MANAGING AGRICULTURAL INDIGENOUS AND EXOGENOUS KNOWLEDGE THROUGH INFORMATION AND COMMUNICATION TECHNOLOGIES FOR POVERTY REDUCTION IN TANZANIA

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ABSTRACT

This article addresses the extent to which information and communication technologies (ICTs) may be used to manage agricultural indigenous knowledge (IK) to alleviate extreme poverty and halve hunger in the rural areas of Tanzania. It also discusses ways that ICTs can be used to introduce exogenous knowledge into the local communities in order to reduce hunger and poverty. The advent of ICTs provides a window of opportunity for developing countries to harness and utilize IK to their advantage. Access to, and use of, ICTs provides new and faster ways of delivering and accessing information and knowledge that may improve productivity in a wide range of sectors, including agriculture. Access to information and knowledge may give Tanzania the possibility to reduce poverty and increase agricultural productivity. The rural population of Tanzania is not only deprived from accessing global knowledge on agriculture, but it also lacks opportunities to share its own IK. Research shows that the use of exogenous knowledge together with IK systems may improve farming activities. Recommendations are given on how IK may be effectively managed through ICTs in Tanzania.

Keywords: Indigenous knowledge, exogenous knowledge, information and communication technologies, agricultural development, sustainable livelihoods, poverty.

INTRODUCTION

The majority of the world's poor are in developing countries. They are rural based and derive their livelihoods mainly from agriculture (Academy for Educational Development and Winrock International, 2003). According to the 2001-03 statistics, there were still 854 million undernourished people worldwide, where 820 million were from the developing countries. Compared with 1990-92, the number of undernourished people in the developing countries has declined by a meagre 3 million, which is very low (FAO, 2006). To address these challenges, the world's governments committed themselves to reducing poverty through the implementation of the Millennium Development Goals (UN-MDGs). The first UN-MDG aims at eliminating extreme poverty and halving hunger by the year 2015 (FAO, 2006; UNDP, 2005).

In spite of the efforts made to address the food insecurity and poverty, the number of rural poor in Sub-Saharan Africa (SSA) has continued to rise (World Bank, 2007a). In Tanzania, poverty levels have also remained high and poverty reduction during the past decade has taken place mainly in urban areas, while rural areas have seen relatively little changes. Poverty is concentrated in rural areas in Tanzania, and agriculture is the major source of livelihood for the rural population. That means that the sustained reduction in hunger and poverty in Tanzania is not possible without special emphasis on agricultural development.

Agricultural information and knowledge to improve agricultural production exists in developing countries. Local communities possess a wide range of indigenous knowledge (IK) that may significantly contribute to the improvement of Africa's agricultural systems in terms of production techniques and post harvest techniques (Koda, 2000). However, that knowledge is generally used in isolation from exogenous knowledge. Research shows that the use of exogenous knowledge together with IK systems may improve farming activities (Kilongozi, Kengera and Leshongo, 2005).

Many African farmers are not only deprived from accessing global knowledge on agriculture, but they also lack opportunities to share their own local knowledge. In fact, IK is predominantly tacit, and it is shared and preserved through oral tradition and demonstration rather than documentation (Sen and Khashmelmous, 2006). As a result it is rapidly disappearing. Further, IK is poorly recognized and it is inadequately protected by most of the international and national intellectual property rights. So, if poverty is to be reduced drastically, intervention must also take place to revive the processes of managing agricultural IK and integrating exogenous knowledge into indigenous knowledge systems to enhance agriculture productivity.

The advent of ICTs provides a window of opportunity for developing countries to harness and utilize IK. Access to, and use of ICTs provides new and faster ways of delivering and retrieving information and knowledge that can improve productivity in various sectors. In particular, ICTs can address the essential information, knowledge and communications dimensions of persistent poverty and low agricultural growth in developing countries since it can enable rapid, efficient and global exchange of information and knowledge, and can also facilitate immediate communication across distance (McNamara, 2003).

INDIGENOUS KNOWLEDGE (IK)

IK is experiential, unique and embedded in the heads, activities and practices of communities with long histories of close interaction with the natural environment across cultures and geographical spaces (du Plessis, 2002; Ellen and Harris, 2000; Ngulube, 2002; Ngulube and Lwoga, 2007; World Bank, 1998). IK may be used to solve local problems, a resource to help grow more and better food, to maintain healthy lives, to prevent conflict, to manage local affairs (Mkapa, 2004), to reduce poverty, decrease environmental degradation, and enhance equity which leads to sustainable development (Henning, 2004). Much of this knowledge is

not available since it is stored in people's heads, where most of them are elderly who die irreplaceably (Akullo *et al.,* 2007).

