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The Use of Information and Communication Technologies for Rural Development and Poverty Alleviation in Developing Countries: An Investigation of Gender Specific Agricultural Development

Caroline Pade

Department of Information Systems, Rhodes University, Grahamstown, South Africa

Brenda Mallinson

Department of Information Systems, Rhodes University, Grahamstown, South Africa

John Lannan

Euro-Asia Centre, University of Limerick, Ireland

ABSTRACT: Information and communication technologies (ICTs) have become a priority among developing nations, and play a significant role in supporting rural development. A core aspect associated with rural development is gender specific agriculture, which focuses on elevating women's contributions towards economic and social enhancement through agriculture. An investigation into the use of ICTs by rural women farmers reveals the constraints they face when it comes to taking advantage of such technologies. Studies within Africa and other developing countries illustrate that these constraints are particularly associated with the social and cultural limitations that women encounter in the traditional environments that characterise most developing countries. Local communities, Government and non-governmental organisations should collaborate to devise policies and initiatives that can support the effective implementation and sustainability of ICT projects, and hence start to remove the barriers that limit the potential use of ICTs by rural women.

INTRODUCTION

The aim of this study is to investigate ways in which modern information and communication technologies (ICTs) can play a role in alleviating poverty, focusing on developing countries. The study looks at agricultural development, which is a critical sub-area associated with poverty alleviation, and concentrates on gender specific agricultural development (GSAD), which refers to the development of agricultural practices through the use of innovative processes, with a focus on gender (Accascina, 2000). Women are twice as likely to be involved in agriculture as men and, globally, women have a principal role in agribusiness, food processing and consumer-related activity (Hafkin & Odame, 2002). Women also make up 70% of agricultural workers, and produce 80% of the region's food in Sub-Saharan Africa (USAID, 2003). If there is benefit to be gained from the use of ICTs in rural agricultural development in Africa, it is therefore important to consider their use in the context of GSAD.

This research study responds to a need to understand the factors that should be considered in implementing ICTs in this environment by bringing together a wide range of literature associated with ICTs and their use in gender agricultural development. To set some background for the study, the first section presents some of the issues pertaining to the so-called "digital divide". The second section describes the uses of ICTs and the key applications for GSAD, and in the third section the barriers to, and constraints on, the use of ICTs by women are outlined.

The fourth section looks at policies and initiatives to promote gender awareness and ICT use in rural development; in particular, the problem of unsuccessful implementation and the difficulty of sustainability of these technologies in rural, poverty stricken areas – especially among women – are addressed here. Finally, the conclusion summarises the findings, and highlights the need for sustainable ICT access, and the participation of Government, rural women, and development communities in the drafting and implementation of initiatives and policies.

BACKGROUND: THE DIGITAL DIVIDE

ICTs play a significant role in social and economic development in developing countries, where interconnectivities and information flows can be established between rural communities and the more developed regions. In this context, ICTs can be defined as tools that aid in the communication between people by capturing, processing, storing, and communicating information electronically, as well as services and applications that assist in the management of information (Heeks, 1999).

The Association for Progressive Communications (2004: Internet reference) describes the digital divide as:

the increasing gap between those who have and those who do not have access to information and communication technologies, access to content that benefits them socially and economically, skills to take advantage of ICT services, and the ability to afford to pay for digital services.

This divide has characterised most developing nations and hence contributed to retarded growth, both economically and socially. But it is not a purely technological issue; there are different dimensions and variations of the digital divide that have been identified by Norris (2002), Keniston & Kumar (2003), and others.

One aspect of the digital divide referred to by Norris (2002) is the global divide. This is the divergence of Internet access between the industrialised and developing countries. With the adoption of other developments and innovations in industrialised countries, developing countries have been left behind, with increasing debt, civil war, famine, disease and other economic crises. This has increased the gap between those in the world who are rich, educated and powerful, and those who are not (Keniston & Kumar, 2003).

The democratic divide identifies the difference between those who do and those who do not use digital resources for civic engagement, mobilisation and participation in public life (Norris, 2002). The “cyber-optimists” highlight the benefits that the Internet could bring, such as direct involvement of citizens in democracy, for example, through political chat rooms and electronic voting (Plüss, 2003). However, the “cyber-pessimists” indicate that the Internet actually contributes to the increasing inequalities in the world between the information rich and poor, and the activists and the disengaged (Plüss, 2003).

