the question emerges, "how do we create a knowledge sharing culture?" Murty (2002) recommends: Realign incentive, the reward program and human resources (HR) to be seen as the catalysts for culture change. Some organizations reward their people in a crisis, but not to avoid a crisis. For the success of KM it is important to reward employees for learning, sharing, and collaborating by providing them facilities such as career opportunities and recognizing their achievements. This way knowledge sharing will be embedded into their culture.

At the same time it is essential to produce a knowledge creating environment based on trust and respect. ICT can be used as a catalyst in empowering Africa's development through KM, but "transformation into knowledge driven organization is essentially a people related issue. HR has a key role to play in nurturing and strengthening knowledge management through 'learning initiatives' and 'culture change initiatives'" (Murty, 2002). All of this indicates the importance of humans in KM.

Successful execution of KM

According to Rosenberg (2002) several myths prevail about KM, which need to be addressed for the proper execution of KM.

Myth 1: You can buy a ready-made system
Many organizations believe that they can buy a ready-made system, which is not true. The system has to be adapted according to the needs of the organization, readymade systems do not serve the real purpose.

Myth 2: Knowledge management is about knowledge control
Some organizations do not trust their employees' abilities and to control the system they add several layers of approvals and the system loses its potential.

Myth 3: If the system is built, employees will use it
Believing so is wrong. People's attitudes and their culture of adapting a new system need to be considered. For that there is a need for strong leadership to encourage and motivate them.

By avoiding the above-mentioned myths an organisation can have "a much better chance of getting the right information to the right people at the right time" (Rosenberg, 2002).

Technology is as important as a machine – it cannot operate itself and make its own decisions – only a person can do this, and use technology as an aid to simplify tasks. It may be that through this partnership, new things are learnt, but whatever the case, the fact remains that without humans, technology serves little purpose. Hence in any development and management process, the human resource component must be included and indeed concentrated upon. So in order to be able to effectively manage knowledge organisations are turning to ICT.

ICT and knowledge management
"ICT is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on..." (http://whatis.techtarget.com/definition/0%2C%2Csid9_gci928405%2C00.html). With the advent of ICT tools the old inefficient methods of managing knowledge have been challenged. "Technology is now available to combat corporate amnesia and facilitate knowledge creation, capture, organization and transmission from the right people to the right people at the right time for the right job" (Arora, 2002, p. 240). Technology can guarantee the accurate and timely expression and delivery of knowledge, in a more efficient way than can be done by people. It is impossible, these days to disseminate and utilize information without focusing on ICT, but researchers have also proved that there is no direct relationship between ICT investment and knowledge management and organizational performance.

ICT can facilitate KM in the following ways:

As mechanisms to help people create knowledge
IT is a mechanism to create knowledge. Nonaka and Takeuchi (1995) suggest four types of knowledge management interactions that are necessary for effective knowledge creation. These are:

(1) *Tacit to tacit knowledge via socialization.* Individuals have a wealth of tacit knowledge to share with colleagues. IT is the most convenient, cheapest and fastest mode of doing so. For instance, face-to-face exchange of knowledge via teleconferencing technologies, including desktop video-conferencing.

(2) *Tacit to explicit knowledge via externalisation.* Explicit knowledge is stored on paper, audio or video or videotape, computer disks, etc. Its creation has been greatly enabled by IT. For instance, electronic mail (e-mail) to exchange information.

(3) *Explicit to explicit knowledge via combination.* In addition to e-mail, organizations have invested in new web-based software and servers to facilitate explicit knowledge sharing. In addition to web sites big companies also use intranet home pages for publishing applications to exploit the hypertext linking and search capabilities of these web technologies.

(4) *Explicit to tacit knowledge via internationalization.* It depends on an individual's ability, expertise, and experience to make sense out of explicit information. Computer applications can help people recognize patterns or anomalies. For example, data mining tools based on neutral networks, simulation modelling and applications based on visualization technologies such as geographic information systems are increasingly being used by decision makers for sense-making in the presence of complex sets of data.

The information sources used by the decision makers
Many information system organizations have invested in the creation of large stores of data (data marts or warehouses) in order to support the information needs of decision makers.

Sense-making activities to support innovation
Many ICT capabilities facilitate sense making in the presence of highly complete information and less complete information both. For example, simulation tools and pattern-matching applications based on neutral networks can be used for the modelling and identification of patterns not apparent to the knowledge worker alone. Here ICT can be used as a tool to support sense making by the decision makers.

