IT REVOLUTION AND CHANGING FACE OF RURAL INDIA

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Abstract:

The role of Information Technology to develop agricultural research, education and extension to improve quality of life in rural area is well established. IT can help an average Indian farmer to get relevant information regarding agro-inputs, crop production technologies, agro processing, market support, agro-finance and management of farm agri-business. The agricultural extension mechanism is becoming dependent on IT to provide appropriate and location specific technologies for the farmers to furnish timely and proficient advice to the farmers IT can be a best mean not only to develop agricultural extension but also to expand agriculture research and education system.

How can information technology (IT) contribute to rural development? What are the channels through which impacts can be realized, and what are the practical means for realizing potential benefits? This paper examines several ongoing projects that aim to provide IT-based services to rural populations in India. These projects are distinguished by the goal of commercial sustainability, which supports scalability and, therefore, more widespread benefits. The analysis highlights the common building blocks required for successful implementation, and the relative strengths and weaknesses of different approaches.

The paper outlines the conceptual and empirical case for the use of IT in India's rural development. The research study provides a broad discussion of the potential role of IT in broad-based economic development. The study also examines the conceptual issues from the perspective of demand for, and supply of IT-based services to rural populations in a developing country. The paper discusses the lessons of some of the efforts underway in India, including the work of Aksh, Drishtee, ITC, n-Logue and TARAhaat.

Keywords: Information Technology, Internet, Rural Development, Electronic Processing, IT-Based Services

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Introduction:

The population of India has already been crossed 103 billion and is still increasing alarmingly and that put a great pressure on the food grain production of India. On a rough reckoning it is an acceptable fact that India achieved a marvellous success in food grain production from a bare 51 million tons in 1951-52 to 212 million tons in 2003 but India is still hungry. What would happen if India needs to produce an additional 50 million tons of food grain by 2010 AD to feed its increased population? This poses a major challenge not only for the policymakers but also more directly to the agricultural educationist, scientists and extension workers.

The Information and Communication Technologies can generate new opening to bridge the gap between information haves and information have-nots in the developing countries. The task force on 'India as Knowledge Superpower' emphasized the need to harness ICT for community transformation. The agriculturally prosperous developing countries like India cannot overlook agriculture in such transformation. The emerging ICT have momentous role to perform in agricultural development. There are many possibilities of integration of ICT in agricultural, for the overall agricultural and rural development.

Change in focal point:

It is inspiring to note that, in India there is a growing consciousness of the multiple roles that Information Technology (IT) could play in overall growth of the country. The politicians and policy makers have also emphasized the significance of exploiting the profit of IT for the overall progress of the country. It is a solid view of the Government that if any technology can generate new prospects to link the space between haves and have-nots in society in the current time, it is information communication technology. The policy makers have also realized that IT to improve the lives of the two fifth of the population, which lives below the poverty line, the Government must play a catalytic and enabling role. Besides the central administration, several State Governments have also committed themselves to make strategies, which intentionally plan as extensively as possible to capture the benefits of IT, including the less privileged segments of society.

Various Stakeholders:

Nowadays there are various take holders- central and state governments, civil society organizations and the private corporate sector. Depending upon the character of the actinvolved, the information communication technology projects in the country may be broadly separated into two groups. The first group refers to those initiated by the central and state governments essentially concerned with e governance. The second group refers to the initiatives undertaken by the non government organizations and the commercial sector. During the year of 2002, the states like Kerala, Karnataka, Andhra Pradesh, Maharashtra, Bihar, Orissa, Uttar Pradesh, Madhya Pradesh, Gujarat, Haryana, West Bengal, Rajasthan, Punjab, Assam, Nagaland, Delhi and Sikkim have initiated many e-governance to harness advantages of information technology.

Regarding the substance:

Access to information and improved communication is a critical prerequisite for sustainable agricultural development. Recent communication technologies when useful to conditions in rural areas can facilitate advanced communication, boost participation, disseminate information and distribute knowledge and skills. It is said that extension through information technology would be the major form of technology dissemination in the near expectations.

It is experiential that the rural community still has trouble in accessing essential information to make timely decisions. It is necessary that information accessibility is demand driven rather than supply driven. The challenge is not only to improve the accessibility of communication technology to the rural population but also to improve its significance to local development. Considering the important need to access to well-timed information and improved communication, this issue is in center of attention on attempts made in different countries to transfer information to the rural population.

