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Information and communication technology emerging tool for agricultural extension

P.R. KOLHE*, P.P. KOLHE[1] AND M.H. THARKAR[2]
Department of Computer Science, College of Agricultural Engineering and Technology, Dapoli, RATNAGIRI (M.S.) INDIA

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One must have heard childhood anecdote that there was a magician who could bring any thing in the world to a piece of mirror he held in this hand: this story has now become a true fact in the form of INTERNET. Such "Allauddin Chirag" for 21st century and future is appurtenant to Agricultural Green Revaluation. According to Dr. MS Swaminathan, "New information and communication technologies offer the possibility of creating a level field for both the rich and the poor, provided we know how to use them with a commitment to gender and social equity". Effective use of Internet for extension in agriculture is elusive despite substantial investments in human capital and other resources. Updated and comprehensive information, availability of new types "Just in time", more and competing information sources; "One stop information shopping"; ease of exchange of information and/or ideas and facilities to discuss them; easier collaboration and/or access to peers, other experimental farmers and experts; a ranked list of useful information such as updated market lists, weather information, plant protection regulations, recommendations and products, news, bulletins, and more are perquisite. Internet accessibility on individual farms or at farmer-gathering locations, input information that farmers/ extension want, and/or needs, identifying a tangible benefit to information users, defining and serving target audiences, packaging information in a way that it can be understood and applied, a simple, user-friendly search engine and interface design, responsibility for the information quality and reliability are guiding factor for web based extension development. There is a felt need of a practical baseline reference for Internet adoption in planning, programme implementation, goal achievement and evaluation.

India has agriculture backbone. Agricultural production is becoming ever more dependant on Information Technology (IT). Existing systems for transfer of agricultural technology is, by and large, fail to reach the farmers. It may be due to lack of motivation on the part of extension agents while working in the rural areas and/or lack of up-to-date agricultural technology information available with them. Often their interaction with farmers does not inspire enough confidence among the farmers to adopt a particular advocated technology. Information and Communication Technology (ICT) provides an alternative and more potent media for information dissemination. Internet connectivity making available any information from all over the world at your desk top and e-mail facility which is replacing the postal communication all around the world as well as internet telephony, web-portals with discussion forums, on-line chatting, video conferencing etc. the entire world is shrinking as far as the reach is concerned.

The use of multimedia technology has made the interactions through computers more lively with images, video clips and stereo sound capability. ICT provides access to the latest updated information on a particular technology clearly outlining the benefits of adoption of that technology through multimedia graphics and video clips. It is well recognized that the computer images and video clips of actual application of technology seem to have far greater impact on the farmers.

With the greater emphasis on establishing rural information kiosks and Kisan Call centers along with country wide investment in creating information connectivity backbone; the rural masses in the remote corners of the country can have greater access to the information through ICT. Thus ICT is more efficient, attractive and interactive media for information dissemination and the same offers a fresh opportunity for taking scientific knowledge/technologies to the end users. Although IT is relatively easy to adopt and cost effective, its adoption is not straightforward and initially can even be counter-productive. The explosive presence of Internet on the IT scene and the rapid adoption of Internet

*** Author for correspondence.**
[1] ARIS cell, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, AKOLA (M.S.) INDIA
[2] Department of Computer Science, College of Agricultural Engineering and Technology, Dapoli, RATNAGIRI (M.S.) INDIA

