Rural Informatics in Agriculture: The Cyber Way

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Abstract:
Agriculture Extension have seen a wide range of reform initiatives in India in the current time enabling efficient access to quality information to the farmers in Rural India, especially in the field of Agriculture.
This paper aims to divulge how Information Technology has enabled the fast and accurate routines of information processing that vanguard the basic analysis and knowledge development of farmers in India. The engrossment of technology with the Agricultural System in India is important from the economic outlook too; a large share of our National Income comes from agriculture and Indian economy is considered to be Agrarian Economy. In addition, the use of technology is transporting various forms of information to all sections of society and is bridging the Gap of Socio-Economic Divide. The rise in agro-based rural communities is possible using Cyber Extension, which also initiates growth and prosperity and these communities, in turn, could be connected across various demography in India giving rise to knowledge network.

The paper appraises some distinctive agricultural extension programs in India by considering their ability to provide and facilitate information sharing and its use in farming communities in various regions in India.
This paper bestows a munificent overview of the current extension vista in India and provides a synthesis of various Agricultural Extension Programs. Each Project is meant to reach the small hold farmers in most remote part of country and share the information and knowledge in the most relevant manner to fulfill the needs of these marginal and small hold farmers. The utilization of Cyber Extension through Diffusion of ICT is a key to this.

Key words: Cyber Extension, Agricultural Development, Agricultural Markets, Information and Communication Technologies, Gyandoot, Agricultural Extension, Knowledge Management, Information Systems, Innovation in Agriculture.

Introduction:
The new millennium has seen Information and Communication Technology providing growth in every sphere of business pursuit by increasing efficiency, competitiveness and productivity. ICT has emerged as a scheming support industry that is influencing significant and powerful economic growth in India. On the other hand, it has also created a Digital Divide in India by increasing a gap of economic disparity among various sectors of the Indian Society – more so the agrarian rural society with negligible exposure of ICT. The overall potential can be harnessed by diffusing the technology across various sectors of Indian Society, especially in rural brigade to fill the Digital Divide gap.

The Rural Administrative structure has seen a huge composition change in last few years. With the rise of Panchayati Raj, it is more decentralized in nature. The rural development plans and services offered by central agencies like district administration, cooperative union, State Government, and Central Government, should get disseminated to the local governance like Gram Panchayats in time, even if they exist in the most remote areas. The planning and decision support to these local governing bodies could be effectively provided by use of ICT applications, which in turn will make the system more transparent too. In addition, this will enable the rural citizen to access to information, leading to empowering of knowledge. There is a huge belief that for the socio-economic development of rural hinterlands on India, the service implementation must be carefully localized using ICT.
Cyber Extension in Agriculture Advisory Services

The agricultural extension i.e. The Agriculture Advisory Service is evolving since the Green Revolution and has adopted participatory and decentralized approach where accountability of increased production using technology is geared towards the users. (Hall et al. 2000; Birner and Anderson 2007; Sulaiman and Hall 2008; Davis 2008; Kokate et al. 2009; Swanson 2009). There are several confronting challenges to Indian farmers including land and water availability, limited availability of natural resources, varied climatic conditions and climate changes, increasing population pressure affecting demand and consumption patterns, and economy and trade liberalization (Lele et al. 2010). Hence, the local information needs of farmers in the Indian Subcontinent with diverse agro-climatic regions and socio-economic conditions are also very wide. The situation and context specific agricultural extension approaches could have significant impact on rural areas in India. Majority of farmers, 81% to be precise, are cultivating the farming land of less than 2 hectares (India, Directorate of Economics and Statistics 2009; NSSO 2006) and the progress in hunger reduction and poverty depends on successful delivery of agricultural extension by increasing the productivity and profitability of these farmers.

India’s 10th and 11th five-year plans recognize agricultural extension as a means to reduce the yield gap in fields and increase the agricultural growth (Planning Commission 2001, 2005, 2006). To achieve this, farmers need to access a wider range of information, related not only to production methodologies but also to postharvest processes, price information, access to remunerative markets, and business development (Sulaiman and van den Ban 2003). This information could be facilitated by integrating diverse knowledgebase with modern cyber communication technologies. In India, the role of agricultural extension in improving agricultural growth is today being recognized with increasing investment on modern media of ICT.