IT IN AGRICULTURAL EDUCATION MANAGEMENT:

Since independence, the higher education system has undergone many changes. The number of universities has gone up from 19 in 1947 to 275 in the year 2000. At the same time the number

of colleges have increased from 591 to over 10,000 and students strength from 0.2 million to about 7.0 million. Today with over 3, 00,000 teachers, the Indian higher education system is the second largest in the world. Considering this scenario of agricultural education the enrolment of students in agriculture remained only 1.5% in agriculture and allied fields. However the percentage of students studying for professional degrees is extremely low. In Japan more than 30% students are studying for engineering degrees, whereas in India, it is hardly 5%. Everyday where one college is being opened in India, only 6 % of Indian population in the age groups of 18 to 23 years is getting the benefit of higher education.

- **IT for Agricultural Teachers and Educational Planners:** In order to see successful integration of IT in Agricultural Education we need to empower teachers of agricultural schools, colleges and universities and so also administrators and educational planners. For this purpose at the elementary stage, we are required to arrange training of these personnel in fundamentals of Computers and then gradually introduce the advanced modules for Computer applications. Teachers need to be trained to use computer to prepare their lesson plan, presentations 'on power point, photo scanning and use of LCD. The educational planners and administrators should be trained to prepare Annual Budget Plan, for teaching aids, resource person and material expenditure, infrastructure budget requirements, time tables to monitor and scheduling the teaching resources, to build up and maintain comprehensive students records and students files etc.

Teacher's role has been changed in IT based agricultural education. Now instead of just information carriers, they have also become information guide or information facilitators to the learners, who have always multiple sources of information.

The Teachers of IT based agricultural education need to be trained to prepare for "Virtual Class Room". For this, they should prepare slides, record their sound of lecture on Computer itself and this recorded lecture is being attended by his learners in 'Virtual Class'. The module courses will have to be designed for virtual Class Studies and 'Network Based Education' or 'Information and Communication Technology (ICT).

IT along with Internet Expertise is boon to the Distance mode of education. Under Open University or School Education pattern, the learners do attend classes by visiting their respective study centres and attend lectures of their teacher counselors. However, with

the introduction of IT the Learner need not come to institutes and study centre but they can attend his virtual class at his home. For this purpose teachers are required to train to prepare 'Training Capsule' for virtual class through which the students or learners can access on their internet facilities. The teachers will have to be trained in E-mail, chatting, surfing, teleconferencing, video conferencing and all latest communication technologies.

- **IT in Agricultural Learners in Class Rooms :** The learners or students in Agricultural School and Colleges need to be well acquainted with 'understanding the lessons projected on the LCD Screen, using power point presentation. Until now the learners of classrooms are in habits of listening lectures with the help of overhead projectors (OHP). Sometimes video films, online internet presentations can also be shown on screen with LCD. The use of CD ROM, on specialized topics on agriculture can also be displayed on computer monitors.

- **IT for Agricultural Learners in Virtual Classes:** With the advent of Internet, Technology, the learners can attend 'Virtual Class' on the monitor of their computer at their homes or workplace. Here the Learners will have to be trained in using Internet Technology i.e. in this case how to log on, do searching and save the information on computer itself. After attending 'Virtual Class' on Computer, one can appear for 'ON LINE' examination test wherein the student will be required to type answer on computer and he will know his evaluation report on screen immediately.

- **New IT Dimensions of Agricultural Education in India:** To prepare the agricultural graduates capable to meet the challenges of the new millennium, they should be given course on International Agriculture, WTO, Trade Related Intellectual Property Rights (TRIPs), Global Conventions on Climate, Biodiversity and Desertification, Computer Technology, Patent and Trade Literacy, International Standards. For this IT can play important role. So Introduction to Computers, Application of Software, Data Base Management Systems, PowerPoint, Drawing Software, Computer Programming, Multimedia, Internet, role of TV and Radio in ICT should be a part of their course curriculum.

- **IT for Agricultural Empowerment Dimension:** There are a large number of dropouts in rural schools and a major segment of the rural population is still unreachable. Every State Agriculture Department should establish independent cells for Distance Education for training these dropouts and rural youth for imparting short-term courses in newer skills in agriculture and allied sciences to improve farming. For this IT can play important role.
- **IT to link all agricultural Colleges of India:** Nowadays there is no any direct like between all the agricultural colleges of India. IT can be an effective mean to link all the agricultural colleges of India. In academic field it is said that if we have good contacts with other instaurations we can be able to know their academic development and compare our work with other them. This kind of contacts gives us opportunity to make necessary changes in out style of work for desired result. IT facility makes person cosmopolitan in nature. Exchange of useful information like collection of question papers, recent trend, information on seminar, symposium, workshop, training and any other academic developmental activity can be known easily through the IT.