IK is threatened by what Chisenga (2002) termed as "modernisation, urbanisation and globalization". Thus, IK is disappearing at an alarming rate in developing countries. Further, lack of IK documentation has posed problems on the retention of IK since it is shared through oral traditions. As a matter of fact, it is estimated by FAO that 30% of animal genetic resources are at high risk of loss due to negligence of IK in favour of conventional scientific findings (Muyungi and Tillya, 2003). Very little indigenous knowledge has actually been captured and recorded for preservation, limiting access and reach to an immensely valuable database (Chisenga, 2002). The rapid disappearance of IK has led to the oppression and underdevelopment of communities, creating an opportunity for loss of culture and identity (Morolo, 2004). There is thus an urgent need to document and preserve IK so that it can be available for poverty reduction initiatives before much of it is completely lost.

Nevertheless, there is a renewed interest on IK due to its important role for sustainable development and rational resource use (Brokensha, Warren and Werner, 1980; Warren, 1991). For instance, an informetric analysis of eight indigenous knowledge databases hosted by EBSCOHost and SABINET revealed a significant growth of IK documents from 1997–2002 (Ocholla and Onyancha, 2005).

POVERTY AND AGRICULTURAL SECTOR

Poverty is no longer regarded as being limited to material and financial deprivation, but encompasses intangible aspects, such as issues of empowerment, rights and opportunities (Slater and Tacchi, 2004). In a wider context, the poor lack opportunities to convert the resources they possess such as labour, skills, experience and physical resources into value-creating activities, for example cash income or other resources valuable to their particular livelihoods (McNamara, 2003). The poor lack access to knowledge and information, the primary source of economic opportunity and political empowerment, rendering them vulnerable and prey to social exclusion and poverty (UN, 2004).

Agriculture contributes to poverty reduction as a leading sector in the economy and it is a source of livelihood and a provider of environmental services in many developing countries (World Bank, 2007a). In Tanzania, the agriculture sector accounts for 45% of the GDP, provides 85% of exports and employs about 85% of the total work force (CIA, 2007). The importance of agriculture in enhancing poverty reduction is well supported by key development policies and strategies in Tanzania. The Agricultural Sector Development Strategy of 2001 is committed to the poverty reduction objectives of the Tanzania Development Vision (TDV) 2025 (URT, 2006).

However, low agricultural growth has been a major factor in Tanzania's slow progress towards poverty reduction. For instance, the agricultural sector in Tanzania grew by 4.1% despite the projected growth of 5% in 2006, and the

actual growth rate of 5.1% in 2005 (Ngasongwa, 2007). Considering that the overall GDP growth target for halving abject poverty by 2010 is in the range of 6-7%, this performance falls short of the needed growth (URT, 2005b).

KNOWLEDGE FOR AGRICULTURAL PERFORMANCE AND POVERTY REDUCTION

The potential of IK in improving agricultural performances is widely recognized (Hart and Mouton, 2005; Ocholla and Onyancha, 2005). Farmers, particularly in developing countries, have planned agricultural production and conserved natural resources by using their IK from time immemorial. In fact, at least 40% of the world's population depends on IK for techniques to produce crops and food supplies (CSOPP, 2001). IK is an important vehicle for agricultural development and poverty reduction in rural areas because it is social capital of the poor, a basis for their decision-making and provides local solutions to development challenges facing poor communities. By building on IK and leveraging other knowledge, poverty can be addressed jointly with the poor (Gorjestani, 2005).

In Tanzania, the potential of IK for reducing hunger and poverty can be gauged by the "matengo pits" practiced in Ruvuma region, the Ufipa mound system, the traditional terracing systems of the Iraqw and the rotational following systems in Mufindi District in Tanzania. These systems demonstrate how the local communities, through their IK, were able to reduce land degradation (especially soil erosion), maintaining soil fertility and increasing crop production (Kauzeni and Madulu, 2003).

However, in Tanzania, a specific policy that deals with IK has not been formulated, instead IK is covered in various national strategies and sectoral policies. Among others, the National Strategy for Growth and Reduction Poverty (NSGRP) acknowledges the usage of IK for agricultural development and wildlife management (URT, 2005a). A sectoral policy, such as the Agriculture and Livestock Policy of 1997 emphasizes the importance of integrating IK and conventional scientific knowledge in agricultural research (URT, 1997). There is thus a need to develop the policy, strategies and action plans on the development and management of IK in Tanzania.