However, in the current time, the coverage of ICT in agricultural extension in India is inadequate and hence as per NSSO 2005, the agriculture reforms induced by central agencies like National Agricultural Research Organization, Government and Non-Government organization, Cooperatives, and Financial Institutions, have a very limited outreach (NSSO 2005). This is majorly due to the fact that information dissemination is not supported by modern Information Technology. The 2003 National Sample Survey Organization (NSSO) survey showed that 60 percent of farmers had not accessed any source of information on modern technology to assist in their farming practices in the past year. Of those who had sourced information, 16 percent received it from other progressive farmers, followed by input dealers.

Information Needs of Farmers

ICT in agriculture is fulfilling the farmers’ needs for information. A diverse range of information is required by the farmers to effectively support their farming processes. In addition, postharvest knowledge including crop processing, market scenario, effective and lossless storage, and supply & Handling, is needed by the farm producer. The main focus of ICT in agriculture is to provide vital stats to the farmer related to the following (Van den Ban 1998):

- Most appropriate farming technological options
- Management of technologies, including optimal use of inputs
- Changing farm system options (mixed farming and diversification, animal husbandry, fisheries)
- Sourcing reputable input suppliers
- Collective action with other farmers
- Consumer and market demands for products
- Quality specifications for produce
- Time to buy inputs and sell produce
- Off-farm income-generation options
- Implications of changing policies (input subsidies, trade liberalization)
- Access to credit and loans
- Sustainable natural resource management and coping with climate change
Cyber Extension – The current perspective in India.
Information Technology can help in collecting, storing, retrieving, processing and disseminating a broad range of information needed by the farmers. This could lead to effective knowledge management which when utilized for strategic planning, can facilitate the research in area of least-cost inputs, logistics management, better market propositions, and the like. Cyber Extension in Agriculture with ICT also enables the farm producer engaged in various cultivation practices to document it for future references and move strategically in coming times.
There are many Information Technology driven projects supporting agricultural extension in India. See

Annexure:
The projects were effectively scheduled at different times; each one was based on adaptation of Information Technology and conceptualized the Agricultural Cyber Extension, better known as Agricultural Extension. They provided the Virtual Cyber Space through networked computers using telecommunications, and let strong, rich, and quality information sharing possible through power of Information Technology. As acquainted by Van den Ban – 1998, these Projects helped the farmers in accumulating post harvest knowledge, crop processing, market scenario, storage of the produce, and supply chain. The major aspects on which these projects concentrated are:

- **Information on New Farming techniques and Prevailing technologies**
  Continuous and rigorous advancement in engineering & technology leads to upgradation of agricultural machinery. The new techniques keep on evolving since the scientific bodies conduct the researches about better techniques. Up to date information regarding latest technologies in agriculture is of immense importance for growth.

- **Information about Rural development programs and subsidies**
  Provision of detailed information on Government initiatives for rural development for the farmers is addressed. The information about subsidies on crops, seeds, manures, machinery, and other agricultural areas in various demographies is disseminated. The support program of the Government at the place of natural calamity is made known to the farmers. Information related to these programs is used by the farmers to bring their investments down and is generally of prime importance to marginal farmers.

- **Latest Methodologies & practices**
  Information on new and feasible cultivation practices is very important to the farmers. Information regarding increasing the output from the farmland by sowing of crops in a specified manner can be important for farmers to withstand the shortfall of crops in previous seasons.

- **Soil testing and soil sampling information**
  Information related to testing of quality or nature of soil is very important for farmers as the soil directly relates to productivity of crops. If this information about the test centre and the type of soil in various regions is easily available to the farmers, they can nourish the soil using appropriate manures and yield a better produce from their farmland.

- **Post-harvest technology**
  The information on pre-harvest is important but ill implementation of post-harvest activities degrades the value of yield. Proper implementation of post-harvest techniques adds value to the produce of the farmer. This may include storage of the crops to logistics management of the same.

