Information and Communication Technology for Agriculture

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Like in many developing countries, Agriculture Sector being the backbone of the Sri Lankan economy, contributes significantly (11.3 % in the year 2007) to the Gross Domestic Products (GDP) and towards economic growth (7.7 %). During the year 2007, 80% of country's population of 20.01 million was rural, while 31.3% of the total Sri Lankan work force was employed in the Agriculture sector. Nearly 14.6% of the population still depends on agriculture as the main means of livelihood. The country's GDP has been growing at 6.8% per annum (in 2007), though that of agriculture grew only at 3.3% (Central Bank, 2007).

Agricultural extension service (Technology transfer mechanism) had been the livewire in agricultural development of the country over several decades in the past. Sri Lanka's Agricultural Extension Service of the Department of Agriculture (DOA) has rendered yeoman service to Agricultural development of the country. Until 1985, the *Krushikarma Vyapthi Seva Niladari* (KVSN or the Agricultural Extension Service Officer) was the grass-root level extension officer who provided a face to face extension service by maintaining a strong and extensive service through the establishment of direct links with the farming community, and thereby facilitating the smooth transfer of technology and information. In 1989, the KVSN extension service which was based on what was called the Training and Visit (T&V) system was brought to an end in compliance with the 13th Amendment to the Constitution which required decentralization of the agricultural extension service to the Provincial Administration. This change-over had a serious negative impact on the technology transfer of agricultural research findings.

Several other major political and administrative changes brought about at that juncture, such as trade liberalization, withdrawal of agricultural extension workers from extension activities, devolution of powers to provincial councils etc, contributed to an inevitable land-slide and disruption in the entire agricultural extension system in the country. This created many voids almost everywhere in the system hampering the smooth flow of information from knowledge repositories (Research Station) to farmers, and getting a feedback to researchers and planners from the farming community, as well as exchange of vital information between traders and farmers, and so on and so forth.

Cyber Agriculture Extension

The Ministry of Agriculture and the Department of Agriculture (DOA) having realised the magnitude of the need for an alternative mechanism to cope up with the demand and cry for agricultural information, took steps to capitalise on the innovations and developments in the Cyber world. Considering the development of teledensity (telecommunication/internet capability), and the rapidly growing e-governance situation in Sri Lanka (see Fig. 1,2 & 3) as an ICT initiative, "Cyber extension" mechanism was implemented by the Audio Visual Centre (AVC) of DOA as an appropriate information exchange mechanism which seemed affordable and convenient to rural farmers in satisfying their information needs.

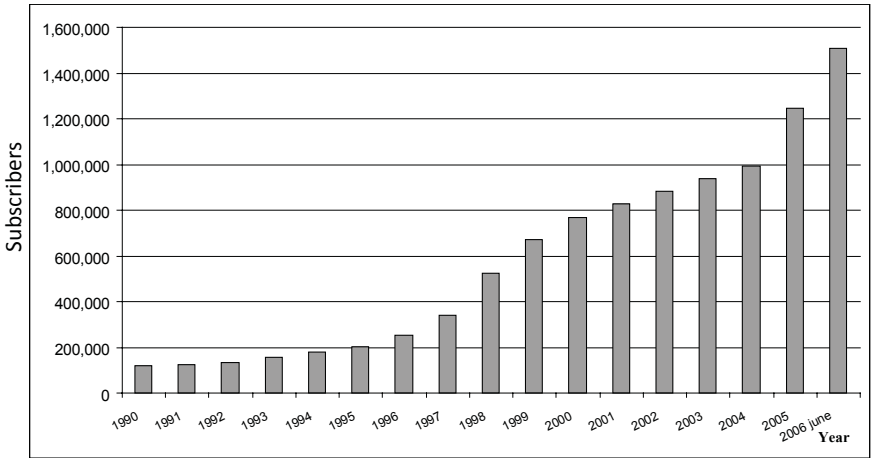

Figure 1: Growth of Fixed Access Telephone Subscription - 2006
Source - http://www.tre.gov.lk/statistic.htm