Lastly, the social divide is the gap between the information rich and poor in societies. The main focus of this divide looks at the rural-urban gap, the ethnic gap and the *gender gap* (Plüss, 2003). Technology has become central to most public life through job opportunities, improved education, and strengthened community networks. However, those who have not been able to take advantage of these technologies in society face the challenge of increasing inequality. The social divide is especially acute for women, hence the *gender divide* – which refers to the digital gap that exists between women and men in society (Huyer & Mitter, 2003). The implications of this divide are that the society is deprived of access to training, scientific and technological job opportunities, capacity building and the participation of women.

THE USES OF ICTS FOR GENDER SPECIFIC AGRICULTURE

The impact and influence of ICTs in developing countries and on the empowerment of women have been identified in recent studies, and constitute a significant factor in poverty alleviation and rural development. Munyua (1998) identifies the beneficiaries of and target communities for such ICTs in order that they are taken advantage of by the appropriate people; they are presented in adapted form in Table 1.1 (below).

Rural women farmers:	Need to be empowered with information for more efficient agricultural production.
Women groups and their leaders:	Involved in collective activities such as cultivation, thatching, marketing, selling and other activities that need collective support. Leaders also need to be trained to be better representatives based on global information available so that they may be empowered and determine how best to advise and direct women farmers.
Farmers' organisations and unions:	Require selective information to represent farmers effectively.
School girls and youth groups:	Early training on the use of ICTs and agriculture has the potential to develop significant decision-makers.
Women in media:	Need to be aware of agricultural and food security information to meet the needs of women farmers so as to package information specifically targeted at certain communities. They should also have access to women's networks disseminating news from elsewhere; for example WOUGNET (Women of Uganda Network) and UNIFEM (United Nations Development Fund for Women).
Extension and research services:	Need to be accessed so as to get feedback from women farmers to researchers. This ensures that appropriate technologies are developed and priority needs of farmers are met.
Government units and national, regional and international institutions:	Need to be aware of activities in other regions so as to identify areas that need collective action and to develop more pragmatic programmes and projects.

Table 1.1: Beneficiaries of and target groups for ICTs

Adapted from Munyua (1998).

Information that women require on agriculture includes, for example, trends in food production, demand and processing, market prices, new environmentally sound production techniques and practices, trade laws and indigenous knowledge (Munyua, 1998). The specific uses of ICTs for gender agricultural development include:

Empowering women to access knowledge and information: Huyer (1997) and Wanyeki (2004) suggest that ICTs support women in their ability to contribute towards development,

as information access becomes decentralised and de-hierarchicalised, by allowing the free instantaneous registration of many perspectives and viewpoints. Hafkin & Odame (2002) propose that as public services – such as agricultural training, adult education, health, credit facilities and banks – become decentralised, this provides a mechanism for governments to foster closer relationships with rural women in the quest for equal rights and protection under law (e.g. labour law, land tenure and investment in public services). This is critical in terms of contributing to policies and innovations for agricultural and rural development, as women's concerns and needs are taken into consideration when decisions are made by Government and other organisations. Cecchini & Scott (2003) give the example of Gyandoot, in rural India, where a Government-owned computer network has made information more accessible to villagers who previously faced the disadvantages of corruption from public officials, inaccurate or unavailable information, and high transportation costs to Government offices.

Decision support: Through empowerment, women become better equipped to make decisions regarding agricultural development that are dependent upon the availability of timely and up-to-date information. Munyua (2000) indicates that the problems regarding development and food security today require that researchers, policy makers, development workers, planners and farmers are kept informed so as to facilitate the development and implementation of policy. Highlighting another aspect, Cecchini & Scott (2003) suggest that ICTs can also act as Decision Support Systems, which in agriculture can be used to improve production efficiency by linking significant stakeholders and creating access – through a network – to databases. Business intelligence can be used to manipulate and analyse data, hence providing women farmers with information on agricultural processes to enable them to make decisions on improving efficiency and the quality of outputs.

Access to market information and services: Access to market information plays a crucial role in rural development, as farmers need to have access to regions nationally and globally if trade is to be facilitated (Bhatnagar, 2000). Such information can be mediated by web-based databases (e-commerce) giving information on better prices, and qualities and quantities demanded, hence strengthening the forward linkage to markets (Munyua, 2000; USAID, 2003). For example, in Uganda, USAID has developed a project called “Investment in Developing Export Agriculture” (IDEA), which has established an Agribusiness Development resource centre that repackages and provides information on market conditions, supply and demand conditions, future markets and political events (Munyua, 1998).

