Institutional Innovations for Using Information and Communication Technology in Agriculture

P Adhiguru and Mruthyunjaya

Introduction

In the era of knowledge-intensive agriculture, farmers need to have easy access to new information. But information inadequacy at the grass root level constraints wider technology uptake. The agricultural extension approach needs to be reoriented to meet the expanding information needs of the farmers. Amongst various approaches, the use of Information and Communication Technology (ICT) has emerged as an important option for the farmers as well as extension personnel in agriculture. ICT comprise various techniques and infrastructure for storage, processing and management of information. These include computers, software, books, personal digital assistants (PDAs), digital and non-digital libraries and different communication channels such as mail and email, radio, television, telephone, mobile phone, pager, instant messaging, internet etc.[1].

ICT: Importance in agriculture

ICT has expanded the scope of information dissemination by covering market intelligence, weather forecast and post-harvest processing in a need-based and user-friendly mode. These can also support bottom-up articulation of development needs and perceptions of farmers. ICT offer enormous opportunities to improve communication potential, scope and efficiency. These enhance productivity, encourage competitiveness and accelerate growth in various business and social sectors[2]. Agriculture in India being dominated by the resource and information poor farmers, can get a boost through the use of ICT.

ICT-based innovative initiatives

In India, various public and private sector institutions and NGOs have taken up several ICT-based initiatives. These initiatives vary in purpose, type and nature of information, funding agencies, facilitation, methodologies and modes of implementation. Some innovative projects involve setting up of information centers/kiosks at the village level. They provide facilities of using computer with access to internet as a source of information and offer several multipurpose services. And some other initiatives involve developing networks connecting research and extension organizations for an effective dissemination of latest and need-based information[3]. A few observations through a quick appraisal of some selected initiatives are presented below.

Public initiatives

Help-line service

Help-line service project offers directly to the farmers, solutions of their farm-related problems and clarifies their doubts. Started by the Chandra Shekar Azad University of Agriculture and Technology (CSAUAT), Kanpur, Uttar Pradesh in 2002, it operates through a toll-free widely publicized telephone service. A panel of twenty-one scientists covering various disciplines of agriculture remains available to attend the farmers' calls. The farmers can interact with this panel of scientists between 1PM to 3PM on all working days[4]. It has been observed that on average 5-7 queries per day are received during this call period. This panel of agricultural scientists provides 'real time' information and helps them in proper and timely decision making. This service has reduced transaction costs for seeking information by about 94% and has helped farmers in taking correct decisions on farm-inputs and adoption of technologies in agriculture and allied areas.

Observations from project site

Amongst the farmers who were benefited through this Help-line service, about 50% opined that this service offers answers to only simple queries of the farmers and provides solutions only to instant problems like recent and suitable varieties, seed rates, date of farmers' fairs and farmers' trainings. About one-quarter of the farmers stated that private telephone booths in the villages did not encourage making calls to this Helpline since as it was a toll-free service. They had difficulty due to the poor telephone infrastructure. This can be understood by the fact that teledensity in the rural Uttar Pradesh is only 0.56 phones per 100 people by March 2003[5]. Low literacy level and weak communication skills also inhibit using this service as perceived by 45 % of the beneficiaries. In this context, a facilitator is required for creating awareness, utilization of Helpline service by facilitating access to the phone and information at village level.

Private initiatives

Soya-Choupal*

The idea of establishing this web-based initiative was conceived by the international business division of Indian Tobacco Company (ITC) in 2000 with the prime objective of enhancing efficiency in its procurement of soybean. The

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* *Choupal* is a very familiar word with the rural masses particularly in north India and is a community place where village elders sit usually in the evenings to chitchat, exchange views and seek advice from the more experienced ones.