Web-based technologies
Web-based technologies are popular for several reasons; they are convenient to use, easy to develop and maintain and provide one of the quickest and most far-reaching means of conveying information. "The key issue is not about the latest information technologies, but whether those technologies are used within, and for facilitating, a culture of information sharing, relationship building and trust" (Malhotra, 1999). In other words, it is not what you have but how you use it and that depends on humans.
Junnarkar and Brown (1997, p. 147) suggest four points to be considered to see IT as a key enabler in knowledge management:

(1) Develop enterprise wide IT standards for an IT infrastructure in order to link people to people and people to information;

(2) Link IT investments in the firm's overall knowledge management strategy;

(3) Knowledge managers need to be proactive in implementing IT tools to access explicit knowledge; and

(4) Establish knowledge management partnerships that bridge information systems and human resources.

Arora (2002) remarks that "a good IT infrastructure is not a sufficient condition for the success of KM but a necessary condition for it". Lang's (2001, p. 48) statement is eye-catchy, "IT *per se* cannot change, but only reinforce norms and folkways about sharing information or insights and using other's ideas in an organization". It is important to have an adequate and efficient system, but this system must be geared towards a long-term fulfilment of objectives as well as immediate goals, otherwise the organisation may succeed initially but will ultimately suffer. It cannot be ignored that the human aspect of KM is the most important-it is here that knowledge arises, technology simply makes it easier to catalogue and convey this knowledge. Without individual participation, even the latest technology will be redundant.

Rutherford (2001) further adds to the above: "Buying a typewriter does not make one a better writer. Similarly, just buying new information technologies does not make an organization better at managing knowledge. What is critical is acceptance and effective utilization of the technologies." It is to be remembered that ICT infrastructure is valuable for knowledge management, but ICT alone cannot bring about a revolution in African development without the necessary expertise.

By looking at the role of ICT in KM when one looks at Africa's ICT environment, the special circumstances in which ICT is used cannot be overlooked.

Africa's ICT environment

ICT is used in Africa with specific limitations. Mutula (2002) identified the ICT constraints as: high cost of access to telecommunications; Government policy towards ICT; under utilisation of existing technologies; limited indigenous base; digital illiteracy. Jain (2002) established a few more in addition to the above mentioned constraints: lack of skilled and trained manpower; inadequate IT exposure in schools; lack of a National IT policy; poor communication infrastructure; ignorance of IT benefits; expensive ICT equipment and resistance to change.

For example, in developing countries, usually there is a low level of internet services available. There are 4.2 million internet users in Africa (excluding South Africa) with a population of about 850 million (NUA, 2002, available at: www.nua.ie/surveys/how-many-online/index), which indicates that 99.9 per cent people have no internet connection. However, in, 2002, 20 countries in Africa had five or more internet service providers (ISPs) while seven countries had ten or more (African Internet Connectivity, 2002). Despite these developments internet growth is constrained by poor telephone infrastructure, low international bandwidth and high-dial-up tariffs levied on internet users. Such factors severely limit internet access.

ICT and indigenous knowledge

Ngubane (2003), the Minister of Arts, Culture, Science and Technology stated at the Signing of a Benefit-Sharing Agreement between the CSIR and the SAN that:

> The concept of traditional knowledge has only in recent years acquired the recognition it deserves, as the broader society increasingly started to recognize that there could be no life without roots. Science and society began to reconnect and the seeds of mainstreaming indigenous knowledge systems were sown (Ngubane, 2003).

In a Special Issue of *The Electronic Library* devoted to discussing the impact of information technology on indigenous peoples, Roy and Raitt (2003) argue that

indigenous peoples around the world do not reside in some primitive and romantic past. Theirs are living cultures where community members maintain, recover, and rediscover cultural expressions in language and traditional lifeways. Native people are establishing new economies and affirming and protecting treaty rights. They are participating in establishing political and information policy to help guide actions in modern life. Along with this cultural revitalization, Native communities have started to take control over physical and intellectual access to their cultural material to show not only how they are aiming at self-determination and supporting their goals as sovereign nations, but also to preserve their heritage. Increasingly, tribal nations in New Zealand and the USA are using information technology to explore their culture, document these efforts, and share elements of their perspectives with the larger world. Africa need be no exception.

ICT is being used all over the world to store, manage, retrieve, disseminate and preserve indigenous knowledge. It is astounding to see how the basic ICT tools like the tape recorder can make the transfer of IK possible. For instance, to promote sustainable management of agro-ecosystems Kenya initiated an IK journal to document and use indigenous/traditional knowledge. For this journal farmers record their knowledge on a specific topic on a audio tape or any other media in their own language. This can then be listed in a scientific journal. Information given in such papers are deemed to be the interpretations of the tapes content (IPGRI, 2001).