The creation of employment: As the use of ICTs in rural areas evolves, this increases employment within these areas. Telecentres and resource centres create employment opportunities for specialists, information managers and technicians. This attempts to reduce the rural-urban migration rate, and improves the skills within rural regions

through training and providing the ability for others to become small scale entrepreneurs (Munyua, 2000).

Facing the HIV/AIDS crisis: Africa is haunted by the HIV/AIDS¹ pandemic, which has played a significant part in hampering growth and development in most afflicted countries, as the potential working population is rapidly being depleted. Food security is crucial in ensuring the health and nutrition of those at risk and those already afflicted and affected. Hafkin & Odame (2002) suggest that telecentres and agricultural extension agents collaborate in providing training and vital information to rural women in accordance with the needs of an area or household.

Entrepreneurship and education: ICTs play a significant role in entrepreneurship and agricultural education. Hafkin & Odame (2002) describe a Youth Summit held in Egypt, which identified that the youth tend to gain an interest in agriculture when they discover that it is supported by ICTs. This is important, as the proportion of students in agriculture-related courses has declined worldwide. Hence there is value in encouraging the younger entrepreneurial population through ICTs that enable them to access resources such as land and monetary credit.

ICTs also enhance human capabilities through education that develops cognitive skills and information management capabilities, as schools, universities and research centres are connected to national and international distance education facilities (such as libraries, research laboratories) (United Nations Development Program, UNDP, 2001; African Information Society Initiative, AISI, 2003). Distance learning can help, as Samoa Polytechnic showed through its development of a distance learning project that provides learners with guidance on how to start a business, utilising techniques in retail and agriculture and improving earnings (Hafkin & Odame, 2002).

ICT APPLICATIONS THAT CAN BE USED FOR GSAD

Munyua (1998) and USAID (2003) claim that modern ICTs offer new and multiple perspectives, such as faster and better focused access to information, as the ability of digital ICTs to record text, photographs, audio, video, process descriptions and other information means that the exact duplication of such digital information is available at a lower cost. Digital networks and telecommunications can connect people and transfer information over vast distances, thereby increasing the value of producing information, lowering the cost of delivering it to audiences, and improving the capacity of remote communities to review the quality of services they receive.

Primary examples of modern ICTs that could be used in GSAD include:

- **The Internet:** The Internet has grown to be one of the world's most important communication mediums, is one of the more powerful tools for storage, retrieval and dissemination of information, and has provided the ability to interact through text, video,

¹ Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome.

audio, voice recognition and many more technologies that are being developed today. Already email and the world wide web provide rural dwellers with the opportunity to access information, and interact with other parties both nationally and globally. Munyua (1998) gives an example of a project in Africa, called the "African virtual farmer field schools", whereby women farmers without any formal training in agricultural skills can assemble a farm over a virtual network with meetings and discussions held with facilitators in telecentres. The Internet also plays a significant role in information dissemination from various agricultural stakeholders such as extension government services, non-governmental organisations (NGOs), agricultural research and documentation centres, and agricultural input and equipment suppliers. However, the use of traditional ICTs (for example, radio and television) should not be ruled out; the Internet can be used in conjunction with radio, which is still more accessible to many rural communities (Richardson, 1997). For example, in Sri Lanka, a joint project between UNESCO and the local telecommunications and broadcasting corporations used the radio as an interface between rural communities and the Internet. A one hour show was devoted to searching the Internet for information requested by listeners and getting feedback through local discussion on networks, hence conveying agricultural information in the local language and ensuring that the content was understood (Kenny, 2002).

- **Databases and networks:** Networks bring people together from different communities, regions, and other countries, as information exists in a pool of resources stored in a database of the system. This allows rural women to access and assess significant agricultural information so as to improve their agricultural practices, while exchanging ideas with other women and intermediaries in other communities (Munyua, 1998). Munyua (2000) cites a good example where, in Chile and Mexico, the Food and Agriculture Organisation (FAO) has introduced a project to establish a farmer information network called FARMNet. This involves agricultural producers, farmer organisations, co-operatives and local Government exchanging information on inputs, prices, markets, weather and credit. An evaluation of the project indicated that farmers were able to sell their produce at higher prices and strategise on demand and quality at the market. Information on weather also informed rural farmers of conditions faced by farmers in other regions hence enabling them to be more competitive with vegetables that were scarce in the market.
- **Wireless technologies:** These can be combined with other ICTs such as the Internet and application software to work to the benefit of rural dwellers (Allen, 2003; Rebelo, 2004). The cellular phone, particularly, has become a popular device for communication, and its market has grown extensively in developing nations, especially most of Southern Africa. According to Allen (2003), teledensity remains low in Southern Africa but the service area

is expanding rapidly via wireless technologies. The USAID (2003) also indicates that a cellular service in Kenya reaches about 90% of populated areas, therefore providing long distance communication services such as a Short Message Service (SMS) between partners and their colleagues. Mobile phones in Bangladesh have transformed the lives of rural people, as voice and text traffic is used to give information such as market price, trade information, the facilitation of remittances from foreign workers and work opportunities (Munyua, 2000). Solar powered cellular phones with built-in cameras even enable farmers to photograph a pest and then send the photograph to an extension researcher for diagnostic purposes; and solar powered palm pilots with financial software can now be used to assess rural credit worthiness (USAID, 2003).