network currently covers about 1,200 *Choupals* at the village level in the state of Madhya Pradesh. These *Choupals* have internet connectivity with solar panel battery back up and VSAT equipment. The service support is provided through a '*choupal sanchalak*' (a lead farmer) who acts as the interface between the computer terminal and the farmers. *Soya-choupal's* portal in Hindi offers the latest information on weather, farming practices, and market prices of soybean to farmers at the village level. Real-time information on market price of soyabean as offered by ITC is provided. Farmers can compare ITC's price with that offered by other local traders and can take decisions about when and where to sell their farm produce so as to gain maximum profit. Thus, 'Soya-c*houpal*' as a direct marketing channel, virtually linked to the '*Mandi* system', eliminates many intermediaries and multiple gains through a better handling and thus improves sale value realized by the farmers for the produce (about 2 %). ITC gains through a better control over quality of produce and reduction in procurement cost by 2.5 % (Rs.250 per ton at current prices) [6]. *Sanchalak* does aggregation of the demand for farm inputs from individual farmers and extends help in procuring high quality inputs from the reputed manufacturers at a fair price.

Observations from project site

This initiative has drawn strength by involving existing rural institution 'the choupal' and redefining the role of traditional intermediaries for facilitation and information gathering so as to help both the farmers and ITC. Though this initiative is supply-driven, by supplementing the information service with correct weighing of the produce and immediate payment at Mandi, it is encouraging higher participation of farmers. Nearly 50 % of the respondents felt that most of the *Sanchalaks* who act as facilitators at these *Choupals* have little knowledge about the agricultural subject matter and on computer operations. About one-tenth of the beneficiaries were of the view that *Sanchalak's* presence in *Choupal* was only for a short period, which limits the access of farmers to *Choupal*. One of the reasons for this is *Sanchalak* gets a commission of one per cent on the total value of the procurement under his facilitation and therefore, he spends more time and energy on the procurement for ITC. Moreover, in a Soya-choupal, marketing transactions and soyabean procurement are given more emphasis than dissemination of technologies. It is understandable because, this soya-choupal is mainly ICT enabled supply chain management for ITC. Among the beneficiaries, almost all were using Soya-choupal for marketing whereas only 25 % utilized it for information on technologies. Business is restricted to soybean and wheat crops; as a result, dissemination of information on technology practically becomes confined to farmers growing these crops. Thus an established infrastructure at the village remains largely underutilized and there is a scope for using this infrastructure for providing other services also. For instance, it can be used for providing services like micro-credit, and crop insurance.

Ikisan limited

Ikisan limited is an initiative of the Nagarjuna group of companies, established in 2000 with the objective of facilitating continued enhancement of agricultural productivity and rural prosperity, and thereby making the Indian farmers globally competitive[7]. Initiative includes both Ikisan portal and information kiosks at the block/ village level for disseminating information. Farmers can access this portal free of cost. It provides information in Hindi and five major regional languages (Tamil, Telugu, Kannada, Marathi and Punjabi). The portal has organized information on agricultural practices, agricultural news, animal husbandry, agricultural machinery, aromatic and medicinal plants, agricultural credit, insurance and prices of inputs. It also provides dynamic information like marketing and weather. Ikisan maintained 21 kiosks—14 in Andhra Pradesh and 7 in Tamil Nadu. These kiosks had facilities like computer, internet connection and other infrastructure. A facilitator was also available at each kiosk for disseminating information and providing services of Ikisan. A 'member registration' system had been evolved for Ikisan at the village level with the twin aims of developing a rapport between the farmers and Ikisan and stimulating revenue generation through specific service charges. The extension officers of the company provided farm advisory service at farmers' fields which acted as complement to the information, provided through kiosks. This initiative had benefited the farmers in terms of crop yield increase (5 %) and reduction in cost of cultivation (14%) mainly due to the judicious use of farm-inputs.

