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The Use of Information and Communication Technologies in the Modernization of Caribbean Agriculture: Focus on Agricultural Extension

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Abstract

The history of Information and Communication Technologies (ICTs) use in Agricultural Extension in the region has been fairly good. The use of radio and television in early days as well as increased use of computer-based presentation software for farmer education in recent times show attempts to keep up with emerging technologies. Unfortunately, these tools can be considered as "old ICTs", and a whole new range of "hardware, software, networks and media for the collection, storage, processing, transmission and presentation of information" (World Bank, 2009) known as new ICTs, is now available. These present opportunities for extension organizations and staff in the region to communicate much more effectively and efficiently with clients and each other.

The need to hasten the use of modern ICTs is urgent because the client base of extension has now expanded beyond farmers to include agribusiness entrepreneurs, agri-processors and marketers. Extension is now expected to provide technical support beyond farm production practices in such areas as value addition, business development and marketing and to a category of clients more technology oriented than traditional farmers.

This paper outlines the benefits of ICT use in the region and provides examples of modern ICT tools and techniques that are available for use in the region: internet kiosks; community based telecentres; SMS texting; internet radio and video; mobile learning units, the creation of virtual extension officers and virtual information centres for specialized clients.

Some of the challenges to overcome are identified and the paper concludes with suggestions for the way forward using ICTs in extension: revisit extension's role and functions; improve client sensitization, build staff technical capacity, and improve access to information.

Key words: Agriculture, Development, Extension, Information Communication Technologies.

Introduction

The use of ICTs in Extension services in the English speaking Caribbean in the future will be based on the vision for agriculture in the region. IICA (2007) noted that agriculture must be seen as more than helping poor farmers and must be viewed as a strategic sector in Caribbean development and that there is sufficient market demand for the output of the sector to make it potentially profitable. The challenges to farming in the region however, have contributed to great losses to farmers and other producers. These challenges include loss of preferential markets for traditional commodities, poor competitiveness of Caribbean farm enterprises in a global trading environment, high levels of risk associated with natural disasters (particularly hurricanes), climate change, new phyto-sanitary standards and issues relating to intellectual property rights. An aging farmer population, use of outdated production technologies, high cost of inputs, unavailability of labour, among others, have been identified as the major contributors to poor competitiveness by Caribbean farmers.

Agriculture in the region is changing and traditional approaches are slowly giving way to what is being termed “new agriculture’. This alternative approach has different focus: value addition; agribusiness and entrepreneurship as well as an expanded clientele base**.**

The role of Extension has changed over the years, much more is being demanded from Extension workers. The traditional role of providing advice to farmers using personal visits has evolved to more group and mass methods which required the use of communication techniques and adult education principles and practices. The use of communication media such as radio, television and a variety of print media has also increased.

In the present demands for accelerated agricultural development, newer roles and responsibilities are increasingly being assigned to extension. These demands require new

approaches and tools for improved communication not only with farmers but with the whole new class of clients that have emerged; agribusiness entrepreneurs, processors, marketers and youths. It is in this context that ICTs can be considered.

Information and Communication Technologies (ICTs) can be defined as consisting of the hardware, software, networks, and media for the collection, storage, processing, transmission and presentation of information (voice, data, text, images), as well as related services (The World Bank, 2009). ICTs became accessible to the common man with the availability of Personal Computers in the early 1980s. However, it is the Internet that has allowed ICTs to become beneficial as a communication tool to the wider public. Renwick (2009) cited some facts (World Internet Statistics, 2008 and 2009) which show that today, there are about 1.6 billion users of the Internet worldwide and, of these approximately 7 million are in the Caribbean.

Benefits of ICTs

In the Region's quest to hasten agricultural development, ICTs have the potential to be used as both an engine of economic growth and for delivery of products and services. One such service is technical information. ICTs facilitate collection, organisation, storage and dissemination along with communication and exchange of data, information and knowledge between and among groups. While the "old" or traditional technologies such as fixed line telephones, radio, television, print, video are still valuable tools, there is urgent need for the speedy adoption of new ICTs. Such ICTs have the potential to enable the exchange of information between Extension and their clients in a much faster and effective manner. Moreover, ICTs make available to users a much wider and deeper pool of information. This will

impact on technical skills of extension workers as they will be required to sift all information and deliver what is relevant and appropriate to clients in new roles as information brokers.

