



Information and Communication Technology for Agricultural Development: A Review

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ABSTRACT

Agriculture is the most important sector in Indian economy along with it also play significant role to sustain the livelihood security for millions of farmers in the country. Today natural resource for agriculture like water, land have almost reached their potential limits along with this there are many problem like everyday fluctuation in the agricultural produces, profit of small and marginal farmers decreasing day by day and lack of receiving of appropriate information is resulting a huge gap for adoption of new technology. In the present context of agriculture soft resource like information and skill is also much important with hard resource like various inputs to increase the production of agriculture sector. So in present condition here the idea of ICT come in our mind. In today world almost everybody has owns a various tools like mobile phone and it has coverage almost all over the geographic area of the country. If we can utilize it as tool for technology transfer it can transform the face of agriculture in India without losing anything. Many initiatives have been taken by public and private sector in this regard to utilize the potential of ICT like ITC-e-Choupal, IFFCO, Tata Consultancy Services, Mahindra Kisan Mitra, Kisan Call Center, KVK-SMS service, e-NAM, Village Resource Centers (VRCs) etc. in agricultural advisory service for agronomic practices, weather forecasts and market price to disseminate the information for agricultural development. Hence, an attempt has been made in this paper is to explore the role of ICT to meet the information gap in the farmer community for boost up the agricultural production and profit of farmers.

Keyword: ICT, Agricultural development, Farmer, Technology transfer

INTRODUCTION

Agriculture is the most important sector in Indian economy along with it also play significant role to sustain the livelihood security for millions of farmers in the country. Agriculture contributes in India's economy as

54.6% of the population is engaged in agriculture and allied activities (census 2011) and it contributes 17.4% to the country's Gross Value Added for the year 2016-17 (at current prices).

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Research, extension system and farmer efforts have all contributed significant food production 50 million tonnes in 1950-51 to a land mark achievement of an 4th estimated 275.68 million tonnes in 2016-17 (Annual Agricultural Report, MoAC & FW, GoI, 2017-18). The total demand for food grains is projected to touch 280.6 million tonnes by the year 2020-21 (Ramesh Chand, 2009) To achieving this demand goal will necessitate a growth rate of nearly two per cent per annum in food grain production (Singh, 2011) and the agriculture sector needs to grow at a targeted four per cent per annum. Cultivation area and water resources are almost reaching their limits; hence, achieving food security heavily relies on “Knowledge Resource” (Saravanan, 2011). Estimates indicated that 60 per cent of farmers do not access any source of information for advanced agricultural technologies resulting in huge adoption gap (NSSO, 2005).

There are about 120 million farm holdings and the number is growing year by year due division of joint family. To provide at least one village extension personnel to 800-1000 farm families, the requirement of field level extension personnel is estimated to be about 1.3 to 1.5 million, against the present availability which is only about 0.1million (100000) personnel (PC, GoI, 2007). In an investigation, on average public extension personnel spends 40 minutes per year for a farmer (Dileepkumar, 2012). With this kind of contact intensity, a complementary service is a non-negotiable need of the country’s farmers.

So tackle to this condition of extension service there is an immediate need of vibrant, dynamic and innovative approach to be adopted for making agricultural extension effective as well as to expand the reach at grass root level, in order to achieve targeted growth rate and serve the farmers better. In this situation it is expected that integration of ICTs tool in agricultural extension network will provide much needed impetus to agricultural sector and ICTs can complement the traditional extension system for “Knowledge Resource” delivery to the

millions of the farmers (Saravanan, 2010) Similarly, use of ICTs in agricultural extension services especially mobile phone services in the agricultural sector has provided information on market, weather, transport and agricultural techniques to contact with concern agencies and department (Aker, 2011).

ICTs, tool like mobile phones has impressive penetration in many of the developing countries changing the agricultural communication process and mobile phones have made personal communications readily accessible, for the first time, to women and men, poor and prosperous, rural and urban dwellers in developing as well as in industrial countries (Colle, 2010). ICT is helpful in providing accurate, timely, relevant information and advice to the farmers, thereby facilitating favorable platform for more remunerative agriculture. By using of ICT’s service farmers can choose any medium to seek the relevant information and advice. It can play a miracle change in the field of extension services. The timely availability of right information for its right purpose in its proper utilization of major inputs required for farming. Information and Communication Technology (ICT) can act as a driving force in the agricultural development process (Chahal et al., 2012). So realizing the importance of ICT’s as complementary mode with extension service to increase the reach to grass root level. Hence, in this paper an attempt is made to explore the role of mobile service with respect to extension service for agriculture development.