A good example of Community Documentation of indigenous knowledge is the Kyanika Adult Women Group (KAWG), who had started a two-year project to conserve and share the diversity of Kitete, a bottle gourd that is found in virtually every aspect of the Kamba people's traditional and culture life, and its associated IK was launched in March 2001. KAWG identified and invited community resource persons to train women at a six-day seminar and women further trained community groups to conduct the project in their own areas. The documented information and techniques are being used nationally and internationally in workshops and other presentations. Recorded materials, documents, and a collection of Kitete samples and seeds can be accessed by the local community and others. Other activities are story telling by elders; sharing myths, songs, dances, riddles, poems, and drama; listening to taped material; looking at photographs; watching videos; and reading written reports (in the local kikamba language); and displaying materials at seed/fruit fairs and IK competitions. Groups has also started in come generating activities such as selling decorated or carved kitetes, making and selling kitete ornaments, and selling rare and popular types of seeds and fruits to the visitors. This all is possible by using modern ICT, which enables he saving, documenting and improving upon traditional knowledge of plants and their uses (IMAC Community Documentation of Indigenous Knowledge, 2001).

If the basic ICT tools can be used so effectively to store, retrieve, disseminate and manage IK through a KM approach, what about advanced ICT? Truly, "when new technologies are powered by indigenous knowledge, the result can be amazing" (www. seeingisbelieving.ca/indigenous/). Using advanced ICT techniques such as creation of electronic databases and copyrighted web sites, IK can be published throughout globally. This will not only publish indigenous knowledge throughout the continent and beyond, they also empower and recognise IK holders for their valuable contribution to advance and sustain Africa's development. The Unesco-MOST and CIRAN (2004) databases are such examples, which encourage promoting of IK systems

and practices to collect relevant data to the development enterprise. CIRAN provides the secretariat for the global indigenous knowledge and development work. It also operates as a clearing house for the global exchange of information on IK and manages an IK information system (partly) on the internet (www.nuffic.nl/ik-pages/). MOST contains the best practices on IK systems and practices (See (www.unesco.org/most). It is anticipated that this joint endeavour of MOST and CIRAN will stimulate communication between local knowledge and global science.

Indigenous knowledge and knowledge management

In Africa we have an abundance of indigenous knowledge (IK), which can be managed and utilized for African development. NUFFIC/IK-Unit) and MOST (www.unesco.org/most/bpindi.htm) define indigenous knowledge as "the local knowledge that is unique to a given culture or society. 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". IK is also termed as "the knowledge that people in a given community have developed over time, and continue to develop. It is based on experience, often tested over centuries of use, adapted to local culture and environment, dynamic and changing" (World Bank Group, 2003, available at: www.worldbank.org/afr/ik/). This site is promoting Africa's indigenous knowledge.

IK is therefore knowledge that is culture specific, and is generally known in any society. This knowledge stems from age-old beliefs, traditions and values, and so comes from experience and observation. Such knowledge takes a long time to develop; recently, with the increased interaction between different societies, the particular components of a society's IK may be influenced and changed by that of another. Hence, a new dimension is introduced to the development and consequently management of IK.

IK and KM have a common factor in that they are both human capital. With the development of society and the rapid evolution of ICT, IK is dying. Changing patterns of society influences IK and people intend to forget their roots where they come from, that is where KM comes in. KM can be used to rescue IK. If we want to preserve our culture, our traditions and our forefathers' invaluable knowledge, which can guide the coming generations, it is possible through KM. IK is not static, it is dynamic, therefore, it is imperative to preserve it not only to develop Africa but to show the world at large what great knowledge the African continent holds.

The Geographic Global Information System (GIS) is being recognised as an important decision-making tool for natural resource management. Recently, Tripathi and Bhattarya (2004) have provided great insight on this ample tool; that it can facilitate the inclusion of IK in the local decision-making processes. Integration of IK with GIS can facilitate the management of IK. Such systems can enhance its usefulness for natural resource management of local communities through participatory processes. GIS technology is also used to address problems associated with the storage, analysis and processing of indigenous information. GIS is a specialized ICT set that helps manage and interpret data about an area's resources and infrastructure, such as digital maps or images of a village, watershed, or entire country. It can store, manage, and analyze information and it maximizes the utility of indigenous information for development. Because it can empower local communities and also provides a platform to be shared by many users at a time. Additionally, comparisons can be made based on the information stored in this system.

ICT and knowledge management approach

ICT can be used using a knowledge management approach by addressing the following issues.

National ICT policy formulation

National ICT policy formulation is fundamental in order to utilise ICT to its full potential. There is scarcity of ICT policies in the African continent. African counties should join hands with networks like Asia Pacific Information Network of (APIN) and initiate such networks, where various countries can collectively think and come up with solutions to develop policies suitable to local environment. APIN (2004) is a regional network that is guided by the five areas of the Unesco Information for All Programme and it provides a framework for international co-operation and international and regional partnerships. In order to implement these policies, the Programme supports the development of common strategies, methods and tools for building a just and free information society. Its main objectives are:

- To develop information policies in order to guide the overall progress of national information infrastructures and services, and to promote ICT applications to support national development.

