Information and Communication Technologies, Knowledge Management and Indigenous Knowledge: Implications to Livelihood of Communities in Ethiopia

Lishan Adam, PhD
ICT in Development Researcher
Lishan@ictfd.net

“Knowledge is the only treasure you can give entirely without running short of it.”
African proverb

I. Introduction

This brief paper discusses the role of information and communication technologies in gathering, storing and disseminating indigenous knowledge, the various community-based structures to be used in order to safeguard and transfer indigenous knowledge and the best practices around the world in using IK systems for development. The paper discusses the link between indigenous knowledge and global knowledge systems and some of the lessons from knowledge for development initiatives. The paper concludes with recommendations for enhancing the role of information and communication technologies in general and knowledge management in particular to collect, preserve and exchange indigenous knowledge in Ethiopia. The aim is not come up with scientific and detailed treatment of these issues but rather to raise salient points around the intersection between information and communication technologies and IK systems.

II. The role of Information and Communication Technologies in the disseminating of indigenous knowledge

Indigenous knowledge is a profound, detailed and shared beliefs and rules with regards to the physical resource, social norms, health, ecosystem, culture, livelihood of the people who interact with environment both in rural and urban settings. It has been the basis for local level decision making in agriculture, health care, food preparation, education, natural resource management, and a host of other activities. It represents an important component of global knowledge.

Indigenous knowledge is dynamic; at least it must be dynamic. It evolved from years of experience and trial-and-error problem solving by groups of people working in their environments drawing upon resources they have at hand. Vital information on health, child rearing, natural resource management is often encoded in unique forms such as proverbs, myths, rituals, and ceremonies but often shunned for modern scientific techniques and thoughts. Incorporating indigenous and scientific knowledge means integrating information collected from rural people with scientific and technological information. Institutions must find ways to process indigenous information in the same way as scientific information processed using information and communication technologies.

Information and communication technologies play major roles in improving the availability of indigenous knowledge systems and enhancing its blending with the modern scientific and technical knowledge. ICTs include telecommunications technologies such as telephony, cable, satellite and radio, as well as digital technologies, such as computers, information networks and software. The new information and communications technologies such as computers and the Internet, can help generate wealth and jobs, build bridges between governments and citizens, forge relations among organizations and communities, and improve the delivery of essential services to poor people.

ICTs can be used to:

- Capture, store and disseminate indigenous knowledge so that traditional knowledge is preserved for the future generation
- Promote cost-effective dissemination of indigenous knowledge
- Create easily accessible indigenous knowledge information systems
- Promote integration of indigenous knowledge into formal and non-formal training and education
- Provide a platform for advocating for improved benefit from IK systems of the poor

While some people still remain skeptical about the direct contribution ICTs to indigenous knowledge transfer and poverty alleviation, there are signs that ICT's can contribute to development goals and to the exchange of indigenous knowledge. Proper application of ICTs is essential to stimulate the flow of indigenous knowledge and incorporation of modern scientific and technological understandings to traditional knowledge. This requires understanding of the capacities and contexts. Proper application of ICTs requires understanding of the

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3 Williams, David and Oliva Muchena, Utilizing Indigenous Knowledge System in Agricultural Education to Promote Sustainable Agriculture, 2000
main characteristics of indigenous knowledge and defining tools, applications and services that meet those characteristics. Table 1. provides a list of major characteristics of indigenous knowledge and how information and communication technology tools must respond to these.