Present ICT use in agricultural extension in the Region

The use of ICTs in agricultural extension in the Caribbean region, similar to many other developing regions, is influenced by its use within the wider society and particularly in the agricultural sector. It is considered an important tool for development and the Caribbean Community (CARICOM) Ministers responsible for Information and Communication Technology, in this context, agreed to adopt and implement strategies designed to "accelerate the adoption of ICTs for development" (CARICOM, 2004). More and more countries in the Caribbean region have recognized the opportunities that ICTs can provide to their citizens in the areas of work, learning and entertainment.

Work in the agricultural sector, and Extension in particular, has been enhanced over the years with the introduction of new ICTs. Some may argue that progress has been slow; nevertheless, there have been positive efforts where several countries have benefited from various donors and technical support through agencies. The Technical Centre for Agricultural and Rural Cooperation (CTA), the Commonwealth of Learning (COL), the Inter American Institute for Cooperation on Agriculture (IICA), and the Food and Agriculture Organisation (FAO), are among this group. Governments, within their often constrained budgets, have also provided access to ICT tools and equipment including computers, printers, photocopy equipment and to a lesser extent cameras, scanners and video equipment.

Extension agents, particularly within Ministries of Agriculture in the region, are often responsible for information or communication within the Ministry. Increasingly, ICTs are being

used in the preparation of information for distribution e.g. factsheets, brochures, posters, training materials and in the delivery of presentations to the public, including radio and television programmes. Agricultural Extension Services have moved from a situation of very limited access to hardware and software to a position where there is increased emphasis on the acquisition and use of ICTs on a day to day basis. There has been increasing use of the Internet, e-mail and online information sources, although information gaps still exist in accessing current technical agricultural information, particularly local information and data (CTA, 2008). In spite of this, however, according to the ICT Development Index (ITU, 2009), the Caribbean is lagging behind its potential as an information society.

New demands on Extension

In recent years, two major issues have impacted on the way Extension does business. One is the changed role and function and the other is the expanded client base. Firstly, Extension Officers are now expected to become facilitators in a relationship between the client and other information sources and service providers, an expansion of the traditional role of technology transfer agents. In addition, extension agents are now expected to support the development of the farm family and rural community. Agro-tourism is also being included within the scope of work of extension as part of their responsibility to rural communities.

Secondly, the clients of extension, in keeping with recently articulated new strategies for agriculture in the region, now include agribusiness entrepreneurs, agri-processors, and marketers. This again is a fundamental change from the traditional client base of mainly farmers to which extension has been accustomed. This expanded group now includes subgroups with different

skill sets and education from the traditional farmers, and differing willingness and abilities to embrace modern communication technologies.

Moreover, the nature of extension systems in the region has also changed dramatically over the last few years. Seepersad and Ganpat (2008) described the now highly pluralistic Extension system in the region, with many agencies both government and non-government, providing services to the same clients, often acting with limited coordination. This situation provides good opportunities to enhance synergies among all service providers through the use of modern information and communication tools. Thus, it is imperative that Extension officers are now equipped with a different set of skills and tools to perform their core functions.

Possible ICT Tools for use in the region

A review of worldwide initiatives, as well as a report (Renwick, 2009), were used as sources of information. Some of the tools and techniques which have good potential to enhance agricultural development in the region include web-based initiatives, networking, use of GIS/GPS technology and mobile telephony, mobile/semi mobile learning units and internet access points.

E-Extension. Cyber Extension supports the delivery of extension service using Web 2.0 tools that allow online sharing, collaboration and networking to exchange and share agricultural information. Some of these techniques are popular in India and Sir Lanka (Sharma, 2003).

Websites are among the most popular methods in use, even in the Caribbean region and allow clients direct access to information, and they may also be customized to support the use of popular Web 2.0 tools.

Several *social networking* sites offer software for sharing information with a group of persons in various locations. Users can access information at their own convenience and manage how much information they wish to access and/or share. Facebook and Twitter are among the popular sites. Their use however, may be restricted by public agencies such as the Ministries of Agriculture.

On-line Forums provide the option for live sharing of information among users and hosting bulleting boards. A number of ICT tools may also be used for sharing videos, podcasting, sharing powerpoint presentations, bookmarks and photos.

Some other possibilities that should be considered for use in Caribbean Extension include:

Video and web conferencing: This provides real time interaction useful for collaboration and for training purposes. Technical backstopping to regional extension staff from a centre of learning is possible.

GIS/GPS technology: There is increasing use of this technology in the region for gathering, inputting and making information available, particularly to enhance the value of location-specific information e.g. areas of disease outbreaks, provided by agricultural extension. Farm data are being collected (Trinidad and Jamaica) and are used in marketing in Trinidad (NAMDEVCO). Google maps technology can provide farm-specific information to farmers. In the future, extension and farmers will be able to use this technology to access information on climate, soil, and fertilizer recommendations for their farms, as well as market locations and road linkages, which are crucial for transportation of their produce.

