

**Potential for Use of Information and Communication Technologies (ICTs)
in Agricultural Extension**

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Introduction

This paper will briefly explore the development of Information and Communication Technologies (ICTs), the current use in agriculture in Trinidad and Tobago, and possibilities for use of in Agricultural Extension and Education.

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 (PCs) in the early 1980s.¹ However, it is the Internet that has allowed ICTs to become beneficial as a communication tool to the wider public. The Internet is a global network of networks enabling computers all over the world to communicate.

But it was the invention of the ability to hyperlink files across networks which allowed for the development of the World Wide Web in 1989. Its popularization by 1993 has made communication across the Web commonplace today.

Today, there are about 1.6 billion users of the Internet worldwide² and, of the approximately 7 million users in the Caribbean, there are about 225,000 users in Trinidad and Tobago.³ ICTs are continually evolving, generally becoming more affordable, accessible and powerful.

Agricultural extension, originally started to guide and assist farmers by using communication and adult education processes. In order to share information, agricultural extension field officers have, traditionally used a variety of means, including face-to-face at the office and farm visits, inter-personal media (seminars, demonstrations, field days, exchange visits, agricultural shows/fairs), print media (pamphlets, brochures, newspapers, and magazines), audiovisual, mass media (radio and television). An anomaly of the Internet as a channel is that it can act as both interactive on the personal level as well as a mass media tool.

However, over time extension has evolved and its role has expanded, been redesigned and new approaches have been adopted. Extension means different things to different people depending on their objectives. The revolution in ICTs is all pervasive and the competencies are on target with Extension. ICTs drive innovation.

ICTs enable the exchange of information about best production practices, innovations in crop varieties, pest control, weather forecasting, irrigation, markets, prices etc. Extension should be able to access this kind of information and shift from purely disseminating information to assessing and brokering relevant information. Capacity building is another area of opportunity. They allow for distance learning and many international institutions like the Food and Agricultural Organisation of the United Nations (FAO), the Commonwealth of Learning (COL) and the World Bank offer online training programmes. ICTs can assist with household food security as much nutritional information is easily and simply available.

Where applicable, they provide easily accessible information on warning systems or relief activities. And, most importantly, they generate networking among people and reduce cost of transactions/finding information (Bertolini 2004).

In the US, research on extension officers' use of ICTs showed that:

- 97.7% had their own computer with modem capability (Internet connectivity).
- 100% reported that they often/very often used email and were comfortable/very comfortable with it.
- 83.7% often/very often used the Internet, and most were comfortable/very comfortable "surfing" (93.0%), finding materials/information on (80.9%), and downloading/printing items from (93.0%) the Internet.
- 42.6% reported that they were comfortable/very comfortable with on-line discussion boards. (Futris, Adler-Baeder, and Dean 2004)

Statistics on extension officers' use of ICTs in Trinidad and Tobago were not found but it is expected that they would not be as expert as their American counterparts. So before extension can utilize ICTs with farmers, a needs assessment should be done and appropriate training provided.

Use of ICTs in Agriculture in Trinidad and Tobago

There are two initiatives by the Government of Trinidad and Tobago which focus on development of ICTs and affects agriculture. One is the Fast Forward policy which is expected to transform the country into an online society and a knowledge-based economy (Ministry of Public Administration and Information. Trinidad and Tobago 2005). The other is the Vision 2020 for agriculture which states that "the agricultural sector must be technology-driven and market led; it must be managed smartly using an efficient information technology support intelligence and information system" (Ranjit 2002).

In order to meet this mandate of the Government, the Ministry of Agriculture, Lands and Marine Resources (MALMR) has moved on various front simultaneously to improve their ability to manage and communicate information and data.

