ORIGINAL ARTICLE

ICTs INITIATIVES IN INDIAN AGRICULTURE

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Abstract:

Indian Agriculture contributes to 18.6 per cent of India's GDP, and approximately 59 per cent Indians derive their livelihood from the agricultural sector. Today's farmers not only want the two-time bread for their families, but also surplus food production that can be sold in the market to earn them sufficient money to fulfill their other needs. Along this line, private sector initiatives like contract farming have commercialized the Indian agricultural sector. Many new concepts and theories that substitute traditional methods have also been seen. One of them is the introduction of Information and Communication Technology (ICT), which enables the dissemination of requisite information at the right time. This revolution in information technology has made access to information easy and cost-effective. ICT includes computers and communication technology along with associated software. The activities of generating, processing, transmitting, disseminating, sorting, archiving and retrieving information constitute the information industry.

KEYWORDS:

ICT, agriculture, Indian village, initiatives, development, communication

INTRODUCTION:

ICTs or Information and Communication Technologies are emerging as an important tool for thedevelopment of societies and have driving forces in the economies world-wide. ICTs are no more confinedto assist high-end research and development; the new technologies have made significant improvementsin the life-styles and the efficiency-levels all sectors of economy. The positive impact of ICTs is most visiblein service-sector, where the efficiency levels have gone very high. New businesses like "Business ProcessOut-sourcing (BPOs)", Banking and Insurance, the entertainment industry and other industries andorganizations, are all taking maximum advantage of the ICT revolution.

The Agriculture sector is gearing itself to make optimal use of the new information andcommunication technologies. At the Government of India level, a number of important initiativeshave been taken to provide IT Hardware and connectivity to all organizations involved in AgriculturalEducation, research, development and dissemination. Simultaneously, Agricultural contentdevelopment initiatives have been taken by Ministry of Agriculture, in collaboration with NationalInformatics Centre (NIC), to provide marketing information of various agricultural commodities tothe farming community. Another content-creation and aggregation initiative is being supported byIndian Council of Agricultural Research (ICAR), under its World Bank aided project – NationalAgricultural Innovations Project (NAIP), wherein the Leading ICT institutions like IIT Kanpur, IIT Mumbai, IITKM, Kozikode, NAARM, Hyderabad and International Crop Research Institute for Semi-Arid Tropics(ICRISAT) have been roped in to guide National Agricultural Research System to design, developmentand implement Knowledge Management Systems (KMS) in Agriculture. ICTs are thus emerging asvery important tools for Agricultural Extension, and it is now a must for every Agriculture graduate tohave working knowledge of Computers, Communications, Internet and World-Wide-Web.

ICTs INITIATIVES IN INDIAN AGRICULTURE

Changing Agricultural Scenario and Information NeedsSo far, we are adopting the traditional systems such as pamphlets, posters, radios, andtelevision to disseminate the agricultural information to the farmers. In this system, there is plenty oftime gap in reaching the information to the farmers. The information should be accurate and itshould reach at right time. The rapid growth of the Information Technology and CommunicationsSystems has changed the world scenario entirely. And, now linking two computers from anywhere in theworld is an easy task. The emergence of Internet and E-mail systems has changed the inter-relations ofpersonal contact so fast. To reduce the gap between rural and urban people, various ICT projects havebeen initiated by the Government, NGOs and private companies. The result was linking of villages withwired network in many parts of the country.

As an information source, the usual forms like "coffee shop" cannot serve for local specific needsof farmers. Farmers need local relevant information for better farming. Farmers operations have numerouscharacteristics - different soil types, crops, whether, pest complexes and marketing arrangements etc. The relevant information of above all will benefit the farmers to achieve the maximum profits. Thesefactors will lead to disseminate location specific information system for agriculture development as afarmer centric model. The extent and rate of change now occurring in the development of ICTs haveopened the way for significant change in crop production management, agricultural decision-making and information dissemination. The farmers may depend on extension personnel to get the proper advice to cultivate the crop. The information needed relate to different schemes, crops, technologies, seeds, fertilizers, pesticides, availability of fertilizers, seedlings, bio pesticides, soil fertility, pest and disease diagnosis and many more. The agricultural marketing information is essential for farmers to increase their profits. Information suchas price details of seeds, fertilizers, pesticides and availability of these products in the market enables thefarmer to take decision in choosing right seed, fertilizer and pesticide required for the better farming. Thevital information that flows from the agricultural policy maker's desk, such as fixation of procurementprice, procurement targets and policy relating to exports helps to farmers to get maximum profits. Weather forecasting is one of the important requirement of farming and it helps the farmers totake right decision at right time. The research is advancing rapidly with the advent of high performance computing and communications systems to predict weather forecasting. The different types of weatherforecasting: short-range, usually referring to the upcoming 36-48 hours; medium-range, referring tothe 1-2 week time frame; and long-range, referring to periods one or more months, which becamemore useful and help the farmers to take right decision in farming timely.