The failure of conventional agricultural techniques to be applied in different types of agro-ecological zones has resulted in greater attention being paid to indigenous agricultural technologies (Hart and Mouton, 2005). A study in Ogun State of Nigeria for example, indicated that farmers reverted to the use of indigenous technologies for crop protection, particularly with cowpeas (*vigna unguiculata*) due to the high cost, adulteration and health hazards of agro-chemicals (Adedipe, Okuneye and Ayinde, 2004). Similar observations were made in the Niger State, Nigeria (Gana, 2003). It is obvious that modern approaches for agricultural development and poverty reduction in Africa will continue to fail unless they take IK into consideration.

It is also important to integrate IK with exogenous knowledge since local farming systems do face challenges that farmers are unlikely to be able to address

without access to exogenous knowledge and information. Exogenous knowledge is defined as the information made available to the rural community from the sources outside its boundaries as part of the information transfer process to support modernization (Mchombu, 1995). The importance of improving the existing agricultural IK by integrating it with exogenous knowledge is well documented (Hart and Mouton, 2005; Madukwe, 2006; Reij and Waters-Bayer, 2001). The integration adds value to local knowledge, innovations and practices rather than replacing them. For example, Dove (2000) found out that the successful production of rubber resulted from the confluence of indigenous and exogenous knowledge in Southeast Asia. It is obvious from the aforesaid that not only indigenous knowledge is significant for reducing hunger and poverty but also exogenous knowledge is important too.

POVERTY – REDUCING POTENTIAL OF ICTS IN THE AGRICULTURE SECTOR

Previous studies indicate that information and communication technologies (ICTs) can positively enhance access to relevant information and knowledge that are pertinent to reducing poverty to poor farmers in developing countries (Gerster and Zimmerman, 2003; IICD, 2006; Myhr, 2006; Soriano, 2007; Souter *et al.,* 2005; Waverman, Meschi and Fuss, 2005).

When properly designed and deployed:

> ICTs can be used by the poor directly to address their information needs, develop their own strategies and solutions for improving their lives, and articulate their interests in societal processes and institutions that affect them (Marker, McNamara and Wallace, 2003).

Although ICTs cannot solve major problems that surround the poor people's basic needs such as clothes, shelter and food, they can be enablers for the management of the knowledge systems for reducing hunger and poverty. As an enabler, ICTs enhance livelihoods, improve efficiency in the agricultural activities and give beneficiaries a voice in the planning process (OECD, 2005). Actually, any ICT project that aims at improving the livelihoods of rural poor will likely have significant direct and indirect impact on enhancing agricultural production, marketing and post-harvest activities – which in turn can further contribute to poverty reduction (Richardson, 2005).

Despite the rapid growth of access to, and usage of ICTs, the rural poor and vulnerable populations may have little opportunity or capacity to use or benefit from ICTs due to the digital divide that has been slightly reduced. The digital divide refers to gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access ICTs and to their use of the internet for a wide variety of activities (Ghatak, 2007). Factors that contribute to the digital divide include: poverty; poor telecommunication infrastructure; lack of electricity supply infrastructure; remote and rural location and illiteracy. Most of the world's 600 million illiterate adults are rural residents. In Tanzania, the adult literacy rate is 69.4% of

the whole population (URT, 2002). High cost and availability of ICTs; lack of ICTs skills; poor educational infrastructures; lack of knowledge of the English language; and inability to see ICT as applicable to everyday life further serve as a barrier to reducing the digital divide. Other challenges include under utilisation of existing technologies and a limited indigenous base (Mutula, 2002).

Thus, the challenge is not only to increase the quantity and accessibility of ICTs in the rural areas but also to improve the access to relevant knowledge for local development. The knowledge and communication technologies exist, however the problem is on how to harness them for sustainable agricultural development, which will lead to poverty reduction. The underlying concern, however, is that it is difficult to measure the impact of ICT on poverty reduction since development is a complex process (Chapman, Slaymaker and Young, 2003; IICD, 2006). Nonetheless, it is suggested that an approach has to be put in place for monitoring and evaluation that will enable development agents to assess over time the effects of ICT interventions on poverty reduction (IICD, 2006).