*Internet radio and television***:** Radio is popular in the region and a single country may have several stations. There are not as many local television stations, although the larger countries may have more than one station. For example, Trinidad and Tobago has 32 radio stations of

which 27 are online; and 10 TV stations, some of which are also online. The availability of online radio and TV has the potential to provide increased programming via the Internet for the new emerging clientele of extension.

Mobile Telephony**:** The use of cellular phones for extension is underutilised at present. Extension staff use cell phones for contacting farmers for meetings. By and large, these Extension officers use their personal phones 'unofficially' and without payment, and thus its use is restricted. The region could consider expanding the use the Short Messaging Service (SMS texting) to share marketing information, provide important information and invitations to meetings, and help to solve plant protection problems. This initiative is in its infancy stage in some countries e.g. St. Vincent.

Internet access points*: Community based telecentres* are places which provide help to persons to access the Internet . Telecentres enable persons to find, share and save information which may be used in a variety of ways, including farming and as resources for training (Erz et al., 2008). Both Extension and clients could make use of these centres.

Internet kiosks: E-Choupals and nlogues are examples of initiatives that operate in private-public partnerships. These are Internet-enabled kiosks which operate in villages in India and which once established provided a significant improvement in communication in the local farming system. In many instances they are not dependent on electricity and have satellite connections.

*Mobile and semi-mobile Learning Units***:** Essentially, these are vehicles that can provide training in communities. They are powered to provide full multimedia presentations on board. This is useful for promoting group work as well as for educating community organisations. The Extension Division in Trinidad has one such mobile unit which uses instructor led training with

multimedia CDs on a variety of topics. It can be enhanced for farmer training by the provision of wireless access so that information could be accessed for training.

A variation is the semi-mobile unit which is a vehicle fitted with workstations which move among communities training clients both in the use of computers as well as in production and post production practices. This variation need not be fully powered but can be parked at convenient locations where power can be sourced. Wireless access may be incorporated to add depth to training especially with staff.

Challenges to the adoption of ICT

Several challenges will impact on the rate and extent of ICT adoption and use in the Caribbean region. Across the board, there are still relatively low levels of ICT use and there is a lack of detailed information about how these are being used at national and regional level. Although an ICT strategy has been presented at the CARICOM level, there is still need for a well coordinated approach to ICT development nationally and regionally. These challenges need to be addressed so that development agencies, including Extension services can have more benefits from the application of ICTs. These challenges are not insurmountable, and may be overcome incrementally given the realities of regional economies.

As noted earlier, the global environment for agriculture has changed, requiring a new approach to extension. Hence, Extension Officers are expected to become more than a trainer of farmers, and must be able to provide a wider range of services not only to farmers, but also contribute to the wider development of the farming community and agricultural sector in general. Other challenges to be faced include:

- An expanded range of commodities and farming systems with different production problems.
- Limited coordination of extension services as well as its decentralization and fragmentation.
- A larger number of clients, in addition to the traditional producers, who have to be serviced.
- The historic weak linkages between Research and Extension
- Varying levels of functional literacy and low levels of computer literacy among farmers
- Poor access to and use of new agricultural technologies and information
- Existing extension infrastructure and systems which have not yet been adjusted to the realities of the global environment and development challenges, and are characterized by limited human and financial resources.

ICTs are among the tools, applications and mechanisms which can provide some solutions to these challenges.

Supporting Increased ICT use in Caribbean Extension

It has been recognised that the agricultural sector must change in light of the current global crisis in food security and energy (World Bank, 2009). Several Caribbean agricultural and development policy makers, recommend the need for a "new agriculture", targeting activities along the entire value chain and a view of agriculture as both food and non-food items. The "new agriculture" requires a different set of extension, educational and research skills and programmes and is closely linked to other sectors of the economy such as tourism, education,

health, transport, trade and finance (Chesney, 2007). In this regard, it is goes beyond extension and agriculture to development and as such special interventions are required. These include:

"Buy-in" from Policy Makers: There must be institutional support across the board from senior management to junior officers. Policies and procedures are needed to allow action on many aspects of implementation of ICTs. Government intervention will be necessary to ensure the proper policy framework is designed to benefit individuals, farmer groups and NGOs.

Work ethic and culture; Work ethic and culture have to be modified as managing ICTs requires fast decision making and an attitude of life-long learning. Regional institutions lag in recognition of the need to implement ICTs, and when action is taken it is generally in a piecemeal approach. What is needed is strategic planning and implementation, which in some instances, could be incremental. Relevant institutional frameworks, together with appropriate strategies and policy frameworks are also critical for success. Innovation should be embraced as a part of this new culture.