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<tr>
<th>Characteristics of Indigenous knowledge</th>
<th>ICT considerations</th>
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<tr>
<td>IK is generated within communities, it works, it is validated and abundant</td>
<td>Community-based resource Centres that can enhance the flow of IK must be adopted</td>
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<td>IK is location and culture specific</td>
<td>Traditional and modern technologies that respond to local culture</td>
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<td>IK covers focuses on basic needs of human and animal</td>
<td>Services and systems that enhance livelihoods should be considered</td>
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<tr>
<td>Use of IK is cost-effective, sustainable and locally manageable, deployment and mobilization is not expensive</td>
<td>ICT services should not add additional burden but make IK more sustainable and manageable</td>
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<tr>
<td>IK is dynamic, innovative, adaptive and open for experimentation</td>
<td>ICTs need to support the move beyond documentation and improve adaptation, adoption and experimentation</td>
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<tr>
<td>IK is oral and rural in nature</td>
<td>Focus should be made on tools that promote oral interaction such as audio-visual technologies, text to speech, etc.</td>
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<tr>
<td>IK is not systematically documented</td>
<td>Documentation of IK without jeopardizing local culture, IPR and other aspects should be considered</td>
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<tr>
<td>IK is not integrated into modern scientific and technical knowledge</td>
<td>ICT services should be designed to enhance systematic integration of modern and traditional knowledge</td>
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Table 1. Link between IK characteristics and ICTS
Adapted from: Guus von Liebenstein⁴, Indigenous Knowledge: Towards Indigenous Knowledge Information System, Bangkok, 2000

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a. Information and Communication Technologies infrastructure for IK Systems

A reliable and accessible infrastructure (radio, TV, telecommunications, Internet) is a prerequisite for modern information exchange. The starting point for economic development in the information age is the existence of a suitable ICT infrastructure. Ethiopia has made significant stride in rolling out infrastructure to various part of the country through Rural Connectivity Project, Woreda Net, Schoolnet and AgriNet, but this has yet to make dent on the flow of indigenous knowledge. Many people still see the Internet as a consumption tool—as a means of recreation, information gathering and shopping, but the Internet has been a key resource for exchange of knowledge. A significant amount work still remains in turning Internet and other technologies around to facilitate the exchange of indigenous knowledge.

There is no specific software designed for indigenous knowledge. Some attempts have made by different projects to set of open source software tools to enable indigenous communities to protect their unique cultures and knowledge through digitization\(^5\). 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 may be considered for the management and dissemination of indigenous knowledge.

Knowledge management tools and platforms ranging from content management systems to group collaboration tools, synchronous and asynchronous communication can also help to capture and share indigenous knowledge. More advanced and new tools like wiki (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. However, the application of these tools should be preceded by understanding of the context of local innovators and those who benefit from indigenous knowledge. Low-tech approach to IK should be a starting point as the majority of those who use IK system may not have advanced technologies.

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b. Challenges of applying ICTs to IK systems

The application of information and communication technologies for managing knowledge is not without problems. Not all aspects of living traditions of indigenous knowledge can be captured as ‘artefacts’ using digital technology. The collection of information from diverse indigenous sources is often a laborious, time-consuming and costly process. Those with knowledge may not be willing to share their actual knowledge. Efforts to capture indigenous knowledge by ICTs and setting up databases were not successful as hoped due to inadequate frameworks for capturing and making the knowledge available in usable formats to the people who need them and who often do not have access to ICTs.

Intellectual property right issues are other challenges, particularly if indigenous knowledge leads to profit for transnational corporations. Documenting and publicizing IK could immediately lead to their appropriation by others without return to innovators. The intellectual property rights of the individuals and communities have to be protected and benefits have to be generated for the innovators as well as local communities. Community structures such as tele-centers are increasingly becoming as the most important platforms for capturing, transfer and exchange of indigenous knowledge.

III. Community structure for promoting indigenous knowledge

ICT implementations often promote a top-down approach to knowledge flow from experts to target groups or expect the poor to use what is in databases. This approach puts major constraints on the flow of knowledge. Linking people with relevant knowledge and each other directly is far useful than accumulating knowledge in ‘stores’ or IK databases. A number of community based structures that bring members of the communities together ranging from “idir” to market places to libraries and community resources centres need to be considered as venues for linking people with each other. Indigenous knowledge can also be disseminated at schools, clinics, worshiping places and at multipurpose community centres.

a. Role of libraries and information resources centers

Community libraries have shown strong tendency towards preserving local culture in digital and paper format and promoting exchange of information in many countries, particularly in Latin America. The International Federation of Library Association asserts that libraries could help in:

- collecting, preserving and disseminate indigenous and local traditional knowledge
- publicizing the value, contribution, and importance of indigenous knowledge to both non-indigenous and indigenous peoples
- raising awareness on the protection of indigenous knowledge against exploitation
- Involving elders and communities in the production of IK and teaching children to understand and appreciate the traditional knowledge
- Encouraging the recognition of principles of intellectual property to ensure the proper protection and use of indigenous knowledge and products derived from it.