APPROACHES TOWARDS THE APPLICATION OF ICTS IN POVERTY REDUCTION

A number of approaches have been developed to increase the understanding of poverty, which include (Gerster and Zimmermann, 2003):

- pro-poor growth strategy;
- sustainable livelihoods strategy;
- rights and empowerment strategy; and
- resources and redistribution strategy.

A good example of such approaches is the Sustainable Livelihoods Framework (SLF) (DFID, 2001). Although SLF has widely been used in the development context, such frameworks, have also been used to examine the contribution of ICT for poverty reduction in developing countries (Arun, Heeks and Morgan, 2004; Soriano, 2007; Souter *et al.,* 2005; Parkinson and Ramírez, 2006; Richardson, 2005).

According to DFID (2001), SLF seeks to gain an accurate and realistic understanding of people's strengths (assets or capital endowments) and how they endeavour to convert these into positive livelihood outcomes. SLF as an analytical tool, focuses on understanding how policies, institutions and decision-making processes influence resource access and ownership, and determine strategic livelihood options available to the rural poor (Chapman, Slaymaker and Young, 2003). The SLF approach thus provides a significant framework for analyzing the contributions of ICT for reducing hunger and poverty, since it focuses on the complexity of rural poverty and the strategies that the poor farmers apply to combat their daily challenges (World Bank, 2007b). More pertinent to this article is that SLF framework allows interpretation and adaptation to fit any particular context (Parkinson and Ramírez, 2006). Thus, SLF can be used to suit any prescriptive since it is not expected to be used in a fixed way.

The SLF approach includes the following major principles: capital assets, vulnerabilities context, processes and livelihoods outcomes that are all related to poor livelihoods. The SLF identifies five capital assets upon which the increase of access and use of these assets can contribute to the struggle against poverty. These five capital assets are described as follows (Batchelor and Scott, 2001):

- natural capital: natural resource stocks used directly for production, or necessary to sustain life;
- social capital: social resources on which people draw in pursuit of livelihoods i.e. relationships, membership of networks;
- human capital: skills, knowledge, ability to work, good health which enable people to pursue different livelihood strategies;
- physical capital: basic infrastructure for the supply of energy, shelter, water, transport and communications, production equipment, markets; and
- financial capital: financial resources available which provide livelihood options, for example, savings, credit, remittances, pensions.

Using SLF framework, this article discusses the role of ICTs in managing IK and exogenous knowledge in facilitating access to more livelihood resources and improving the poor's agricultural livelihoods. The most pertinent constructs of the livelihood framework which are often discussed in relation to ICTs and agricultural livelihoods are social (networking), financial (income) and human capital (access and use of information and knowledge resources). This article is also confined to the discussion of these three constructs.

ITCs may play a significant role in facilitating access to sustainable livelihood assets enumerated above. ICTs are important since they can improve access to information and knowledge that can lead to the creation of capabilities to gain more livelihood resources. However, it is important to understand the information needs of the rural poor for efficient implementation of appropriate ICT interventions in support of sustainable livelihoods (Chapman, Slaymaker and Young, 2003; Richardson, 2005). Further, SLF requires enhanced two-way information flows between the rural poor and policy-makers (Chapman, Slaymaker and Young, 2003). This requirement necessitates a need to determine the indigenous knowledge that farmers possess, and ways that are used to access and use that knowledge before disseminating exogenous knowledge to them (McNamara, 2003). Actually, the determination of the farmers' IK and their knowledge gaps will enable the appropriate use of ICTs in dissemination of knowledge that suits farmers' needs.

ICTS FOR MANAGING INDIGENOUS KNOWLEDGE FOR AGRICULTURAL DEVELOPMENT AND POVERTY REDUCTION

Despite the fact that the poor rely on their IK for agricultural development and poverty reduction, IK is not properly managed in Tanzania and thus it is not effectively replicated in other communities. By drawing from various ICT tools

and capabilities, ICTs open up a new opportunity for farmers to document and share experiences with each other (IICD, 2006). ICTs can enhance the economic viability of farmers by increasing access to knowledge about effective indigenous agricultural production methods (IICD, 2006). Actually, the need to manage IK through ICTs has been well emphasized despite the issues of inequitable access (Chisenga, 2002; Luyin, 1999; Mutula, 2002).

The usage of ICT to manage IK within and across local communities can improve cross-cultural understanding, enhance their well-being and sustain their agricultural practices which they depend upon. In addition, IK management may lead to economic gain (access to markets, job creation, improved livelihoods); empowerment of communities; wide application of indigenous technologies; and promotion of community conservation of biodiversity (FAO LinKS Project and Vetaid Tz, 2000). Experiences from Tanzania indicate that ICTs can be used to manage IK that may contribute to the reduction of hunger and poverty.