Major Potential Service’s area of ICT

- ICT in weather forecasting
- ICT for climate change adaptation and application
- ICT for Agricultural Market Information
- ICT for improvement of soil quality
- ICT for Efficient Water Resources Management
- ICT for Aquaculture
- ICT in Animal Disease Management
- ICT for Women empowerment
- ICT in Dairy Entrepreneurship
ICT in rural development

ICT service by public sector for agricultural extension

Kisan call center

The Department of Agriculture & Cooperation (DoAC&FW), Ministry of Agriculture cooperation and farmer welfare, Govt. of India launched the on-line phone based expert advice service, Kisan Call Centers (KCC), launched by the Ministry of Agriculture, Government of India is available for all within the country since January 2004. A toll-free telephone number “1800-180-1551” has been provided that is operational on all days from 6.00 am to 10.00 pm. to deliver extension services to the farming community. The purpose of these call centers is to respond to issues raised by farmers, instantly, in the local language in every state which are expected to handle traffic from any part of the country. Queries related to agriculture and allied sectors are being addressed through these call centers. The Farmer Call Centre is a integration of separate technologies namely, the Information and Communication Technology (ICT) and the Agricultural Technology, both have their specialized domains and work cultures. To optimize the utilization the strengths of both these systems, it was proposed to take full advantage of professionally managed Call Centre mechanism and dovetail it with the specialized Subject Matter Specialists knowledge of Agricultural Scientists and Extension Officers, so as to facilitate its reach to the farming community.

In a study conducted by Hanumankar (2011). revealed that there is considerable interest and acceptance among farmers for ICT based agricultural extension services. The study has shown that farmers in the age group of 29 to 48 years are the biggest user group of KCC helpline. In terms of academic background, farmers with a minimum exposure of six to seven years to formal schooling (86%) seek to utilize the KCC support and relatively inexperienced farmers with less than 10 years of experience are more likely (47.5%) to call the KCC.

KVK mobile service

Krishi Vigyan Kendra (KVKs) (Farm Science Centre's) under the control of Indian Council

of Agricultural Research (ICAR) has been operational since, 2008 to providing Mobile advisory services to the farmers. The Farm Science Centre Babhaleshwar and KVK, Chhindwara, Madhya Pradesh, India has pioneered in the IT-enabled service aiding instant messaging from Farm Science Centre to individual farmers for extending agricultural information through SMS alerts. Weekly SMS alerts are issued on various agricultural developments like weather forecast, disease forecast and market information (<http://www.kvk.pravara.com>). In an impact study of the SMS service of Farm Science Centre, Babhaleshwar by Bhaskar (2013) found that 70 per cent of the people contacted said the service was excellent and the rest 30 per cent said it was very good. As such, mobile phones have been regarded as the widely accessed tool among the farmers for communication and also accessing agriculture-related information particularly for the marketing of produce (Chhachar et al., 2014).

National Agriculture Market (e-NAM)

Prime Minister Narendra Modi has launched the electronic trading platform on 14 April 2016. In its first phase, the initiative will cover 21 mandis from eight states, namely, Gujarat, Telangana, Rajasthan, Madhya Pradesh, Uttar Pradesh, Haryana, Jharkhand and Himachal Pradesh. Further, 25 crops, including wheat, maize, pulses, oilseeds, potatoes, onions and spices have been included for trading on the platform. It is proposed that 585 markets across the country will be brought on the platform by March 2018. This responsive web portal will ultimately uplift the farmer's growth. Because of its dynamic web technology, it is very easy to be viewed in any type devices with no lags. Using this web portal both the farmer and trader can get benefit.

Market update by Rubber board of India

The Rubber Board provides the update of both national and international market rates of natural rubber through SMS throughout the country. Through this service the rubber farmers and dealers in India (especially those in the state of Kerala in South India) are

tracking the prices of the commodity in real time by SMS. The rubber growers are helped by this SMS service by the Rubber Board which provide updates on the global as well as domestic market rates to the farmers, which is also displayed in the Rubber Board's web portal (www.rubberboard.org.in).