IT IN AGRICULTURAL RESEARCH MANAGEMENT:

The major contribution of agricultural research in India has been reflected in various agricultural revolutions during the post independence period. The result of agricultural research boosted the food production and we could see the Green, White, Blue and Yellow revolutions in the fields of Cereal crops (wheat), Milk, Fisheries and the Oil Seeds witnessing the Golden Revolution of horticulture crop production. However with the advent of new emerging agricultural technologies there was a change in focus from increased production to increased efficiency.

The new areas of concerns for agricultural research included the sustainability in agriculture, food security and demand driven research than merely the supply driven. For this purpose, the findings of laboratory research need to reach the unreached.

- **IT for research documentations: Textual and Non textual documents Textual documents** – To present information in the form of *Written text* e.g. books, periodicals, catalogues, statistical compendia, trade publications, patents, etc. and *Non textual documents* - e.g. maps, plans, graphs, diagrams, posters, paintings, photographs, slides,

sound tapes, films, videotapes, artistic monuments and magnetic documents for computer processing IT can be the best mean in agricultural research management.

- **IT in Prioritization of Research:** The changing scenario under Indian and global context affects the entire process of agricultural research, especially the identification of thrust areas of research. The skill to distinguish between what is urgent and what is important will hold key to the success in deciding priorities. Such skill can be acquired by IT.
- **IT in Research Communication:** The benefits of Internet connectivity can be utilized for better collaboration amongst scientists for exchange of their views.

IT IN AGRICULTURAL EXTENSION MANAGEMENT:

The present age has been rightly termed as an "information age". People want adequate and authentic information as early as possible. Farmers as human beings are also anxious and become more desirous with the advancement in science and technology to know what is happening in the field of agriculture. Farmers have enthusiasm to obtain knowledge, particularly in the field of modern agriculture to become psychologically strong and conducive with necessary capacities to adopt modern methods of agriculture. In India, it is very difficult to contact each and every farmer in limited time to communicate latest agricultural technology. To diminish this difficulty, various mass media are certainly most effective avenues to convey information to the broad means of people, particularly to the huge illiterate segment of the farmers.

Up till now in India among various media, radio, television, literature and newspapers are certainly most utilized by the extension workers to transfer agricultural technology to the huge illiterate and literate segments of the rural. We are observing a great transformation in agricultural extension approach in dissemination of knowledge. This revolutionize is due to more expansion in farming system fairly than the earlier accent of yield improvement. Even at previous junctures of agriculture extension growth, the style was information provide oriented to a certain extent than farmers' demands driven.

The Agricultural Extension System (AES) has five important pre requisites 1.Regular training and maintaining of extension workers and functionaries at various levels in the specific knowledge and skills. 2. Monitoring the AES and understanding the constraints. 3. Strong information, documentation and publication support. 4. Effective institutional network for synergetic support. 5. Develop national and international linkages. For this strong information, documentation and publication support are very pivotal. IT can play significant role in this.

- **Planning for Future Resource Documentation:** The production of CD ROM on special topics can be the best mean for future resources documentations.
- **IT in Methods of Extension: E-Extension:** This a new term coined for electronic extension approach, which is otherwise can be called as I.T. oriented Extension.
- **For the linkage between Research, Extension and IT 's role can be encouraged :** The network between different agencies like Agricultural Science Centers (Known as Krushi Vigyan Kendra) ,Farmers Training Centers , Agricultural Technology Management Agency and Information Shops needs to be developed for useful linkage and proper utilization of available resources. The human resources will have to be trained in usage of IT Tools and all infrastructure facilities required for strengthening the Agricultural extension System and Services.

IT IN AGRO-BASED RURAL DEVELOPMENT:

It is assumed that 60 to 85% of household consumption belongs to agricultural products so agriculture plays important role in industrial development, it provides raw materials to industries like cotton textiles, jute, sugar, tobacco, edible and non edible oils, leather, plantation industries etc. The food processing industries is also dependent on agriculture. Lots of agro based materials are exported in European and Gulf countries by India. In all such agro-based industries, role of IT needs to be improved. IT Tools are very useful in creating effective linkages in agro based industry activities.

IT IN AGRICULTURAL PRODUCTION:

The IT Approach for commercial crops, horticultural crops or floriculture have to focus on Integrated System may be for plant nutrition or plant protection. The well established Integrated Plant Nutrition Approach and Management and Integrated Pest Management (IPM) need to be strengthened with the help of IT Tools. The Post Production Technology (PPT) needs to be utilized properly.