- To support the production of local content and foster the availability of IK through ICT literacy training; continuing education and lifelong learning in the fields of communication, information and informatics.

- To promote the use of international standards and best practices in communication, information and informatics in Unesco's fields of competence; and to promote information and knowledge networking at local, national, regional and international levels.

- To develop the technical and organisational infrastructure to share information resources.

- To promote ICT literacy and the application of ICT in education, science, culture and communication.

Bangladesh initiated its National ICT policy in 2002 to build an ICT-driven nation with a knowledge-based society by the year 2006. To make this vision a success, a country-wide ICT-infrastructure will be developed to provide access to information to every citizen to facilitate empowerment of people, enhance democratic values and to sustain economic development by using the infrastructure for human resources development, governance, e-commerce, banking, public utility services and all sorts of on-line ICT-enabled services. To accomplish this goal various sub-policies are formulated, such as: Training and Human Resources Development; ICT Infrastructure; Research and Development in ICT; ICT Industry; E-Commerce; Legal Issues; Implementation and Monitoring; Funds and Resources; Institutional Arrangement for ICT Policy Updating, Standardizing, Implementing and Monitoring (Bangladesh Computer Council, 2002).

Unesco-MOST (www.unesco.org/most) links researchers and policy makers, and emphasises the importance of social science research in policy formulation. Such initiatives are essential in order to use ICT as a developmental tool. Botswana is

currently working on its ICT National ICT policy, which is expected to be completed by the end of 2004 and then submit to the cabinet.

Literacy programs

ICT literacy programs are critical for its proper exploitation. ICT should be well-integrated with the curriculum from the primary level of education. This way ICT will not be seen as a techno-stress device. However, a lot of initiatives are being taken in this direction. The International Literacy Institute (ILI, 2002) held a meeting in the partnership with South Africa for literacy and basics education partnership. UNISA and ILI invited about two dozen specialists of SA Higher Education Institutions (HEIs) to participate in the UTLP-SA project. UTLP-SA is designed as a collaborative HEI partnership program in South Africa, intending to benefit multiple South African universities. The main goals of the UTLP may be summed up as follows:

· How can HEIs better employ their student base and infrastructure to improve the lives of the poor communities in their neighbourhood?

· How can these pro-development opportunities help to make HEIs more development friendly institutions, thereby attracting greater numbers of underprivileged students, while at the same time helping faculty and staff play a greater role in development.

The UTLP-SA was established in the local context. The Minister of Education had established a National Literacy Initiative (SANLI) in 1998, highlighting the raising of literacy levels in South Africa as one of his top priorities aimed at providing youth and adult learners in poor communities with basic literacy and numeracy skills. In November 2001, the Ministry of Education launched a new Information and Communications Technology Education Strategy in order to advance all sectors of education, including literacy and adult education (ILI, 2003, http://literacy.org/products/ili/webdocs/UTLPprog2003.html). The African Information Society Initiative (AISI, 2003) is a national response to facilitate the digital inclusion of Africa and its integration into the globalization process by providing a guiding framework for integrating ICTs into national development programmes and promotes the use of African local languages in ICTs.

In South Africa Ngubane (2003), the Minister of Arts, Culture, Science and Technology signed a benefit-sharing agreement between the CSIR and the SAN as a landmark in terms of an indigenous community staking its claim and restores dignity to indigenous societies. This type of agreement can be further enhanced if IK owners and local scientists jointly add value to it.

Legal and regulatory framework

Without a legal and regulatory framework ICT cannot fully take off. Hence, all the countries need to address this seriously and some of them have already started working on it. The Global Internet Policy Initiative (GIPI) organised a seminar in mid-2003 where the various benefits of legal and regulatory framework were documented at length. Nations around the worlds have moved from "benign neglect" of the internet to legislative and regulatory interest in promoting ICT development. By investing in modern technology and applying ICT tools to deliver services, India, for example, has given new impetus to economic growth.

Some of the recommendations GIPI (2003) made were: for an open internet, necessity to work locally and develop consensus among stakeholders at the national level about the laws and regulations. What framework is required for the internet and ICT to flourish. All the regulatory and legislative process should be transparent, accessible by all the nationals and implemented without discrimination. Local barriers to ICT development and opportunities for reform should be considered. ISPs should have access to network facilities on the same terms Telecom provides their own ISP affiliates. Goods and services should be opened to foreign competition and there should be low trade barriers. Industries, Government and NGOs should encourage the creation of local language websites. Support should be given to the development of standards for browsers and other software that display local alphabets. Intellectual property should be protected adequately and in order to give profit to knowledge holders.