THE USE OF ICTS BY WOMEN: BARRIERS AND CONSTRAINTS

The use of ICTs for GSAD and poverty alleviation appears to be promising. However, the discussion that follows illustrates how women in developing countries face barriers and constraints concerning the use of ICTs, due to certain limiting factors.

ACCESS TO INFRASTRUCTURE

Most developing countries are characterised by a poorly developed telecommunications infrastructure. Furthermore, the most developed (and often the only) infrastructure is available in the cities, yet most of the population resides in rural areas (Huyer, 1997; Hafkin & Odame, 2002). Women comprise the majority of people living in rural regions (about 60% of the rural population), as men have tended to migrate to the cities for work purposes – while women's traditional responsibilities for children and the elderly make it more difficult for them to migrate. Therefore, the urban bias in connectivity deprives women, more than men, of the universal right to communicate.

SOCIAL AND CULTURAL INFLUENCES

In most developing countries, women are deprived of taking advantage of ICTs due to the limitations on women, and discrimination against them by male dominated community and organisation leaders – hence the social divide (Hafkin & Odame, 2002). Women who live in conditions of low economic and social status tend to have a negative attitude towards, and less interest in, ICTs (Huyer, 1997). The geographical location of Internet centres in rural areas also poses a limitation of access to women, as such centres may be located at a great distance, in unsafe neighbourhoods or open at late hours. In addition to this, Hafkin & Taggart (2001) explain that in conservative societies, where religious or social customs dominate, the mobility of women is further limited as their beliefs do not permit women to travel alone. The ICT access centres in most developing countries also tend to be operated by male facilitators. This can be quite intimidating for some women as their custom inhibits them from interacting with men outside their families, hence making it important to avoid any interaction with the

facilitator (Hafkin & Odame, 2002). A project by the National Institute of Information in India, called "Hole in a Wall", installed a computer screen and keyboard in a slum or school, with a hidden camera, so as to observe the behaviour of males and females. Females showed an interest in the device but when males came to try out the device, females were often pushed away and withdrew from participation as they were fearful (Hafkin & Taggart, 2001). Similarly, Huyer (1997) explains that the tendency to direct women to non-technological professions leads to "fear and embarrassment" on the part of women when dealing with ICTs. A source in Nigeria revealed that women associate the word "technology" with male connotations, yet the word "information" was seen as being more feminine. The existence of these social influences imposes fear and a sense of discouragement among women, when it comes to taking advantage of these technologies.

LANGUAGE, CONTENT AND SKILLS

Poor countries in most developing regions are characterised by high illiteracy rates and low proficiency in English. The concern regarding these factors lies in the fact that most of the ICTs that are available today require that their users can understand and interpret the information that they produce. This is a barrier to poor women in developing countries, as the average literacy rates in most countries occupied by the poor are 54% and 73% for women and men respectively (Kenny, 2002). Hafkin & Odame (2002) state that two-thirds of the 876 million illiterate people that exist in the world are women. Women also face the language barrier, as in most developing countries the majority of poor rural women do not speak the official predominant Internet language, English. In addition to this, the responses to an African Pacific Caribbean (APC) 1996 Women's Networking survey indicated that language was one of the top barriers to Internet use in Eastern Europe, Latin America and Francophone Africa. A survey at a training institute in Mexico illustrated that, even in cases where women understand a little English, they still face discomfort when it comes to accessing the Help function of certain ICTs (Hafkin & Taggart, 2001). Altogether, this discourages rural women from realising the full potential of ICT use, as the barriers of illiteracy and local language limit the possible interaction with, and operation of, ICTs.