The MALMR drafted an Information Technology (IT) Strategic Plan (2006-2008). It states that databases to support improved information and communication are being developed e.g. State Agricultural Land Information System (SALIS), Land and Surveys Database, Farmers Database, Fisheries Database, the Agricultural Incentive Database and the Farm Animal Monitoring and Recording System (F.A.R.M.S.) (Joefield 2009; Narinesingh 2009; Dowlath 2009).

The National Livestock Database/F.A.R.M.S has been developed within the Animal Health and Production Division of the MALMR. Animals are branded with a permanent ID and when fully functional shall be used for health surveillance among other reasons. Plans to

link with GIS for disease mapping and is available via VPN (Virtual Private Network) (Rastogi 2009).

The Land and Water Development Division is using Geographic Information Systems (GIS)/Geographic Positioning Systems (GPS) in conducting its work.(Joefield 2009)

Use of ICTs in Extension in Trinidad and Tobago

Some examples of ICTs in extension in Trinidad and Tobago are:

- **NAMDEVCO**

One of the more successful examples of how ICTs have been utilized is at the state corporation, National Agricultural Marketing Development Company (NAMDEVCO). Here they are used for marketing extension. NAMDEVCO has developed, since 2005, an information system called the National Marketing Information System (NAMIS) which provides information to all stakeholders in the agricultural sector on prices/volume (wholesale and retail) in different formats – via their website⁴, in print (newspapers, a monthly newsletter entitled “GreenVine”, digital display of prices in real time and information kiosk at the farmers’ markets) and by telephone. Also on the website:

- Production data for about 550 certified farmers
- A crop compendium with up-to-date data (production info, input supplies – price and treatment)for the commodities traded
- A comprehensive listing of traders of commodities in international markets.
- A buyer/seller forum to link persons who wish to trade.

Website hits has been as high as 38,000 a month. They have ten extension field officers who advise, train in computer skills and share information on the standards for production for export (Certification protocol). Their ten information collectors use handheld devices like Personal Digital Assistants (PDAs) (Ragbir 2009).

- **Regional Administration Field staff/Extension Training and Information Services Division (ETISD)**

All extension field officers have access to the MALMR intranet as well to the Internet. Attempts to implement use PDAs to collect info on land administration by field extension officers were not very successful. Each county has a farmers’ registration database with information on cropping patterns. The Farmers Training Centre uses computers and multimedia projectors to conduct training (Dowlat 2009). ETISD has a mobile training unit, produces tutor-guided multimedia CD-ROMs and instructional videos (Seepersad and Ganpat 2008)

- **GIS/GPS**

There was some GIS/GPS and Multimedia Training at a Workshop entitled “Demystifying Global Positioning Systems (GPS) Technology in Extension: Integrating Field Applications with Multimedia and Communications Technology” in 2008 for MALMR Extension staff (Joseph 2009).

- **Short Messaging Service (SMS) texting**
When funding is available, Extension would like to introduce SMS texting via cellphones to farmers. But communication would be two-way, a form of dissemination info to farmers and providing a helpdesk for farmers (Joeifield 2009; Dowlat 2009).
- CARDI and IICA both provide extension material online e.g. training courses, agribusiness information. Professional Associations and Conferences on ICTs provide information up-to-date info on ICTs. Newspapers on the Internet may provide agricultural information (Seepersad 2003).
- Most agricultural organisations have websites, however, most are static not interactive.

ICT Initiatives and Innovations for Extension/Education and Training

Technologies for Conservation and Development provides a detailed listing of the ICTs utilized internationally.⁵ They can be grouped into communication, tracing, data management and information sharing. Some are initiatives are highlighted below.

Web-based Initiatives

There are a number of initiatives like Cyber Extension, e-Agriculture and e-Extension which all use the Internet to provide extension services over the Internet.