Experiences of the Illubabor community libraries in Ethiopia shows that information resources centres could indeed act as a source of empowerment and knowledge exchange by enabling young people, old, employed and unemployed to exchange traditional and modern knowledge and create platforms for interaction among member of the communities.

b. Role of multi-purpose community resource centres

Multipurpose community centres are increasingly becoming the main venues for organizing IK and disseminating it using digital technologies. Access to indigenous knowledge databases, audio and video footages can be made to members of communities through tele-centers. Technologies and tools ranging from speech to text, text to speech, mobile phones, PDAs, community radios, etc. can be installed and tried out for suitability for sharing of indigenous knowledge. Community centres that may have radios can also serve as a hub for broadcasting and exchange of information among members. Participatory videos and radio programming initiatives can be launched at community centres to capture indigenous knowledge and exchange within and beyond the communities.

c. Traditional structures and indigenous knowledge management systems

Community based structure such as “idir” and “iqub”, “senbete” and other forms of gathering including the “meeting under tree” and rituals have been a key source of indigenous knowledge transfer for centuries. While the main goals of these traditional structures were focused on “self-help” or “managing and resolving conflicts”, or “micro credits”, their ancillary benefits as a medium of interaction and exchange of knowledge about agriculture, health and environment management was not fully recognized in Ethiopia.
In effect, it is possible to building on some of these existing structures and enable each village and community to capture and exchange knowledge or develop indices of IK on “what works” and “what does not”, who holds relevant knowledge and how to contact them both in electronic and non-electronic formats. Part of the index can be exchanged informally, but this can also be available for consultation within and beyond the given community. This would enable the knowledge to be available in local languages.

IV. Best Practices around the World

The most successful indigenous knowledge initiatives so far are those that take the constraints of access, the eco-systems and capacities of the resources of the poor people (i.e. their knowledge) into consideration. The Honey Bee Network in India is one of such initiatives aimed at gathering, organizing indigenous knowledge while recognizing, respecting and rewarding local creativity, traditional knowledge and contemporary grassroots innovations. The network has documented more than 11000 outstanding examples of traditional knowledge and contemporary unaided innovations. Some of these have been taken up to set up as a venture for incubation and product development. Every six months the members of Honey Bee Network walk for eight to ten days from one village to another to scout for innovations, respect the knowledge experts at their doorstep and share the multi-media, multi language Honey Bee database of innovations with the local communities.

Patents have also been filed through the grants under the Department of Scientific and Industrial Research and Department of Science and Technology. The benefits in the process have gone to innovators three to five times of their annual income. A competition among women for demonstrating various recipes which use at least uncultivated plants also helped in drawing attention towards the less known (but perhaps more valuable) source of food and nutrition. Further, these contests helped in identifying women experts whose knowledge is often discounted. Experience of the Honey Bee Network shows that the value chain of innovations beginning from scouting, validating, value addition, product and enterprise development, intellectual property rights protection, licensing and dissemination requires a whole range of institutional innovations which are absent in Ethiopia.  

Other experience shows that strong government support and involvement in recognizing indigenous knowledge systems is critical for it to gain prominence in development and for promoting innovations and protection of the intellectual property rights of innovators. The government of South Africa for example has developed a policy on indigenous knowledge systems that was adopted by its

7 Gupta, Anil, Transforming Indian villages through innovations, knowledge network and entrepreneurship: Dealing with the bottom of the pyramid or tip of the iceberg
8 Gupta, ibid
Cabinet in 2004. The policy among other addresses institutional frameworks for supporting indigenous knowledge systems, academic and applied research issues, systems for capturing indigenous knowledge, the promotion of networking among practitioners and legislations to protect intellectual property associated with indigenous knowledge. This policy provides a basis from which countries like Ethiopia can draw on to develop their indigenous knowledge polices.

