Management of Indigenous Knowledge for Developing Countries

Saeed Lodhi, Peter Mikulecky

***Abstract*—** Indigenous knowledge refers to a large body of knowledge and skills that has been developed outside the formal educational system. It is embedded in culture and it is unique to a particular location and its culture. Although many authors in the past wrote masses about the importance of indigenous knowledge, its management is still lacking. However, management of indigenous knowledge can be essential for the food security and health of millions of people in the developing world. This paper is devoted to the area of indigenous knowledge management, stressing the position and needs of developing countries.

***Keywords*—** Knowledge management, indigenous knowledge, developing countries, best practice.

I. Introduction

IT is highlighted in [1] that knowledge is the key to sustainable social and economic development. Building on local knowledge, the basic component of any country knowledge system, is the first step to mobilize such a capital. Exchange within a community where providers and recipients speak the same language and share its underlying cultural concepts is much more easily accomplished than transferring tacit knowledge across cultures. Indigenous knowledge and appropriate "techno-blending" is essential. In this way people can use their own locally generated knowledge to change or improve their livelihood and provide opportunities for designing development projects.

If serious consideration is given to the indigenous knowledge management, it could provide practical tools for poverty alleviation, sustainable development, and empowerment in general. The exchange of indigenous knowledge is an ideal outcome of a successful transfer and dissemination. To provide the foundation for indigenous innovations and experimentations is an initial step for managing indigenous knowledge. In order to gain maximum benefit developing countries have to improve both scientific as well as traditional knowledge at the local level.

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Saeed Lodhi is a doctoral student at the Department of Information Technologies, Faculty of Informatics and Management, University of Hradec Kralove, Rokitanskeho 62, 50003 Hradec Kralove, Czech Republic (e-mail: lodhi923@ gmail.com).

Peter Mikulecky is a full professor of Managerial Informatics and head of the Department of Information Technologies, Faculty of Informatics and Management, University of Hradec Kralove, Rokitanskeho 62, 50003 Hradec Kralove, Czech Republic (e-mail: peter.mikulecky@uhk.cz).

II. Indigenous Knowledge

A. What Is Indigenous Knowledge?

Indigenous knowledge (abbreviated IK) refers to a complete body of knowledge, know-how and practices maintained and developed by peoples through generations, generally in rural areas. As they have extended histories of interaction with the natural environment, indigenous knowledge is somehow unlike the international knowledge system which is generated by universities, research institutions and private firms. According to [2] indigenous knowledge is the information base for a society, which facilitates communication and decision making; it is dynamic and is continuously influenced by internal creativity and experimentation as well as by contact with external systems. On the other hand, in view of [3] indigenous knowledge is unique to a given culture or society, the basis for local level decision making in agriculture, healthcare, food preparation, education, natural resource management and a host of other activities in rural communities. IK can be broadly defined as the knowledge of indigenous (local) community accumulated over generations of living in exacting environment. This definition encompasses all forms of knowledge – technologies, know-how skills, practices and beliefs – that enable the community to achieve stable livelihoods and survival in their environment.

Indigenous knowledge is built up by a group of people through generations of living in close contact with nature but mostly not available in codified form. In [4] it is reported that "IK is usually tacit knowledge, stored in people's individual or collective memories, and often guarded jealously, hence the saying that *each times an elder dies, it is as if a library had burned down*". Indigenous knowledge is also the accumulation of practical experiences. It encompasses sum of facts that are known or learned from experience or acquired through observation.

B. Indigenous Knowledge Methodology

Indigenous knowledge is a practical concept, which can be used to facilitate communication among people coming from different backgrounds such as researchers, development practitioners and beneficiaries. IK is usually shared among local communities and transferred from one generation to the next, through oral traditions and storytelling. IK contains

several important characteristics which distinguish it from other types of knowledge. These include originating within the community, maintaining a non-formal means of dissemination, collectively owned, developed over several generations and subject to adaptation, as well as imbedded in a community way of life as a means for survival.

Generally indigenous knowledge has two kinds of carriers. The first kind is millions of laypersons, ordinary householders, farmers, shepherds, artisans, artists, & priests. It includes both men and women. The second kind is scholars and seers. Their numbers runs into several hundred thousand. The exchange of IK is taking place through personal communication and demonstration i.e. from master to apprentice, from parents to children, from neighbor to neighbor, from priest to parish. Herbal medicine is a good example of IK, which has noticeable impact on the lives of people around the globe.