ICTs: The Definition and RelevanceICT or Information and Communications Technology in simple terms, can be defined as thebasket of technologies, which assist or support in storage, processing of Data/ Information, or indissemination/ communication of Data/ Information, or both. ICT thus includes technologies suchas desktop and laptop computers, software, peripherals and connection to the Internet that are intendedto fulfill information processing and communication functions.

According to Wikipedia (2008), the term ICT is the broader term of Information Technology (IT), to explicitly include the field of electronic communication, in addition to IT. The term IT is defined as "thestudy, design, development, implementation, support or management of computer-based informationsystems, particularly software applications and computer hardware." IT deals with the use of electroniccomputers and computer software to convert, store, protect, process, transmit and retrieve information,securely. CT is thus used as 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.The importanceof ICT lies less in the technology itself, than in its ability to create greateraccess to information and communication among the hitherto un-reached geographies andpopulations. Appropriate ICT interventions are yielding positive results in developing and under-developed economies. The "Grameen Phone" initiative in Bangladesh, Kothamale Radio Project inSrilanka, and ITC's e-Chaupals in India, are examples of such innovations. Many countries aroundthe world have established organizations for the promotion of ICTs, because it is feared that unlessless technologically advanced areas have a chance to catch up, the increasing technological advancesin developed nations will only serve to aggravate the already-existing economic gap betweentechnological "have" and "have not" areas.

The relevance of ICTs for Agricultural Development in general and for Agricultural Extension in particular is extremely high for a country like India. ICTs are most natural allies to facilitate theoutreach of Agricultural Extension system in the country. Despite a large, well-educated, well-trainedand well-organized Agricultural extension manpower, around 60% of farmers in the country stillremain un-reached (NSSO, 2005), not served by any extension agency or functionary. Of the 40%, who have some access to Agricultural Information, the major sources of this information are Radioand Television. The telephone has just started to make its presence felt on this scenario. During lastfour years of its operations, the Kisan Call

Centres (KCC) helpline- 1551, has registered over 2.4million (24 Lakh) calls. Internet-supporting Information-Kiosks are also serving the farming community,in many parts of the country. Hence ICTs are highly relevant for Agricultural Extension scientists, researchers, functionaries and organizations.

NEED OF ICT IN INDIAN AGRICULTURE

At present, the ratio of farmers to extension workers is as low as 1000:1. Although the appointed Village Local Workers (VLWs) disseminate information, there is lack of accountability. These two issues have created an urgency to effectively address the information needs of poor farmers. In addition, the cost involved in face-to-face information dissemination at the right time and the difficulties of reaching the target audiences have also created the urgency to introduce ICT for this purpose. It is only through the introduction of ICT that information can also be updated and extended at the lowest cost. There are several ICT models in Indian agriculture, which have made significant difference to agricultural operations (Meera, Jhamtani, &Rao, 2004).

ICT Initiatives for Agricultural Development in India by Various Agencies
Some initiatives in India that use ICT for agricultural development are:

Name of the project	Particulars
Web portals	
aAQUA	Online discussion, archived, multi-lingual and multimedia based. 27674 posts 3.3 million views by 12,964 viewers (www.aaqua.org).
KISSAN Kerala	Content processing and dissemination system. Online information, video channel, Tele-advisory, SMS and GIS based agro-services (www.kissankerala.net).
TNAU AGRITECH Portal	Dynamic portal and e-linkage with research stations and farm sciences centres for agro-advisory services (www.agritech.tnau.ac.in).
AGRISNET	Agriculture Resources Information System Network (AGRISNET) is a mission mode project funded by the Ministry of Agriculture, Government of India to develop a comprehensive online knowledge portal to disseminate relevant information to farmers. Under this scheme most of the State Governments are established information rich agricultural websites. For example, Sikkim AGRISNET (http://www.sikkimagrisnet.org), Andhra Pradesh agri-portal, http://www.apagrisnet.gov.in, Uttar Pradesh (UP) Agrisnet Knowledge Portal (http://agriculture.up.nic.in), Tamil Nadu-www.tnagrisnet.tn.gov.in, AGRISNET–HimachalPradesh (http://203.193.179.168/default.aspx) - Expert Advisory Services (http://www.hp.gov.in/expertadvisory/SignUp.aspx).
DACNET	DACNET scheme, 46 web sites and 39 applications are developed (75 were developed and functional), which include web portals on complete information on 9 crop directorates, extension services, Integrated Nutrient Management, Marketing, Mechanisation and Technology, Economics and statistics (www.dacnet.nic.in).
e-Krishi	Web based farm advisory services, market information, resource library and online expert advisory (www.e-krishi.org).