Education and skills development are needed to reduce the effects of illiteracy and language limitations. However, in the rural areas of developing countries, most women are deprived of the opportunity of a formal education. Boto *et al* (2002) say that rural women are three times less likely than men to have a formal education. Similarly, Munyua (1998) postulates that when training programmes to address the problems facing rural agricultural farmers are implemented, preference is given to men over women. This occurs despite the fact that it is significantly important to enhance the knowledge of the principal agricultural workers, which are women. Women also face challenges when it comes to enrolling within an

education institution. The barriers to pursuing an education include the lack of time to attend school, family and household duties, lack of control of funds to pay for education, and socio-cultural norms that give female education a low priority (Hafkin & Taggart, 2001). The challenges that women face limit their ability to take advantage of ICTs, as education in English language and in literacies (especially including computer literacy) is vital in order to operate and understand the information accessed from ICTs. The women and girls that at least receive an education are still discouraged at an early age from taking up courses that have to do with science and technology, as these subjects are usually associated with males. There is a need for female guidance counsellors at schools to guide and encourage women towards scientific careers (Hafkin & Taggart, 2001).

Norris (2002) maintains that education improves the general capacity for analytical reasoning and information filtering, which assists in coping with the flow of information available online, as well as strengthening numeracy, literacy, English-language and keyboard skills. The significance of this is that it is essential that women are educated on how to understand and interpret the content of information accessed from ICTs. This does not only include the language content but other factors such as “source proximity” to understand the context of information, “trust” of the information source for business decisions, “knowledge” to access and assess information, and confidence or security to be motivated to take a risk in accessing and using information (Heeks, 1999). Women also need to be computer literate in order to use modern technologies such as the Internet. This is a vital aspect, as ICTs may remain idle if women do not possess the skills to operate these systems. Hafkin & Taggart (2001) illustrate this, as they report that the Bamshela Telecentre Project in South Africa, which had been operating for three years, was used by women mainly as a phone shop, as they did not have the skills to use the computers that were available.

FINANCIAL CONSTRAINTS

In order for ICTs to be relevant to rural use, the issue of the affordability of these technologies has to be dealt with. Rural regions in developing countries are characterised by low average incomes, and high poverty rates. Kenny (2002) reports that the average poor person lives on less than a third of the income of the average global citizen. The costs of equipment and other Internet costs (such as connection fees, technician costs, electricity) pose an obstacle to Internet use in rural areas. An example in Ethiopia illustrates that the cost of 20 hours of Internet access amounts to 8.4 times the gross domestic product *per capita*, and even for the more elite group, the cost of usage could amount to 50% of a university professor’s monthly salary (Hafkin & Taggart, 2001). In addition to this, public access fees at cybercafés or telecentres are more affordable to men than women, who have less access to financial resources.

Pigato (2001) stipulates that the introduction of new software, such as wireless software,

may enable rural women to take advantage of ICTs at lower access costs. However, the challenge to the poor of attempting to raise standards of living – both individually and as groups so as to purchase ICTs – acts as a barrier.

TIME LIMITATIONS

Time is one of the main obstacles that limit rural women accessing the Internet, as their time is mostly spent undertaking family and household activities such as education, nutrition, health, and parenting (Munyua, 1998). Whether Internet access is at home, work or public access, time is still an obstacle as it is associated with seeking out information, becoming familiar with computer use, getting help, preparing materials, uploading them and responding to email, setting up a website, hiring people to assist in moderating and developing online activities, learning, and screening through information (Hafkin & Taggart, 2001). Women may also not have time to access public centres, as during the day they usually work, and in the evening they usually have to take care of their families. For example, in Ghana, an advisor noticed that users at the telecentre were mostly female students, who had more flexible times to use the centre, rather than working women (Hafkin & Taggart, 2001). Even though the centre was promoted through a programme called “Women’s Week”, and the number of working women visiting the centre rose in the short term, it dropped off again.

Women will tend not to use ICTs unless they see the immediate benefit of doing so. Despite the fact that data such as health, educational issues and government policy, which they need, can easily be accessed through thematic and sectoral information systems, according to Huyer (1997) women tend not to have the time or patience to discuss, learn and network using ICTs.

PARTICIPATION OF WOMEN IN PROFESSIONAL DEVELOPMENT SERVICES

Women should play a significant role in contributing to information content, policy and the development of ICTs for rural development. Professional women understand the basic needs and considerations of rural women, and have the potential to voice their opinions through networking with organisations. Huyer (1997) points out that those women who are based in ICT professions face the challenge of strong hierarchicalisation in institutions and industry and, because of their lower positions, they do not have access to computer equipment even though they have a greater computer ability and need.

Munyua (1998) also points out that agricultural extension services that are central to economic development programmes are usually not sensitive to women farmers. It is estimated that 7% of research extension time and resources are devoted to women farmers and only 7% of extension agents are female. Therefore, women need to be trained and recruited into development related professions, as they are more effective than males when working with women farmers.

