Knowledge Transfer through ICTs-Changing scenario to revitalize Rural Agri-business

MRK Murthy¹, Research Associate, Ph.D Research Scholar, JNTUH, National Academy of Agricultural Research Management Rajendranagar, Hyderabad, A.P, India - 500 030, E-mail: rajamorlakm@gmail.com

OK Tara², Research Associate, National Academy of Agricultural Research Management Rajendranagar, Hyderabad, A.P, India - 500 030, E-mail: tara.srinivas2003@gmail.com

Abstract—This paper presents the need for ICT’s in Agriculture that has reached far beyond necessity as compared to the past. There is a great scope to implement ICT in Agriculture to disseminate the information effectively and timely to the farmers who are the ultimate beneficiaries of the system. The traditional agriculture paradigm has to be transformed the way it has been functioning since past so as to bring a new revolution in enumerating the available resources for increased productivity and economy. Sustained livelihood in the rural areas is the main driving force to the concept of ICT enabled Agriculture. As seen in the present scenario, Agriculture Extension services need a change in traditional mindset. Mere “Transfer of Technology” does not suffice to the needs of farmers. “Transfer of knowledge” has become necessity to enable the system to enrich its vigor and rejuvenate with changing agro-climatic scenario. The conventional approach of extension services have not been able to resolve the challenges posed by various factors in Indian Agriculture. The paper at length discusses about the challenges and the need felt ICT mediated services for knowledge transfer in rural Agri-business.

Keywords- Agri-business; Knowledge transfer; ICTs; Rural agriculture; Value Chains.

Introduction

Information and communication technologies (ICT) are used by researchers to communicate with each other, and as tools for data and information management. Efforts are being made to deliver research outcome to farmers and other stakeholders through its effective use. ICT enables interactivity and access to even the illiterates. With information, agriculture can be improved to be more sustainable, economically viable and ecologically balanced. Information and communication have always mattered in agriculture. Ever since people have grown crops, raised livestock, and caught fish, they have sought information from one another. Recent developments in the field of Information and Communication Technologies (ICT) are indeed revolutionary in nature. ICT, when used as a broad tool for educating the communities especially entrepreneurs, business graduates and managers, heralds the formation of a new class of society—the Knowledge Society. Knowledge thereby becomes the fundamental resource for all economic and societal developmental activities in the highly competitive and pluralistic world. ICTs play a key role in improving the availability of information on agricultural production and market in developing countries.

In rural areas, Current limited evidence from individual farmers and fishermen in India supports the conclusion that ICTs improve incomes and quality of life among the rural poor [1], [2]. ICTs can raise incomes by increasing agricultural productivity [3] and introducing income channels other than traditional farm jobs. The idea that wider access to and use of ICTs throughout a country will reduce inequalities in income and quality of life between rural and urban residents is compelling. Despite the scarcity of evidence to support this notion, it underlies widespread policy initiatives to ensure equitable access to ICTs in all areas.

Creating affordable ICT services in rural areas is a complex challenge. Affordable access to ICTs in rural areas can be frustrated at the supply as well as the demand end of the service provision chain. To supply ICTs and related services in rural areas, the main challenge is the high level of capital and operating expenses incurred by service providers. On the demand side, rural adoption of ICTs in developing countries is curtailed by low availability of complementary public services, such as electricity and education, and by the relative scarcity of locally relevant content.

Recognizing the equity implications of access to ICTs, governments have adopted regulatory policies to enable the rollout of ICT infrastructure and the supply of services in rural areas, and they have addressed low rural demand by introducing locally relevant content in the form of e-government and e-agriculture services. ICT-based market information systems have a proven track record for improving rural livelihoods in middle income developing countries where they have been introduced. However, these systems are generally limited in scale and
have not been effectively replicated beyond the local level. This paper attempts at an analysis of ICT role play in transfer of knowledge bringing about sustainable agricultural development and future perspectives in agriculture and ICT.

Objectives

In this backdrop, the present research on Information Communication Technology among farmers and buyers has been conducted to assess the feasibility of ICT Applications in knowledge transfer in some of the Existing Agri-business Systems in India.