The rural poor have been using ICTs available to them to acquire human capital in order to generate livelihood outcomes. Tanzania's farmers have been able to access knowledge and skills on the effective agricultural indigenous production methods through ICTs. For example, the Tanzania Development Gateway has enabled rural poor to access agricultural indigenous production techniques in local language "Swahili" (Tanzania Development Gateway, 2007). Similar projects were set up in India (Traditional Knowledge Digital Libraries) to disseminate various types of IK and to prevent international companies from patenting Indian IK (TDCL, 2007). Other international agencies such as the World Bank, CAB International, FAO LinKS Project and Canadian International Development Agency have established research centers and websites to preserve and share IK (CIDA, 2002; FAO, 2007; World Bank, 2007a). However, the impact of these national and international databases in managing IK of the rural poor is negligible due to the language barrier (that is, most of the IK information is in the English language), inappropriate packaging, poor ICT infrastructure in the rural areas, and low ICT literacy.

On the other hand, telecenters have been effective in managing IK in the rural areas of Tanzania. For example, the Sengerema telecenters in Western Tanzania has recruited several sectoral experts to collect local content in various fields including agriculture. For example, information collected on indigenous chicken farming and use of organic manure is shared through its community radio and website (COSTECH, 2005).

While ICTs can be used as tools to enable the management of IK, issues related to ownership and accesses are still contestable. A balance must be drawn between open access to knowledge and local communities' right to control delivery of content. Some local communities have developed policies and ethical codes to protect their cultural heritage from being appropriated or exploited by other people. For example, is the policy document of the 1993 Mataatua Declaration on Cultural and Intellectual Property Rights of Indigenous Peoples (ANKN, 1993).

ICTS FOR DISSEMINATING EXOGENOUS KNOWLEDGE FOR AGRICULTURAL DEVELOPMENT

Apart from having limited ways to manage their IK, the poor also lack access to knowledge and information from the policy makers, researchers and business community that are important to reduce hunger and poverty. As a matter of fact, the poor lack access to accurate exogenous information and knowledge on production, prices and markets for agricultural products (D.Net, 2006; IICD, 2006). The major reasons for this problem are that, farmers' information needs are highly diversified and the knowledge required to address these needs is beyond the capacity of the rural knowledge systems as well as the extension services (Sharma, 2003). ICTs can improve the access to exogenous knowledge and information that may meet the location specific information needs of the farmers (FAO, 1998; Sharma, 2003). ICTs can improve access to prices, markets and agricultural production information and knowledge (IICD, 2006) that may increase access and use of the three SLF capital assets (social, human and financial) in order to contribute to the struggle against poverty.

The impact of harnessing ICTs has been enormous on the social capital in Tanzania. Actually, ICTs have enabled farmers to interact with other communities at regional and national levels, thus reducing their social isolation. For instance, the experience from the Sengerema telecenter shows that the local community not only uses Internet communication but constantly communicate through the community radio instead of travelling long distances on bicycle in order to network with others (COSTECH, 2005). The study in India, Mozambique and Tanzania also indicates that telephones were largely used for social networking, particularly within the family (Souter, *et al.,* 2005).

As far as financial capital is concerned, ICTs have been effective in raising the income levels of the poor communities and families in many developing countries. In Tanzania, the CROMABU telecenter and price information services are examples of how small-scale farmers were able to increase their income through access to the best market prices for their produce, as well as securing direct buyers from abroad through the Internet.

The impact of ICTs is also observed on human capital. Exogenous knowledge gained from ICTs has enabled farmers to adopt new agricultural technologies that improved their food security. For instance, the Tanzanian's Northern Agricultural Research Institute is an example of how a number of requests for agricultural information and follow-ups increased at the research institutes from farmers due to a weekly 15 minutes agricultural radio programmes (William, Manyama and Schouten, 2003). Actually, radio is effective in delivering knowledge on agricultural production in many developing countries. Studies in Vietnam indicate that improvements in the yields of crops from households with a radio were often equal to those of households who had regular visits from extension workers (OECD, 2005). Further, telecenters have also been influential in equipping the local communities with the useful agricultural information. For example, the Sengerema telecenters in western Tanzania has enabled farmers and livestock keepers to search for various pieces of information including prices, markets,

agricultural chemicals, (that is, herbicides and pesticides), type of fertilizers and knowledge in general in the Internet (COSTECH, 2005).