Despite the vast amounts of literature devoted to the topic of this study, little is known about the precise causes of the great advances that have occurred in the field of ICT. At times, it seems that the evidence contradicts what theoretically must be happening, and this may be in part due to faulty regulatory infrastructures and policies. Regulatory infrastructures and policies rarely benefit from public interest, and because of this they do little to assist these developments. It is because Africa hardly produces its own policies and regulatory frameworks, African countries just adopt from the developed world. That does not fit in African context. More research is vital to base legal framework to address country-specific problems.

The initiatives have already been taken by Research ICT Africa (2004). This network "seeks to fulfil a strategic gap in the development of a sustainable information society and knowledge economy on the African continent by building information communication technology (ICT) policy and regulatory research capacity in Africa needed to inform effective governance. It will generate the information and analysis needed to inform appropriate but visionary policy formulation and effective regulation of ICTs across Africa. It will embark on sustained and rigorous research to provide decision-makers with the data and analysis to make informed decisions in the public interest" (www.researchictafrica.net/index.php).

Efforts are being made in this direction, still a lot need to be done in terms of adequate legal and regulatory framework in Africa, if Africa wants to use ICT as an empowering tool for its development.

Manpower training
The manpower needs to be trained to manage knowledge in the thrust of an African environment. Manpower training is imperative in order to reap the benefits of ICT to its fullest potential, including all types of jobs people are performing, since today ICT facilitates all walks of life. Sri Lanka initiated a training project in the liaison with Unesco aiming to bring various groups together: GEC students, IT education infrastructure, ICT professionals, R&D institutions in ICT; private sectors involved in ICT; the National Institute of Education and the National Open University. The Ministry of Education adopted the policy of introduction of IT as a subject at the General Certificate of Education, Ordinary Level. These are the things African countries have to pursue. One initiative was taken by Division for the Advancement of Women (2004), who organised a meeting-cum-training workshop to strengthen the capacity of national machinery through the effective use of ICTs; develop strategies on

the use of ICTs and train representatives from national machineries, especially information managers, in the use of ICTs to enhance cooperation, knowledge management and information sharing.

The first UN World Summit on the Information Society (WSIS, 2003) was held in Geneva in 2003 where the challenges and opportunities of the information society were highlighted. The next will be in Tunis in 2005. The Summit will focus on various issues from the regulatory framework to the promotion of investment into the ICT infrastructure and political issues such as the freedom of the press. The main objective of the Summit is to complement and enrich the WSIS political summit with a forum focussing on the implementation, innovation and human development dimension of ICT4D (World Summit on the Information Society, WSIS). If all African countries initiate such projects and programs Africa will definitely be able to use ICT to manage IK using knowledge management approach.

Empowering local people

It is a well-recognized and accepted fact nowadays that IK plays an important role in the sustainable developments whether through natural resources or agriculture, medicinal plants or artefacts, and all of this can have global impact. On the other hand, the vanishing of IK can have a negative effect, especially on those who create IK. It is essential hence, to empower those local people who are the creators of IK and use it to make their living.

Communities express their knowledge in many forms: through storytelling, drama, in conversations and meetings, as words on paper, as voices on the radio, through art and culture, in photographs and film, and digitally by email and the internet (*INASP Newsletter*, 2002). One of the main objectives of this newsletter is to identify, encourage and support new initiatives for local publication. INASP emphasizes on empowerment and creativity for local content. According to Batcher (2002), there are two elements of ICT content that need to be highly prioritized; focus on processes in order to empower local groups and foster creativity among them. He believes that if we help a person to be creative thinker, you feed them for life.

Quek and Eyzaguirre (2001) from International Plant Genetic Resources Institute (IPGRI) (www.inasp.info/newslet/jun02.html#6) insists that in the process of emphasizing ICT, the importance of local language should not be forgotten. Local language provides a wider scope of knowledge sharing. ICT can be used more effectively if linked with local cultural practices, languages and traditional forms of communication and festivals. The documentation of IK preserves and honours local indigenous people knowledge and their forefather's knowledge. The collection of information from diverse indigenous sources is often a difficult. That is when the role of ICT comes in. *The Handbook of CiDA Project Planning and Indigenous Traditional Knowledge* (CIDA, 2004) (www.kivu.com/CIDA%20Handbook/cidahow.html) recognizes that including traditional knowledge systems in projects requires respect, trust, equity, and empowerment of indigenous peoples and of the traditional knowledge system.