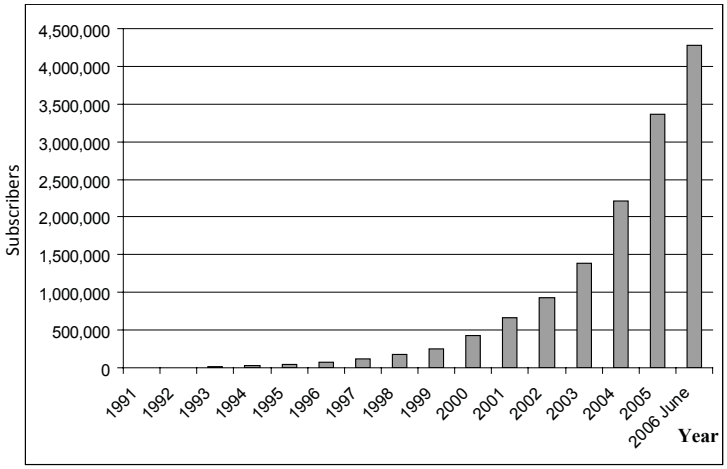

Figure 2: Growth of Mobile Phone Subscription - 2006
Source - http://www.tre.gov.lk/statistic.htm

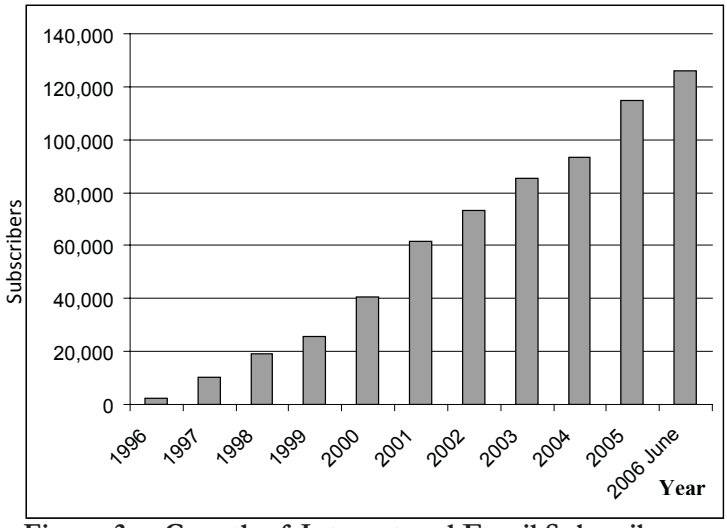

Figure 3: Growth of Internet and Email Subscribers – 2006
Source – http:/www.tre.gov.lk/statistic.htm

Cyber extension is an agricultural information exchange mechanism over cyber space, being the imaginary space behind the interconnected computer networks through telecommunication means. It utilizes the power of networks, computer communications and interactive multimedia to facilitate an information sharing mechanism.

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To begin with, eighty Cyber Extension Units[1] (CEU) were installed at Agriculture Instructors' offices, Govijana Kendra (Agrarian Service Centres) in 20 administrative districts in the country. Each Cyber unit was equipped with a technically high capacity computer, complemented with other facilities which included scanner, laser printer, digital camera, uninterruptible power supply unit (UPS) along with the required office facilities to function.

Multimedia e-learning strategies were implemented effectively by using Interactive Multimedia CD-ROMs (IMM CD-ROMs) produced by the AVC. The objective of using IMM CDs as an ICT strategy was to assist farmers enhance their knowledge and skills on relevant crops and crop technologies in a community friendly, aesthetically pleasant and enjoyable learning environment. Extension workers were able to use these IMM CD ROMs containing most up to date technologies in agriculture, as teaching tools (audio-visual aid) to deliver technological messages effectively to the farming community. The farmers, either with a basic skill to operate a system, or with the assistance of another person (or Agriculture Instructor) at the same time could use CD ROMs as a self-learning package for upgrading his/her relevant knowledge skills. Farmers trained this way

