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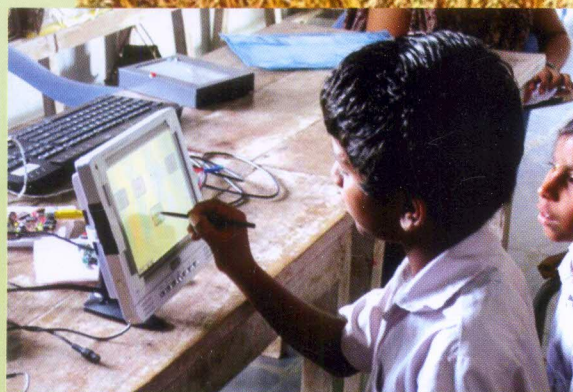
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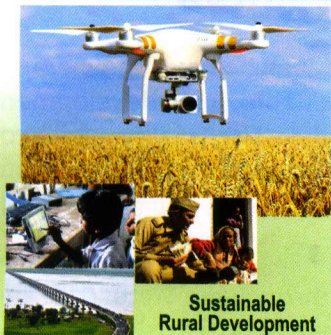
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CONTENTS

✗ Agriculture for Rural Transformation	J P Mishra	5
✗ Promoting Livelihood Through NRLM	Dr H.S. Shylendra	12
✗ Financial Inclusion for Inclusive Growth	Dr R S Reddy T S Raji Gain	18
✗ MGNREGS: Empowering Rural India	Nirendra Dev	23
✗ Health Services In rural India	Dr Chandrakant Lahariya	27
✗ Swachh Bharat Mission: Success Stories		34
✗ SPMRM: Bridging Rural-Urban Divide	Dr Kavita G. Kalkoti	38
✗ Digital Technology: Connecting Rural India	K.M. Singh Pushpa Singh	43
✗ Women: Driving Force of Development	Dr Shahin Razi	51
✗ Unleashing Potential of North East India	MK Srivastav	56

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DIGITAL TECHNOLOGY: CONNECTING RURAL INDIA

K.M. Singh and Pushpa Singh

Quick dissemination of technological information from the research system to farmers in the field and reporting of farmers' feedback to the research system is one of the critical inputs in transfer of technology. Digital technology is one of the means whose potential can be exploited to bridge the gap between research system and farming system. Recent years have seen an increase in the use of Digital technology in almost all spheres of rural lives, despite persisting problems of access, connectivity, literacy, content, and costs.

Exponential growth of internet user, invention of modern communication devices, significant development in cloud and grid computing etc. have helped digital technology to flourish in the last decade. Broadband internet access is seen as central for societal innovation because storing of large datasets and live communication requires good connectivity. Until recently, connectivity in rural areas was limited to slow dial-up lines. Satellite connections now make broadband access possible in remote areas. Use of mobile phones has seen an enormous increase in recent years. New wireless technologies such as MESH and WiMAX, and new generation mobile phone networks, will provide high speed internet services at sharply reduced costs, thereby dramatically increasing internet coverage in rural areas. Various access tools are converging, becoming cheaper and more flexible. New mobile phones and laptops provide omnipresent access with ample functionality for communication, transactions and transfer of data.

The National Alliance for Mission 2007 and the Common Service Centre Scheme to establish tele-centers country-wide in India are clear examples of the government's dedication to enhance rural access. Ensuring sustainability is a major challenge. Cost-sharing arrangements between local stakeholders, such as health centers, farmers' organizations, schools and local governmental bodies are taking place. Also, payments for local services can generate revenues to sustain tele-centers. Price information projects in India report that farmers are willing to pay for price information from the gains

made through access to it. Rural information centers also provide a learning environment for farmer groups on the use of Digital technology but also on jointly solving problems in their livelihoods.

Digital support to Agriculture:

Agriculture is the backbone of rural economy in India. The vast majority of poor people live in rural areas and derive their livelihoods directly or indirectly from agriculture. Increasing the efficiency, productivity and sustainability of small-scale farms is an area where digital technology can make a significant contribution. Farming involves risks and uncertainties, with farmers facing many threats from poor soils, drought, erosion and pests. Digital technology can deliver useful information to farmers about agriculture like crop care and animal husbandry, fertilizer and feedstock inputs, pest control, seed sourcing and market prices.