Observations from project site

In spite of offering a variety of information by I-kisan portal, about 50 % of the beneficiaries expressed about lack of timely location-specific information. A majority of the users (above 60 %) felt that inadequate infrastructure facilities including electricity and telephone at the village level led to frequent poor internet connectivity in kiosks which hampered access to online information. The establishment costs (Rs. 3 crore) and maintenance (Rs. 3 lakh per month) of I-kisan limited were opined to be met by the parental Company, since there was not much recovery of costs and income generation in I-kisan. For example, recovery from farmers prevailed only in Tamil Nadu and that too from a limited membership (175 members per centre) with a nominal cost of Rs 150 per member. Consequently, I-kisan tended to keep their kiosks under the management of the pesticide dealers of the concerned area. This practice had adversely affected the performance of the kiosks since the basic motto of a pesticide dealer was to sell pesticides rather than providing the needed information. As a result sustainability of the kiosks was affected. However, Ikisan portal continues to be maintained and other revenue streams are being established. Now the company is offering its expertise in conceiving, developing, and implementing IT enabled solutions in agriculture on a turn key basis.

NGOs Initiatives

Village knowledge centre

MS Swaminathan Research Foundation (MSSRF) initiated a project, 'Village knowledge centre' in Pondicherry in 1998 with the objective of providing the rural families access to a variety of information in fostering agricultural and rural development through the use of ICT. This initiative has value-addition centre (VAC) (hub station) at Villanur, Pondicherry, which is connected to ten Village knowledge centres through a hybrid wireless network comprising computers, telephones, VHF duplex radio devices and facilitating both voice and data transfer[8].

The content for dissemination is prepared locally using indigenous knowledge combined with generic information, including experts' suggestions. Local volunteers, mostly women, gather the information and feed it into the intranet.

Value-addition is done to this information by preparing it in the local language (Tamil) and use of multimedia. The Village knowledge centres disseminate these information using display boards, computers, public address system, paper-clipping as per the requirements. For instance, weather forecasts for fishermen are translated into local language and broadcast

Computer on Wheels

Another ICTs initiative, which is novel in its approach (mobility and use of advanced technologies) is the Computer on Wheels (COW) project (Box 1). This initiative is in the initial stage of the implementation.

Box 1. Computer on Wheels (COW)

The Computers on Wheels (COW) is a novel initiative taken up since 2003 by an individual developmental entrepreneur—Ms Rajeswari Pingali and has been supported by Stanford Reuters Digital Vision Program and Digital Partners Institute, Seattle, USA (about US$ 40,000). The fund seeks to support innovative ICT model for socio-economic development. The objective of the initiative is to enable information empowerment to citizens by providing expanded access to information and exposure through technologies in the rural areas [9]. To provide access to information, a motorcycle is used which is equipped with a solar-powered laptop computer and facilities like Internet connectivity, printer, digital camera, and a mobile telephone. It provides doorstep services at the village level. Seven remote villages in the Mahbubnagar district of Andhra Pradesh currently receive these services and get access to information on agriculture, healthcare and a range of other rural issues. The information provider, who is the facilitator in the model, visits every village once in a week for both getting queries and providing solutions to the queries collected during the previous visit. This model is at the initial stage and if successful, will be replicated in 227 villages through the involvement of village youth as information providers.

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over public address system. Area-specific information related to crops, prices of agricultural inputs and outputs, healthcare, livestock care, transport, weather, government development schemes are provided. The value-addition centre in Villianur has generated a number of databases to answer local people's day-to-day queries. Rural yellow pages containing local advertisements are published. The facilitator in the Village knowledge centre is motivated by adequate training and providing a token incentive of Re. 1 per visitor to the Centre.

Observations from project site

Signing of the memorandum of understanding by the villagers with MSSRF for providing infrastructure and in identifying local volunteers while establishing Village knowledge centres has encouraged the community partnership. Gender sensitivity orientation and involvement of women volunteers have resulted in active participation of women and their empowerment. The proportion of women users varied from 34 to 50 %. Creation of content locally and disseminating it in a user-friendly mode with state-of-the-art ICTs has led to extensive use of the initiative and a strong sense of ownership among the villagers. Apart from financial support from the donors, comparative advantages of the project area (Pondicherry) in terms of government support, infrastructure and literacy have led to a big success of this project.