[1] Marassana (Kandy), Poojapitiya (Kandy), Hanguranketha (Nuwara Eliya), Kandhapola (Nuwara Eliya), Weeravila (Hambanthota), Thellulla (Monaragala), Kappetipola (Badulla), Anuradhapura (Anuradhapura), Kahatagasdigiliya (Anuradhapura), Baminiwatta (Kegalle), Ambepussa (Kegalle), Embilipitiya (Rathnapura), Rassagala (Ratnapura), Urapola (Gampaha), Kelaniya (Colombo), Rathmalana (Colombo), Kalutara (Colombo), Meegahajadura (Hambantota), Kamburupitiya (Matara), Iginimitiya (Puttalum), Labuduwa (Galle), Dambulla, Nivithigala (Rathnapura), New Town (Polonnaruwa), Madirigiriya (Polonnaruwa), Rajanganaya (Anuradhapura), Mahiyanganaya (Hasalaka), Ambalanthota (Hambanthota), Mahawa (Kurunegala), Hettipola (Hasalaka), Mannar, Extension & Training Division (Peradeniya), Rice Research & Development Institute (Bathalagoda), Bakamuna (Polonnaruwa), Hingurakgoda (Polonnaruwa), Okkampitiya (Monaragala), Savasthipura (Anuradhapura), Weeraketiya (Hambanthota), Kaltota (Hambanthota), Yodhakandiya (Hambanthota), Siyambalanduwa (Monaragala), Padaviya (Anuradhapura), Palkuda (Puttlam), Dedicated Economic Zone (Dambulla), Pulasthigama (Polonnaruwa) and All Eastern province Agri In-service Centres, ect.

on use of information technologies in agriculture, would be well expected to become 'e-farmer' of the day. The extension workers in the meantime would become 'e-extensionists' who could lead the march forward at field level. The AVC of the DOA has already facilitated this revolution by designing, developing and producing forty three crop-based and technology-based IMM CDs[2], and distributing them to established Cyber extension units.

In addition to technical information organized into several chapters on each crop in IMM CDs, a separate chapter has been compiled as a database on research papers and articles published by local authors in local and foreign journals. Each CD is further enriched with a separate link for video films, which have been produced pertaining to each crop, and telecast through Mihikatha Dinuwo and Govibimata Arunalu (weekly television programs of the DOA) by the Audio Visual centre.

IMM CDs were developed through Macromedia Director with support of Photoshop, Adobe premiere, 3D Max, etc. CD-ROMs were produced for extension workers as well as for farmers, where few of the potential users were expected to have had much previous exposure to such technologies. Considering the low computer literacy of extension workers as well as of farmers, a familiar concept for the interface was used; an electronic book which is similar to reading an analogue book. Page turn is facilitated by two icons; 'Next' (to go next page) and 'Previous' (to go back to previous page). The contents were organized into chapters, topics and sub-topics. Most of the pages contain a variety of multimedia presentations (video, sound /voice-overs, animations, graphics and text). All media are interactive and users may review and/or skip section, as they desire. Each page is printable and farmers will be able to get a print-out. (See Fig. 4 & 5 for the interface design of an IMM CD-ROM)

Figure 4: Content Page of Micro-irrigation IMM CD

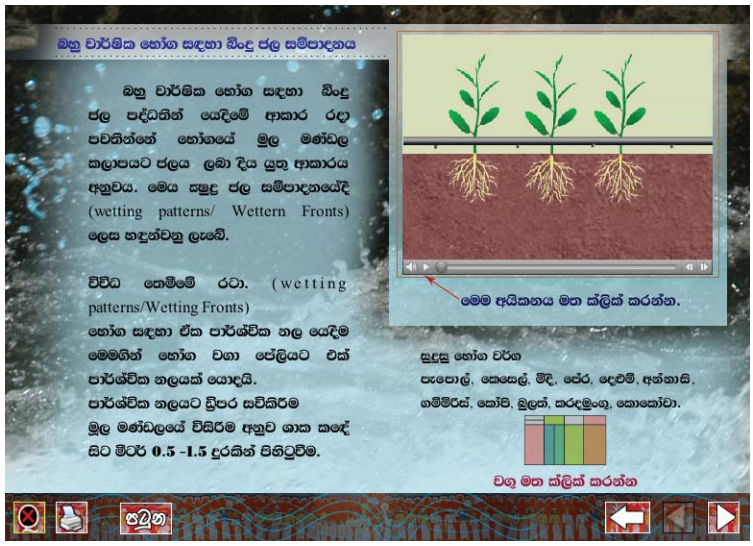

Figure 5: Typical Page of Micro-irrigation IMM CD

Two separate CD-ROMs were designed, developed, produced and introduced to improve presentation skills of Agriculture Instructors (perhaps any category of officers who are involved in teaching; education department, health, etc.), and distributed among all Cyber units. As a result, with the assistance of these materials extension workers were able to produce low cost audio visual aids at their door step with locally available material (Hi-tech to improve low cost instructional media). All the above CDs are available for sale at the main offices

[2]Sinhala medium - Flipchart, Mushroom, Coconut, Micro Irrigation, Protected Agriculture, Soil Conservation, Citrus, Chilli, Potato, Bean, Banana, Maize, Anthurium, Orchid, Gerbera, Vegetable pest, Betel, Pasture, Leafy vegetable, Cucurbitaceae, Jack, Tibbattu, etc.
Sinhala & Tamil medium - Paddy, Papaw, Brinjal, Tomato, Red onion, Big onion, etc.
English medium – Anthurium story, Vegetable insect pest, Royal botanical garden, etc.

of DOA [Gannoruwa, Colombo (in front of public library) Agunakolapelessa, Labudoowa]. Farmers/ school children are allowed to get a copy burnt from Cyber unit, free of charge.