More experience and lessons for promoting indigenous knowledge at national and local and institutional levels has also been gained through the knowledge management for development initiatives by development aid institutions such as the World Bank, the United Nations Scientific and Cultural Organization (UNESCO) and Bellanet International\(^9\) over the last decade.

V. Linking global knowledge to local knowledge – Lessons from Knowledge for Development Initiatives

Knowledge management has become one of the main topics on global development agenda of development aid agencies and United Nations, especially following the holding of the Global Knowledge conference in Canada in 1997 where international organizations, governments and nongovernmental organizations met to discuss the relationships between globalization, ICT, knowledge, growth and development. The focus on the role of knowledge in development processes is the result of understanding about the relationship between economic growth and the application of knowledge. It is also evident that knowledge for development should not only confined to scientific and technical knowledge but also community-based knowledge systems and development practices that underpin the day to day survival and innovations at local levels. However, while significant progress was made in the area of knowledge sharing for development, the success in understanding community-based knowledge remains very much behind.

a. The Nature of Knowledge in Development

The experiences of knowledge for development initiatives in international cooperation underscores the complexities and difficulties associated with knowledge but these have contributed to the understanding of the nature of knowledge that has impact on development. It is clear that knowledge is both a process and a product; it is dynamic and mostly available in the “heads” of individuals and also embedded in a practice of livelihood. The creation of knowledge is complex; its sharing requires diverse tools for translation, conversion, filtering and two-way communication and interaction.

\(^9\) See, www.km4dev.org
Three different types of knowledge that have implications to IK are distinguished:

- **Tacit knowledge** - unconscious and intuitive knowledge gained through experience that allows individuals to make decisions without referring to rules or principles (e.g. knowing how to perform medical operations, knowing how to network at a conference);

- **Explicit knowledge** – knowledge that is articulated and accessible to anyone who reads, hears or looks at it (e.g. a training guide on using a software package or the conclusions of a policy briefing paper);

- **Implicit knowledge** helps individuals to know what is socially and culturally appropriate in a given circumstance including shared beliefs, values and expectations (e.g. knowing that it is inappropriate to undermine colleagues in public, understanding management attitudes within a given organization).

These different knowledge dimensions can also be seen from the perspectives of individuals and communities as shown in table 2 below.

**Table 2: Different Dimensions of Knowledge**

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<th>Explicit Knowledge</th>
<th>Implicit Knowledge</th>
<th>Tacit knowledge</th>
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<tbody>
<tr>
<td><strong>Individual</strong></td>
<td>Verbalized or documented thoughts</td>
<td>Physical skills, Habits, Rules, Rules</td>
<td>Unconscious, intuitive</td>
</tr>
<tr>
<td></td>
<td>and strategies</td>
<td>and routines</td>
<td></td>
</tr>
<tr>
<td><strong>Inter-subjective</strong></td>
<td>Books, Libraries, Manuals, Technology</td>
<td>Language, Social capital</td>
<td>Group behavior</td>
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</table>

While much of the emphasis in 1980s was on explicit knowledge in the form of books, databases and libraries, the practice of international development over the last decade has shown that implicit and tacit knowledge are central to progress at institutional and national levels. Nurturing the flow of tacit knowledge has been one of the preoccupations of international institutions such as the World Bank, DFID and UNESCO over the last decade. Indigenous knowledge is mostly tacit. It is also obvious from table 2 that in the absence of codification of indigenous knowledge, the vast majority of it resides in the head of the creator as tacit knowledge or as implicit knowledge in the form of habits, rules and routines.