Quick dissemination of technological information from the research system to farmers in the field and reporting of farmers' feedback to the research system is one of the critical inputs in transfer of technology. Digital technology is one of the means whose potential can be exploited to bridge the gap between research system and farming system.



Recent years have seen an increase in the use of Digital technology in almost all spheres of rural lives, despite persisting problems of access, connectivity, literacy, content, and costs. Dissemination of knowledge through appropriate delivery methods plays an important role and it can be multiplied manifold by modern digital technology applications such as Internet services and mobile phones etc. Information provided through modern information technology gadgets should be need-based, demand-driven, site-specific and in local language. This development of communications infrastructure, especially in the area of telecommunications, brings with it both opportunities and challenges. Agricultural technology transfer, which depends to a large extent on information exchange between and among farmers on one hand, and a broad range of other actors on the other hand, has been identified as one area in which digital technology can have a particularly significant impact.

Farmers need dynamic information relating to cultivation, management, meteorological and marketing factors as related to crops, livestock, fisheries, agro-forestry and agro-processing. It is also important to address the need for demand driven and value added information, which is time and location specific. Apart from information related to farming, farmers urgently need access to information about education, healthcare, Government policies, product prices, market-led entrepreneurship opportunities etc.

Digital technology is proving a boon to the farmers in realizing their needs effectively and empowering them with latest knowledge and global trend. Digital technology includes a converging spectrum of technologies that consist primarily of telecommunications (such as telephony, cable, satellite, and computer networks), computing (computers, Intranet, Internet, software and mobile phones) and broadcasting (Radio and TV technologies). Digital technology plays a major role in storage, process, retrieval and dissemination of information to farmers at distant places. It has shown its strength

in implementing sustainable socio-economic development and poverty alleviation programs by providing ample job opportunities all over the world.

Harnessing the right technology available can offer multiple issues of governance in agriculture sector providing most needed timely relief to distressed farmers, cutting delays, inefficiencies, corruption and costs. One can create geo-tagged databank of all farmers' fields as well as all water bodies village wise with actual volumes etc. Crop insurance schemes cover farmers who see huge delay in getting the payment when crop is damaged. By adopting the right technology, farmers can be paid back within a week. Use of smart phones, artificial intelligence and local weather data can be used to provide immediate relief to the farmers.

Some of the telecom companies have developed a platform for farmers offering access to real time market prices irrespective of distance. Private sector-led Agriwatch (www.agriwatch.com) and e-Choupal programme (www.itcportal.com/ruraldevp_philosophy/echoupal.htm) support several million farmers with price information, tender and transaction facilities. Digital technology is making processes more efficient and transparent. It helps in making laws

 **कृषि एवं किसान कल्याण मंत्रालय, भारत सरकार**

किसानों की सेवा में - किसान कॉल सेंटर

(किसान कॉल सेंटर योजना की 15वीं वर्षगांठ के सुअवसर पर)

कृषि संबंधी समस्याओं का अपनी भाषा में तुरंत समाधान पाने के लिए किसान कॉल सेंटर पर विशेषज्ञों से बात करें।

भारत के किसी कोने से, किसी फोन सेवा से किसान कॉल सेंटर पर बिलकुल मुफ्त संपर्क किया जा सकता है।

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and land titles more accessible. Global Positioning Systems (GPS) linked to Geographical Information Systems (GIS), digital cameras and internet, help rural communities to document and communicate their situation. Rural communities benefit from better access to credit and rural banking facilities. Recent mobile banking initiatives offer further scope to reduce costs and stimulate local trade.

Digital Technology for Capacity-building :

Communities and farmer organizations can be helped through the use of digital technology to strengthen their own capacities and better represent their constituencies when negotiating input and output prices, land claims, resource rights and infrastructure projects. Digital technology enables rural communities to interact with other stakeholders, thus reducing social isolation. It widens the perspective of local communities in terms of national or global developments, opens up new business opportunities and allows easier contact with friends and relatives. Digital technology helps in making laws and land titles more accessible. Global Positioning Systems (GPS) linked to Geographical Information Systems (GIS), digital cameras and internet, helps rural communities to document and communicate their situation. Rural communities benefit from better access to credit and rural banking facilities. Recent mobile banking initiatives offer further scope to reduce costs and stimulate local trade. The Indian AMUL programme automates milk collection and payments for its 500,000 members, thereby enhancing transparency of the milk volume and quality collected and ensuring fair payments to farmers.