supported activities have created a wide range of opportunities and expectations. Internet for Agriculture in general and extension in particular are no exception. Extension providers' and clients' expectations include superior information accessing and dissemination, ongoing farmer-extension-research communications, with online effectiveness, better knowledge management, real and "just-in-time" information updating, discussion forums, integration of information sources, improved extension delivery, extension service organization and more. As is often the case with technological-innovation, potential and expectations can outpace reality. Adoption is usually not spontaneous, the technology has to be taught and learned - adopted to existing experience and integrated into to production. Specific environments dictate specific solutions, which have to be developed, alternatives - past and present including "resistance to change" can be implements. These and many other reasons stand in the way of innovation-adoption of Internet for agriculture and extension again not being an exception. By the same token, adoption of Internet must be studied and understood in order to define trends, areas of cooperation, unique issues and priorities. The relatively low cost of Internet entry compared to the very high cost of maintaining relevance and the uniqueness of country specific solutions. The problems, however, are the uneven regional development leading to greater inequality between states and also greater rich-poor, urban-rural inequalities; and lack of absorptive capacity standing in the way of knowledge filtering to other sectors of the economy. There is poor domestic demand for ICT as it remains outward looking. ICT can be the answer to the unmet demands and the needs of the countrymen. It has already started to improve infrastructure, education, health, gender, private enterprise, governance, rural development and public services. And there is enormous potential for future development. There is already evidence of this through initiatives such as the *Gyandoot* in Madhya Pradesh, village knowledge centre in Pondicherry (IVRP) and TARA kendras in Punjab where the models comprised of multipurpose kiosks in rural areas catering to specific local and clientele-based packaging and delivery of information. *Gyandoot* has wider coverage and strong social roots. There are clear signs of empowerment, though still partial and limited. There are instances of local power relations being reinforced. However, there is relatively better basal use because of the unique set of services the project offers. In Pondicherry, the kiosks, which rely heavily on local resources, offer highly uneven facilities. Critically, communities which are backward and poor are unable to acquire the infrastructure required to set up the kiosks. The reality is that though massive job creation and poverty alleviation may be the lofty goals, it is extremely difficult to pursue them with an overemphasis on the potential of new technologies.

The role of ICTs in poverty alleviation needs to be examined in the context of extreme deprivation and poverty in which a majority of people live, not only in India but in the entire developing world. The World Bank in its annual report on 'Global Economic Prospects' has highlighted that the population of the poor living on less than one dollar per day has increased from 474.4 million in 1987 to 552 million in the year 2000.

The knowledge economy does not offer permanent jobs nor permanent specialization because related skills need to be constantly upgraded and improved to be able to compete. Yet increasingly ICTs could help bring the poor closer to opportunities for economic growth, even though merely 0.25 per cent of Indians are net enabled. The problem lies with the nature of the policies to promote ICT development and use. The Indian Government's IT task force and the National Working Group on "Taking IT to the Masses" have focused on how the profitability of the Indian IT Industry can be increased-something that hardly needs any significant focus considering India exported software and services to 95 countries around the world during 1999-2000 amounting to over US$8 billion. But they have yet to visualize how ICTs can fulfill the needs of the rural poor, nor have they examined creative ways in which the communication technologies, perhaps sequenced with some of the old ones, can help accelerate poverty eradication. Nor are the policy-makers seriously examining ways to generate employment in the IT industry, which could be done by integrating ICTs into local level development planning and work, an Expert System for Extension (ExSysExt) has been developed for providing farmer advisory services through extension agents. Another expert system on wheat crop management is being developed. Besides, there are several projects where information systems are being developed to provide the content on the Internet related to agricultural research

ICT in rural background :

– Use of multimedia technology has made the interactions through computers more lively with images, video clips and stereo sound capability.

– ICT provides access to the latest updated information on a particular technology clearly outlining the benefits of the adopting that technology through multimedia graphics and video clips.

– Computer images and video clips of actual

application of technology seem to have far greater impact on the farmers.

– With the greater emphasis on establishing rural information kiosks and Kisan Call centers along with countrywide investment in creating information connectivity backbone, the rural masses in the remote corners of the country can have greater access to the information through ICT.

- ICT is more efficient, attractive and interactive media for information dissemination and the same offers a novel opportunity for taking scientific knowledge/ technologies to the end users.

Underlying issues in using ICT for benefiting the end users such as

- Operationalising in the rural surroundings with dusty surroundings
- Not very reliable power supply,
- No useful content for the end users,
- lack of resources with the poor farmers,
- No ability to purchase the contents,
- No employment generation,
- High cost of the technology,
- Lack of repair and maintenance of the systems
- Rapid obsolescence requiring up gradation of hardware and software etc.

