

ICT Initiatives for Agricultural Development in India

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Introduction

ICT (information and communications technology - or technologies) is an umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in education, health care, or libraries. The term is somewhat more common outside of the United States.

According to the European Commission, the importance of ICTs lies less in the technology itself than in its ability to create greater access to information and communication in underserved populations. Many countries around the world have established organizations for the promotion of ICTs, because it is feared that unless less technologically advanced areas have a chance to catch up, the increasing technological advances in developed nations will only serve to exacerbate the already-existing economic gap between technological "have" and "have not" areas. Internationally, the United Nations actively promotes ICTs for Development as a means of bridging the digital divide.

ICT in agriculture is an emerging field focusing on the enhancement of agricultural and rural development in India. It involves application of innovative ways to use ICT in the rural domain. It can provide with accurate information necessary for the farmers which facilitates better agricultural output.

Though Public-Private Partnership, private initiative and government programmes are there, but it is still in nascent stage in India and evolving as an emerging trend. The benefit of ICT is yet to reach all the farmers, many farmers, especially

those who are marginal or sharecroppers are not getting this service or it "s better to say they are not availing this due to poor economic condition and social constraint. Other factors are illiteracy, language barrier, and unwillingness to adopt the new technologies.

One critical aspect in the usage of ICT"s for farmers and their groups, is the engagement of human interface in the last phase, thus it is crucial to know as to how far in actuality ICT is paying the dividend to the farmers. A new paradigm of agricultural development is fast emerging in both developing and developed countries. The overall development of rural sector is also taking a new direction while growing; at the one hand, old ways of delivering important services to citizens are being challenged and on the other, traditional societies are being transformed into knowledge societies all across the world. E-connectivity is the key word in the new social order.

The report of the „Task Force on India as Knowledge Superpower“ (GOI, 2001) emphasised „the necessity of developing the capacity to generate, absorb, disseminate and protect knowledge and exploit it as a powerful tool to derive societal transformation.“ ICT is seen as an important means of achieving such a transformation. When used as an extensive device for providing local farming communities with scientific knowledge, ICT initiates the formation of knowledge societies in the rural areas of the developing world. However, this can only be realised when knowledge and information are effectively harvested for overall agricultural and rural development. The development of precision farming in Northern countries harps on knowledge-intensity; thus, the agricultural archetype in the developing world will have to be redesigned to take advantage of knowledge availability to achieve multiple goals like income, food, jobs, etc. ICT has a significant role to perform in developing such a paradigm, as

was evident from the „Interdisciplinary Dialogue on IT: Reaching the Unreached“ (Swaminathan, 1993).

Important ICT initiatives in India

Agropedia:-

Agropedia platform consists of a Knowledge repository, a social networking platform and content distribution services. Knowledge repository consists of universal meta-models and localized content developed for open learning and sharing of information related to agriculture. It is the first Indian agricultural knowledge repository developed with knowledge-models for localized content for a variety of users with appropriate interfaces built in collaborative mode to support information access in multiple languages.

Agropedia is one stop shop for all information, pedagogic or practical knowledge related to extension service in Indian agriculture. Agropedia is sponsored by National Agricultural Innovation Project (NAIP), Indian Council of Agricultural Research (ICAR) with the following objectives:

- To develop an agricultural repository and to build a Digital Ecosystem in agricultural domain for proper knowledge circulation.
- To prepare a bridge between explicit knowledge holders (like agricultural researchers, scientists, experts and tacit knowledge holders like farmers and other field workers).
- To deploy extension services for agricultural development.

E Choupal:-

e-Choupal is an initiative from ITC's Agri Business Division to face the challenges of India's agricultural uncertainty. Indian agriculture is characterised by fragmented farms, weak infrastructure and the involvement of numerous intermediaries. E-Choupal aims at bringing out the Indian farmers from vicious circle of low risk taking ability - low investment - low productivity - weak market orientation - low value addition - low margin. For this, Indian farmers keep struggling despite abundant resources. To increase the competitiveness of the Indian agricultural sector and enhance productivity, ITC has developed this market-led business model. It is assumed and expected that a growth in rural incomes will also result in the overall growth of Indian economy. The Model in action e-Choupal operates in three layers. This three-layered infrastructure allows ITC to provide a complete end-to-end solution to suit the needs of both the farmers and consumers at village as well as in global level. The first layer consists of ICT kiosks (Village Level) with internet access, managed by an ITC trained local farmer called the Sanjalak. The second layer is known as hubs managed by the traditional intermediary who has local knowledge /skills called Samyojak. The final layer is a network of companies (consumers of farmers' products and providers of products