Digital Technology and Service Delivery:

Huge gap exists between information residing in agricultural knowledge centres and rural communities. At local level, multi-stakeholder mechanisms are important to make relevant information accessible to end users. Intermediary organizations have to connect rural communities to



available knowledge. Users will increasingly want tailor-made, quality answers to their questions. In the Agricultural Clinics in India, customers get answers within one to two days. Mobile Q&A services are being piloted in India. At national level, mechanisms need to be in place to ensure learning and information sharing.

Transforming Rural India:

Digital technology is becoming the facilitator of socio-economic development in rural India with its obvious facilities by way of health, education, financial services and employment avenues, etc. Digital technology offering can be classified into:

Empowerment: e-Choupal comes up as fine example of empowerment with efficient supply-chain system empowering the farmers with timely and relevant information enabling them better returns for their produce. Due to its community centric approach, it gives other offerings also to the farmers' like insurance and farm management practices. **Aadhar** is another such tool, which has empowered the masses by confirming their identities and is good example of digital technology solution attempting to provide access to monetary benefits by establishing the correct identity and this way rural economy is also expanding.

Enablement: The practice of e-governance, which creates transparency and governance through IT has empowered the citizens. Successful implementation of e-governance in the areas like- maintenance of land records is a big step in



removing the malpractices and creating assurance of rightful ownership.

Market expansion: Indian rural market is going under transformation with better access to information. With the help of IT, farmers can use the services of FMC and can get better value for their product. Market expansion with the help of digital technology can be seen through various examples, like, in the recent years, the village and heritage tourism in remote areas of the country has picked up a huge momentum and this has been done on account of awareness being created by the online portals, attracting more visitors as compared to the past. Direct connect through e-commerce has facilitated large number of artisans and agro-based small enterprises in rural areas. Women's livelihood is being facilitated amongst the weavers' community in the north eastern states by marketing their product through the internet medium. In India, ICT applications such as *Warana*, *Drishtee*, *e-Chaupal*, *E-Seva*, *Lokmitra*, *E-Post*, *Gramdoot*, *Gyandoot*, *Tarahaat*, *Dhan*, *Akshaya*, *Honeybee*, *Praja* are quite successful in achieving their objectives.

e-Extension (e- Soil Health card Programme): This is the programme of Deptt. of Agriculture, Gujarat which aims to analyze the soil of all the villages of the state and proposes to provide online guidance to farmers on their soil health condition, fertilizer usage and alternative cropping pattern.

AGRISNET uses state-of-the-art broadband satellite technology to establish the network within the country.

AGMARKNET is a comprehensive database which links together all the important agricultural produce markets in the country.

Agri Business Centres: It provides a web based solution to the small and medium farmers as well as owners of large landholdings. It brings on a single platform all the stakeholders in agribusiness like farmers and farmer groups, institutions and autonomous bodies, agro machinery and farm equipment makers, cold chain tech., commodity brokers, cooperatives, food processors, pre and post harvest management experts, packaging technology providers, insurance companies, warehousing and logistics agencies, surveyors and certification agencies.

e-KRISHI VIPANAN: It professionalizes and reorganizes the agriculture trading business of Mandi Board by installing cost effective digital infrastructure using latest advancement in digital technology by collecting and delivering real time information online. It makes the operations more effective, totally transparent, benefiting all stakeholders (farmers, traders & the government), empowering them through accurate and timely information for effective decision making.

Query Redressal Services: This empowers the farmer community through effective, need-based interventions. It enhances livelihood promotion of farmer community through information dissemination and extension services, using digital technology as a tool. The project helps the farming community by making available a 10000 plus network of experts to them. Any queries from farmers are forwarded to the ISAP central office from where it is routed to the relevant experts.