ICTs can also enhance access to markets and market information that improve choices for the sale of farmers' produce and it can strengthen farmers' own capacities and better represent their constituencies when negotiating input and output prices (Stienen, Bruinsma and Neuman, 2007). For instance, the Tanzania Chamber of Commerce, Industry and Agriculture (TCCA) and Agricultural Business Information Services (BIS) in Tanzania have enabled rural farmers access to information on crop prices via the web and to increase their profit (TCCA, 2007; IICD, 2005). Short message services are also used to effectively deliver market information through mobile phones to farmers in Tanzania. This project has been implemented by the Ministry of Industry, Trade and Marketing and Vodacom since 2005. Although, there has been no impact evaluation of this initiative yet, the available evidence shows that people call in to ask for the information (ESRF, 2007). Similar projects have been implemented in other African countries, such as Senegal, Benin and Zambia (Stienen, Bruinsma and Neuman, 2007).

Access of information on market prices and production techniques can also empower the local communities to make informed decisions regarding their marketing strategies. For instance, the Maasai pastoral people in northern Tanzania are now agreeing to sell their livestock and engaging in marketing and businesses due to the Orkonerei Radio programmes on food and nutritional security (Development Associates Ltd, 2004).

ICTs have also contributed to e-literacy. Like other telecenters, training provided by the Sengerema telecenters in western Tanzania have assisted the rural poor to increase their productivity through the use of modern technologies which are accessed from the Internet or telecenters' websites. The training has also enabled the rural poor to get better earning jobs, and attend distance learning (TCRA, 2006).

ICTs have also demonstrated greater impact on overall vulnerability in the developing countries, including Tanzania. ICTs are effective in providing accurate weather forecasting and timely warning to lessen the effects of natural disasters, as well as to improve crop yields and lessen the effects of severe weather or drought (World Bank, 2007b). For example, in northern Tanzania, the broadcasts on breakouts of livestock diseases through the Orkonerei radio station enabled quicker response to the disaster (Development Associates Ltd, 2004). The telephone also has greater impact on overall vulnerability, particularly because of its immediacy, interactivity and ability to secure assistance from afar.

A study in Tanzania revealed that the telephone was used by fishermen to reduce their vulnerability to weather shocks and to risks by connecting the fishermen to sources of assistance that is, their social network and emergencies (Myhr, 2006). Similar findings were reported in India, Mozambique and Tanzania (Souter *et al.,* 2005). The village knowledge centre established in the coastal village of Veerampattinam in Southern India also provides weather bulletins to the fishermen via loudspeakers using a local language (Arunachalamm 2004).

Apart from income gains, ICTs have also been influential in improving food security as demonstrated by the CROMABU telecenter and price information services in Tanzania (Mendam, 2005). Experience from other developing countries also show that the radio has been effective in improving food security. For instance, in Uganda, agricultural programmes in Radio Apac and Radio Uganda improved agricultural productivity which led to increased food consumption (maize) at the household level as well as to income gains from the sale of milk and beans. For example, the knowledge gained from the radio broadcasts made the farmers in Katiwanda and Apac districts in Uganda increased their milk production from 15 to 25 litres per day where they gained between Shs. 7500 to Shs. 12,500 per day (Gerster and Zimmermann, 2003).

CONCLUSION

The foregoing discussion has demonstrated that ICTs may be exploited to manage exogenous knowledge, facilitate access to more livelihood resources and improve the poor's agricultural livelihoods. The use of ICTs in the context of exogenous knowledge has enhanced social livelihoods (networking), financials (income) and human capital dimensions (access and use of information and knowledge resources). Experiences from Tanzania indicate that the impact of ICTs for managing IK is limited to human capital (indigenous agricultural production techniques). In order to manage all the three dimensions of livelihoods, there is need to borrow from the strategies employed in disseminating exogenous knowledge and take advantage of the ICTs' ability to capture, transfer, preserve and disseminate information and knowledge.

Despite the fact that ICTs have the potential to reduce poverty, their effective use may be limited by the lack of relevant content, language, literacy, gender and urban/rural disparities, financial resources and ICT policies. It is evident that ICTs should not be an end to itself, but a means towards managing IK and disseminating the relevant exogenous knowledge for achieving efficiency in agricultural productivity and poverty reduction. ICTs can enable rural poor to combine their assets to improve the agricultural livelihoods and expand their asset base.

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