Need of ICTs and Market Information for Farmers

Marketing of commodities at the right time is highly essential. As farmers are unaware of the market prices and due to the interference of the middleman, they are unable to sell their produce at desirable price. With the knowledge of actual market price farmers can gain more profit by selling their produce at the right markets. This is now possible by using modern information communication technologies.

Understanding Drivers of ICT in Agriculture

Five main trends have been the key drivers of the use of ICT in agriculture, particularly for poor producers: (1) low-cost and pervasive connectivity, (2) adaptable and more affordable tools, (3) advances in data storage and exchange, (4) innovative business models and partnerships, and (5) the democratization of information, including the open access movement and social media. These drivers are expected to continue shaping the prospects for using ICT effectively in agriculture.

Raising rural income through ICTs

Using ICT enhance the chances of rural income generation to achieve agricultural development goals by supplementary investments, resources, and strategies. ICTs could educate rural masses on flexible but strongly supportive policies and regulations, complementary investments in physical infrastructure, support to men and women farmers of different age groups, technological appropriateness, the enabling environments for innovation and new businesses and such other facilities. This brings about opportunities for greater market accessibility, foster employability, sources for finance or income generation and poverty alleviation. This determines the long-term impact and sustainability of these efforts.

Access to ICTs - the supply perspective

The supply side perspective is concerned with both technical and organizational aspects of providing access to ICT-based services in rural areas across the agricultural supply chain. The technical aspects include connectivity, computers and peripherals, software and applications, and capacity building of farmers and other users in rural areas. The organizational aspects include the creation of an organizational structure for developing and maintaining the technical infrastructure, provision of services, and capacity building in using ICTs in rural areas. Different types of organizational structures have emerged in India, as the corporate agribusiness model, public sector model, non-government organization (NGO) service models or even PPP models as discussed in coming segments. The former focus on incorporating ICT use into the overall corporate business strategy. The latter adopt a rural information center based approach to provide access, and network sources of knowledge, information and services for the rural populations. For all the models, the ICT infrastructure for internet connectivity and communication is critical for the success of the business strategy.

ICTs based services - the demand perspective

Farmers make critical decisions throughout the year. These decisions include those based on choice of inputs (crop varieties and seeds, water, power, fertilizers and pesticides) and market transactions related to them, farm operations (tillage, sowing, water management, fertilizer management, pest management, harvest), post harvest operations and transactions (storage, transport, marketing, processing, etc.) and others. Further, at the level of households, a number of non-farm decisions are made related to consumption, savings, investments, education, health, etc., which impact farm operations. Typically farmers rely on accumulated experience and the support of local organizations (e.g., input suppliers, rural credit agencies, extension services, NGOs) for information related to both farm and non-farm decisions. They also receive information from radio and television broadcasts by experts and professionals from more distant sources. Together, these form the local knowledge system accessible to a small farmer for taking decisions. Often, this system is inadequate and many decisions are made with limited information. The decisions are also subject to high transaction costs and time delays. The role of ICTs in such a scenario is to provide timely information, increase choice, reduce transaction costs, and contribute to improving the efficiency of decision making to raise rural incomes and improve the quality of life of the rural populations.

Applications of ICT

Applications of ICT that support agricultural and rural development fall into five main areas as: 1. Economic development of agricultural producers; 2. Community development; 3. Research and education; 4. Small and medium enterprises development; 5. Media networks.

Economic development of agricultural producers can be done by providing instant market information through Internet, mobile phones, PDA’s etc. Connectivity to various sources can be achieved quickly and effectively. Many services like AGMARKNET are providing market information to the farmers direct from the mandi. Media networks can be
developed by using ICT interventions through Internet, mobiles etc.

Role of ICT in transfer of knowledge and information for Agri-business development

- Farmers are in need of online information regarding package of practices, disease and pest management, potential exporters and importers, registration procedure for export of the produce, weather details and prices in important national and international markets, demand-supply scenario, market forecasts etc. A sustainable value to the grower can only be achieved when an integrated system is developed to meet the grower needs. ICTs familiarize farmers for effective technology dissemination and better market access.