Kisan Call Centres: The sole objective is to make agriculture knowledge available at free of cost to the farmers as and when desired. Queries related to agriculture and allied sectors are being addressed through the Kisan Call Centres, instantly, in the local language by the experts of State departments, SAUs, ICAR institutions etc. There are call centres for every state which are expected to handle traffic from any part of the country. SMS using telephone and computer interact with farmers to understand the problem and answer the queries at a call centre. The infrastructure is placed at three locations namely-a professionally managed call centre (level-I), a response centre in each organization, where services of SMS

are made available (level-II) and the Nodal Cell (level-III).

Tata Kisan Kendra: The concept of precision farming being implemented by the TKKs has the potential to catapult rural India from the bullock-cart age into the new era of satellites and IT. TCL's extension services, brought to farmers through the TKKs, use remote-sensing technology to analyze soil, inform about crop health, pest attacks and coverage of various crops predicting the final output. This helps farmers adapt quickly to changing conditions. The result: healthier crops, higher yields and enhanced incomes for farmers.

e-Choupal: ITC's Agri Business Division launched it in June 2000 in which village internet kiosks managed by farmers - called *sanchalaks* - themselves, enable the agricultural community access ready information in their local language on the weather & market prices, disseminate knowledge on scientific farm practices and risk management, facilitate the sale of farm inputs (now with embedded knowledge) and purchase farm produce from the farmers' doorsteps (decision making is now information-based).

e-Sagu: The word 'Sagu' meaning 'cultivation' in Telugu language, aims to improve farm

productivity by delivering high quality personalized (farm-specific) agro-expert advice in a timely manner to each farm at the farmers door-steps without farmer asking a question. The advice is provided on a regular basis (typically once a week) from sowing to harvesting which reduces the cost of cultivation and increases the farm productivity as well as quality of agri-commodities.

AKASHGANGA: It was established at a time when information technology was almost unknown in the villages of India. AKASHGANGA's success demonstrates the potential of information technology to impact livelihoods in poor, rural communities and that even illiterate or semi-literate people can adopt IT-based systems when they see substantial benefits and when the systems are deployed in purposeful, easy-to-use ways.

Decision Support System for Agro-technology Transfer (DSSAT):

DSSAT is a software package integrating the effects of soil, crop phenotype, weather and management options that allows users to ask "what if" questions and simulate results by conducting, in minutes on a desktop computer, experiments that would otherwise consume a significant part

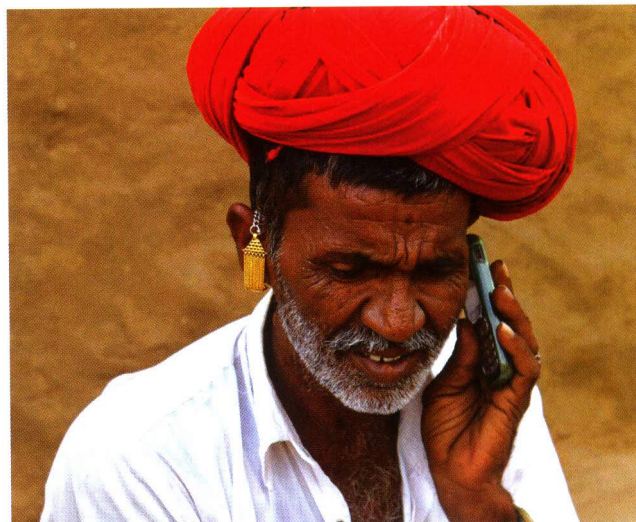


of an agronomist's career. The user can then simulate multi-year outcomes of crop management strategies for different crops at any location in the world. DSSAT also provides for validation of crop model outputs, thus allowing users to compare simulated outcomes with observed results. Crop model validation is accomplished by inputting the user's minimum data, running the model then comparing outputs. By simulating probable outcomes of crop management strategies, DSSAT offers users information with which to rapidly appraise new crops, products and practices for adoption.

Agricultural Markets: Agricultural Marketing in India has evolved from being restricted to catering to local demand by having market Yards within the range of farms to one which now aims to have interconnectivity between markets of other States to have value dispersion between farms and consumers. Emerging changes in agriculture marketing environment of the country i.e. electronic market, model act, warehousing, pledge loan, contract farming etc. are ushering in opportunities for new formats of markets which are effective in responding to demand and supply. These changes require investment in infrastructure, infusion of technology.

