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IMPACT OF ICT ARCHITECTURES IN AGRICULTURAL SECTORS

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Abstract:- *Information and communication technologies (ICT) are increasing day by day among different communities for obtaining the information about related issues, problems and their solutions. In the context of agriculture development, ICTs have played important role in developing countries. Internet, mobile phones, radio and television are most important tools of communication providing knowledge and information to farmers about agriculture. Internet is disseminating information regarding price and marketing of goods and farmers are receiving information within minutes from all over the world. Agriculture is an important sector with the majority of the rural population in developing countries depending on it. ICTs play an important role in addressing these challenges and uplifting the livelihoods of the rural poor. e-Agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use ICTs in the rural domain, with a primary focus on agriculture.*

Keywords: *ATIC,* e-*Agriculture, ICT, Kisan Call Centre, Precision Agriculture.*

INTRODUCTION

Agriculture is an important sector of the Indian economy as it contributes about 17 per cent to the total gross domestic product (GDP) and provides employment to over 60 per cent of the population. Indian agriculture has registered impressive growth over the last few decades. The food grain production has increased from 51 million tonnes (MT) in 1950-51 to 252.23 MT in 2015-16 (Anonymous, 2016). Indian agrarian economy is characterised by low degree of market integration and connectivity, accessibility of reliable and timely information by the farmers on prices of commodities. The development and application of better customised technologies specific to agro-climatic conditions, farm size and level of agricultural development is the real challenge ahead for the policy makers. The bane of Indian agriculture is not lack of technologies and R&D efforts but inadequate and inefficient dissemination of relevant information to the farming sector (Bahl, 2008).

The application of ICT can play a pivotal role in efficient dissemination of information. The ICT can deliver fast, reliable and accurate information in a user-friendly manner for practical utilisation by the end user. The information disseminated facilitates the farmers to decide what and when to plan, how to cultivate, when and how to harvest, what post-harvest management practices to follow, when and where to market the produce etc. In order to get the desired results from the use of ICT for dissemination of information in a country where majority of the farmers are illiterate, land holdings are small or marginal, the level of infrastructure development is very poor in the rural areas, there is need to assess the information requirement of the farmers. Further, how effectively ICT may be used to deliver the required information to the satisfaction of the user and identifying the suitable model for Indian farmers is required. ICT refers to technologies that provide access to information through telecommunications medium such as the radio, television, cell phone, computers, satellite technology; internet including email, instant messaging, video conferencing and social networking websites which have made it possible for users across the world to communicate with each other to give users quick access to ideas and experiences from a wide range of people, communities and cultures (Bhalekar *et al*., 2015).

Furthermore, mobile phones have reduced the gap among farmers and buyers, now farmers directly communicate with customers and get price of their products from market. Mobile phones have also provided new approach to farmers to get latest information from metrological department for weather conditions before using pesticides in their farms.

Reasons of Agricultural Information delay in rural India

The main purpose of extension is to transfer the agricultural advanced technology and research to the farmer, and feedback of field problems to the research system. Latest information and knowledge on the subject play a major role to full fill this purpose. There is an information delay between farmers and agriculture researcher in India because:

- Media, Information Management and ICT are not properly used
- Lack of sufficient extension workers
- Lack of Agricultural information literacy in India
- Lack of updated agriculture information with the farmers and most of the extension workers
- Poor technological knowledge of farmers and village level extension personnel
- Economic problems of rural people

- The top-down approach is adapted for extension activity. So the linkages between research- extension and farmer remained weak etc.

Advantage of ICT in Agriculture

The benefits of ICTs for increased agricultural productivity and strengthening the agricultural sector include timely and updated information on agriculture related issues such as new varieties release, emergence of new threats such as diseases, weather forecast, pricing control, warning alerts etc.

ICT in enhancing agricultural productivity

- Understanding and addressing global agriculture developments both advantageous and disadvantages are critical to improving smallholder livelihoods, in which ICT can play a major role.
- The continued increase in globalization and integration of food markets has intensified competition and efficacy in the agriculture sector and brought unique opportunities to include more smallholders into supply chains.
- Agriculture faces a range of modern and serious challenges, particularly in developing countries exposed to price stocks, climate change, and continued deficiencies in infrastructure in rural areas.