IT AS GEOGRAPHICAL INFORMATION SYSTEM (GIS) IN AGRICULTURE:

The use of IT through GIS is very encouraging in India. The important areas like Crop forecasting (procurement policy, crop insurance, relief measure) , Cropping System (input management : fertilizer, Crop Diversification, intensification, degradation measures, sustainability measures), Command Area Management ,Watershed Management ,Land and Water Resources Development ,Drinking Water Potential Mapping Precision , Natural Disaster Management (flood, drought), Fishery (inland, Marine), Hill Area Agriculture Development Management, Post Harvest Management and Precision Farming can be reinforced with the help of Information technology in India.

Implementation: Cases, Impacts and Lessons

Drishtee

Drishtee.com had its origins in Gyandoot, a government project in Dhar district of Madhya Pradesh, in central India. Gyandoot provided an intranet for 33 village information kiosks, offering a range of mainly e-governance-related services. The most prominent of these is land record certificates, which are needed by landowners for transactions such as sale or leasing of land. While Gyandoot was a specific local initiative, involving heavy support from the District Collector, Drishtee has attempted to take that model and rapidly replicate it across the country.

Currently, Drishtee has over 100 rural Internet kiosks in several states, run by franchisees according to a revenue sharing arrangement. In Drishtee's case, a kiosk has, at least initially, just one computer. The set-up cost is in the range of Rs. 50,000.

Drishtee is a commercial organization, with specific social objectives of targeting benefits to the rural poor built into its vision and strategy. Drishtee has developed some software on its own, but also relies on various partners for software development, as well as, in some cases, other partners for management of district hubs, from which kiosks in a district are managed. Thus Drishtee's model involves not only franchising individual kiosks, but also potentially franchising district hubs. Partnering with local district hub 'channel partners' allows Drishtee to expand faster without creating a bulky organization, spreads risks, and also insulates Drishtee from some of the commercial pressures that might conflict with social objectives.

Despite some challenges, Drishtee appears to have built a capable but lean organization, with learning having been systematized in a manner that makes it transferable across locations, permitting more effective scaling up.

Electric power and telecom connectivity have posed challenges for Drishtee, since it is a pure startup, without resources for heavy investments in infrastructure. It uses standard battery backup for power interruptions, and has relied mainly on dial-up Internet access, though it is experimenting with Wi-Fi for district-level intranets. In some cases, it has set up kiosks even without phone connectivity, relying on physical delivery of information.

With the origins in Gyandoot playing a role, simple e-governance, such as making government forms available and allowing a variety of complaints to be relayed to the district level government, has typically been the lead service in setting up operations in a new district. In this context, informal partnerships with district level government officials(both state and local) have been very significant. For example, in Sirsa and Jaipur districts, Drishtee has been able to act as a significant intermediary for information exchange between the district government and constituents.

Expanding the range of services has meant tying up with content partners, particularly organizations such as Agriwatch, which provides a substantial quantity and range of agricultural information to farmers. Agriwatch is essentially developing into a large-scale Internet portal for farmers, and Drishtee's role can be seen as providing lastmile access to this rich information,

through its kiosks. It is difficult to quantify the benefits of this service, but its popularity with farmers suggests that it is valuable. Related examples from the cases of ITC and n-Logue will provide a more definite assessment of these benefits.

Education has played a limited role in Drishtee's offerings, though kiosk owners have often used the presence of a computer and peripherals to offer computer training, as well as other offline services such as printing and games. The benefits in these examples are reductions in transaction costs for existing transactions, improved quality of successful matches, and potentially most significant, completion of activities (e.g., training, entertainment, communications) that would otherwise not take place because of high transaction costs.

Finally, Drishtee has appeared to learn rapidly with respect to the selection and training of kiosk owners, and eliciting the preferences of rural Internet kiosk users. This partly reflects the organization's own structure and character. As a lean start-up, it seems to have attracted people who are relatively in tune with rural market environments. The process has not been painless, and there are still challenges in managing operations that are spread across several states, but Drishtee's ability to manage its own human resources and the end users of its services has grown over time.

Aksh

Aksh is essentially a fiber optic cable company, with its core competence in laying and maintaining cable. Its revenue model is driven by the content and data that can be delivered over this cable. Therefore it has an interest in increasing such content delivery.

While urban areas in India have seen substantial penetration of cable TV, through a model (now in transition) of largely unregulated local operators, the rural market remains largely unserved. The bottleneck has been the lack of last mile infrastructure, since there is a significant percentage of rural households (especially in richer districts) that can afford cable TV. Aksh, along with other companies such as Reliance, has received licenses for laying a new fiber optic network in rural areas.