- Online modules of information on Land Preparation, Sowing / Planting, Water Management, Fertilizer Management, Weed Management, Integrated Pest and Disease Management, Harvest, Post Harvest Technology and Storage would give knowledge and information to the farmers, wholesalers, retailers and other persons for prospective agriculture.

- Information on Details of land, Varieties, Age of the Farm, Water schedule, Pruning Dates, Spray Schedule, Prevailing Crop Growth Stage and Harvesting Schedule from time to time promotes marketable opportunities. Such information can be exchanged on all linkages including public, private, voluntary organizations and NGOs. This can give an advantage for government organizations to make better policies to address the issues of agriculture in better comprehensive manner for maximizing the efficiency and enhancing productivity.

- Efficient technology dissemination mechanism and sustained export marketing efforts by use of ICTs minimize loss of information

- Faculty working in the government organization with sound knowledge of package of practices on cropping and export procedures can deliver expert advise online for in situ problems on specific issues.

- Developing separate websites could facilitate direct interaction and rapid market access to important export markets and customers in the international market.

INDIAN SCENARIO OF EXISTING ICT APPROACH

Rajiv Internet Village programme in Andhra Pradesh

Andhra Pradesh government launched the Rajiv Internet Village Programme to bring the government services or benefits intended for the citizens in a quick, cost effective and trouble free manner with single window approach, for the people living in villages and rural areas. Rajiv Internet centres are being set up in 8618 villages across the state.

The programme benefits the citizens by providing the information on following:

- Easy access to information on agriculture, education and health etc.

- Market prices, cropping pattern, weather forecast, agriculture extension

- Quality inputs, seeds, fertilizers, pesticides and complete literacy for one person in each family.

E-Choupal

This is an initiative of ITC’s International Business Division as a cost effective alternative supply chain system to deal directly with the farmer to buy products for export that transformed into a mega market for rural India. It is a unique web-based initiative in Central India and caters to soya growers regarding all information, products and services required in soya farming. The soya kiosk facilitates supply of high quality farm inputs and purchase of soya at the doorsteps of the villages. The project has 23 tele-centres in Hoshangabad districts of Madhya Pradesh.

The e-choupal initiative has already benefited over 3.5 million farmers. By 2012, the e-choupal network projected to cover 1,00,000 villages, representing one-sixth of rural India and create more than 10 million e-farmers with knowledge in logistics and risk management, thereby enabling them to face global competitions.

E-Krishi

It connects farmers community throughout Kerala to have access to information. E-Krishi is primarily focused on agriculture, aimed at enhancing the marketability, productivity and quality of agricultural goods. Sellers (farmers) and buyers (merchants) can register to receive such information through their local community markets. It provides web-based solutions for small and medium size farmers, as well as owners of large landholdings supported by a technology enabled robust transaction platform that facilitates enhanced information on agriculture, seeds, high-end crops, fertilizers and pesticides.

It assists in fostering networking opportunities between farmers and traders. It enables both farmers and merchants to post their requirements, view advertisements and arrange for virtual meetings with other parties. It addresses the existing gap in agriculture information flow and transaction management. The e-Krishi platform helps foster information, communication, and transaction and payment services for all
citizens. The project was piloted in the Malappuram district as well as in Kasaragod, Kannur, Kozhikode and Kollam.

**Bhoomi**

"With equal access to information, a person from lower social strata, now has the same privileges as a person, from upper social strata" says Rajiv Chawla, who oversaw the $3.7 million program, called Bhoomi -- which means "land" in both Hindi and Kannada. In Karnataka alone, for instance, deed fraud once cost poor farmers $20 million a year; today, the problem has been virtually wiped out, according to the data. The project was piloted in the Malappuram district as well as in Kasaragod, Kannur, Kozhikode and Kollam.