ASHA	Relevant and need based agricultural information for the farmers of Assam state of North-East India.
India Development Gateway (InDG) portal	Multilingual portal for agriculture and other rural information. Decentralized content management system by
Rice Knowledge Management Portal	Comprehensive information portal on Rice. Separate domains for farmers, extension personnel and researchers
Agropedia	Agriculture knowledge repository of universal meta models and localized content for a variety of users with appropriate
Web Portals for Market Information and Agri-Business Firms' Portal to Farmers	
AGMARKNET	Market information by portal. Information on 2000 markets and 300 commodities in India (www.agmarknet.nic.in).
ITC-e-Choupal	Innovative trading and e-Commerce initiative in agriculture. Reaches 4 million farmers by 6500 e-Choupals spread over 40000 villages of rural India (www.echoupal.com).
EID Parry- Indiagriline	Information and knowledge solutions through Cane Management System and also other support services to farmers at seventy Namadhu Parry Mayyam outlets (Our Parry Centres). SMS alerts for farmers and cane field staff to plan their activity (Eidparry Annual report, 2010-11). Centre establishment, operating and service charge is recovered from the farmer from the sugarcane payments (www.eidparry.com/agriland.asp).
Indiancommodities.com/	User fee-based market information on Cotton, Sugar, Oilseeds, Pulses, Spices, Rice, Wheat, Tea, Coffee (http://www.indiancommodities.com/)
Mahindra KisanMitra	Mahindra and Mahindra Ltd., Farm Equipment Sector of the Mahindra Group hosted MahindraKisanMitra.com, a web portal for the Indian farmers to access wealth of information which is updated on a daily basis. Farmers can check daily mandi prices, read weather updates, latest crop advisories, and agri related news. The site also provides information under various other sections such as crop information, loans, insurance, mandi database, cold storages/warehouses and agri events (www. mahindrakisanmitra.com).
IFFCO Agri-Portal	Information for farmers in local language. Web portal and 100 farmers' information kiosks in 16 States (Patil *et al*., 2009) (www.iffco.nic.in).

Agrowatch Portal	The agriwatch.com is the largest agribusiness portal in India and enables access to a large amount of agribusiness related information covering more than 15 sub sectors within the agricultural and food Industry. The daily, weekly and fortnightly Agriwatch trade research reports are published (Patil et al, 2009) (www.agriwatch.com).
iKissan	Agriculture information; Crop specific package of practices of crops, animal husbandry, aromatic and medicinal plants, agricultural machinery, allied agriculture, sprayers, rural credit, insurance iKisan crop solutions; farmers have a critical need to get timely solutions for protecting and nurturing their crops to get best yields. Addressing this key need, iKisan has developed easy-to-use diagnostic packages
VKCs/ VRCs/CICs/ CSCs	
Village Knowledge Centres (VKCs)-M.S. Swaminathan Research Foundation (MSSRF)	101 VKCs in Tamil Nadu, Puducherry, Maharashtra, Orissa, Andhra Pradesh and Kerala state of India. VRCs and VKCs working with 315 partners for implementation and location specific content generation (Senthilkumaran, 2011). Demand driven information and knowledge with support services, social inclusion, community ownership and partnership proved critical for the success and sustainability (www.mssrf-nva.org).
Village Resource Centres (VRCs) –Indian Space Research Organisation (ISRO)	473 VRCs have been set up in 22 States/Union Territories in India. The VRCs are connected to Knowledge/Expert Centres (ECs) like Agricultural Universities and Skill Development Institutes (SDI). Over 6500 programmes have been conducted by the VRCs in the areas of agriculture/ horticulture, fisheries, live stock, water resources, tele-health care, awareness programmes, women empowerment, supplementary education, computer literacy, Micro credit, micro finance, skill development/ vocational training for livelihood support *etc*. So far, over 500000 people have availed VRC services (www.isro.org/scripts/villageresourcecentres.aspx)
Community Information Centres (CICs)	Community information centres in North-East India e-Infrastructure for accessing rural information needs of farmers and others (http://www.cic.nic.in/).
Common Service Centres (CSCs)	Web based e-governance to services, including agriculture information to rural areas. So far 96,163 CSCs were rolled out in India (www.csc-india.org).