Extension services are undergoing structural changes. Internet use will help to adapt, facilitate and even cause these and other changes, e.g. "flattening" the organizational structure. Extension will also have to adapt to Internet's influence on the increasing disparity between technology-innovators (agents of change) and innovation-followers, the weeding out of inefficient producers and their dependence on the public sector.

Farmer organizations play an important role in Internet adoption, provision of subject matter content and funding for information generation and dissemination. The organization's goals do not always correspond to individual member's goals; The economics of Internet use in agriculture is to be researched. This is becoming an issue of some urgency due to the high penalty imposed by non-focused Internet use, indirect "invisible costs", "too much" information and availability of cheaper information dissemination and communication alternatives.

The present methodology of Internet use is transitional. Wireless transmission and greater interactivity, with innovative I/O devices are here. Their derived implications for agriculture, e.g. for online precision farming. Past experience with videotext shows that (conceptually) being an attractive substitution to print is not enough to sustain an information dissemination technology over the time. Regardless of Internet's phenomenal success the technology, its implications and chances for survival are far from being understood

There are many other initiatives for establishing Information Kiosks, some of these were government supported and others adopted a business model where users pay for the services. There are two important initiatives in this regard: ITC's e-chaupal and Hindustan Lever's iShakthi. Prof. Ashok Jhunjhunwala has been behind nLogue, an IT company largely promoting the technologies developed by IIT Chennai and is a franchise model on the pattern of STD/PCO booths, where they provide information kiosk (PC with internet and video conferencing facility, scanner, photocopier etc.) at a low cost and train the kiosk owner and the owner provides different services and tries to earn a reasonable income. There is local community knowledge center, the TARAkendra by TARAhaat, an NGO run by Parmar sisters (Rajmani and Priti Parmar) in Bundelkhand region promoting TARAhaat information and marketing services TARADhaba which provides courses on life and vocational skills and strengthen this tiny community of 3,800 inhabitants through outreach activities.

The contribution of the ICT sector can be viewed at two levels, direct and indirect effect. The direct effect is in employment, income and export earnings from ICT. The indirect effect is in enhanced productivity, competitiveness and growth of other sectors on account of IT diffusion, emergence of altogether new services enabled by ICT and spillovers. It is argued that the direct benefits are laudable. The ICT sector itself has shown remarkable vibrancy in terms of output and export growth as well as technological dynamism. These are often cited as the outcome of the export-oriented growth strategy that was followed. But the economy as a whole seems not to have benefited because of high regional concentration of ICT activity and low diffusion of ICT to other sectors of the economy. Because of the ICT boom, other sectors of the economy which compete with it for skilled manpower would have been adversely affected. There are also adverse implications on other services like teaching, training, research and development. These are bound to have long-term implications on the overall growth of the economy and as well as in sustaining the current competitive advantage of ICT. Thus there is a need for a national policy on ICT diffusion which could mitigate the adverse effect of 'excessive' export orientation.

Internet adoption in agricultural extension: Some issue

- Technical problems in adopting or using Internet for extension
- User Benefits by using Internet by Extension/

Farmers

- Drawbacks of Internet for Extension
- Critical success factors for effective Internet use
- Organizational structure aspects and networking responsibilities
- Obstacles in the use of Internet
- Knowledge gaps and new trends relevant to Internet
- Proposed and/or potential development projects
- Issues to be focused

Technical problems in adopting or using Internet for extension :

The basic issue is the extent of technical problems as a factor limiting Internet adoption and operation. This in turn indicates that major technical problems identified are probably locale specific.

There are no technical problems in adopting use of Internet for extension.

- Outdated computers. Care detrimental to development of Internet infrastructure
- Overload on rural communication facility's capacity during peak demand.