and services to the farmers) orchestrated by ITC is known as Choupal Sagar, which has a pan-Indian presence. e-Choupal is the largest initiative among all Internet-based programmes in rural India. It reaches to over 4 million farmers of more than 400000 villages through 6500 kiosks. It operates across ten states, namely Madhya Pradesh, Haryana, Uttarakhand, Karnataka, Andhra Pradesh, Uttar Pradesh, Rajasthan, Maharashtra, Kerala and Tamil Nadu in the cultivation of soybeans, coffee, wheat, rice, pulses, and shrimp.

Kissan Kerala:

Kissan Kerala is an Agriculture Information Services system to provide information and advisory to the farmers of Kerala. This is accessible by all concerned anytime in the day and from any parts of the state. The objective of this programme is to empower the farmers by providing them useful information and required knowledge; this would lead the farmers to take better decision. To disseminate the message and to answer farmers queries, various channels are used like Television, Internet, Telephone, and Mobile. The farmers are free to choose any medium of their choice. The quintessential feature of this ICT enabled service delivery model is to ensure that the farmers get the experts assistance on time and agricultural organisations provide necessary help to the farmers. This has helped the cultivators to better the crop production, enhanced crop protection, value addition to the existing practices, opening up new avenues and improves the overall life of the farming community. Children, Youth, women, men and seniors are the target group of this programme, who are somewhat related to the agricultural activities.

Kissan Kerala focuses on five broad areas. Online Agri advisory service : Portal based online Advisory services for the farmers (www.kissankerala.net) Kissan Krishideepam: Agriculture based weekly Television program in vernacular language Online Agri video Channel : In collaboration with the You Tube, online agricultural video channel was brought in the country Tele Advisory Services : Farmers are just a call away from getting solutions to their problems. The mobile based Agri Advisory services: Through text, voice or video message, farmers can get their answers on mobile phones. The project has made certain positive impacts, such as Kissan Kerala has improved the extension and communication competence among the Departmental officers. Timely assistance by the Kissan Kerala programme, agricultural production has increased, thus, attracted the youth and women for agricultural sector. It has also helped in improving the knowledge-sharing among the peer groups and has provided better opportunity to the farmers for marketing their products.

These are some of the few examples of ICT enabled services for Indian farmers. With the advent of the new technology more and more companies are coming ahead to strengthen the Indian farmers' condition. Southern states are far ahead in adopting the new technologies and implementing the same in their day-to-day life. With words of mouth more and more

people are getting interested in this. This is because in southern states especially in Kerala and Andhra Pradesh, farmers get the access in their own language whereas in other states language is a problem. So many a times, even if the farmers are willing, they cannot totally switch over to the new technology.

Agricultural Marketing Information Network – AGMARKNET:-

(A Central Sector Scheme of Directorate of Marketing & Inspection, Department of Agriculture & Cooperation, Ministry of Agriculture)

AGMARKNET has led to a nation-wide information network for speedy collection and diffusion of market information, computerization of market related information such as market fees, market charges, etc., ensuring regularity and reliability of data and increasing the efficiency in agricultural markets. AGMARKNET Project has also been designated as one of the Mission Mode Projects of the Department of IT, Government of India and has won accolades and awards for effectively fulfilling the objective of speedy collection and dissemination of agricultural marketing information for better market access and price realization by the farming community.

Objectives of AGMARKNET

- To establish a nation-wide information network for speedy collection and dissemination of market information for its efficient utilisation.
- To computerize data on market fee, market charges, total arrivals, arrivals by agencies, prices (variety wise/quality wise), storage, dispatches with destination, mode of transportation, costs, sold and unsold stocks, sources of supply with destination, method of sale, payment, weighting, grading facilities, quantities graded, market personnel (trained/untrained), market functionaries, market finance, development programmes, infrastructure facilities, constitution/composition of Market Committee, income and expenditure and other activities of the APMCs, State Marketing Boards and Directorates.
- To ensure flow of regular and reliable data to producers, traders and consumers to derive maximum benefit of their sales and purchases.
- To increase the efficiency in marketing by effecting improvement in the existing market information system.