**Indian Society of Agri business Professionals (ISAP)**

ISAP is enabling application of ICTs in rural extension and particularly agricultural extension. ISAP is a network of professionals in India and SAARC countries, and is a non political, non-governmental organisation started and run by professionals. It has 75 chapters, 400 NGO partners, 1,10,000 farmers sign ups. It has answered over 3000 queries/problems raised by members of the farming community. This is probably the largest network of its kind in the world. ISAP targets to further create a network of 1,00,000 members who would work at taluk levels and below as micro entrepreneurs to achieve this task. It plans to put together an expert back end consisting of more than 50,000 experts. ICT has made the task of creation and management of this network possible. ISAP will help people make connections and grow their networks and keep in touch with friends from the agricultural and allied sectors. Its site will enable NGOs kiosk operators and others to locate experts for queries clearance in their area of interest. Awareness and opportunities are created for social and economic upliftment of the volunteer members of the network. Thus, Strengthening the capacities of service-providing institutions (both government and others) to respond to grassroots initiatives and deliver improved services in remote communes or village transfer project implementation knowledge to local community leaders (Sunil Khairnar in iNARS).

**Indian Agribusiness Systems Private Limited (IASL)**

IASL is involved in collating and distributing market reports on all the major commodities in India. It produces research reports on each commodity on daily, weekly and monthly basis. It also publishes weekly newspapers for farmers and journals for the agri-business community. Agri watch reach through the print medium is 2,00,000 farmers. The online media have a reach of a couple of 1000 people. The company uses Internet, Email, SMS and print for delivery of information and knowledge to all its clients. The company covers more than 50 major markets in India, and is in daily contact with the market participants. More than 2000 odd sales team, who are on variable commission, are engaged in distribution and sale of the IASL information services to the participants in the agribusiness trade. The initial investment of close to a million US$ came from purely private sources. This is probably the only profitable private sector content organization in the developing world. (Sunil Khairnar, www.agriwatch.com).

**e-sagu**

By exploiting recent information technology revolution (mainly the database, web, image processing technology), the Indian Institute of Information Technology (IIIT), Hyderabad built a cost-effective and scalable agricultural expert advice dissemination system to disseminate agricultural advice to the farmers, both in a timely and personalized manner. The agricultural experts generate the advice based on the information about the crop situation received in the form of both text and images. IIIT is currently implementing e-sagu, the idea of web-based agriculture expert advice dissemination system to cotton farmers in AP (http://agriculture.iiit.net/agrids, http://www.esagu.in/esagu).

**Initiatives from some of the ICAR Institutes**

Under the National Agricultural Research System (NARS) the ideal delivery model for the ICTs was envisioned as a multi-pronged strategy involving Institutions to go online to host and share their contents and services through centres like rural information kiosks for information access to the farmers. The internet-based ICTs helped to establish effective linkages between research and extension. Some of such models are presented in brief.

**Expert Systems**

Some of the agricultural research institutions have developed ICTs in specific fields of subject to enhance the connectivity for specific purposes. Indian Institute of Horticultural Research (IIHR) developed expert systems on Grape, Mushroom and Package of practices for Horticultural crops. Central Plantation Crops Research Institute (CPCRI) developed expert system on Coconut pests and disease management. National Institute of Agricultural Extension Management (MANAGE) developed expert system called Rice Doctor to diagnose rice pests and to suggest prevention/cure. Center for Informatics Research and Advancement (CIRA), Kerala designed ‘AGREX’ expert system for agri field personnel to give timely advice to the farmers. Punjab Agricultural University (PAU) developed Advisory System on Farm Management.

**The integrated ICT model**

An integrated ICT model was used in an action research project of National Academy of Agricultural Research Management (NAARM) for developing a strategy and up scaling of ICTs for the rural masses. The integrated ICT model
involves integrating Process with Content and Technology to achieve sustainability. The process involves participatory methods such as Rural Appraisals, Assessment of Needs, Problem Prioritization and appropriate content treatment and delivery through suitable and preferable media to achieve sustainability. The integrated ICT model also encourages the public-private partnership in extension activities in a collaborative mode with the people involved at all stages. The model advocates strengthening the on-going extension mechanisms in association with numerous organizations instead of a stand-alone approach. Such integrated models owe their effectiveness to the networking of contributing organizations, people’s mobilization and social capital utilization through capacity building.