An Agriculture Instructor attached to an Agrarian Service Centre, is in a position to produce a location specific simple extension material like a 'Power Point' presentation, desktop publications in the form of simple hand outs, leaflets, pamphlets etc by using the facility of Cyber extension unit for their *in situ* extension training.

Facilities at Cyber units, enable users to gain access to a wide range of information related to agriculture by browsing local and international websites of organizations such as DOA, International Rice Research Institute, Sri Lanka Rice Knowledge Bank etc.

DOA website (www.agridept.gov.lk), which is the largest interactive and dynamic website in this country is accessible in anyone of the three languages. This website won two awards in the year 2008 for the Best Departmental Website, and the Best Government Website.

When farmers come to a cyber unit, technical assistance is sought through e-mail enquires with visual attachments. For instance if there is any new problem such as the emergence of a new pest or diseases, it can be visualized either by digital camera or by scanning the live specimen with the scanner, and sending the information to the subject matter specialist (SMS) or the researcher at the Station far away, for necessary action.

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Farmer Database for e-marketing

Avoiding the numerous obstacles and barriers that farmers face in marketing agricultural products is an essential task to be fulfilled to ensure the success of Sri Lanka's agricultural development. Sri Lankan farmers currently face a wide range of problems in marketing their products. More often than not, low prices offered for products during harvest times, is a bitter and unpleasant experience faced by a majority of farmers. Marketing problems of tomato and big onion farmers during July/August, marketing difficulties faced by lime and orange cultivators (Jan/Feb) as well as pumpkin and potato farmers are few examples.

One of the reasons for this type of problems happen to be the lack of guidance and assistance to the grower in arriving at decisions pertaining to time, extents, crops and cultivars to be grown. As a result of such eventualities farmers tend to grow the same type of crops within the same time, without any planning, leading to further chaos during harvesting time. Very low prices are offered for their products by intermediaries who capitalize cunningly on the situation. If market forces are better coordinated, producers are better informed, and the entire system operated on an integrated mode, wholesale traders will be in a position to get information about farmers, so that they can go directly to them without being involved with intermediaries, and purchase their products offering a better price to the producer.

Additionally, there are problems faced by those who want to market agricultural produce to overseas markets. The main reason for this is the lack of reliable and accurate information about foreign buyers who need products of specific standards at particular times in definite quantities, and also information about farmers who grow crops to supply overseas markets on a continuous basis.

Even policy makers face difficulties in arriving at correct decisions on imports and exports of agricultural products, due to absence of correct information. As such, farmers become victims of unfortunate eventualities due to the importation of similar products from other countries when they harvest their crops. This situation may become worse, if relevant information on what type of products, period of availability, and in what quantities etc are not available at national level.

There is a strong need for continuous updating of statistics and information on farmers and farmer products in finding solutions to all the above problems.

It will be easier to find solutions to these problems, and overcoming difficulties by establishing modern information and communication technologies, and implementing such strategies for updating statistics at national level.

Therefore, a farmer database at each cyber unit (name of the farmer, type of crop, extent, expected yield etc.) was introduced to the network of information repository of the DOA web site in early 2007. (http://www.agridept.gov.lk/agmis.php). In addition, daily price information from the Dedicated Economic Zone (main vegetable wholesale market) at Dambulla is collected by the Cyber unit established at this centre in 2007, which now appears in the DOA website.