Agri Clinics and Agribusiness Centres

- Government of India, in association with NABARD and MANAGE has launched this unique scheme to take better methods of farming to each and every farmer across the country.

Objectives

- To supplement the efforts of government extension system
- To make available supplementary sources of input supply and services to needy farmers
- To provide gainful employment to agriculture graduates in new emerging areas in agricultural sector

Developing Interactive Electronic Educational (ICT) Tools for Livestock Owners

Interactive Electronic educational tools or the Information and Communication Technologies (ICTs) can be defined as the techniques, methods and tools used to access information and to communicate with others and to educate them. The major steps of the development of the ICT tools/ information system include processing, storage and retrieval of information and developing effective technologies for communicating the information represented in various formats. The information may be contained in the form of text, image, graphics, audio, video or animations. India like many other developing countries is adopting ICTs in almost all sectors of economy including the livestock sector. Kapange (2002) reported that, ICTs are crucial in facilitating communication and access to information for agricultural and rural development. Since agriculture is the national priority sector, it is one of the potentially beneficial areas for the application of ICTs for economic transformation.

(i) Information system for farmers in Hindi on “Pashudhanavum Kukkutrog Suchnapranali” (PAKRSP)

Features: Majority of the livestock and poultry diseases in our country occur due to the ignorance and lack of awareness of the livestock owners about the important livestock diseases, their symptoms, prevention and control measures.

This software has been developed for 78 most important diseases of the livestock and poultry prevalent in the country and nine common packages of practices.

The system is in Hindi language and would cater to the whole of the country, with voice back up, animations and photo and line diagrams. The CD will be very useful for the farmers rearing the livestock and poultry and would help them provide primary aid for most of the ailments, and would also help in disease identification, its prevention, control.

(ii) Software for students and professionals in English on “Livestock and poultry disease information system” (LPDIS):

- **Features:** This CD has been developed for most of the livestock diseases prevalent in the country.
- The system is in English with voice back up, animations and photo and line diagrams.

- The system will be very useful for the students and veterinary professional dealing with the livestock and poultry disease treatment, for disease identification, its prevention, control and for providing proper and timely treatment.
 - In fact it will act as an expert system for the professionals in need of advice. This system can be also used by the trainers for training programmes.
- (iii) **CD for farmers in Hindi based on the frequently asked queries with search engine entitled “ Digital Pashuwasthyaavum Pashupalan Prashnottri”**
- **Features:** It is a digital system developed in farmer’s own language (Hindi) for frequently asked question (five hundred) on animal husbandry and veterinary science and is a well-understood solution to address the farmer problem.
 - This system provides two primary functions: to provide a web interface to access the database under different section wise and second primary function is that user can search the topic by entering the keywords.

Voice Krishi Vigyan Kendra (vKVK)

- vKVK is a platform that connects KVKs with farmers through internet and mobile technology. The objective here is to bridge the gap between the farmers and the KVK expert. vKVK is developed by IIT-Kanpur in a consortium mode as part of ICAR-NAIP supported project entitled “Engaging Farmers, Enriching Knowledge - Agropedia Phase II”
- vKVK service started in August, 2011 as a pilot project in four states with the official partners viz International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)-Hyderabad, University of Agricultural Sciences-Dharwad and ZPD-IV.
- Initially, the service was started in **24 KVKs** and is now being up-scaled in **190 KVKs** covering more than **30,000 farmers** . The vKVK service is cutting across all the service providers and can be accessed flawlessly on even low end mobile handsets. All vKVK services are free of cost to the farmers.

Dairy Information Services Kiosk and Dairy Portal:-

A proof of concept application using Information and Communication Technology (ICT) in the dairy sector was developed by the Centre for Electronics Governance at the Indian Institute of Management, Ahmadabad (CEG-IIMA). The application aims at helping the dairy farmers with timely messages and educating them on the care for their milch cattle and enhance the production of quality milk. It also aims at assisting the dairy unions in effectively scheduling and organizing the veterinary, artificial insemination, cattle feed and other related services. The application uses Personal Computers at the milk collection Centres of the Dairy

Cooperative Societies (DCS) having connectivity to an Internet Service Provider (ISP). The application includes two components - a Dairy Portal (DP) and a Dairy Information Services Kiosk (DISK).