Cyber (Virtual) Extension uses the power of networks, computer communications and interactive multimedia to facilitate agricultural information exchange. It is being used in India and Sri Lanka, for example(Sharma 2003)

E-Agriculture- FAO initiative e-agriculture.org is a global initiative to enhance sustainable agricultural development and food security by improving the use of information, communication, and associated technologies in the sector.⁶

E-Extension is the delivery of extension service using Web 2.0 tools which allow online sharing, collaboration and networking. Examples of Web 2.0 tools are:

- Websites are pull technology. However, software for chatting like Meebo, or customized search engines can be added to the website to make it interactive. Websites development needs hosting as well as content management software. E.g. Drupal
- Networking software for sharing information with many people are social networking sites. This information they can check at their own convenience and control how much and with whom they wish to share. E.g. Facebook

- Online sharing – tools to allow sharing information in different formats:
 - Web mail
 - Video sharing
 - Podcasting
 - Sharing PowerPoint slides
 - Sharing bookmarks
 - Sharing photos
 - Feeds
 - Alerts
 - Sharing Table of Contents
 - Sharing references
 - Listservs
 - Discussion forums, chat, bulletin boards

- Collaboration
 - Wikis
 - Docs and Spreadsheets
 - Tagging
 - Blogs
 - surveys

- Video conferencing
 - Instant messaging

- Web conferencing resources that can be used for online training
 - E.g. DimDim – free for less than 20 persons per meeting
 - Telephone via the Internet

- Online Learning software – integrated systems
 - Open source
 - Paid

- Mashups
 - Google maps technology can provide to farm-specific information to farmers. Using this technology, farmers can go online to see climate, soil, and fertiliser recommendations for their farms, as well as market locations and road linkages, which are crucial for transportation of their produce. project underway in Ethiopia is expected to capture data on road access, water points for irrigation, location of silos and market areas for use by farmers (Mulama 2009) .

Web-based resources available. For example,

- Electronic publications (books; *Spore*; journals: *Rural 21*)
- Websites and Portals (e.g. MALMR Website)

- Virtual Libraries (e.g. Digital Library Services at the Main Library)
- Virtual Projects
 - Virtual Agronomy Project in Australia provides access to current and past agronomy trials.
- Agriculture answering service
 - Aaqua - online forum allowing 'questions from the grassroots to be answered by experts in the field'.⁷

Internet Radio and Television

Trinidad and Tobago has 32 radio stations of which 27 are online; and 10 TV stations which are also online. These can provide programming via the Internet for the farming populations.⁸

Internet kiosks

E-choupal and nlogue are examples of ICT kiosk with Internet access which are used in India by private-public partnerships. In 2005, E-choupal had 6,500 kiosks in 31,000 villages serving 3.5 million farmers and plans in 2010 to have 20,000 kiosks in 100,000 villages serving 10 million farmers.⁹

Community-owned Intranet/Internet Kiosk- the Gyandoot intranet community network was conceptualized on January 2000, and installed and made operational within less than two months. Within a few months of its installation, the network was offering 22 services including rates of agriculture produce, land records, grievance redressal, Hindi e-mail, rural matrimonial services, rural e-market, application for caste/residence/income certificates, information regarding government programmes and schemes, etc. Later, educational, health and commercial services were added.¹⁰

Community based Telecentres

These are centres where information, assistance and help are available and where anyone can access the Internet. It enables users to find, share, save information. These institutions bring information to locals and provide opportunities to use information in different ways: to work, to learn or simply for recreation (Erz, Koda-Traoré, and Crul 2008).

Battery-powered Mobile Unit

Infothela is a mobile unit meant for providing and exchanging information through fax, internet, telephony etc. It will serve the purpose of education, entertainment, and provide agriculture based information, weather information, health care information, government information, etc.¹¹

Mobile telephony

Mobile telephony using cell phones SMS texting to get marketing, weather, production information as well as conduct banking transactions has become quite extensive in Africa. Recently access to information on treating crop diseases by getting location-specific information from community knowledge workers (CKWs) sending text messages to

farmers in a given locality has been made possible in Uganda (Mulama 2009) . Pagers are being used as well.

