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“INFORMATION AND COMMUNICATION TECHNOLOGY FOR  
AGRICULTURE AND RURAL DEVELOPMENT (ICT4ARD)”**



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# INFORMATION AND COMMUNICATION TECHNOLOGY FOR AGRICULTURE AND RURAL DEVELOPMENT (ICT4ARD)

## *A. Abstract*

*“This paper describes about the application of ICT in various agriculture, rural and allied sectors like health, education, microfinance, e-governance etc. This paper highlights the active role of various public, private, government and NGOs institutions in the successful implementation of ICT for agriculture and rural development. It explains how ICT has served as an effective tool for disseminate variety of information to the rural mass. It also explains about the sustainability of rural livelihood through ICT tools. This Paper looks at the methodology of ICT for agriculture and rural development. This paper also discusses the various projects based on ICT run by central and state government”*

**Keywords:** *ICT, Agriculture, Rural Development and ICT-based initiatives*

## **1. Introduction**

We live in the age of information. The development and proliferation of electronically ICT has accelerated economic and social change across all areas of human activity worldwide- and it is growing at a rapid pace. While the use of information and communication technologies (ICTs) remains concentrated largely in the developed world, but now ICT diffusion is beginning to reach developing countries, including agriculture, rural and allied sectors. Yet although technological innovations, such as cellular telephones and wireless broadband access, are playing an important role in building ICT level globally, strong inequality still remains. The rapid growth of ICTs in developing countries is partly a result of very low initial access, and therefore in absolute terms developing countries are still well behind the developed world access to ICTs.

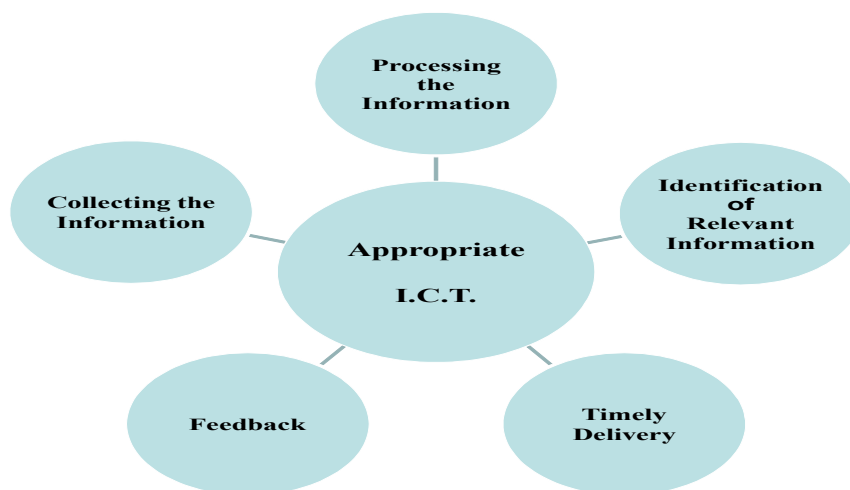
Information is very critical issues to the social and economic activities relating to development process like Agriculture and Rural development. Indian economy has already witnessed several Revolutionary developments, viz. Green, White, Yellow, Blue, and now Rainbow Revolution in Agriculture, Bio-technological Revolution, Industrial Revolution and Information Technology (IT) Revolution etc. Good Communicating System coupled with Information Technology has a great potential for providing needed support to the agriculture

in achieving sustainable production by way of timely dissemination of agricultural technology needed by the farmers. These technologies have in fact converged to ICT which is defined as the technologies involved in collecting, processing, storing, retrieving, disseminating and implementing data and information using microelectronics, optics, telecommunications and computers.

*“It is well recognized that the computer images and video clips of actual application of agriculture technology can have far greater impact on the minds and psyche of the rural, uneducated farmers than the textual descriptions of the technology. With the greater emphasis on establishing rural information kiosks and Kisan Call Centers along with countrywide investment in creating information connectivity fiber optics backbone, the rural masses in the remote corners of the country can have far greater access to the information through ICT. Thus, as an alternative, ICT offers a more efficient, attractive and interactive medium for information dissemination and provides a novel opportunity for taking scientific knowledge/technologies to the end user” [2.]\**

## 2. ICT methodology

The ICT methodology consists essentially of the smooth interaction of all the components to serve the purpose of disseminating the information by using different means of communication through different ways of communication. E.g. radio, TV, field visits, print media, internet etc. The methodology should be such it does not fail the timely deliverance of knowledge in right amount to concerned person. Following diagrams shows the integration of different steps with the process of ICT when planning an ICT based approach (moving in clockwise direction).