- **Early warning and management of diseases and pests**
  The information about weeds and pests in a specific area alerts the farmers and help them take the precautions. Information on breed of pest damaging a specific crop is of utmost importance to the farmers.

- **Market information & Current Scenario**
  The Market information prepares the producer and helps them strategize. The strategy may include price updates of agricultural commodities of surrounding districts on a daily basis. For farmers, the price updates of markets outside their villages have a higher priority so that they can compare the prices and choose to sell at the appropriate place.
• **Input prices and availability of resources**  
Information caters to the availability of agricultural inputs like seeds, fertilizers, manures, and the like, and their respective prices in the area. Farmers can compare the prizes on offer by different suppliers.

• **Weather forecasting**  
Updated information on weather such as temperature, humidity, forecasts on rains in coming times helps the farmers in strategizing the crop type to be sown in near future.

• **General Rural Development and agricultural news**  
General news and information related to various agricultural events in villages and districts. These events are generally organized by the Government bodies or NGOs to make the farmers aware about the latest offerings of the Government. These offering could be new facilities or subsidies and the events are a positive step towards keeping the farmers well informed.

• **Information on insurance / claim processing**  
Information regarding various policies like detailed information on crop insurance schemes, the type of damage covered and compensation offered in case there is loss in cultivation. The information details minutest of the details including premiums to be paid, rebate in case of no claim and the like.

• **Mixed farming and diversification**  
Information on mix of traditional and modern approaches in farming including cross farm practices like traditional agriculture amalgamated with animal husbandry, poultry farming & fisheries.

The project Gyandoot in Madhya Pradesh has been discussed briefly as a live case to understand the extent to which Agricultural Cyber Extension is effectively used to cater to the information needs of the farmers, to give them the opportunity to increase their information and knowledgebase. This has led to holistic development of the Rural Citizen, enabling them to understand the market and participate in creation of an extended agricultural market using Cyber Extension.

**Case Study:**  
**GyanDoot: A Community Owned, Self Sustainable & Low Cost Rural Intranet Project,**  
**Location – Dhar, Madhya Pradesh**

Dhar district is located on the south western corner of the central India and has a population of 1.7 million, with half of the population (54%) being tribal (Bhils, Bhilalas, Patleiyas) and 60% population living below poverty line. On January 1, 2000, Dhar district began with the installation of low cost, self-sustainable and community owned rural Intranet project. Computers in 20 village centers in ten Blocks of the district were wired through an Intranet network that has grown to 35 in number. The main aim of Gyandoot is to harness Information and Communication Technologies to improve governance at village, block and district levels. This Intranet system has been named Gyandoot (Information Messenger) and the setup for the same has been enabled by the State government. Software working in Hindi language and touch screen applications has been designed to encourage maximum utilization and access by poor rural farmers.

The project has a broader target of overall development of the rural setup rather than just focusing on agricultural extension. Gyandoot provides many information services to the farmers like:

1. Commodity/ Mandi Marketing Information System.  
2. Income Certificate.  
5. Landholder's passbook of land rights and loans (Bhoo adhikar evam rin pustika).  
6. Rural Hindi e-mail.  
7. Online Public Grievance Redressal Cell (Shikayat Nivaran)  
10. Employment news.  
11. Rural matrimonial (Vivah Sambandh).  
12. Rural Market (Gaon ka Bazaar).
14. Advisory module (Salahkar)
15. E-education.
17. Khasra Nakal Avedan.