Most traditional knowledge, however, is held in the minds and practices of the people and mostly shared freely among the community as the main means of dissemination of the knowledge. It is not something that can be picked up and used by a non-indigenous person easily. To be able to use and understand traditional

knowledge requires a long-term commitment, respect for indigenous culture, and ample time and effort to listen and learn. In general, indigenous peoples share their wisdom happily but not for commercial purpose or for debasing it. Therefore, it is essential to empower local people by ensuring the protection of their knowledge.

Active involvement of informational professionals
Informational professionals deal with the provision of information everyday, thus they can appreciate the importance of information better on individual, communal and national levels. Information professionals interact with their users mainly in three different roles as: information providers to satisfy their user needs; information guides by assisting the user to select appropriate books and other materials on a particular topic; and, finally as information instructors teaching users how to locate information themselves, and make use and understand all available information tools. Because they have more insight on information needs and utilities, information professionals must have an active participation and involvement in the process and must play their roles prudently and wisely.

Benefits of IK
Emadi (1998) strongly believes that IK should permeate development "for the simple reason that it is less expensive, readily available, environmentally appropriate and familiar, and most important of all, it has a proven record of effectiveness". It is easy to concur with this statement. Increasingly, it has been recognised that globally available information cannot be the sole answer to the development of any country, since they all have a different environment, different facilities and a different level of education and understanding; the local element cannot never be ignored. Hence, many initiatives are going on all over the world to capture, preserve and manage IK. An annotated list of key on-line sources is available at: www.big-world.org/links/62.asp, which specifically focuses on how ICTs are being used to capture and exchange IK. The benefits from IK can be listed as below:

- by putting IK on web sites, it can be used for business purposes;
- through IK Africans will be known in a global society;
- in the endeavour to manage IK some of the lost African traditions and information will be traced;
- sometimes African information is hijacked; by making it available on the web with a copyright, it will not be taken over;
- IK is cheaper than western know-how;
- IK information will be exchanged world-wide; and
- it will facilitate sustainable development.

To reap all these benefits it is vital to manage indigenous knowledge through knowledge management.

Implications of KM applications to IK
KM is institutionalised knowledge, while IK is community-based knowledge. KM is explicit, whereas IK is tacit. KM caters for an organisational wellbeing and its sustainable development by creating more efficient and effective processes; creating

customer value, boosting innovation and promoting the development of unique market offerings. On the other hand IK can be used to create sustainable development for the whole country, including organizations. To summarise, it is easy to identify an expert in an institution, but difficult to trace a traditional healer. Both are different in nature. In addition to these problems, KM practices in Africa are made rather complex by limitations on ICT usage. In spite of all these variations and implications KM can be adapted for IK, they have one common feature that both are human related.

It is possible to use KM applications in IK by enhancing IK through the codification and consequently digitalisation of IK. People have a great deal of tacit knowledge in their heads, which can be made explicit by suitable codification, digitalisation and storage. That can be made possible by local people's involvement and make them aware of the importance of their knowledge. Amina's story of how IK in East Africa plays a key role in the survival strategies of border communities is an excellent example of IK recognition and management in Africa (Amina, 2003). IK can also be indexed and linked. Web-based technologies can be used conveniently to create and disseminate the quickest information around the world. A lot is already happening in Africa in this direction. Thus, by codification and indexing IK can be managed and published both electronically and in paper format.

Recommendations and conclusions

There are already many efforts being carried out in Africa and Unesco and the World Bank are supporting such initiatives. To enhance ongoing efforts and activities this paper makes the following recommendations. To use ICT as a catalyst in empowering Africa's development, what needs to be done to subject IK to KM, the ICT conditions in Africa need to be addressed by:

- *ICT policy formulation:* National ICT policy formulation is vital for the complete take-off of ICT.
- *ICT literacy programs:* by making people aware of its benefits and by well-integrating ICT with the curriculum from the primary education level.
- *Legal and regulatory framework:* by formulating a transparent legal and regulatory framework based on the local environment and needs and with the consensus among stakeholders and which provides protection to intellectual law.
- *Manpower training:* The manpower needs to be trained to manage knowledge in the thrust of an African environment.
- *Empowerment of local people:* It is vital to empower local people by involving them through their participation in IK creation and ensuring that their knowledge will not be misused.

Indigenous knowledge will have a greater role to play if subjected to knowledge management practices by publishing it through web sites and creating databases.