Nokia Life Tools is software on cell phones in India that assist with acquiring agricultural information and even have tools to learn English.¹²

Statistics indicate that in 2007 there were 1.008 million in Trinidad and Tobago (Central Intelligence Agency 2009) so there is tremendous potential for exploring this use locally.

GIS/GPS

These are increasingly used to enhance the value of location-specific information e.g. areas of disease outbreaks, provided by agricultural extension. GIS/GPS information combined with photos, e-mail etc can prove to be an expeditious way of doing extension.

Challenges to the implementation of ICTs

Though Trinidad and Tobago is poised to exploit ICTs to provide excellent extension services, there are a great number of challenges which need to be managed. There would be high initial cost for equipment, infrastructure, telecommunication connections, training, adequate and appropriate staffing and acquisition of relevant resources.

There must be institutional support by way of “buy-in” across the board from senior management to junior officers. Policies and procedures would be needed for many aspects of implementation of ICTs, for example:

- Training for extension and IT officers as well as clientele – initially and ongoing
 - General computer literacy, information literacy¹³, and in specialized software.
- Security – both physical and electronic
- Back-up and disaster recovery
- Daily trouble-shooting, routine maintenance and regular upgrades
- Ensuring stable Internet access and adequate bandwidth

Work ethic and culture may have to be modified as managing ICTs requires fast decision making and an attitude of life-long learning. As bureaucratic institutions all over the world took long to recognize the need to implement ICTs, generally a piecemeal approach by early adopters would have taken place. Now common solutions and integration would be needed – so IT personnel would have the challenge of working with many people to implement standardized technologies. Planning must be strategic and in some instances, incremental.

Rethinking goals could prove a challenge for decision-makers but it must be faced if ICTs are to be used effectively and efficiently. This is an information and communication age, tools to enable the tasks of extension works easier and more accessible, albeit, only relevant where adequate infrastructure and power is available. Bridging the digital divide is essential for survival in less developed countries. Giving farmers access to relevant and reliable information is the ultimate aim of providing agricultural information services, one of the goals of extension.

ENDNOTES

- ¹ Source: Computer Hope: History of computers - <http://www.computerhope.com/history/198090.htm>
- ² Source: Internet World Statistics (Mar 31 2009) - <http://www.internetworldstats.com/stats.htm>
- ³ Source: Internet World Statistics (June 30, 2008) - <http://www.internetworldstats.com/stats11.htm>
- ⁴ Source: National Agricultural Marketing Development Company (NAMDEVCO) – <http://www.namdevco.com/home.asp>
National Agricultural Marketing Information System of Trinidad and Tobago (NAMIS) - <http://www.namistt.com/>
- ⁵ List of ICTs for development - http://www.t4cd.org/Resources/ICT_Resources/Technologies/Pages/ICTTechnologyList.aspx
- ⁶ E-Agriculture – <http://www.e-agriculture.org> .
- ⁷ Aaqua – Agriculture Answer Service - <http://aaqua.persistent.co.in/aaqua/forum/index>
- ⁸ Radio statistics – http://radiostationworld.com/locations/trinidad_and_tobago/radio_websites.asp
http://radiostationworld.com/Locations/Trinidad_and_Tobago/Radio.asp
<http://www.tatt.org.tt/radioBL.htm>
Television statistics - <http://www.tntisland.com/media.html#telstns>
- ⁹ E-choupal - <http://www.apdip.net/resources/case/in14/view>
- ¹⁰ Gyandoot - <http://www.apdip.net/resources/case/in10/view>
- ¹¹ Infothela - <http://www.iitk.ac.in/MLAsia/infothela.htm>
- ¹² Nokia Life tools - http://www.nokia.com/NOKIA_COM_1/Microsites/Entry_Event/phones/Nokia_Life_Tools_datasheet.pdf
- ¹³ A set of abilities requiring individuals to “recognize when information is needed and have the ability to locate, evaluate and use effectively the needed information.”

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