The aforementioned barriers and constraints illustrate the profiles associated with rural women farmers in developing countries. In order for countries to develop a strategy for

sustainable ICT projects there is a need to understand the profiles of rural women, so as to identify the challenges faced when it comes to implementing such projects.

POLICIES AND INITIATIVES TO PROMOTE GENDER AWARENESS AND ICT USE

Clearly, women in developing countries face challenges that act as an obstacle to the effective use of ICTs. It is essential that local communities, Government and NGOs take these into consideration, and devise policies and initiatives to support the implementation and use of ICTs in developing countries, with specific reference to gender equality. The TeleCommons Group (2000) identifies the significance of policies to support the sustainability of ongoing ICT access, and the sustainability of the developmental results that rural ICT access can support, such as health, improved agricultural practice, and empowerment. Boto *et al* (2002) also stipulate that the priority areas for gender, ICTs, and agriculture today include mainstreaming and networking, gender policy support, access, content and human capacities.

Initiatives and policies that have been implemented at a local level have proven successful in most developing countries. Case studies from many countries illustrate this, but India in particular is a rich source of lessons learned, as it has been widely used as a “laboratory” for ICT innovation and development (USAID, 2003). Evidence from India, and from other (mainly African) countries indicates that the main effective initiatives and policies are as described in the remainder of this section.

LOCAL COMMUNITY AND GROUP INVOLVEMENT

Community involvement and group collaboration among rural women play an important role in supporting the facilitation and use of ICTs in rural areas. In fact, in order for most of the initiatives implemented at a local level to produce results, group formation is essential – allowing women to contribute more confidently. Through social organisation, capital formation and human resource development, forming groups enables women to be more effective in their contribution (Harris, 2003). Group involvement can be examined at a local level, and also a national level. At the local level, village organisations can be brought together to discuss and make decisions on local development issues so as to initiate them in the village and household environment (Harris, 2003). This strategy has been applied in Nepal, where village organisations have encouraged rural dwellers to accumulate savings, and obtain training in management techniques and income generating activities in order to create grassroots institutional development, and support those who wish to undertake socio-economic activities. Women can also form and join women's groups that exist at a national level; these bring together women in decision making positions at all levels in the agricultural and development sectors. Examples include (African Women Leaders in Agriculture and the Environment) AWLAE and (Women in Service Development Organisation Management) WISDOM in Gambia, which have given women more autonomy to criticise policies that significantly discriminate against women

(Munyua, 1998). Boto *et al* (2002) suggest that partnership developments like these between rural women and representative organisations have the ability to strengthen the capacity of women to genuinely voice their concerns and bring ICTs within their reach.

CAPACITY BUILDING AND TRAINING

In order for women to take full advantage of ICTs, education and capacity building in rural areas are important. Women and girls should be given priority with regard to skills development in ICT related programmes. Capacity building, which aims to build the skill sets necessary to use, maintain, manage and integrate ICTs in the context of agriculture, is cost-effective, as it introduces training that is continuous and has a long life in the community (USAID, 2003). Rural women farmers become equipped to apply ICTs to agricultural activities, which enables them to introduce innovative uses of ICTs and to create demand driven initiatives for their implementation. Even though the demand for ICTs may not be as prominent in rural areas, this can be encouraged through awareness creation and campaigns, along with training (Munyua, 1998). Specific women in the community are selected and trained so that they are in a position to both make use of the technology and become stakeholders in the future success and development of the use of ICT for agricultural development (TeleCommons Group, 2000). Munyua (2000) states that organisations such as the (Food and Agricultural Organisation) FAO have sought partners to fund capacity building activities that assist in building human and institutional capacities. This has enabled training and education programmes in rural areas to manage local knowledge and information through ICTs. In these situations, training materials are usually made available as electronic training resources that can be repackaged to preferred media such as video, or translated into languages for local use.

Training also starts within educational institutions; the opportunity for girls and women to receive a formal education should be encouraged in order to improve the literacy and human capacity rates in developing countries. In order for women to be effective producers and users of ICTs they need to receive formal tertiary level training in technological and scientific areas such as computer science, information systems analysis, software engineering, network design and management (Marcelle, 2001). Pigato (2001) postulates that this will ensure long term diffusion and ICT adaptation at local level, as new skills among the young will flow to other sectors of the economy, including teachers and trainers, information technology (IT) professionals, agricultural researchers and other enthusiasts.