A comparison of these ICT-based initiatives reveal subtle differences in approach in implementing ICTs projects among public and private sector institutions and NGOs and is presented in Table 1.

Strategies and policy options

Each initiative is a unique model in the application of ICTs to agriculture and has merits and constraints of its own. Based on learning from these initiatives, as reflected in this brief, some suggestions are being provided for greater success of ICT initiatives:

- Involve local people in content development as in Village knowledge centre) to assess information needs and collection of indigenous knowledge, which can be synthesized, with information from experts/ institutions.

- Prepare user-friendly content in the regional languages also with visuals.

- In kiosks, supplement the digital information with public address system, vernacular print media, and bulletin boards for wider dissemination.

- Use alternative technologies to substitute electricity (batteries and solar panel) and telephone connectivity (wireless network), use space in rural institutions (*Panchayat* office,

Table 1. Different features of selected ICT-based initiatives

Features	Public sector	Private sector	NGOs
Investment	Funds from central and state governments,	Company expenditure	Funds from international organizations, state governments, etc.,
Area of interest	Research, education, training and capacity building	Business goals with social orientation	Uplifting of remote area people
Salient services	Researcher-farmer linkage, call centers	Input-output marketing, technology dissemination	Agriculture and animal husbandry, social developmental work
Working areas	Based on the research and training needs, villages/districts	Commercial, strong marketing areas of the companies	Remote and socially under-developed areas
IT facilitator at the grass root level	Government officials, trained local personnel	Local trader, professional personnel	Volunteers from local areas and service-oriented personnel
Goals	To make a role model for agriculture and the allied development	To generate economic benefits for the people as well as company	To create awareness about socio-economic economic benefits of innovative technologies

school, temple) to overcome infrastructure barriers (e.g. Soya-choupal, Village knowledge centre).

- Appoint facilitators exclusively for information service; they should be motivated and accountable, well qualified with adequate knowledge on subject matter and computer operation.

- Facilitative role of institutions like Village *panchayat*, agricultural extension offices, and *Krishi Vigyan Kendras* are desirable to enhance access to information (e.g. Helpline service).

- Sustainability from ICT enabled information service can be achieved if and only if such service offers wide range of assured higher economic benefits to the farmers (e.g. improved yield and cost reduction). Initiatives can be run in a sustainable manner through either win-win profit-driven option (e.g. Soyachoupal) or through continuous sponsorship (e.g. Village knowledge centre).

- Support these initiatives by other quality services and rural infrastructure (extension expert's advice, market access, transport service, roads, development schemes etc.) to translate knowledge-based decisions into actions without bottlenecks.

- Encourage networking of institutions and public-private partnership for improving rural teledensity, information generation and delivery, capacity building of the facilitators etc.,

- Public sector institutions have to play a greater role in synthesizing information while private sector institutions and NGOs disseminate it through information centres. Even though, the 'Ten point agenda' of Union Ministry of Communication and Information Technology has emphasized ICT as of extreme importance for bringing about an all round economic development, this agenda need to be pursued further by framing explicit ICT policy, which is well integrated with sectoral policies (e.g. agriculture, rural development, etc.).

To sum up, for effective utilization of ICT, policies need to be focused on **5 Is**:

Information and interface: Media planning for need-based content development and mode of delivery; evolving capacity building programs for facilitators to improve their effective interfacing.

Integrated support: Devising strategies to integrate quality services and needed infrastructure to support ICT-enabled services.

Institutional arrangement: Optimizing partnership among public and private institutions and NGOs to perform complementary roles in ICT-led growth.

Incentives: Incentives for use of advanced and alternative technologies of ICTs to overcome regional barriers (remote and underdeveloped) in connectivity.

Investment: Increasing public investment for rural infrastructure development and launching explicit ICT-based agricultural development programs.

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