User benefits of using internet by extension/farmers:

- Updated and comprehensive information
- Availability of new types of information - in addition to extension's field of competence
- "Just in time" information. Access to more and competing information sources
- Access to more and competing information sources. 'One stop information shopping'
- Easy to exchange information and/or ideas and discussion on them
- Easier to collaborate and /or access peers, other innovative farmers and experts.
- A tool for distance learning, training and consultation
- A ranked list of useful information: updated market lists, weather information, cultivation practices, paste and nutrient management, news, and bulletins
- An instrument to connect to the "outside (non rural) world"
- The user has a sense of "belonging".
- Provides access to markets, services and shopping
- Informal meeting place

Drawbacks of using internet for extension :

- Too much (possibly contradicting and/or non-focused) information. Unreliable or outdated information
- An over dependence on "one" source of information.
- A need for a "middle man" (e.g. extension person) to interpret Internet information
- Information supplier lack of accountability
- There are invisible costs involved in Internet use that are usually unidentified and/or ignored.
- Internet use is not compared to costs and benefits of alternative information options.
- Abandoning farmers to the Internet

Critical success factors for effective Internet use :

"Finding out what information the farmer wants and needs" is necessarily universal agreement, as compared to current situations providing only" available" and/or "official" information.

- A simple interface and easy to navigate search engine
- Someone has to be responsible for the information quality and reliability. Credibility/reliability
- Updated information
- Provision of professional information and not just presence.

Internet information facilities may change existing organizational structures. Information providers other than extension functionaries may have to restructure. Alternative information entities may establish themselves e.g. a Farmers' union on Extension service.

- Internet accessibility at individual farm or farmer group locations.
- Identification of what information the farmers want and need as well as "extension" needs.
- Identification of a tangible benefit to information users
- Identification of a tangible benefit to information providers
- Provision of information and/or a service unavailable elsewhere
- Awareness
- "Umbrella sites for facilitating easy use of Internet. Identification the information's target audience
- Package information in a way that it can be understood and applied
- Simplicity, good design and easy to navigate search engine
- Credibility/reliability of Internet use will have an effect on Internet application development
- Updated information
- Building the web site together with the end user
- A site must provide professional information and not just presence

- Fast lines to transfer the information
- Integration of multi stakeholder's vision and government policy
- Low price for hardware, software and net use costs
- Integration of information preparation and dissemination
- Internet subject matter training for extension personnel

Organizational aspects and networking responsibilities :

Only one fact was universally agreed as having an important organizational impact. This may be the result of short experience with Internet implementation and organization specifics. Experience in other activities indicates that adoption of IT has a profound impact on organizations. There is no reason to assume that organizations dealing with extension delivery will be immune.

There is a need to define the role of the extension worker as a part of the new Internet options.

- Fewer organizations and more networks
- Encouragement innovators as part of a supportive political climate
- There is a need for EU and national policies
- There is a need to balance between Internet innovator's freedom and national policies
- We have to use the extension structures that are already working
- Internet options. A high degree of development within the organizations has to be combined with networking between organizations
- Internet information facilities may change existing organizational structures.
- Information providers other than extension worker may have to restructure.
- Alternative information entities may establish themselves e.g. a farmer's union extension service.
- Farmer organizations and extension services paid by them may not represent farmer needs

Obstacles in the use of internet :

- Farmer's resistance to change
- Culture and tradition
- Extension officers may feel threatened by Internet services
- Extension service decision-maker's "misunderstanding"
- Extension service decision-maker's (manager's) fear of change
- A "top down", "we know better" approach to provision of information
- Alternative sources of information
- Extension's competitors
- Unsuitable packaging - language, misunderstood descriptions, nonstandard information, etc.

Knowledge gaps and new trends relevant to Internet:

Establishment of standards for training and supporting the creation of Internet services has become necessary.