C. Significance of Indigenous Knowledge

Indigenous knowledge is a key element of the "social capital" of the poor; their main asset to invest in the struggle for survival, to produce food, to encompass shelter or to achieve control of their own lives. Owing to dynamic nature IK changes its character according to the needs of people and gains vitality from being deeply entrenched in people's lives. Consequently it has the potential of being translated into commercial benefits by providing leads/clues for development of useful practices and processes for the benefits of mankind. According to [5] indigenous knowledge is an integral part of the development process of local communities. Moreover IK is an important resource in the development process and sharing IK within and across communities can help enhance cross-cultural understanding and promote the cultural dimension of development.

Observation shows that knowledge for development not only confined to scientific and technical knowledge but also to community-based knowledge systems. Therefore development practices that underpin the day to day survival and innovations at local levels should be increased. It is stressed in [6] that IK holders and innovators encourage economic self-sufficiency for indigenous peoples, and also provide incentives for the conservation and sustainable uses of environment. IK is important for both the local communities and the global community as it is based on exchange within a community and expresses human creativity; both individual and collective level. In [7] it is stated that indigenous knowledge provides the basis for local-level decision-making about many fundamental aspects of day-to-day life: for example hunting, fishing, gathering, agriculture and husbandry; food production; water; health; and adaptation to environmental or social change. Indigenous knowledge provides the basis for problem-solving strategies for local communities, especially the poor ones. Furthermore [8] or [9] argue that IK is capable of increasing production and real economic growth rate without further damaging the environment by better knowing, harvesting and using knowledge as a vital and competitive development resource.

Significance of indigenous knowledge for contributing as revenue generator is highlighted in [10]. According to it the annual world market value for medicines derived from medicinal plants by indigenous people is US $ 43 billion. One paradigm is given by [11] that in Himalayan range (Pakistan) at least 70% of medicinal plants and animal species in the region consist of wild species, and 70-80% population depends on these traditional medicines for healthcare.

There is additional role of indigenous knowledge as a part of education for strengthening a culture of safety and resilience at the local level and has the potential to provide solutions for reducing disasters at many levels. It is important, that IK is available for almost no cost. Consequently, development strategies based on IK could be completed with very low cost. There is another significance of IK due its capacity to empower the community. Communities, including the most vulnerable and disadvantage groups, are much more able to take action instead of relying on external help only.

Some of the characteristics of indigenous knowledge which demonstrate its applicability in development are given below:

- Understandable to users;
- Implement able (usable, doable);
- Originated within communities, based on local needs, specific to culture and context;
- Provides core knowledge with flexibility for local adaptation for implementation;
- Uses local knowledge and skills, and materials based on local ecology.

Indigenous knowledge proved to be useful to the poor in the areas like agriculture, animal husbandry and ethnic veterinary medicine, use and management of natural resources, primary health care, preventive medicine and psycho-social care, saving and lending, community development, and poverty alleviation, among others.

D. Transformation of Indigenous Knowledge

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. The integration of IK into the development process is essentially a process of exchange of information and knowledge sharing. IK is local and tacit in nature which is rooted in a particular community and situated within broader cultural traditions; it is a set of experiences generated by people living in those communities. Therefore separating the technical from the non-technical, the rational from the non-rational can create some ambiguity, so its transformation needs careful attention. According to [12] the process of exchange of IK within and between developing countries and between developing and industrial countries involves recognition and identification, validation, recording and documentation, storage in retrievable repositories, transfer and dissemination. It is argued in [1] that IK could be a missing link between neglect and empowerment, as well as between losing and surviving. Some time modern ways of transferring knowledge is incapable of appreciating traditional cultures; so the

attempts to record, document and transfer of indigenous knowledge could lead to the dis-empowerment of indigenous people. Sensitive approaches are therefore required to reduce the potential risk of dis-empowerment of local communities, without compromising the principle of global knowledge partnership for the benefit of all communities. According to [13] technical or indigenous information can be transmitted through both indigenous means or through exogenous channels such as mass media and schools, and the information can be based on exogenous or indigenous knowledge.

E. Indigenous Knowledge System

The Indigenous Knowledge Systems unlike other knowledge systems is a policy framework to stimulate and strengthen the contribution of indigenous knowledge to social and economic development. Local knowledge systems often combine specific and general aspect of knowledge with great ease as everybody has local, everyday knowledge about the environment. IK systems are geared to dealing with diversity in both natural environment and social organization and also continue to evolve over time. IK systems differ from scientific knowledge in their capacity to deal with local problems. The degree to which they are accessible to the members of the social group charged with resource management and production.