Appraisal of ICTs for Agri Services

ICT based agricultural development services focus on enhancing the skills and knowledge of smallholder farmers and enabling smallholder value chains to improve their competitiveness and flourish.

ICT delivers value for value chain stakeholders through:

- Knowledge delivery, including access to information, e-learning, and advisory services
- Farm planning to help enhance efficiencies in agribusiness operations
- Quality assurance through communication of standards and capture of auditable data
- Procurement portals that facilitate input commerce and output trading exchanges
- Supply chain planning to reduce cost and create visibility for logistics
- Financial services that give greater access to capital and help reduce the cost of financial transactions
- Community services that enable rural citizens to access basic healthcare, education, and e-government services

Recommendations

- The organizations and departments concerned with agricultural development need to realize the potential of ICT for the speedy dissemination of information to farmers.
- Government at national and state level in India has to reorient agricultural policies with a full-fledged strategy to harness ICT’s potential for agricultural development.
- Generating awareness among young and middle-aged farmers about the availability of ICT services to increase farmers’ participation in ICT initiatives. Older farmers should be brought into the chain of ICT networks at a later stage. Emphasis should be given for providing information relevant to their farming systems.
- Strong interfaces should be developed at village level so that the problem of computer illiteracy among farmers may be resolved. User-friendly software, graphic interfaces and pictorial information would encourage more IT use.
- It is recommended that, in drought-prone and less endowed areas, future ICT initiatives could provide information services such as facilitation of access to land records, question-and-answer services, information on rural development programmes, weather forecasting, marketing information, best package of cropping practices for dry land agriculture, early warning of disease and pest problems, information on crop insurance, input costs, post harvest technology and market approach.
- It is also recommended that, before ICT services are set up in a region, efforts are to be made to develop among the farmers both a satisfactory level of faith in the intentions of the ICT staff and a firm commitment to the goals of the proposed project. It is also suggested that participatory and rapid rural appraisals are carried out to ascertain what information the farmers need. It is further recommended that the farmers be instructed on how to get the best possible use out of the services provided.
- Continuous persuasion is essential for knowledge dissemination through ICTs usage among the rural masses until it becomes a routine practice for better interface and interaction among the players of the system. This erases the resistance and the feasibility of utility increases.

Emerging technology options

1. Certain niche product chains (e.g.: poultry, many horticultural, spices and organic food products) have well established market chains. Most of these chains at the farmers end function on the basis of trust and not through legal contract deeds. The business houses use modern communication technologies extensively in the higher levels of the supply chain. It may be possible to encourage and enforce through regulation such business can be used to use ICTs in their supply chain.

2. There is need for regulatory support to promote cellular, mobile and IP based broad band technologies to enhance and speedup penetration of
tele-services in rural areas. The regulatory support can be in the form of subsidy for basic infrastructure and initial maintenance to enhance telecom penetration in rural India, which in turn would push the ICT enabled services to farmers in rural areas.

3. ICT initiatives in rural areas should be shouldered by public, private and non-governmental agencies. Such partnership arrangements need policy support and national program in the lines of National Adult Education Program.

Conclusion

Provision of right type of information to right type of people at right time is very much the need of the hour for making farming more sustainable, economically viable and ecologically balanced. As there is a wide gap in the rural areas due to rampant illiteracy, feasibility of usage of digital devices and information is at stake. Even the most well intended initiatives have failed to achieve their objectives. As education and information can greatly be improved through the use of the ICT, proper implementation of it should be made the primary goal of every village. To sum up, knowledge dissemination through appropriate ICT applications, realistic opportunities in the field of development and social change, we need to think about bringing in combination of players from inside and outside agriculture system. ICTs give the potential of integrating information in a cross-sectorial way, e.g. through ‘mobile databases’. Participatory Information and Communication Technology Development (PICTD) can play an important role in this regard. With ICT, agri-business will become a boon for the lives of people in rural areas. If properly handled and implemented, rural agri-business India will shine with confidence. Till now, rural agri-business, which is supposed to be a liability, will become an asset for the country.

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