Use of ICT in Agriculture

- Increasing efficiency, productivity and sustainability of small scale farms.
- Information about pest and disease control, especially early warning systems, new varieties, new ways to optimize production and regulations for quality control.
- Better of markets resulting from informed decisions about future crops and commodities and best time and place to sell and buy goods.
- Up-to-date market information on prices for commodities, inputs and consumer trends.
- Strengthen capacities and better representation of their constituencies when negotiating input and output prices, land claims, resource rights and infrastructure projects.
- Reduce social isolation, widen the perspective of local communities in terms of national or global developments, open up new business opportunities and allow easier contact with friends and relatives.

Impact of ICT Architectures in Agriculture

e-Agriculture:

e-Agriculture is an emerging field focused on the enhancement of agricultural and rural development through improved information and communication processes. Applications of e-Agriculture has geared up for maximizing profits in developed countries but in many developing countries farmers' access to information is improved through grass root level initiatives of using ICTs as well as distance education modalities to enhance the knowledge base among service providers.

Role of e-Agriculture

- Ensure the systematic dissemination of information using ICTs on agriculture, animal husbandry, fisheries, forestry and food, in order to provide ready access to comprehensive, up-to-date and detailed knowledge and information, particularly in rural areas.
- Public-private partnerships should seek to maximize the use of ICTs as an instrument to improve production (quantity and quality).

Precision Agriculture:

Precision Agriculture is the term used for application of sophisticated technologies in Agriculture to improve the quality as well the quantity of production. Precision Agriculture is about harnessing computer and satellite technologies by farmers for cutting costs, improving yields and protects the environment. These include global positioning systems, geographic information systems, yield monitoring devices, soil, plant and pest sensors, remote sensing, and variable rate technologies for application of inputs." In precision agriculture or site-specific farming, farmers are using ICTs and other technologies to obtain more precise information about agricultural resources which allow them to identify, analyze, and manage the spatial and temporal variability of soil and plants for optimum profitability, sustainability, and protection of the environment. Precision Agriculture is basically the advanced e-agriculture application. It makes use of 5 major components of technology:

- Geographical Information Systems (GIS) for analysis and management of spatial data and mapping
- Remote Sensing (RS) to identify and Global Positioning Systems (GPS) to locate and define spatial features or activities that contributes to the quality of site-specific practices
- Variable Rate Technology (VRT) allowing targeted, site specific input applications and yield monitoring for recording crop productivity as an historical database for crop management.

It also uses the e-commerce for marketing the sale of agricultural products over the Internet and extranets. Precision agriculture is described as:"a system to manage farm resources better. Precision farming is an information technology based management system now possible because of several technologies currently available to agriculture.

Kisan Call Centre (KCC)

Asymmetry of Information between farmer and farmer, village and village, region and region and the country as a whole versus other countries is a big challenge for Indian Agriculture sector and ICT is the feasible solution. More than 5 lakh Indian villages are already under the coverage of telecommunication network. To make the best utilization of the fast growing ICT sector department of Agriculture and Cooperation appointed TCIL, a Govt. of India Company to start the Kishan Call Centre (KCC). KCC scheme is operational since 21st January 2004. These KCC can be accessed on a common toll free number 1551 anywhere in India. There are 13 KCC; each centre is allocated a cluster of states. 116 Agriculture Graduate are posted in these call centers. The quarries received from farmers attended by these call centre executives (Agriculture Graduate) are replied in the local language. The quarries/problems which could not be cleared at level-I (call centre executives) are forwarded to 123 experts located in different parts of the country at State Agriculture Universities, ICAR institutes, Considering the India Agricultural scenario the KCC is the instant ICT solution for the farmers. The reasons are as following:

- Real time interaction in local languages
- Simply a mobile phone is sufficient for communication with KCC executives.
- Almost sufficient to meets the local requirement

ICT for masses(Common Services Centres)

In May 2006 the Government approved the CSC is a strategic cornerstone of the National e-Governance Plan (NeGP) as part of its commitment in the National Common Minimum Programme to introduce e-governance on a massive scale. By March 2011, Department of Information & Technology (DIT), Government of India, has planned to rollout out 100,000 + Common Services Centres (CSCs) across the country particularly in rural areas. High quality and cost-effective video, voice and data content and services in the areas of e-governance, education, health, telemedicine, entertainment as well as other private services would be provide by these CSCs.