TELECENTRES

Telecentres – work locations that provide technical support and training and are usually managed by community committees – play a major role in mobilising the use of ICTs in rural remote regions of developing countries, as they are often the primary packagers and

disseminators of information to these communities (Munyua, 1998). Rural telecentres can be used to collect information from farmers and co-operatives on available products, market prices, technologies adopted, indigenous knowledge and government information via email or the Internet. Such multi-purpose community centres have been established in isolated rural regions of South Africa; they provide IT and telecommunications facilities, user support and training for community members that cannot afford to install their own facilities, or for individuals who lack the skill to use ICTs. According to the International Development Research Centre (2004), the telecentre concept has received a lot of attention among international development communities, public and private telecom service providers, and national Governments. Over 20 pilot projects have been implemented in Ghana, Mozambique, Uganda, Benin, South Africa, Tanzania, Zambia, and Zimbabwe.

DEMAND DRIVEN INITIATIVES AND SERVICES

One of the challenges that development communities face is defining a framework on which to base the application and development of ICTs in rural communities (Wanyeki, 2004). Keniston & Kumar (2003) indicate that there has been a tendency for well-wishing Government officials, international agencies, and NGOs to assume that ICT implementation is focused on “a computer in every village”, scattering of “information kiosks” throughout the nation, and “universal computer-based education”. These initiatives are based not on a local assessment of needs in a community but rather on the assumption of the uniformity of needs in distinct localities with different populations, economic bases, cultures and social organisation. Initiatives that do not meet the demands of everyone in the local communities they aim to serve, including women, or do not involve them in the planning process, will not contribute to sustainable agricultural development (TeleCommons Development Group, 2000; Benjamin, 2004). Hence, before going ahead with an ICT implementation plan in a rural community, it is necessary to assess and analyse the needs of that community, so as to avoid wasting resources that result from a mismatch made between what ICTs claim to provide and what rural women need for GSAD. This will support the development of technology applications that are appropriate to gender specific agricultural systems. Therefore, ICT initiatives should be developed with a bottom-up rather than a top-down approach. Keniston & Kumar (2003) describe a case study in India that illustrates the use of rural appraisals and surveys to assess the local needs and demands of communities. In assessing the information needs of a village before the introduction of an ICT project in Pondicherry, it was found that women wanted information about child care, education, and reproductive control, whereas men wanted information on crops, prices, and economic life. With this knowledge, the project group were able to craft Internet uses in relation to the information the villagers requested.

Cechini & Scott (2003) and Accascina (2000) also advise that it is important that rigorous monitoring and evaluation of the social and economic benefit of ICTs applied in different rural environments is carried out before an ICT project is implemented. This measures how the benefits may outweigh the costs of particular applications of ICTs on certain agricultural activities so that money is not wasted on failed or unstable projects not related to the needs of the community.

In using these demand driven initiatives, ICTs should have the ability not only to be user friendly technologies, but also to produce information that is of interest and relevance to the local community.

REPACKAGING AND LOCAL CONTENT DEVELOPMENT

Emphasis needs to be placed on the development of ICTs that present information that is relevant to local development and enhances decision-making that is economically efficient, socially just and environmentally sustainable (USAID, 2003). This supports demand driven initiatives, as ICT resources that are produced should involve the participation of local communities and be packaged in the local language (Munyua, 2000). Keniston & Kumar (2003) state that women in developing countries who are faced with the challenge of illiteracy and language cannot take advantage of ICTs unless these technologies have accessible software that is in people's local language or there is a means devised for the illiterate to use the Internet or email. In India, efforts have been made to create local language software, as sites are beginning to appear in mother tongue languages such as Hindi, Bengali or Tamil. This has proven essential, since most Indians, whether wealthy or educated, do not know English well (Keniston & Kumar, 2003).

Even though successfully implemented ICTs have encouraged women's participation and gender specific coordination over networks, there does not exist a means of tracking the use of information produced using ICTs. Such tracking is necessary to maximise ICT use and application in agricultural development. ICT analysts therefore also need to understand the potential users of ICTs, how they will be reached, and what information is required (Wanyeki, 2004).

The USAID (2003) suggests that, in order for local communities to contribute to content development, ICTs could be used to store digital agricultural information on economic incentives and inexpensive mechanisms. This can provide case study information to improve the quality of agricultural research, extension services and management. Munyua (1998) stipulates that it is important to build the skills of local women so as to identify, design, produce and repackage ICT content in a professional way, understanding the needs of the local community.