The above services offers best practices related to agriculture, prices of agricultural produce in different markets, online registration and provision of land records, rural communication facility in form of an email, information regarding government (rural development) programs, Ask the Expert, Application formats for rural development schemes, and the like. Gyandoot also gives a provision of a database that stores best practices of the farmers which they adopt in crop cultivation. In addition, it provides the transparency to the farmers regarding prices of prominent crops like wheat, gram, soybean, in various markets i.e. at local and other auction centers in nearby areas. Other value addition services include the online applications for farm land registration and its certificate. The farmers who are registered in the community can auction their equipments, cattle, land, and agriculture machinery without the middlemen, thereby saving the commission and dictated prices. The farmers can put up their complaints regarding drinking water, scholarship sanction / disbursement, quality of seed / fertilizer, employee establishment matters (like leave or provident fund sanction) queries, functioning of school, public distribution system, beneficiary oriented schemes, functioning of village committee and the like. In case of any dilemma or discrepancy, the farmers can address their queries under the facility “Ask the Expert” and get their queries resolved on time which otherwise would result in wastage of time, money and potential livelihood earnings if they are required to go to district headquarters.

The quality and success of the project also gave it the recognition. Gyandoot was declared winner in "Public Service and Democracy" category out of 109 IT projects from all over the world. The Gyandoot project is the only Indian project to receive the award in any category. Gyandoot project of Dhar District has been awarded Stockholm Challenge IT Award 2000 at a glittering function in Town Hall, Stockholm on 6th June 2000. The project is also awarded CSI-TCS National IT Award for best IT usage, instituted by the Computer Society of India, for the year 2000. The final contestants for the award were ICICI Bank, Global Trust Bank, SAIL and National Crime Record Bureau, along with the Gyandoot project.

Conclusion
The cyber extension in Agriculture is a vital machinery to support the extension functionaries. For effective and speedy Agriculture extension, the use of Information Technology to assist information over internet can’t be overlooked. The Knowledgebase implementation over internet based technologies and with diffusion of other ICTs enhances the Agricultural Extension components like Agricultural Research, Market Management and the Core Farming Techniques. In today’s date, in the rural arena, various successful e-governance initiatives are giving hope to abolish the digital divide in India. This is due to the improvement of IT infrastructure and many ICT projects for development of Agricultural Service. With great caution, a continuous monitoring is required to sustain various initiatives and projects. To eradicate the digital divide between the society, we require adequate support of the government, industry, community participation, encouraging private partnerships, massive campaign on e-governance involving rural people, as it is done in past.

Agricultural Cyber Extension has given rise to various Rural Information Systems that have focused on supplying information to the rural stakeholders. The Information base could also be used to supply information about rural areas to policy makers rather than just vice-versa aspect of information flow from policy makers to the farmers and rural poor. The extension of agricultural information is moving beyond merely working as a messenger service. Using the facilities of Agriculture Extension, the new modes of acquisition of information are practiced which leads to duplex dialog and more participation of the farm producers in rural India. The farmers can now use the Cyber Extension in Agriculture to request information which can benefit them directly and impact their particular livelihood needs. The
Information Experts are working rigorously to recognize the enormous potential of Cyber Extension to support and enhance these changes.

References

Books & Publications


Online Journals

5. Gyandoot: The purveyor of knowledge. http://gyandoot.nic.in
6. ICT in Agriculture. www.e-krishinaip.in

Annexure

| Name |
| AGRISNET (Agricultural Informatics and Communications Network |
| **Project Initiator** | Department of Agriculture and Cooperation, Ministry of Agriculture, GoI |
| **Area** | Rural Areas of India |
| **Implementing Agency** | NICNET |
| **Sponsoring Agent** | Indian Council of Agricultural Research (ICAR) |
| **Year** | 2002 |

| Name |
| ASHA |
| **Project Initiator** | National Informatics Centre |
| **Area** | Assam |
| **Implementing Agency** | NIC-Assam |
| **Sponsoring Agent** | Dept of IT, Govt. of India |
| **Year** | 2001 |

| Name |
| Chalao Ho Gaon Mein |
| **Project Initiator** | National Foundation for India (NFI) |
| **Area** | Palamau, Jharkhand |
| **Implementing Agency** | Alternatives for India Development, grassroots NGO and Manthan Yuva |
| **Sponsoring Agent** | National Foundation for India (NFI) |
| **Year** | 2001 |

| Name |
| Coll-Net (Content Development and IT |
Localization Network: A Cultural Heritage Digital Library