Department of Agriculture, Haryana State, India SMS Service

The Haryana Agriculture Department has introduced Short Messaging Service (SMS) for farmers. The service was made available by the agriculture department's Kissan (Farmer) Call Centre. More than 800 farmers had sent their queries through SMS service and replies had been sent by concerned officials and agricultural scientists. The free of cost SMS service is available to farmers on providing one's mobile number (News-i4d, 2007).

SMS Service of Haryana Agricultural University Hisar

CCS Haryana Agricultural University, Hisar introduced Mobile SMS service as e-Mosham Krishi Sewa under ATMA project to the farmer. Through its various service related to agronomic practices, weather update and plant protection are provided to farmer. Till date 323345 farmers were registered. The information is accurate and timely delivered so that farmer can manage the farm activities according to time. This helps farmer to save money, time loss due to unexpected weather event like hailstorm, precipitation etc. Among the ICTs, mobile telephony has emerged as the technology of choice of the majority of the urban and even the rural masses (Ansari & Pandey, 2013).

Dynamic Market Information (DMI), TNAU-C-DAC, Hyderabad

The Tamil Nadu Agricultural University (TNAU) and Centre for Development of Advanced Computing (C-DAC), Hyderabad jointly provided daily market information on 161 perishable commodities from 13 markets in South India where information was disseminated to ten thousand farmers through mobile based SMS in the local language at free of cost. The information was also uploaded in the web portals of India development gateway

(IndG) and Tamil Nadu Agritech portal (www.indg.in & <http://agritech.tnau.ac.in>).

Annapura Krishi Prasaar Seva of Andhra Pradesh

AKPS service being pilot-tested with 600 farmers from six villages of two districts of Andhra Pradesh by the Media Lab Asia (Department of Electronics and Information Technology (DeitY), Ministry of Communications & Information Technology, GoI and Acharya N G Ranga Agricultural University through its KVKs namely KVK-Nalgonda and KVK-Nellore. Personalized agro-advisory on agriculture (paddy), animal husbandry (dairy) and fisheries, local market price of important crops, weather based advisory, crop calendar based services, special message services are being provided to the farmers under this project (Media Lab Asia, 2013).

Private initiative of ICT service in agriculture:

IFFCO Kisan Sanchar Limited (IKSL)

IKSL provide voice messages in local languages. 95000 voice messages have been delivered and 81 000 Q&A repository with 5 000 feedback messages from the farmers have been received. 1.3 million Active farmers are benefiting from IKSL's Value Added Services and IKSL enrollment has crossed four million with forty thousand cooperative societies operating as IKSL Retailers (ICTFSECBP, 2009; Marcel & Bart, 2012).

KISSAN Kerala

KISSAN (Karshaka Information Systems Services and Networking) Kerala-is an integrated, multi-modal Agricultural information system, which provides several dynamic and useful information and advisory services for the farming community across the state of Kerala. The core deliverable approach of the project is an integrated multi-component, multi-modal delivery of Agriculture Information Services system that is accessible anywhere anytime by all concerned. The project adopted a strategy of providing right information to the right people in the right context at right time and empowers the farmers with adequate knowledge, which

helps them to take better decision to solve the problem of content gaps by providing the authentic agricultural information through various delivery methods like Television, Internet, Telephone, and Mobile. The project offers text, voice and video based contents and Agri information services through mobile phones and third one Kissan Krishideepam: Agriculture based weekly Television program - in local language through Satellite channel.

Major challenges in access of ICT services

Low Literacy and Awareness about ICTs

The study conducted by (Rajoria et al., 2017) revealed that lack of training and practical exposure towards ICTs (60.00%) and low ICT literacy (58.33%) were found to be 'most serious constraints' while lack of awareness of benefits of ICTs (56.67%), lack of skills in handling ICTs (50.83%), poor finance and erratic power supply (44.17% each) perceived as 'serious constraints'. (Dhaka & Chayal 2010) in a study in Bundi district of Rajasthan reported illiteracy, non-availability of relevant and localized contents in their languages, affordability, poor accessibility & awareness and un-willingness for adoption of new technologies as the major problems in adopting ICT by farmers.

In study of (Singh et al., 2015) reported some existing issues to include inadequate accessibility of ICT services to rural farmers, lack of basic skills of using ICT facilities in agriculture, inability of government to deliver adequate ICT knowledge to farmers. On the other hand, a study by (Agu 2013), specifically focuses on the problems faced by women in agriculture like access to land, access/weak extension services, access to credit, lack of supportive policies, access/no adoption of new agricultural technologies.