The repackaging and use of some information available on the global (Internet) and local networks is still, however, limited by intellectual property rights. AISI (2003) postulates that developing countries need to adapt a legislative framework that strikes a balance between the

commitment to intellectual property rights as an international necessity and the provision of basic intellectual needs to poor rural communities.

FINANCIAL SUSTAINABILITY

A significant challenge to rural women in developing countries is the affordability of operating and accessing ICTs. In order to fight this obstacle, women have organised themselves into groups to enable them to have access to credit facilities from institutions such as the International Fund for Agricultural Development (IFAD) and UNIFEM. In addition to this, a pool of personal savings enables rural women to create a project that takes advantage of ICTs to improve agricultural activities (Munyua, 1998).

Counts (2004) illustrates how the Grameen Bank in India has introduced a loaning scheme called Swayam Krishi Sangam (SKS), which provides micro-credit services to rural people. This is a programme that is based on using smart cards and hand-held computers for more efficient banking transactions that save time, reduce fraud and improve the buying power of India's poorest population. All cash transactions take place at a village meeting with about 90 seconds per person; credit histories, which are also available on the smart cards, enable retailers to check the credit worthiness of rural women (Cecchini & Scott, 2003).

PROVISION OF CONNECTIVITY AND INFRASTRUCTURE

In order for targeted rural communities to have access to modern ICTs, the communities need to be provided with low cost connectivity approaches that can provide access to networks and process the information they need. In South Africa, the Electronic Communications and Transactions (ECT) Act (Republic of South Africa, 2002) emphasises the need for a national e-strategy that outlines programmes and approaches to promote universal access to disadvantaged communities. Examples include encouraging the private sector to initiate schemes for ICT access, the provision of Internet connectivity to disadvantaged areas, and securing support services for ICT facilities and infrastructure (Republic of South Africa, 2002). Huyer (1997) also suggests that since cost, technology expertise, repair and infrastructure issues limit ICT access in most African regions, affordable information systems suited to the African case should be introduced. It has been indicated that women tend to limit themselves to email and listserv/conference systems, due to time constraints, cost and level of technical ability. Therefore, the focus of most ICT development strategies should be on such technologies. However, the new network technologies such as stationary satellite ground-station systems, wireless local loop networks and cellular networks can help to provide access to rural areas in a speedier and (sometimes) more cost effective manner, hence enabling the wider use of ICT applications (TeleCommons Development Group, 2000). These technologies can be used collectively, creating a hybrid of satellite and wireless networks that are key to making rural

connectivity profitable. Governments should therefore focus on developing cost effective infrastructure that is more accessible to rural communities.

DEALING WITH TIME CONSTRAINTS

The lack of time associated with most women in rural areas influences the content and form of most ICTs. Women will not use ICTs to their full advantage unless they see the immediate benefit of doing so (Huyer, 1997). Through workshops and conferences, women must be made aware of the benefits of ICTs; for example, the Beijing Conference signified the importance of ICTs in improving women's agricultural practices.

Another helpful strategy is UNIFEM's recommendations on the use of labour saving devices, such as water tanks that reduce the time women spend collecting water, to allow women to spend their time doing more developmental and recreational activities (Munyua, 1998). For example, in Gambia, women who have received credit to buy diesel-powered grinding mills have reduced their time spent grinding from four hours to five minutes per day.

CONCLUSION

GSAD significantly contributes to social and economic enhancement in most developing countries, especially in Africa, which relies heavily on agriculture as a means of development. ICTs can play an important role in supporting agricultural development, as they contribute to introducing innovative processes and providing access to vast amounts of information. This has the potential to bring about great social and economic transformation, as rural areas are linked to the activities that are effective in alleviating poverty. However, while women have been identified as key participants in this agricultural development strategy, most researchers realise that rural women in developing countries face barriers that limit their potential to take full advantage of these technologies. If these barriers are not addressed, the utilisation of modern ICTs becomes irrelevant among rural women farmers.

Initiatives and policies have been devised that can be implemented at local level, so as to make ICT projects feasible in rural environments and cultures. With these types of policies and initiatives implemented by development communities and government, ICTs can become an important part of the future for growth and development among developing nations. However, there are key elements of policies and initiatives that must be considered to ensure their effectiveness. These are the integration of gender perspectives into policy making, encouragement of civil society participation in policy making, coordination and harmonisation of policies for more effective collaboration among communities, and integration of ICT policy into other policy areas for development. Taking these key elements into consideration may greatly improve the effectiveness of policy and initiative development towards facilitating the use of ICTs for GSAD in rural areas and, hopefully, address some of the aforementioned unresolved issues. □

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