In the case in point, Aksh rapidly laid a large fiber optic network in rural Jaipur district (excluding the city itself). It initially partnered with Drishtee for the development and

maintenance of kiosks that would act as distribution points for cable TV access, as well as Internet kiosks. The Drishtee franchise model, interface and services were adopted, but with the brand name of "Gramdoot."

However, this asymmetry between Drishtee and Aksh was fairly quickly reversed, and now Aksh stands as the main service provider, with Drishtee reduced to the role of providing software and related services.

In any case, the model of rural IT-kiosks managed by a large company with incentives to provide access to large numbers of rural households appears to be scalable and sustainable. Cable TV over fiber optic networks provides a strong revenue base, and a range of Internet-based services and content can be provided through partnerships. As companies such as Drishtee also scale up, they may be more effective in providing the necessary scale for ongoing management of the kiosks, including training services and customer relationship management. For now, providing software is easier for start-ups in such cases. The history of Aksh's initiative means that the range of services provided in their kiosks, the revenue model, and pricing structures currently follow the Drishtee model.

Hence the earlier discussion of benefits transfers over to this case. The importance of cable TV revenues, however, suggests that these kiosks may emphasize a range of entertainment services more than utility services such as agriculture-related information or e-governance. It is conceivable, however, that kiosk operators will be able to span the entire range of services. The bandwidth available will certainly support a full range of offerings, and the issues will be managerial attention and the perceptions of rural users.

n-Logue

While Aksh and Drishtee are mostly active in north India, n-Logue has its origin and chief presence in the south. It is a for-profit corporation, with majority ownership residing with a nonprofit organization. The main impetus for n-Logue came from the IIT Chennai research group headed by professor Ashok Jhunjhunwala. This group has been responsible for a stream of hardware and software innovations that enable rural IT-based service delivery, through connectivity and applications.

The core innovation at the heart of n-Logue's operations is a WLL technology, Cordect, which provides joint wireless Internet and voice connectivity. The kiosk-levelhardware is relatively inexpensive, and adds only marginally to the overall cost of a kiosk. However, the construction of WLL towers and maintenance of the WLL hub is relatively costly, and this fixed cost requires a substantial density of kiosks within a particular radius of the tower.

Another constraint on this connectivity model is the requirement of clear lines of sight, and therefore relatively flat topography. Nevertheless, large parts of India are still suitable for this implementation. Furthermore, n-Logue has progressed well beyond being simply a connectivity provider, to delivering a range of services – these can be adapted to different connectivity technologies. N-Logue is the second largest organization in this field, supporting over 500 rural-IT kiosks.

The WLL technology does provide several strengths. It overcomes lack of dial-up connectivity, and provides an extra revenue stream for kiosk operators, through voice calls. Furthermore, it has greater bandwidth than traditional fixed line dial-up, which allows a wide range of applications to be delivered. In particular, the IIT Chennai group has been able to develop video applications that are sufficiently compressed to work

within the constraints of the WLL.

ITC

ITC stands out as a large Indian corporation serving global markets. Its kiosks are called e-choupals, and they have several differentiating features. The key distinguishing factor is that the e-choupals are totally designed to support ITC's agricultural products supply chain. This gives them a focus that is not present even in EID-Parry's kiosks in Nellikuppam. In addition, the e-choupals are totally owned and set up by ITC, with the operators not having any investment or risk of their own. Furthermore, e-choupal operators are, because of the focus, always substantial farmers, and therefore always male. All these features make the e-choupals different from the previous three initiatives. The e-choupal initiative has involved a clear focus and strong direction from the head of ITC's International Business Division. ITC has been able to turn its substantial

organizational and managerial capabilities toward this initiative. Management trainees are heavily immersed in the e-choupal model as part of their inculcation into ITC's workings.

There are four kinds of e-choupals, tailored very specifically for four different products: shrimp, coffee, wheat and soybeans. The first two of these involve large commercial farmers, and the focus is on creating Internet access to global market information to guide production and supply decisions. There are a few dozen of these e-choupals. In the case of wheat and soybeans, there are many small farmers, and over 2,000 e-choupals have been set up, in several states of India.

Conclusions:

This paper has briefly surveyed several initiatives to provide IT-based services in rural India. The author have provided a broad overview of the economic impacts of IT, and gone on to examine demand side and supply side issues of successful implementation. In particular, The author have suggested that there is a broad range of services that can be provided to a cross-section of rural households, even at relatively low levels of income. This creates challenges for implementation by posing choices for organizations, but also opportunities for creating niches.

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