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Role of Information and communication technology (ICT) in agriculture and extension

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Abstract: Information and communication technology (ICT) aids provide up-to-date information on the market prices of commodities, inputs and consumer trends which ultimately can improve a farmer's negotiating position and their livelihood. Major aspect of ICT is that accurate information should reach the farmers at the right time to make more sustainable use of on-farm resources. Now the question arises that how this information can be disseminated to such a diverse group of the farming community. ICT is going to play greater role in agricultural extension as well as private sector agribusiness, market information and market intelligence. Here this paper review the role of ICT not only in providing greater awareness and knowledge in agriculture technology and information but also in terms of farmer's attitudes towards trying to adopt new technologies.

Keywords: Agricultural, Cyber, ICTs, Impact and extension

INTRODUCTION

Developing countries like India are though able to achieve self sufficiency in food production after green revolution but they are in threat to maintain this self sufficiency as they are likely to face food shortages in near future because of the population growth rate which is too high as compared to food production rates. Thus the demand of continuous increasing population can be fulfill with the help of ICT as a tool of revamping extension network of the country. ICT is emerging as an important tool for the development of societies and are the driving forces in the world economy.

ICT is used to accelerate the food growth rate by using technologies to perform tasks like predict weather conditions, insect-pests and disease forecasting learn about the latest methods to improve farming productivity (Nancy and Hafkin, 2002). One of the major factors responsible for food shortage is increasing food demands while the world is facing a decrease in natural resources such as water shortages, declining soil fertility, effects of climate change and a rapid decrease of fertile agricultural lands due to urbanization (Benson and Todd, 2004).

ICT and agriculture: ICT can act as a catalyst in the productivity of Indian agricultural markets. Knowledge is a useful resource and backed by adequate technological infrastructure and appropriate strategies, it can become a transformational factor for overall development of agricultural markets. According to Jones (1997), agricultural extension is an essential mechanism for delivery of knowledge and advice as an input for modern farming. The need is of a shift of focus from delivery of technology to delivery of knowledge and information. This is possible with the use of ICT's which can make agricultural extension a more diversified, knowledge driven system for meeting the demands of farmers regarding information needs to make more sustainable use of on-farm resources. ICT can continuously introduce new sets of information services to agricultural markets where farmers can have a better control not only on information access and but also on disseminations as well. Access to such new information sources is a crucial requirement for the sustainable development of the farming systems.

ICT in everyday life: The acronym ICT (Information and Communication Technology) includes all technical means that are used for handling information and facilitating communication, including computers, network hardware, communication lines and all the necessary software. In other words, ICT is comprised of information technology, telephony, electronic media, and all types of process and transfer of audio and video signals and all control and managing functions based on network technologies **(**Celebic and Rendulic, 2011).

National policy and role of ICT on agricultural extension services delivery: Extensive use of modern information technology will be promoted for communication between researchers, extension workers and their farmer clients to transfer of technologies and information more cost effectively. Further, it emphasised IT application in marketing, wider use of electronic mass media for agricultural extension, farmer participation in IT programmes and support to the state gov-

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ernment for using IT in agricultural extension (DoA and C, 2000). National e-Governance plan indicated that the typical services envisaged in Agriculture as a Mission Mode Projects (MMP) to provide information to the farmers on seeds, fertilizers, pesticides, government schemes, soil recommendations, crop management, weather and marketing of agricultural produce. Several projects such as ASHA in Assam, KISSAN and e-Krishi in Kerala and Krishi Maratha Vahini in Karnataka have been initiated by the Department of Agriculture and Cooperation (DoA and C), Government of India. To spearhead implementation of MMP in Agriculture, DoA and C has adopted twin strategy through AGRISNET and two portals AGMARKNET and DACNET (Mathur *et al.,* 2009).

Increasing production is a major challenge in front of agriculture scientists and farming community. Agricultural extension services provide critical access to the knowledge, information and technology that farmers require to improve the productivity and thus improve the quality of their lives and livelihoods. It is hence crucial to provide farmers with the knowledge and information in a quality and timely way. Although some ground-breaking tools like the tele-centre can serve as major catalysts for information, knowledge and development opportunities, the access for farmers in remote villages is restricted due to the lack of infrastructure (UN, 2005). Agricultural extension services include transferring knowledge to farmers, advising and educating farmers in their decision making, enabling farmers to clarify their own goals and possibilities, and stimulating desirable agricultural developments. Traditional public-sector extension services use a variety of extension programs to overcome barriers to technological adoption without much success (Anderson and Feder 2004, Anandajayasekeram *et al.* 2008, Aker 2010). It is found that ICT allows efficient and transparent storage, processing and communication of information and that entrepreneurial innovation in this field may affect economic and social change (Kaushik and Singh, 2004). Growth in ICT investment is also found to be positively associated with growth in both GDP and productivity in Asia-Pacific countries for the period 1984-1990 (Kraemer and Dedrick, 1994). ICT would enable extension workers to gather, store, retrieve and disseminate a broad range of information needed by small producers such as information on best practices, new technology, better prices of inputs and outputs, better storage facilities, improved transportation links, collective negotiations with buyers, information on weather.