In [14] it is observed that IK is different than formal scientific knowledge; the scientific knowledge is an explicit or "codified" knowledge that is transmittable in formal, systematic language. On the other hand, indigenous knowledge is a tacit knowledge of the local or indigenous people, which is personal, content-specific, and therefore hard to formalize and communicate.

IK systems consist of a wide range of knowledge that has largely remained hidden from the mainstream of education, innovation, industry and commerce. IK holders, as custodians thereof, have enormous potential for innovation and commercialization of indigenous knowledge. According to [15], in knowledge systems generation of knowledge starts with "stories" as the base units of knowledge; proceeds to "knowledge," an integration of the values and processes described in the stories; and culminates in "wisdom," an experiential distillation of knowledge. IK systems are typically human centered, very diverse, applying technology of local origin with strong cross-linkages and is developed after the years of experiences and experiments, trial and error and incremental refinement. For example knowledge about the characteristics of a particular plant and its properties as a healing substance, or stated differently, the technology of its use, is what gives medicinal plants their social and economic value.

[14] suggests that in order to proper understanding and incorporating of indigenous knowledge systems for sustainable socio-economic development and poverty alleviation, the scientific community perhaps need to "unlearn" our old view of knowledge and should grasp the importance of local or indigenous peoples view. We suppose this could be possible by integration of indigenous knowledge to international knowledge system. This will raise the awareness about the important role of IK in development process that is likely to help preserve valuable skills, technologies, artifacts and problem solving strategies among local communities.

F. Role of ICT for Indigenous Knowledge

Technology should be introduced where necessary, but in minimalistic ways, so as to add value to the traditional systems and make them more resilient in the face of new threats such as those posed by climate change.

Undoubtedly ICT can play major roles in improving the availability of IK systems and enhancing its blending with the modern scientific and technical knowledge. Information and communication technologies such as computers and the Internet can help to generate wealth and jobs, build bridges between governments and citizens, build relations among organizations and communities, and improve the delivery of essential services to poor people. In our point of view the application of ICT is essential to stimulate the flow of IK and incorporation of modern scientific and technological understandings to traditional knowledge. This will enable indigenous communities to protect their unique cultures and knowledge through digitization. Moreover IK and techno blending practices to the local setting can help to improve agriculture production and sustainability of development assistance.

The main use of ICT for promoting indigenous knowledge could be as follows:

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

G. Best Practice Based on Indigenous Knowledge

The concept of best practices based on indigenous knowledge is to develop cost effective and sustainable survival strategies for poverty alleviation and income generation. IK is an important part of the lives of the poor while it is also an integral part of the local ecosystem but it is sad that IK is an underutilized resource in the development process. While learning from IK, by investigating first what local communities know and have, it can improve understanding of local conditions and provide a productive context for activities designed to help the communities.

Generally during natural disasters in rural areas survival mostly rely on IK, because the non-formal means by which IK is disseminated provides a successful model for other education on disaster risk reduction. In [16] it is highlighted that in Chitral (Pakistan) locals have learned to interpret early signs of potentially destructive flash floods. Such signs may be the color, smell and behavior of mountain streams as well as

meteorological forecast skills. In 2005, 106 houses were destroyed in Brep village due to a Glacial Lake Outburst Flood. However, not a single life was lost since the interpretation of the stream behavior acted as an early warning and the village was evacuated in time, while according [17] based on this experience and the local knowledge of a flood 100 years before, in 2006 the community twice warned an engineering company to relocate their camp since it was situated in the flood plain. The company did not heed to the local knowledge, and a foreign engineer lost his life to a flash flood on July 14th, 2006, which also destroyed millions of rupees worth of equipment.

Best practice using IK which is also related to development process is given as a Karez system in Xinjiang area of China. Turpan is one the district of Xinjiang which is very dries in all seasons and very hot during spring, summer and autumn. High temperature and strong solar radiation result in high annual evaporation. So local people developed a traditional irrigation water system for irrigation which is called Karez, which is able to make use of underground water efficiently. According to [16] Karez is composed of four primary components: vertical wells, underground canals, a surface canal, and small reservoirs. As a result of Karez system, Turpan, a basin located in the arid area of Northwestern China, is well-known for its wide variety of agricultural products. In the Turpan area of Xinjiang, Karez is still being used to supply water resources for irrigation and domestic use.

Modern technology has been integrated into the traditional Karez system to further reinforce the successful traditional practice. Karez system in Baluchistan (Pakistan) adopted by locals is still there in some parts but small scale as compared to Xinjiang. Karez system in Baluchistan can be reinforced with modern technology and management.