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10 Ben Ramalingam, Implementing Knowledge Strategies: Lessons from international development agencies, ODI Working Paper, 244
and social capital. This poses a tremendous challenge for capturing, sharing and transfer.

b. Management and Sharing of Knowledge

Experience of knowledge for development initiatives has shown that a vast array of tools can be used to facilitate the sharing of knowledge. Mechanisms such as community of practice, peer assists, synchronous and asynchronous communications are important to improve the exchange of indigenous knowledge. Tools such as intranets, search engines, content management systems (CMSs), electronic publishing systems, workflow systems, groupware, help desk applications, as well as more fundamental systems such as personal and group filing, project archiving have been refined to foster the sharing of knowledge. Other insights reveal that:

- Sharing knowledge using these tools is possible but that does not always translate into action for taking decisions and modifying behaviors in order to achieve development goals.
- Effective knowledge sharing should not be imposed from outside but should be organic, learned and has to be embedded into work processes, local eco systems and livelihoods.
- Most of the local knowledge emerges form local particularities like context, actors and processes. This limits the way local knowledge can be generalized and replicated in other settings.
- Valuable indigenous knowledge is often not locally known nor socially recognized. This is partially constrained by myths, old paradigms, cultural idiosyncrasies and prejudices of professionals and institutions.

There was also a significant progress in understanding the linkage between global and indigenous knowledge and the complexity in integrating them. While the contribution of scientific and technological knowledge in increasing productivity, accelerated economic development and improved living conditions is fully appreciated, progress in integrating local and global knowledge was slow and needs to be nurtured further.

VI. Conclusions

This brief paper attempted to discuss some of the salient features of IK and ICTs and progress in integrating ICTs and knowledge management concepts into indigenous knowledge systems. The integration of indigenous knowledge with modern thoughts, respect for local innovations and improving the exchange of

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traditional knowledge is essential for sustainable development and for improved livelihoods.

ICT-assisted indigenous knowledge development in Ethiopia requires a number of integrated steps:

- Networking major institutions that have already begun to work on indigenous knowledge
- Study on the indigenous knowledge covering aspects such as IK asset at community levels, community structures and networks in support of indigenous knowledge systems and how information and communication technologies may enhance this.
- Research to map out social and cultural barriers to the flow of knowledge
- Development of pilot interventions to learn how ICT impact on IK that in turn improve livelihoods

Ethiopia needs to put mechanisms for identifying, collecting, documenting, characterizing, recognizing and sharing of IK at national levels and establish the necessary organizational incentives and support systems. In addition there is a need for:

- Creating local/regional/national registers of innovations and indigenous knowledge
- Establishing mechanisms for rewarding innovators
- Developing intellectual property rights protection systems
- Stimulating the flow of indigenous knowledge in schools to increase awareness on innovation and traditional knowledge

The knowledge management and sharing capabilities of key institutions such as the Ministry of Agriculture and Rural Development (MoARD), Ministry of Water Resources (MoWR), Ministry of Health (MoH), Ministry of Education (MoE), Ministry of Women Affairs (MoWA), Ethiopian Institute of Agricultural Research (EIAR), and Information and Communication Technology Development Agency (ICTDA) of the Ministry of Capacity Building (MoCB), among others needs to be improved. Knowledge management is a fast growing filed. Development professionals from these institutions need to develop their skills in knowledge management and participate in global discourse around the interface between knowledge sharing, indigenous knowledge and information and communication technologies. ICT professionals need to work with those engaged in IK systems in order to understand the characteristics and complexities in adapting technologies for capturing, management and dissemination of indigenous knowledge.

There is also a need to strengthen the capacities of local authorities at district and kebele levels including teachers, nurses, extension workers as
intermediaries to support communities to manage and share their indigenous knowledge and acquire knowledge from the outside world.

The ICTDA also needs to consider developing a national policy or framework on IK systems based on experiences of developing countries. This would not only promote and protect IK systems but also creates further platforms for interaction on indigenous knowledge, knowledge management, ICTs and development.