Cyber Agriculture Wikipedia (www.goviya.lk)

The latest ICT initiative of Cyber Agriculture Wikipedia is a participatory and interactive web tool for agriculture development in Sri Lanka, through the participation of the agriculture community. This is a common meeting place for farmers, experts, academic, students and the general public interested in Sri Lankan agriculture. The web tool will be hosted under the name of www.goviya.lk and open for the public in the near future. (This will be effective from July 2009)

This will consist of three major components to attract and cover needs of the majority of the agriculture community. They are

1. Wiki Govi Forum (Discussion Forum)
2. Wiki Govi Learning (Agriculture e-Learning)
3. Wiki Govi Lanka (Encyclopedia/Wikipedia)

Wiki Govi Forum

This is a discussion forum open to all members of the agriculture community, and the discussion will centre around Sri Lanka's agriculture policies, current issues etc. Initially, priority will be given to the *Api Wawamu Rata Nagamu* programme implemented by Ministry of Agriculture. The discussion here will be based on the 21 crops selected under this programme.

Wiki Govi Learning

Know how on agriculture crops, and ICT for agriculture are the two major subject areas open for the agriculture community in this learning component. Agriculture community would have a good source of resource materials for their training activities. Initially, this will be open for the Cyber Agriculture Staff (Rural Knowledge Centre of DOA). Gradually, it will be extended to others in the agriculture community for participation in e-Learning.

Wiki Govi Lanka

A web based encyclopaedia for Sri Lanka agriculture will be developed, and this will be continuously updated and nourished by the agriculture community. Ultimately, this will result in a complete encyclopaedia on almost all components of Sri Lankan agriculture.

The basic Wikipedia will be developed using MediaWiki software with the support of HTML based web pages with the support of PHP coding, JAVA scripting, MySQL database and Apache server application initially on Windows 2008 web edition platform, and later replaced with Linux Red Hat enterprise edition or Fedora Linux OS. The e-Learning component will be developed using Moodle e-Learning management system. Content of the cyber agriculture Wikipedia will initially be in English and later it will be available in local (Sinhala / Tamil) languages, since it will ensure the participation of majority of the local agriculture community.

Toll Free Agriculture Advisory Service

Recently a Toll Free Agriculture Advisory Service with a dedicated hot line number (1920) was established at the Audio Visual Centre with a view to leveraging the extensive telecommunication infrastructure of the country. The purpose of this telephone facility is mainly to respond to issues raised by farmers instantly in the local languages (Sinhala and Tamil). It consists of a complex of telecommunication infrastructure, computer

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Figure 6: Entrance of Agro Technology Park at Gannoruwa

Figure 7: Cyber unit (one-stop shop) of the Agro Technology Park at Gannoruwa

support and agriculture professionals organized to manage effectively and efficiently the queries raised by farmers instantly. When this service commenced, its activities became very popular among the farming community and the general public of Sri Lanka, and daily on an average about 350 inquiries are received by the Toll Free Agriculture Advisory Service. A data base comprising Frequently Asked Questionnaires (FAQs) is being developed every week to analyze burning farmers problems of the week, and then weekly television programmes are designed to address their issues.

Information dissemination through Agro-Technology Park

As a quick information dissemination strategy, the first Agro-Technology Park was established by the Audio Visual Centre in the year 2005 at the Gannoruwa Agriculture Complex (Main Agriculture Complex in Sri Lanka), and the second was established at Hambantota in the year 2007. A wide range of Information and Communication strategies (live field demonstrations, self explaining field instructional boards, facilitators for each demonstration sites, instructional leaflets, IMM CDs, VCDs, DVDs etc.) were introduced here for disseminating agricultural information to all those who visit these sites daily in their thousands. Each park is provided with a one-stop-shop which consists of a Cyber Agriculture Information Unit, Seeds and Planting Material Sales Centre, Books/CD sales centre etc to cater to needs of visitors (see Fig. 6 & 7).

The main objective of the park (A Parks) is to demonstrate current recommendations on agriculture by the Department of Agriculture, the Department of Export Agriculture, Department of Animal Production and Health, Forest Department, Department of Indigenous Medicine, and the Faculties of Agriculture, to educate farmers, school children, students in professional education in agriculture and general public in an aesthetically pleasing environment.

The way forward

His Excellency the President of Sri Lanka has taken the initiative to establish cyber extension units in all Agrarian Service Centres (ASCs) after realizing the value of such farmer databases by the Strategies and Perception Committee of the Presidential Secretariat. Therefore, a project proposal was submitted to the Presidential Secretariat to scale up the cyber extension project. After providing equipment to all ASCs (550), an island wide farmer census will be conducted to gather information of all farmers in the island. This will be the first farmer census in Sri Lanka, and each cyber unit will update this farmer database regularly.

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