- Commercialization is a way to sustain web services.
- There is a need for local (versus "global or average") knowledge.
- There is a need for identifying the practical aspects of research results.
- There is a need for "prompts" for those who do not know "what" is available.
- How to integrate available information (e.g. a spraying schedule) with real time
- How to filter information.
- PCs should be viewed as communicators as well as "advanced calculators"
- Internet could be used to "push" information in addition to providing information accessibility.
- Portable communicating devices will enhance Internet availability.
- Interactivity will become ever more important and feasible.
- Demand will become a more important factor in developing services available via the Internet.
- Use and friendliness will facilitate easier and more efficient use of Internet.
- Teaching and learning will become more self directed and focused.)
- Tele-working and distant education will increase.
- Wireless communication may overtake wired facilities.

Proposed and/or potential projects for development :

Extension Internet professionals should found an international forum to communicate, "What's going on" and ideas. Establishment of an inventory of extension projects and sites and making them available on the Internet and coordination on standards for data exchange and development is prerequisite.

- A study to learn lessons from past experience in similar media - mainly videotex
- An international exchange of extension Internet professionals - at least a discussion group
- International Funding Institutes (FAO, IBRD,

etc.) may be convinced that the use of computers, which are already sponsored by them, should include Internet components

- Building virtual organizations around projects and products. EFITA (The European Federation for Information Technology in Agriculture) could start a pool for ideas and 'What's gon'
- Establishment of going on and sites ad-make them available on the Internet
- Establishment of an inventory and tool for "frequently asked questions" at local and aggregate levels
- Use of Internet as a tool to cooperate in developing different IT resources - Images, GIS, models etc.
- Use the Into facilitate solutions to language difficulties
- Evaluation of standard procedures to measure the impact of Internet projects, use and services
- Establishment of standards for training and supporting the creation of Internet services
- Establishment and agreement on standards for data exchange and development
- Support EFITA co-ordination activities in different Internet subject matter areas.
- Establishment of methods to measure the quality of telephone lines

***Issues to be focused* :**

- How can products and project ideas be developed and used as a source for new sites and services?
- What information should be made available in the public domain for free as part of a public service and what information should be left to the market on a pay-per-access?
- The benefit of integrating Internet in agricultural schools and training as a research tool
- A better understanding of how farmers make decisions will facilitate a better design
- Options for providing access to Internet, in areas where not everyone has a communicator, are tele-cottages, Internet clubs, shared communication
- Resources, public use of extension offices, kiosks in marketplaces, schools, public offices, libraries, and more
- How to involve Internet information end users in the development, design, and on- going maintenance of websites.
- How can critical evaluation of Internet-originating information be encouraged for example by end users such as farmers or extension officers? Such experience-based evaluation is equivalent to applied research - making end users, in effect, information providers.
- Funding of projects that need final, pre-marketing development fine-tuning

Summery :

Internet extension in agriculture will be a useful tool for defining trends, identifying areas of agreement, unique issues and issues of common relevance. Repeating the 'interpretation-exercise' will enable each user to benefit in the same way. This would provide a practical baseline reference for Internet adoption planning, programme implementation and goal achievement evaluation. End-users would be farmers - as information users and information generators (opinions and field results); extension personnel - as information disseminators and information generators (field trials and "imported" know how); agricultural researchers - as information generators and information users (feedback from farmers and extension) and service providers such as packing houses, wholesalers, soil labs, agro meteorology services, veterinarians, equipment suppliers, and other sector information actors.

Agriculture continues to be a major sector in larger part of the world. In recent years, the IT sector is growing exponentially. It offers an immense potential for synergistic benefits effecting the growth of all sectors including agriculture and agricultural extension. Rapidly expanding population, a dwindling natural resource base and steady trade liberalization dictate harmonious integration of agricultural research, management, coordination and extension. ICT enables research program managers working in national ministries and funding agencies to achieve this. The challenge ahead is to explore the opportunities provided by the IT revolution to ensure a vibrant, responsive, sustainable and productive agriculture. It has to be done in some sort of alliance with a shared sense of direction facilitated by

ICT integration into research operability, monitoring, control and assistance to all fields of agricultural production, research and extension.

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