Electronic National Agriculture Market (eNAM) is envisioned as a unified national electronic market bringing Inter-connectivity to markets across the country. The diffusion of ENAM is through Organizations and intended through change in policy. The diffusion will be faster if the desired policy changes are made in the organization followed by change management in organizations.

eNAM for agriculture marketing can be regarded as technology which will bring a social change in markets. The social change in relationships and networks that work between buyer and seller as they exist in traditional markets will change as the technology enabled eNAM is adopted in agricultural markets. Successful adoption/diffusion will depend on easing the adoption barriers that can be categorized as technological and organizational. The eNAM portal launched by the government in April 2016 has 45.4 lakh farmers and 451 mandies registered on it. eNAM aims for integration of marketing process and flow of goods to be achieved by bringing interconnectivity



of markets through information technology. The unified online agricultural market initiatives were launched in Karnataka in 2014. The success of UMP in Karnataka has acted as an innovator for the next stage of technology innovation in public domain i.e. eNAM. The early adopters of eNAM are Himachal Pradesh, Telangana, Haryana, Uttar Pradesh, Andhra Pradesh, Madhya Pradesh and Gujarat. Efficient markets require good infrastructure, good governance and innovation-oriented institutions which aims to provide market information, establish grades and standards, manage risk and create better opportunity to enhance income and upgrade the existing markets and marketing system to integrate with National Markets.

Empowering Farmers:

Technical and institutional innovations that reduce transaction cost have proven to be enablers especially the wider use of information technologies- mobile phone, the internet, social networks for vertical coordination arrangements with farmers or producer organization. Producer organization including agricultural co-operatives plays an important role in supporting farmers to trade in the market place and understand the trends in marketing. FPO and collective action can help to enhance farmers' competitiveness and increase their advantage in emerging marketing system of eNAM. Collaboration between FPO and Private sector built on their Extension functionaries have a key role to play in engaging farmers with markets. SWOT analysis of the market, organizing commodity based farmer's interest groups and

farm management capacity building, backward and forward linkage, Farmer's exposure to market intelligence and guidance for a quality decision about the market. Empowering farmers by linking them to eNAM information, services and Linkages through Market Led Extension is a long-term solution.

Way Ahead:

India has proved its strength in Digital technology related activities all over the world. The Indian Government's IT task force and the National Working Group on "Taking IT to the Masses" and many other private entrepreneurs are working on how Digital technology can fulfill the needs of rural poor. New creative ways are being explored by which the communication technologies can help to eradicate poverty and generate employment in rural India. These efforts can be achieved by integrating digital technology into local level development planning and work. The "National Commission on farmers" (<http://krishakayog.gov.in/>) under the chairmanship of Dr. M.S. Swaminathan had recommended harnessing the benefits of Digital technology for improving the socio-economic status of rural people by suggesting the establishment of "Rural Knowledge Centers" all over the country using modern Digital technology tools.

The role of Digital technology to enhance food security and support rural livelihoods is increasingly recognized and was officially endorsed at the World Summit on the Information Society (WSIS) 2003-2005. This includes the use of computers, internet, geographical information systems, mobile phones, as well as traditional media such as radio or TV.

Awareness of up-to-date market information on prices for commodities, inputs and consumer trends can improve farmers' livelihoods substantially and have a dramatic impact on their negotiating position. Such information is instrumental in making decisions about future crops and commodities and about the best time and place to sell and buy goods. Simple websites to match offer and demand of agricultural produce are a start of more complex agricultural trade systems. These sites tend to evolve from local selling/buying websites and price-information

systems, to systems offering marketing and trading functions.

It is a known fact that information to sustain and increase agricultural production is spread over different agencies, notably farmers, universities, research institutes, extension services, commercial enterprises, and non-governmental organizations (NGOs). However, this knowledge is often poorly documented or hard to access. In India, organizations attempt to capture local knowledge, such as in the Honey Bee programme, if the information does not exist, intermediary organizations can help to generate it, make it accessible and influence research agendas. The Tele-Support project collects farmers' questions, repackages answers from local research institutes and universities on video and in local language, store online (www.telesupport.org) and send feedback into the local community.

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