Dairy Information Services Kiosk (DISK):-

With the initiatives of National Dairy Development Board (NDDB), out of 70,000 dairy cooperative societies in the country, around 26000 are using Electronic Milko-Testers (EMT) and around 2500 are using the PC connected electronic milko-tester machines (known as Automatic Milk Collection Systems - AMCS). These systems introduced very satisfactory milk collection methods and facilitated immediate payments to farmers based on the quality and quantity of milk delivered. The success of these systems coupled with inexpensive connectivity opportunity offered by Internet, motivated the CEG-IIMA to enhance the PC at the Automatic Milk Collection Systems (AMCS) into a Dairy Information Services Kiosk (DISK) and offer an extensive knowledge and service delivery mechanism through a Dairy Portal. The DISK when used with a Dairy Portal of the Union, enhances the scope of services that would benefit the farmers as well as the dairy industry. Dairy farmers who are members of the DCS, the dairy farmers, visit the milk collection Centre of the DCS twice a day to deliver the milk. Thus, there exists enormous opportunity to interact with them on the issues related to DCS and union activities. The Figure below pictorially illustrates the concept of DISK and Dairy Portal.

Dairy Portal:-

The Dairy Portal is designed to provide an interactive dairy information and education channel to the members of the DCS (farmers) and others in the dairy sector. To a large extent, the contents are created and the interaction is facilitated in the regional language as well as English. The Dairy Portal has textual as well as multi-media content useful to the farmers, extension workers, business executives and researchers dealing with the dairy sector. The portal mainly offers services such as education, entertainment, discussion forum, frequently asked questions, data transfers, application forms for submission to various agencies, e-commerce, and e-banking.

Mobile based advisory services for rural India:-

Agriculture extension and farmer-outreach programmes are facing major challenges—cost-effective outreach, solutions tailored to needs of individual farmers and an image that is farmer-friendly. The mobile technologies have created new channels to communicate with other mobile phone is helping to agricultural extension outreach. Keeping these various characteristics and the needs of Indian farmers in mind, various applications and services have been deployed by different projects. The projects are providing farmers’ needs based specialised mobile-based advisory services through their technological innovative applications combined with creative business plans such as IFFCO Kisan Sanchar, Nokia Life

Tools and Reuters Market Light, which are helping a millions of farmers across the country take the right decisions. aAqua Mini offers real-time decision support tools (aAQUA) to progressive farmers and organizations supporting progressive farming (Bahuman and Kirthi, 2007). The aAQUAe Agri Service is a problem-solving system dedicated to find solutions to problems posed by Indian farmers - small and large. Answers toagri-related queries are sent in 24 to 72 hours depending on the difficulty. Sixty experts form the expert forum who come from diverse areas of expertise. The Kisaan SMS Portal competes with *Behtar Zindagi*, a mobile based service launched by Bharti Airtel which leverages interactive voice response (IVR) to communicate information such as weather updates, market rates, livestock, agriculture, fisheries, health, education and finance. Mobile also has a competing voice based rural information service called *Cell Shakti*. Previously, Tata communications offered its subscribers *Nano Ganesh*, a product which allows farmers to use mobile phones to remotely monitor and switch on irrigation pumps used for watering crops in remote locations. TCS has also developed *MKrishi*, a mobile based service delivery platform that aimed to provide farmers with information on their produce, weather, rainfall, etc., viaIVR based system and GPRS handsets. Nokia also has Nokia Life Tools service that provides an agriculture pack providing information on horticulture, dairy farming, fisheries, among others. In September 2013, the company had launched *Nokia Life+* an Internet based Nokia Life tools service. Intuit has deployed a pilot project called *Fasal*, which is free SMS based platform offering real time price information to farmers about their crops. Thomson Reuters group also runs *Reuters Market Light* (RML), a mobile based information service for farmers. All India Radio (AIR) news is planning to send news updates via SMS to registered users across the country, reports *The Hindu*. The publication reports that every SMS will have 3 to 4 news headlines along with an advertisement. The news update will occupy 100characters in an SMS while the advertisement will occupy 160 characters. In March 2013, AIR had launched an application on Android which is available for download from the **Google Play Store**. The app provided national and regional news from *Prasar Bharati*, and regional news bulletins in audio forms. AIR has already received permission from TRAI to send bulk news messages under transactional messages category. *Fisher friend* – The project of M.S. Swamina than Research Foundation (MSSRF) in Tamil Nadu and Puducherry leverages mobile technology to provide vital livelihood information to fisher folk. All content is displayed in the local language - Tamil.