The paper concludes with the role of information professionals in this endeavour. Information professionals have key roles to play in National ICT formulation, ICT literacy programs and formulation of legal and regulatory frameworks. They are the knowledge protectors and knowledge providers – they possess many major roles in various important fields. Hence, they are in a better position to influence political leaders, as well as the public at large. They appreciate the importance of information,

and are wary of its needs and utilities. They have a greater knowledge of these than most, so they can convince the political leaders about the great need of a National ICT policy and legal framework. In the process of their everyday interaction with public they can be the remarkable people in ICT literacy programs. To play this role efficiently and effectively, they need to be proactive, dynamic and creative to take a lead in policy development and literacy programs. As professionals they need to develop a vision for a transformational society, where they have goals and strategies in common with those of the Government. Only then can ICT be used as a catalyst to preserve indigenous knowledge and facilitate Africa's development.

References

African Internet Connectivity (2002), *The Current Status of the Internet in Africa*, available at: www.3.sn.apc.org/africa/afstat.html (accessed 14 December 2003).

AISI (2003), *African Information Society Initiative*, available at: www.uneca.org/aisi/ (accessed 17 December 2003).

Amind (2003), *IK in East Africa Plays a Key Role in the Survival Strategies of Border Communities*, available at: www.worldbank.org/afr/ik/ (accessed 6 December 2003).

APIN (2004), *Asian Pacific Information Network*, available at: www4.irandoc.ac.ir/apin/Constitution.html (accessed 23 November 2004).

Arora, R. (2002), "Implementing a balanced score card approach", *Journal of Knowledge Management*, Vol. 6 No. 3, pp. 240-9.

Bangladesh Computer Council (2002), *National Information and Communication Technology (ICT) Policy*, available at: www.bccbd.org/html/itpolicy.htm (accessed 27 November 2004).

Batcher, S. (2002), *INASP Newsletter*, available at: www.inasp.info/newslet/jun02.html#6 (accessed 17 November 2004).

Bhatt, G.D. (2001), "Knowledge management in organizations: examining the interaction between technologies, techniques, and people", *Journal of Knowledge Management*, Vol. 5 No. 1, pp. 58-68.

CIDA (2004), *Handbook of CIDA Project Planning and Indigenous Traditional Knowledge*, available at: www.kivu.com/CIDA%20Handbook/cidahow.html (accessed 27 November 2004).

Division for the Advancement of Women (2004), available at: www.un.org/womenwatch/daw/meetings/workshop/natmach-ict04/namibia-apr04.htm (accessed 27 November 2004).

Emadi, M. (1998), "Indigenous knowledge: sustainability and empowerment", *Indigenous Knowledge and Development Monitor*, Nuffic-CIRAN, The Hague, December, available at www.acdi-cida.gc.ca/cida_ind.nsf/0/23612f815643a63485256c59005fb687?OpenDocument (accessed 27 November 2004).

GIPI (2003), "The legal and regulatory framework enabling development of the internet as an engine of economic growth and democratization", Global Internet Policy Initiative, paper presented at the UNITAR/INTEL Seminar, 27 June, available at: www.un.int/unitar/patit/NYtraining/2003SemIII/JDEMPSEYPRESENTATION, (accessed 27 November 2004).

Grenier, L. (1998), *Working with Indigenous Knowledge: A Guide for Researchers*, International Development Research Centre, Ottawa.

Halsey, W.D. (Ed.) (1986), *Collier's Dictionary*, Macmillan Publishing, London.

ILI (2003), Summary of 1st Meeting of University and Technology-for-Literacy/Basic Education Partnership in South Africa (UTLP-SA), UNISA, 6 December 2002, available at: http://literacy.org/products/ili/webdocs/UTLPprog2003.html (accessed 27 November 2004).

IMAC Community Documentation of Indigenous Knowledge (2001), available at: www.imacmexico.org/ev_es.php?ID=5459_201&ID2=DO_TOPIC (accessed 17 November 2004).

INASP Newsletter (2002), available at: www.inasp.info/newslet/jun02.html#6 (accessed 17 November 2004).

IPGRI (2001), *Plant Genetic Resources in Asia, the Pacific and Oceania*, available at: www.ipgri.cgiar.org/regions/apo/ik.html (accessed 17 November 2004).

Jain, P. (2002), "IT industry in Botswana: challenges and opportunities", *Malaysian Journal of Library & Information Science*, Vol. 7 No. 1, pp. 77-86.

Junnarkar, B. and Brown, C.V. (1997), "Re-assessing the enabling role of information technology in KM", *Journal of Knowledge Management*, Vol. 1 No. 2, pp. 142-8.

Lang, J.C. (2001), "Managerial concerns in knowledge management", *Journal of Management*, Vol. 5 No. 1, pp. 43-57.

Leonard, D. and Sensper, S. (1998), "The role of tacit knowledge in group innovation", *California Management Review*, Vol. 40 No. 3, pp. 112-32.

Malhotra, Y. (1999), "Three myths that can derail your KM investments", *CIO Enterprise Magazine*, September 15.