Infrastructure facility

In a study by (Taragona & Gelb 2005) maintains that awareness, time, cost of technology, system integration, and software availability are the main constraints of ICT adoption in horticulture. Another study by Gelb & Voet (2009) aim to analyze ICT adoption trends in agriculture. It was revealed that the key challenges to ICT implementation

were lack of customized ICT applications, increase of sophisticated software with enhanced human capital requirements, lack of harmonization with production, market and essential ongoing end-user extension training that will enhance farmers. Inadequate, and unstable power supply, cost of hardware and software are high with respect of average rural dwellers (Kale et al., 2015). Similarly,

Affixation of Knowledge and Language

A study by (Kale et al., 2015) found that in India main problem of ICTs is disintegration of scientific knowledge and farmer knowledge and concluded that there is need of Affixation of the basic and scientific research knowledge database and farmers' knowledge database adopted biologically and socially over a period of time. Author also concludes that there is need to develop an integrated policy framework to link the ICT based initiatives for faster dissemination of agricultural information and knowledge among the various stakeholders in the sector.

Lack of Regional Specific Information

The information by ICTs dispersed mainly universally even though out the country. But in India agriculture is divided by different agro climatic zone depending on local climatic condition. So in this situation the information should be location specific and in regional language. Above statement supported by the finding of Adhiguru & Devi (2012) who concluded that problem of lack of local information, inadequate subject matter are major constraints faced in adaptation of ICTs services. (Ramaraju et al., 2011) reported that the major problems faced by farmers in adoption of ICT were lack of simplicity and acceptability of technology and no relevant and in-time delivery of practical solutions - area/location wise- for all agricultural operations.

Future perspective of ICT services in Indian agriculture

Technologically it is possible to develop effective network systems, to cater to the information needs of Indian farmers. User friendly systems, particularly with content in location specific crops recommendation with local languages, can develop the interest in the

farmers and others working at the grassroots personals engaged in agriculture. It is possible to create dedicated networks to harness the potential of ICTs to make these services are available to trough out country. The issue of creating application packages and databases to cater complete range of Indian agriculture information is a big and complex task. For this work long term agricultural policies can play a path finder role in every specific area of agriculture.

India has an advantage of huge number of specialized technical and professional research institutes viz. ICAR and CISR institutes which are engaged in various technologies generation in agricultural and others fields. These institutions can play a crucial role in designing the necessary applications & databases and services. Along with this it will also provide modularization of various works, better supervision and help in achieving quick results. As it is, several institutions have already developed various application and tools related to their area of specialization.

During developing these applications it is important to consider the major users that is targeted is not computers friendly in India particularly farmers community. This places premium on user friendliness and it may be useful to consider touch screen technologies to improve user access levels. It is often observed that touch screen kiosks, with their instructional approach, provide a means for easy learning, develop confidence in user and more peoples participation. Another important aspect is belonging to language, it is also necessary to provide as much content as possible in local languages.

After the development of application and database another main obstacle is with transfer of technology to grass root level from research institute. In this various infrastructure and organization like, KVK, cooperative society, ATMA, State agriculture department, NGOs and private firms may be used regarding installation of information application through computers and kiosks. This network can also be used on other area

rather than agriculture like health, education, various govt. schemes.

CONCLUSION

An information communication technology is helpful in providing accurate, timely, relevant information and advice to the farmers, thereby facilitating favourable platform for more remunerative agriculture. In contest to Indian agriculture, farmers are one of the big communities in developing countries where they have limited facilities in their area for increase their product and income. The ICT movement is still evolving. Except few ICTs based projects- Kisan Call Center of DAC which covers entire country, most of ICTs project for farming community have been implemented in very limited geographical area and covering few thousand of population.

The rapid changes in the field of information technology make it possible to develop and transfer required ICTs services to rural India. The existing bottlenecks in undertaking the tasks need to be addressed immediately. A national strategy needs to be drawn for spearheading IT penetration to rural India. A national coordinating agency with an advisory role can act as a catalyst in the process. For effective information delivery, traditional extension methods (personal contact methods, print media, radio and TV) should be supplemented with new ICTs tools involving research institutions, government agencies, NGOs and private sectors in public-private-participatory (PPP) mode.

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