Telephony/ Mobile Telephony	
Farmers Call Centre (Kissan Call Centre)	32 Farmers Call Centres, 2043636 farmers calls' answered during 2010-11, total calls answered during last five years (2005-2010) was 6247911.
Lifelines India	Connectivity by innovative mix of internet and telephony.
	Reaches 200000 farmers in three States of India (www.lifelines-india.net).
IFFCO Kisan Sanchar Limited (IKSL)	Voice messages in local languages. 95,000 voice messages delivered and 81000 Q&A repository with 5000 feed back messages from the farmers. 10 Lakh active farmers benefiting from IKSL's Value Added Services and IKSL enrollment crosses 4 million and 40000 cooperative societies as IKSL Retailers (www.iksl.in).
Fisher Friend	QUALCOMM, MSSRF, Tata tele services and Asute system technology jointly implemented mobile based advisory services (instant access to helpful information such as weather conditions, where they can and cannot fish and market prices) to fishing communities of costal Tamil Nadu since, 2007. Due to technical challenges and availability of services only 5 nautical miles created mixed impact. Some of successful case studies on mobile services impact were reported by Mittal et al., 2010.
Reuters Market Light (RML)	Micro-information Services designed specifically for the farming community was launched by RML in 2009. Currently covers over 440 crops and varieties with more than 1400 markets and 2800 weather locations of 15000 villages in 13 States of India. Timely and personalized information and individual farmers have reaped significant return on their investment achieving up to INR 200,000 ($ 4000) of additional profits, and savings of nearly INR 400,000 ($8000) by using RML (www.reutersmarketlight.com).
Mobile Advisory Services by Krishi VigyanKendras (KVKs) of Indian Council of Agricultural Research (ICAR).	Mobile advisory services to the farmers by the Krishi VigyanKendras (Farm Science Centres) are operational in India since, 2010.
Hybrid Projects **(Mix of ICTs, Info-mediaries& Conventional Extension Methods)**	

e-Arik	Internet, Offline CDs and farmer-to-farmer communication, conventional extension methods. A study among 300 farmers indicated that an average Rs. 5252 was increased among 73 number of e-Arik registered farmers who were growingKhasi mandarin. Similarly, an average Rs. 1611 was increased among 258 paddy farmers who were registered with e-Arik initiative. The cost and time indicators comparing traditional extension system and e-Arik project, sixteen fold and three fold less time were required to the clientele availing and extension system delivering extension services, respectively. Further it is also reported that 3.4 fold economic benefit as compared to the expenditure of deploying e-agriculture prototype and
	traditional extension system (www.earik.in).
e-Sagu	Agro-advisory services by digital photographs and co-ordinators for 3035 farmers (4130 ha). Benefited Rs. 9491 (USD 240) per ha (www.esagu.in).
Digital Green	Farmer participatory video for agricultural extension. 1681 videos produced and 60313 farmers involved. Increased seven fold more adoption of farm practices and ten times more effective per dollar spent as compared to traditional extension system (www.digitalgreen.org).
Knowledge Share Centres	Information by touch screen kiosks, IVRS, bilingual web portal and awareness created by screening films & CDs by the Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad. Project covered 51 villages in eight districts of Andhra Pradesh State in 2011 (www.naipsri.org/ikisan)

BARRIERS IN ICT IMPLEMENTATION

Educating and catering to the information needs of farmers across nearly seven lakh villages in India indeed sounds unrealistic as this would require immense financial investment. A one-time major investment in establishing communication technologies in the required places restricts the government's objective of covering more people regularly because of insufficient power availability in rural areas, poor ICT infrastructure, ICT illiteracy, non availability of timely relevant content, non-integration of services, poor advisory services and lack of localization, and in particular non availability of agricultural information kiosks/ knowledge centers at the grass root level.

Moreover, farmers sometimes become averse to adopting technology as they think that it might result in their losing their traditional methods of cropping practices. They simply do not want to use such systems, even if the cost incurred is negligible. Therefore, the attitude and mindset of farmers needs to be changed first. There is a need to win their confidence and create awareness about the benefits of ICT in agriculture.

Future Outlook

Despite the huge potential of harnessing ICT for agricultural development, only a few isolated projects have been initiated in India and in other parts of the world. Interestingly, many of these projects were initiated by NGOs, private organizations, cooperative bodies and government organizations rather

than by government-established agricultural departments. This shows the apathy of agricultural development departments towards incorporating ICT in their day-to-day activities. To formulate a strategy for overall agricultural development, isolated ICT projects need to be studied and the experience gained must be documented in order to draw lessons for the future. On the other hand, the need to market agricultural produce at competitive prices will also change the farmers' attitude towards usage of ICT. ICT will thus help to sustain Indian agriculture.

It is necessary to develop ICT based agricultural services along with a communication backbone (such as a fiber optic network) in rural areas. Though the use of Information and Communication Technology in agriculture is in a nascent phase in India, ICT has immense potential to standardize and regulate agricultural processes and address the needs of farmers. It will therefore definitely serve as an important tool for agricultural development in the near future.

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