mKrishi: Tata Consultancy Services (TCS) Mobile Agro Advisory System:-

It connects farmers with an ecosystem that empowers them to make efficient decisions about agriculture, drive profits, and conserve the environment. This allows the farmer to make a query in a local language from a mobile phone and receive personalized advice or relevant information on the same in

local language (Horvath, 2008). This is the project working on private partnership based revenue generating business model in Maharashtra and Uttar Pradesh states. The services broadly include, crop disease diagnosis; sensors based remote land & crop property recording (grape, cotton, soybean and potato); micro- weather information (temp, cloud cover, precipitation etc.

IFFCO Kissan Sanchar (IKSL):-

IFFCO being a cooperative of about 40,000 societies and 55 million farmers felt its role of helping in attaining inclusive development through creating awareness in individuals by communicating with them through mobile phones. It promoted an enterprise *IFFCO Kissan Sanchar Limited (IKSL)* to achieve the goal converted mobile phones into dynamic powerhouse of knowledge to change the living of the poor. IFFCO Kisan Sanchar, which has 13 Kisan Call Centres in different parts of the country, has thrashed out contingency plans in consultation with the State Agriculture Department & Research Organisation to assist farmers impacted by the delayed monsoon. The idea is to make use of IFFCO's (Indian Farmer Fertilizer Co-operative) deep extensive reach and establish a low-cost telecom distribution channel through the network of cooperative societies. To accomplish the task, IFFCO tied up with Airtel to build and offer a platform for the farmers through the cooperative society network. The project is working on public-private-NGO partnership based revenue generating business model across major states covering in two stages. The services to farmers include telecom products and services of Airtel; free daily voice update on VAS platform (market prices, farming techniques, weather forecasts and fertilizer availability) and dedicated helpline for farmers to answer their queries. Database confirms that nearly 12 lakh farmers are listening to our voice messages everyday and most of its messages are related to monsoon.

Nokia Life Tools:- Finish mobile handset maker Nokia says nearly 30 million customers subscribe to its Nokia Life Tools service and a sizeable chunk of this group are farmers. It is having a range of agriculture, education and entertainment services designed especially for the consumers in small towns and rural areas of the emerging markets. This project works on private partnership (PP) based revenue generating business model in India. The services includes, information on seeds, fertilizers, pesticides, weather(temperature, rainfall, wind conditions) and prices in English, Marathi and Hindi language option and prevailing market prices, education service in dual language display option. Nokia Life provides personalised text messages on 270 commodities in 12 languages across 22states in 12 languages and can be accessed by farmers on a daily basis.

Monsanto's Dr DEKALB Farm Care: It is a free phone advisory service for growing DEKALB brand of corn, which is manufactured by Monsanto India. Content is delivered via automated voice and SMS text messages and staffed answer centres, the company's website said.

CERES: The services specific to farmers include, information on seeds, fertilizers, pesticides, disease and farming input market prices and weather (micro-climatic, rain/storms, temperature, humidity, precipitation, wind speed) on weekly and monthly basis. It aims to assist farmers in timely and customized manner to meet specific local needs to increase the overall productivity of agricultural practices (Anurag et al., 2008). This is the project working on private partnership based revenue generating business model in Gujarat state covering 78 villages in Vadodara district.

NDRI-MS

National Dairy Research Institute, Karnal, has developed NDRI-MS Portal with the aim of building inexpensive tools and user friendly technologies to bridge some of the information gaps in farmer's field. This portal is based on software to send the SMS (voice and text) from the computer to the farmers mobile. This software will keep the record of messages, farmers and message history. This software is designed in ASP.Net 4.0 using C# language. Database is designed using SQL Server 2008.

Conclusion

Despite the huge potential to harness ICT for agricultural development, only a few isolated projects have been initiated in India and a few in other parts of the world. Interestingly, many of these projects we restarted by NGOs, private organisations, cooperativebodies and governmental organisations other than agricultural departments. This shows the apathy of agricultural development departments towards incorporating ICT into their day-to-day activities. To formulate a strategy for overall agricultural development, the isolated ICT projects need to be studied and the experiences generated must be documented in order to draw lessons for the future.

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