Project Initiator: Dept of IT, Ministry of Communications and Information Technology, Govt. of India
Area: Rajasthan, Harayana, Delhi, Uttranchal, UP, MP, Chattisgarh, Jharkhand, and Bihar

Implementing Agency: Indira Gandhi National Centre for the Arts (IGNCA)
Sponsoring Agent: Ministry of Communication and IT, Govt. of India
Year: 2005

5 Name: Community Information Centre (CIC)
Project Initiator: Dept. of Information Technology, Ministry of Communications and Information Technology, Govt. of India
Area: 7 Sister States, North East India
Implementing Agency: National Informatics Centre (NIC) and National Informatics Centre Services Incorporation (NICSI)
Sponsoring Agent: Ministry of Development of North Eastern Region
Region
Year: 2002

Computers on Wheels
Project Initiator: Global Catalyst Foundation
Area: Telengana Region of Andhra Pradesh
Implementing Agency: Global Catalyst Foundation & Partners
Year: 2003

7 Name: e-Krishi / Agri Business Centre
Project Initiator: Akshaya e-Kendra Entrepreneurs
Area: Malappuram District, Kerala
Implementing Agency: Kerala State IT Mission
Sponsoring Agent: UNDP-NISG
Year: 2005

8 Name: e-Krishi Vipanan
Project Initiator: State Government
Area: Madhya Pradesh
Implementing Agency: MP Agricultural Marketing Board and Madhya Pradesh Agency for Promotion of Information Technology
Sponsoring Agent: Govt. of MP
Year: 2003

9 Name: Gyaandoot
Project Initiator: Govt of MP
Area: 311 Gram Panchayats and over 600 villages
Implementing Agency: Govt of MP, NIC
Sponsoring Agent: Govt of MP
Year: 2000
10. **Name:** Gyaansanchar  
**Project Initiator:** CIDA, BSNL, Govt. of MP  
**Area:** Hoshangabad and Harda Districts, MP  
**Implementing Agency:** Gyan Sanchar  
**Sponsoring Agent:** Canadian International Development  
**Year:** 2002

11. **Name:** ICT Intervention for farmers through Query Redress Services  
**Project Initiator:** Indian Agribusiness Systems Pvt. Ltd.  
**Area:** Villages in Maharashtra  
**Implementing Agency:** Indin Society of Agribusiness Professionals (ISAP) along with partner NGOs i.e. Maitree, Avani, Manavlok  
**Sponsoring Agent:** Microsoft  
**Year:** 2006

12. **Name:** ITC eChoupal  
**Project Initiator:** ITC Ltd. Pvt. Funding Agency  
**Area:** MP, Harayana, Uttaranchal, Karnataka, Andhra Pradesh, UP, Maharashtra, Rajasthan, Kerala  
**Implementing Agency:** ITC’s International Business Division  
**Sponsoring Agent:** ITC’s IBD  
**Year:** 2000

13. **Name:** Kisan Kerala  
**Project Initiator:** IIITM – Kerala  
**Area:** Kerala  
**Implementing Agency:** IIITM - Kerala  
**Sponsoring Agent:** Dept of Agriculture, Govt of Kerala  
**Year:** 2003

14. **Name:** Krishi Bazar Mahiti VIIT – Baramati,  
**Project Initiator:** Govt of Maharashtra  
**Area:** Baramati District of Maharashtra  
**Implementing Agency:** VIIT  
**Sponsoring Agent:** Maharashtra Knowledge Corporation Ltd, Indian Council of Agricultural Research, New Delhi  
**Year:** 2003

15. **Name:** Rural Knowledge Centre  
**Project Initiator:** Microsoft Corporation, and NASSCOM  
**Area:** Nine Coastal States of India – West Bengal, Orissa, Andhra Pradesh, Tamilnadu, Kerala, Karnataka, Goa, Maharashtra and Gujarat  
**Implementing Agency:** Microsoft, NASSCOM Foundation  
**Sponsoring Agent:** Microsoft (Nasdaq MSFT)  
**Year:** 2004

16. **Name:** Village Information Kiosks, Andhra Pradesh
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