Adequate ICT tools: This is an information and communication age, thus tools to enable the tasks of extension workers easier and more effective must be made available. Bridging the digital divide is essential for survival in less developed countries. Giving farmers access to relevant and reliable information in a timely manner is the ultimate aim of agricultural information services, a key component of extension.

Training and capacity building: Insufficient attention has been paid to targeted training to increase the skills of users overall. These include training for extension staff and farmers in areas such as general computer literacy, information literacy, and in specialized software use. Extension agents must also develop the ability to introduce ICT tools to their communities. Training for Extension officers should include the use of multi-media, alternative media, and

other ICTs relevant and appropriate to their needs such as preparation of CDs/DVDs, participatory video, Web 2.0 tools, Internet Radio, streaming video, and other evolving technologies. The ability to integrate old and new technologies is a must to ensure all audiences can be reached. New skills are required by staff to repackage, analyse and make information more locally relevant to the various audiences, in particular, farmers and rural communities. Further, skills in advocacy, sensitization, networking and collaboration will be necessary.

Adapt Extension to new realities: Agricultural Extension is changing worldwide, with emphasis on innovation (Saravanan, 2008) and increased involvement of other rural groups besides farmers. Better access to information will be critical to these clients in this new environment, as we develop an extension service that is configured to facilitate the transfer of information from both the global knowledge base and local research, to local clients. Extension officers will thus require an expanded skill-range for them to better understand ICTs and the roles and functions of extension in region must be re-examined and re-engineered. Some interventions may include empowering extension through technology to be able to reach out and work more closely with each other in the region and with regional research organizations. Officers can also use technology to design and develop appropriate learning materials, to respond quickly to farmers' problems and queries through use modern ICT tools.

Build on existing information and experiences: A significant amount of locally developed information is available and these can be made available on the Internet, which is fast becoming an important source of information for the region. However, this will require that much of the present information must be collected, organised and digitized for access. This exercise must start immediately.

The use of mobile telephones, which is now so wide-spread, should be considered for disseminating information to the users, using innovative methods. Examples of use in Trinidad & Tobago (NAMDEVCO) and Jamaica (RADA) may be examined and replicated where appropriate. The success of the Mobile Learning Unit for farmer training in Trinidad and Tobago which is in great demand is another example. New approaches and pockets of innovation being implemented or championed either individually, at unit level, or department level that may not yet be mainstreamed at the institutional level should also be examined for replicability. These include: the use of mobile phones for supporting question and answer services (QAS); the linking of QAS to radio talk shows focusing on agriculture in St Vincent and the Grenadines; the use of interactive multi-media training materials on the Web in St Lucia; and the use of interactive CDs for training farmers in Trinidad and Tobago. With easier access to ICTs, these are initiatives that can be shared through networking of Extension Officers, Farmers' Organisations and NGOs.

Encourage young professionals: The younger extension officers are much more comfortable with modern computer technology, therefore supporting the improved use of ICTs in the work programmes among this group, will contribute to greater ICT adoption. Their supervisors however, may need to be persuaded if they are less comfortable with the technology. ICTs may also encourage wider participation of youth in agriculture, not only to attain technical, professional and business skills in agriculture, but also to promote opportunities for innovation and development of the agricultural sector.

Networks and discussion forums: Ongoing linkages and exchange of information between and among extension groups and other stakeholders will assist in better access to expertise, information and experiences by all participants. Local, national and regional producer networks

such as the Caribbean Farmers Network (CaFAN) and the Caribbean Association of National Fisherfolk Organisations (CANUFO) can provide good fora for community learning, social interaction, collaboration and resource sharing (de Freitas et al., 2006). A number of other Caribbean networks exist, and these have the potential to become increasingly important as vehicles for collaboration and sharing information among each other, and will contribute to increased efficiencies and reduced costs in travel. A network of Extension Officers is mandatory and will assist agents to support and learn from one another and thus contribute to improved human resource capacities in the region and better linkages with farmers and other stakeholder groups.

Conclusion

The Caribbean has sufficient capacity and infrastructure to embark on a higher level of use of ICTs for development. However, there must be more investment in raising awareness, a changed culture in extension with regards to the use of information, so that both extension officers and their potential clients can benefit from the use of ICTs in the agricultural sector. Changing the technology isn't the only issue. More important, may be how Extension professionals will interact with technology and the future of extension will ultimately depend on leaders' ability to interpret trends and use technology to deliver programmmes and empower clients to solve their own problems. This will take time. It won't happen overnight, but we must begin the process now!!.

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