III. Management of Indigenous Knowledge

Management of knowledge is extremely important. To have knowledge only is not sufficient but connecting knowledge with its application empirically or conceptually or even philosophically to desirable social ends is essential. IK systems generally provide a way of connecting a way of knowing, a way of feeling and also a way of doing. Like the scientific knowledge, indigenous knowledge also needs to be managed on technical base. The essential steps as mentioned by [12] are the ways of its transformation i.e. recognition and identification, validation, recording and documentation, storage in retrievable repositories, transfer and dissemination. These steps can be further elaborated as follows:

Recognition and identification: Some IK may be embedded in a mix of technologies or in cultural values, rendering them unrecognizable at first glance to the external observer (technical and social analyses may, therefore, be required to identify IK).

Validation: This involves an assessment of IK significance and relevance (to solving problems), reliability (i.e., not being an accidental occurrence), functionality (how well does it work?), effectiveness and transferability.

Recording and documentation: Recording IK and its documentation is a major challenge because of the tacit nature of IK (it is typically exchanged through personal communication from master to apprentice, from parent to child, etc.). In some cases, modern tools could be used, while in other circumstances it may be appropriate to rely on more traditional methods (e.g., taped narration, drawings).

Storage in retrievable repositories: Storage is not limited to text document or electronic format; it could include tapes, films, storytelling, gene banks, etc.

Transfer: This step goes beyond merely conveying the knowledge to the recipient; it also includes the testing of the knowledge in the new environment. Pilots are the most appropriate approach in this step.

Dissemination: Dissemination to a wider community adds the developmental dimension to the exchange of knowledge and could promote a wider and deeper ripple impact of the knowledge transfer.

We presume that the awareness, pilot applications, and "mainstreaming" are necessary steps required for a successful integration of IK into the development process which could help in managing indigenous knowledge. Higher education institutions need to play a role in harnessing and disseminating indigenous knowledge for sustainable development providing the knowledge base and transmitting of new skills. Libraries can be used for collecting, preserving and disseminating indigenous knowledge. Incorporating IK into an educational environment can help students feel ownership of the knowledge they bring to learning environments. According to [6] IK needs to be addressed and integrated into educational programs settings or learning environments, and students better connected to material taught can become a major knowledge source for their community sustainable development. For managing indigenous knowledge, the following four factors are important: dissemination of information, facilitating exchange of IK among developing countries, applying IK in development processes, and building partnerships.

Disseminating information:

- Developing a database of IK practices, sources, lessons learned and partners;
- Identifying and testing instruments for capture and dissemination of IK;
- Publishing selected cases in print and electronic format.

Facilitating exchange of IK among developing countries:

- Helping build local capacity to share IK, especially among the local IK centers;
- Identifying appropriate methods of capturing, disseminating IK among communities;
- Facilitating a global network to exchange IK.

Applying IK in the development process:

- Raising awareness of the importance of IK among development partners;

- Helping countries to prepare national policies in support of indigenous practices;
- Integrating indigenous practices in programs/projects supported by partners.

Building partnerships:

- Learning from local communities and NGOs;
- Leveraging limited resources of partners to obtain greater impact on the ground;
- Addressing the intellectual property rights issue of indigenous knowledge.

Management of indigenous knowledge is extremely important because whenever bearer's of this knowledge die, they will die with all the information, knowledge and wisdom, which could have been saved and passed on to others. Education and awareness is essential contributors for the management of indigenous knowledge.

The **following steps** can be suggested for promoting and using indigenous knowledge of local communities in development countries:

- Identifying and testing instruments for capture and dissemination of IK;
- Integration of two knowledge systems i.e. indigenous and modern;
- Raising awareness of the importance of managing IK among native communities and general public;
- Protecting the intellectual property rights issue of indigenous knowledge;
- Promoting inter cultural exchange of experiences in education for sustainable development;
- IK for food preservation, such as drying food fruits and vegetables, should be popularized to ensure food security and reduce dependency on food aid;
- Developing a framework for incorporating IKS into development programs of government and non-governmental organization (NGOs) and into the curricula at various levels.

IV. Conclusions

This paper aims to stress the importance of indigenous knowledge and its management as one of the developing factors easily usable namely by various communities in developing countries. These communities are, however, not always able to preserve their indigenous knowledge and use it properly for their benefit, therefore introducing necessary steps towards its better management could help substantially.

We think that also educational institutions should take steps to include indigenous knowledge into curricula and relevant accreditation frameworks; this will create awareness among students about indigenous knowledge and enable them to understand the impact of indigenous knowledge systems on their daily lives. And last but not least, to enable them to better help in further development of their local communities after returning there.

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