Meso, P. and Smith, R. (2000), "A resource-based view of organizational knowledge management systems", *Journal of Knowledge Management*, Vol. 4 No. 3, pp. 224-34.

Murty, K.S. (2002), *Role of HR in Institutionalizing Knowledge Management in a Company*, available at: www.kwork.org/White%20Papers/papers.html (accessed 11 December 2004).

Mutula, S. (2003), "The digital divide in Sub-Saharan Africa: implications for the revitalisation and preservation of indigenous knowledge systems", paper presented at the SCECSAL – 15 Conference, 15-19 April 2002, Johannesburg.

Ngubane, B. (2003), Address by Dr Ben Ngubane, Minister of Arts, Culture, Science & Technology, Molopo Lodge, South Africa. Available at: www.dst.gov.za/news/speeches/minister/benefit_sharing_san.htm (accessed 27 November 2004).

Nicholas, D. and Rowlands, I. (2000), Aslib/IMI, London.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge Creating Company*, Oxford University Press, Oxford.

NUA (2003), *Internet Surveys*, available at: www.nua.ie/surveys/how-many-online/index.html (accessed 5 December 2003).

O'Brien, A.J. (1993), *Management Information Systems: A Managerial End User Perspective*, 2nd ed, Irwin, Burr Ridge, IL.

Prytherch, R. (2000), *Harrod's Librarians' Glossary & Reference Book*, 9th ed., Gower, London.

Quek, P. and Eyzaguirre, P. (2001), *Plant Genetic Resources in Asia, the Pacific and Oceania*, IPGRI, available at: www.ipgri.cgiar.org/regions/apo/ik.html (accessed 7 November 2004).

Research ICT Africa (2003), available at: http://link.wits.ac.za/research/rictafri.html (accessed 27 November 2004).

Rosenberg, M. (2002), *The Seven Myths of Knowledge Management*, Knowledgepoint Pty Ltd, available at: www.knowledgepoint.com.au/knowledge_management/Articles/KM_MR001.htm (accessed 15 December 2003).

Roy, L. and Raitt, D. (2003), "The impact of IT on indigenous peoples", *The Electronic Library*, Vol. 21 No. 5, pp. 411-13.

Rutherford, E. (2001), "Knowledge management depends upon acceptance and effective utilization of the technologies", *CIO Online – Quick Poll*.

Skyrme, D.J. (2001), *From Information Management to Knowledge Management: Are You Prepared?*, available at: www.skyrme.com/pubs/on97full.htm (accessed 16 December 2003).

Smith, A.D. and Rupp, W.T. (2002), "Communication and loyalty among knowledge workers: a resource of the firm theory view", *Journal of Knowledge Management*, Vol. 6 No. 3, pp. 250-61.

Tripathi, N. and Bhattarya, S. (2004), "Integrating indigenous knowledge and GIS for participatory natural resource management: state-of-the-practice", *The Electronic Journal on Information Systems in Developing Countries*, Vol. 17 No. 3, pp. 1-13, available at: www. is.cityu.edu.hk/research/ejisdc/vol17/v17r3.pdf (accessed 30 November 2004).

Unesco-MOST & CIRAN Databases (2004), *Best Practices on Indigenous knowledge, Joint Publication of the Management of Social transformations Programme (MOST) and the Centre for International Research and Advisory Networks (CIRAN)*, available at: www. unesco.org/most/bpikpub.htm#sources (accessed 27 November 2004).

World Bank Group (2003), available at: www.worldbank.org/afr/ik/ (accessed 16 December 2003).

WSIS (2003), World Summit on the Information Society, available at: www.ict-4d.org/ exhiconf_forum_loc.htm (accessed 24 November 2004).

Yahya, S. and Goh, W-K. (2002), "Managing human resources toward achieving knowledge management", *Journal of Knowledge Management*, Vol. 5 No. 5, pp. 457-68.

Further reading

An annotated list of the key on-line sources (2004), available at: www.big-world.org/links/62.asp (accessed 17 November 2004).

ICT definition (n.d.), Available at: http://whatis.techtarget.com/definition/0%2C%2Csid9_ gci928405%2C00.html (accessed 16 December 2003).

About the author

Priti Jain has a BA Hons. LL.B from Meerut University in India, a Master's in Library and Information Studies from the University of Botswana, and a PhD in Information Science from the University of South Africa. He has worked for four years worked at the Botswana College of Agriculture Library, and since September 2002 has been working at the University of Botswana as a Lecturer at the Department of Library & Information Studies and a subject librarian in the University Library. The author of several published papers, Dr Jain's research interests include Information Studies, Information Technology, Work Improvement Teams, Productivity, and Human Resources Management. Priti Jain is the corresponding author and can be contacted at: jainp@mopipi.ub.bw