Agricultural extension

An advocate for ICT policy and regulatory reform: There is a need to temper enthusiasm about the potential use of new ICTs with a reality check on the availability of basic telecommunications services in rural and remote areas. If there was one clear message from the observatory, it was this – "rural connectivity" is a critical issue. One way to improve the situation is for agricultural extension practitioners to become more actively involved in rural telecommunications policy advocacy efforts. Many observatory participants were supportive of a role for agricultural extension in the domain of rural telecommunications policy and were keen to learn more. Evidence shows that even small efforts to put rural telecommunications policy on the national agenda can have notable results.

Lessons from ICT for agricultural extension initiatives in India

Pilot project syndrome: Most of the ICT based agricultural extension projects were implemented as pilot projects and after the pilot period, most of the projects were never implemented in larger scale. Efforts for continuance of pilot projects were not taken sincerely by the implementing and also by funding (donor) agencies.

Unsustainable large investments: Portals like in DG, TNAGRITECH portals and Rice Knowledge Management Portal (RKMP) was developed investing large amount of money. These portals were developed in project mode for a particular period of time. After the project period, it was difficult to sustain momentum and updating the portal with limited or no financial resource availability.

Users unwilling to pay: Most of the ICT based agricultural extension projects beneficiaries (generally farmers) are not willing to pay for the services they receive. Similar to most developing countries farmers, in India also most farmers feel that agricultural advisory services are welfare activity of the state and national Governments. So, they are unwilling to pay for the services.

Small scale of operation: The ICTs for agricultural extension projects were implemented in very limited geographical area and covering few hundred or at maximum thousands of farmers. Exceptionally, few projects like 'farmers call centers' and 'e-Soil Health Card Programme' covers entire country. While only few web portals were developed for larger farm stakeholders i.e. AGMARKNET, e-Krishi and Rice Knowledge Management Portal etc. However, continuous updating and maintaining web portals require sufficient resources, which were lack after few years.

Knowledge middle men with less permanency: Most published projects were from educational/ research institutions, which generally, ignored traditional extension system and extension personnel, those who were serving over a long period in rural India. They implemented time bound ICT based projects and hired facilitators/intermediaries. Once, project completes stated objectives and targets achieved, facilitators also disappear along with the project. In case of e-Arik, public extension personnel were unwilling to collaborate with the ICT project; because most of the field level exten-

sion personnel never used internet and lack of skill in using other ICTs (Saravanan, 2008).

Information alone not for development: Along with ICT based advisory services, input supply and testing need to be integrated for the greater impact (Balaji *et al*., 2007). In e-Arik project of North-East India, farmers demanded inputs as per recommendations of the project research fellows. Along with information, support services need to be ensured. As indicated by Heeks (2005) e-development projects must be designed around the information chain.

Difficulty in localization of content: Content need to be aggregated from different sources but it needs to be sorted in granular format for rapid adaptation for local use. Localization and customizability of content were still not practiced on a significant scale (Balaji *et al*., 2007). If sufficient scientific information is not available, content need to be generated, tested, refined and used for further advisory services through ICTs. Most of the web portals lack relevant content in local language.

One-way information flow: Most of the ICT initiatives information flow one-way. There was a limited scope for interaction. Projects such as Farmers Call Centre, Village Resource Centre, e-Arik, e-Sagu, Digital Green, Lifelines India and IKSL provide opportunities for interaction among farmers and experts.

Islands of learning: In almost all the projects, the participation of agricultural education and research institutions appears to be marginal (Balaji *et al.,* 2007). Most of the projects do not have collaboration with other farm research and extension stakeholders. Practical challenges or constraints in implementing the ICT projects were seldom disclosed and shared with others.

Lack of systematic evaluation: Most of the projects never revealed actual evaluation results, generally they reported 'positive' results and most common difficulties such as inadequate rural ICT infrastructure and difficulty in content localization and customization were indicated. Systematic and objective evaluation or impact of the projects was seldom done. Similar type of projects, with little modification, was implemented in isolated manner. Except few projects, large number of projects evaluation results were never published or communicated. Even after experimenting hundreds of ICT projects for rural development in the last two decades. There was no noteworthy comprehensive comparative evaluation of e-agriculture projects in India (Keniston, 2002; Saravanan, 2010).

Lack of co-ordination: In the absence of collective and coordinated efforts by the public-private agricultural research and extension institutions, ICTs have not penetrated satisfactorily in rural India despite time, money and efforts invested so far (Patil *et al*., 2009).

Conclusion

Indian economy is dependent upon agriculture and mostly people are directly and indirectly dependent on agriculture. So, Low cost ICT tools such as mobile phones etc. should be promoted to provide agricultural information related to agronomic practices, weather forecasting, plant protection etc. ICT are going to play greater role in private sector such as agribusiness, market information and market intelligence. It is enabling farmers to make better decisions about future crops and commodities. It is important that accurate information reaches the farmers at the right time. Hence, it is high time to find out appropriate information to provide through ICTs.

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