The main objectives of these CSCs are to offer web-enabled e-governance services to rural communities in providing the following services: • Application forms • Certificates and utility payments such as electricity, telephone and water bills. Under the Scheme, favourable atmosphere would be created for private sector and NGOs active participation for effective implementation of the CSC Scheme thereby becoming a partner of the government in the development of rural India. The proposed CSC scheme under the Private Public Partnership (PPP) model will be consisting of a 3-tier structure:

- Village Level Entrepreneur(VLE) will be at the bottom of the structure also called the CSC operator.
- The 2nd layer above the VLE will be the Service Centre Agency (SCA) which will be responsible for a cluster of 500-1000 CSCs.
- The topmost layer called State Designated Agency (SDA) identified by the State Government will be responsible for managing the implementation above the entire State.

Agriculture Technology Information Center (ATIC)

The importance of an appropriate information package and its dissemination as an input has assumed added emphasis in this "information age". The kind of information and the way it is to be used are critical factor to the growth of agriculture. The establishment of an ATIC will provide such a mechanism beyond the individual unit of a research institution to contribute to the dissemination of the information. This will serve as a single window delivery system for services and products of research for the areas in which the concerned institute is involved.

The cornerstone of India's agricultural revolution has been the availability of improved varieties of cereals, oilseeds, pulses, etc. breed of livestock including poultry and fisheries; horticultural plant materials and improve management practice for increase productivity, sustainability and stability of various crops and livestock enterprises. This has raised the search by farmers for future availability of seed, planting materials and other materials, easy accessibility to diagnostic services for soil fertility and plant protection, availability of appropriate information through leaflets and pamphlets and increased scope in sale of consultancy services. Often the farmers are not aware as to whom and where to approach for field problems. It is felt that the facility of a 'single window' approach at the entrance of the ICAR Institute/State Agricultural Universities will enable the farmers to have the required information for the solution to their problems related to the areas in which the concerned institute is involved.

Role of ATIC

1. To provide a 'single window' delivery system for the products and species available form an institution to the farmers and other interested groups as process of innovativeness in Technology Dissemination at the institute level.
2. To facilitate direct the farmers access to the institutional resources available in terms of technology, advice, technology products, etc. for reducing technology dissemination losses.
3. To provide mechanism for feedback from the users to the institute

Some of the important efforts by public sector, NGOs and private sector in ICT for rural India are:

- Cyber extension program of MANAGE (http://www.manage.gov.in/)
- National Informatics Centre (NIC) (http://home.nic.in)
- Community Information Centre (CIC) (http://www.cic.nic.in/)
- Warna Wired Village Project (http://www.mah.nic.in/warana)
- Bhoomi (http://www.bhoomi.kar.nic.in)
- e-Seva (http://www.esevaonline.com)
- http://ruralinformatics.nic.in/
- http://www.drishtee.com/
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- http://www.lokmitra.gov.in
- http://www.gyandoot.net/
- http://www.agmarketnet.nic.in
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CHALLENGES

• The information asymmetry between farmer and farmer, village and village, region and region and the country as a whole versus other countries in which e-Agriculture is the feasible solution.
• The Common Services Centers (CSCs) has a big role to plan in e-Agriculture as well as in bridging the digital divide in India. But the non-availability of the contents in local languages is a big handicap considering the huge percentage of illiterate population involved in Agriculture sector.
• Connectivity especially high speed Internet connectivity in rural areas is also another big challenge for e-Agriculture.
• KCC is providing the first level instant solution for Agriculture related issues but it not sufficient for the growing demand of e-Agriculture like Precession Agriculture.

Conclusion and Future Scope

ICT play a key role in development and economic growth of the Nation. ICT is already on roll in e-commerce, but e-Agriculture is yet to find its feet. The best example of e-commerce application for the masses in India is India Railways Catering & Tourism Services online ticketing website https://www.irctc.co.in & Core Banking Solutions (CBS) of various banks.

Precision Agriculture is the term used for application of sophisticated technologies in Agriculture to improve the quality as well the quantity of production. KCC is providing the first level instant solution for Agriculture related issues. The CSCs are likely to serve as Information Kiosks for easy & quick access for Information on Agriculture.

The integration of e-commerce & e-Agriculture is one of the best options keeping in view the successful implementation of many e-commerce solutions as of now. e-Agriculture is an emerging field in the intersection of agricultural informatics, agricultural development and entrepreneurship, referring to agricultural services, technology dissemination, and information delivered or enhanced through the Internet and related technologies.

ATIC provide a ‘single window’ delivery system for the products and species available form an institution to the farmers

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