**Figure 1: Integration of different steps of ICT process**

### 3. Scope of ICT

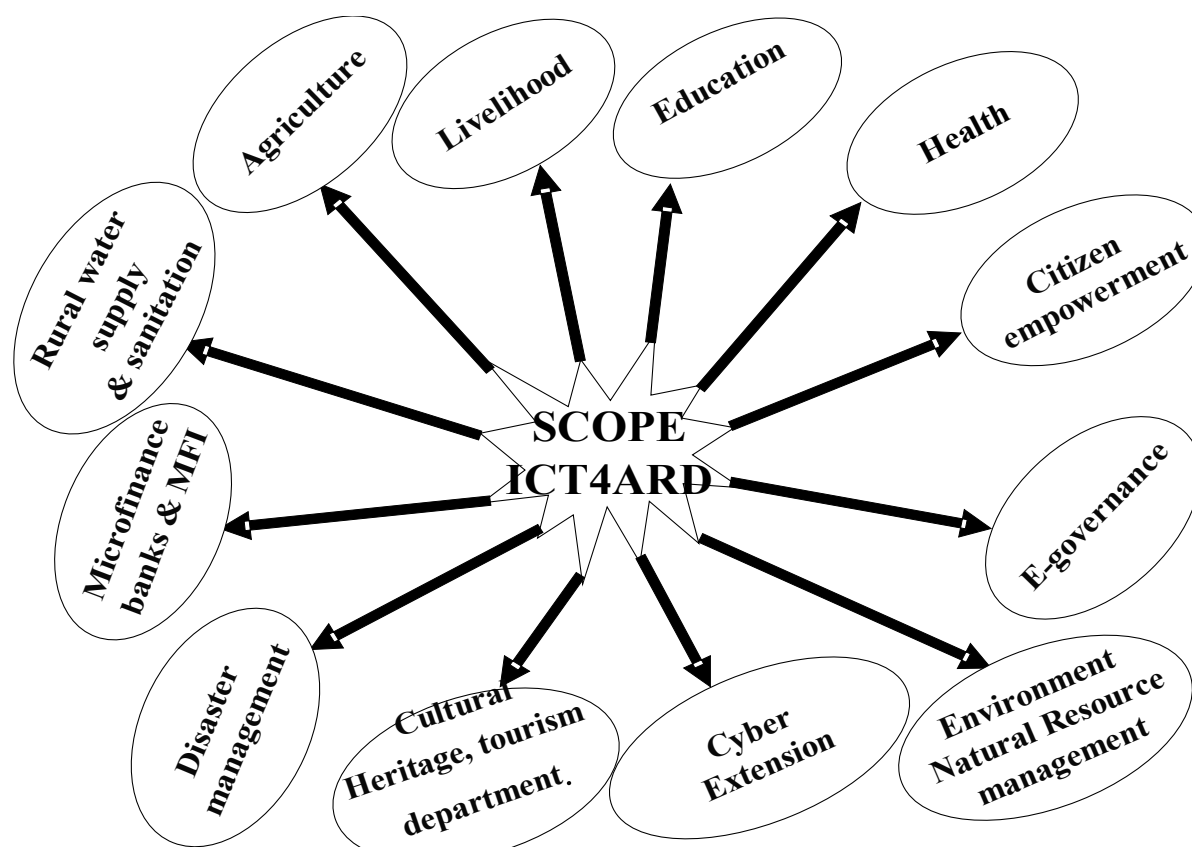


Figure 2: Scope of ICT

#### 3.1 Agriculture

Indian farmers are facing greater disparity in income in comparison to other sectors, agriculture marketing are fully dependent on information system i.e. on adequate information about what people want, at what price, and who can supply it. ICT is an innovative tool for development of agriculture and rural sector as well as research and development. ICT directly linked the farmers and provide employment generation to make available market, weather, soil, prevention or treatment of crop or animal disease, crop information, extension advice, up to date market, commodity prices and information about rural development programs. This programme is conducted be government, private and NGO for all community of farmers of any kinds of business enterprises.

Farmers are using ICT to get appropriate market information on timely basis for better price of agricultural commodities. ICT helps farmers make judicious decisions about what crops to plant and where to sell their produce and buy inputs. ICTs empower farmers, rationalize supply chains, analyze and interpret long-term data to predict pest attacks one week in advance and improve productivity. ICTs facilitate agricultural farm extension technologies

and approaches such as the development of effective seed technologies to enhance food security and subsistence. ICTs tool has been used in creating water maps to enable estimate monthly water demand and availability from various sources for the villagers.

Gyandoot (ICTs) provides facility to allow farmers to sell land, agricultural machinery, bullocks or equipment or other durable commodities and eliminate middle man. There are farmers need to understand how to use the ICT services in agriculture and rural development.

### **3.2 Livelihood**

It is very important for rural people to get rural credit from banks, NGO or MFIs to improve the livelihood and reduce vulnerability. ICTs are the tool that provides information regarding the rural credit in order to make decisions on their livelihood strategies. Microfinance and microcredit organized through Self Help Groups (SHGs) is a useful complement to state provided credit, especially in rural India. ICTs play an important role in sustainable development and sustainable livelihood at grassroots level. ICTs directly impact on the poverty reduction and improving livelihood through the employment generation into poor rural and its effects on enhancing returns from economic activities undertaken by poorer households. ICTs bridge the gap between social equality and livelihood security. When ICTs used in participatory and collaborative and having significant role in alleviating the poverty and improving livelihood.

### **3.3 Education**

ICTs have great potential in educating the rural students and bringing high quality education. For example: e-learning which can involve a wide variety of software technology like CD-ROM, DVD and internet that are proving various informations to the students. Distant education can be possible through the application of ICTs to the rural women. This is not only for students but also for teacher who can learn teaching style and get online teaching material. This tool brings the open education system

Indian government has been taken initiatives to disseminate the information through a number of e-learning projects not only for rural people but also for rural communities. This project are categorized in three heads (a) Social development projects to provide informal IT training to the rural illiterate mass (b) Community information services project for people who have minimum knowledge (c) School based curriculum projects imparting computer education to the rural students.

### ***3.4 Health***

ICTs act as a medium to transform the health care sector to improve the quality to the larger population of India. ICTs can bring the change in three ways: (a) as an instrument for continuing education they enable health workers and trained them in advance (b) improve the delivery of health and disaster management services to poor and remote locations (c) increase the transparency and efficiency of governance to improve the availability and delivery of publicly provided health services. ICTs facilitate two way process of information in healthcare and access the latest health information and treatment and informing officials of rural public health issues. With the help of ICT tool rural mass can saves on time, effort and money to arrange future appointments, consultations, hospital admissions, and follow-ups with different specialists.

ICTs are helpful particularly in the areas of healthcare equity, Human Resource Development and programme evaluation. For example satellite based tele-medicine technologies implemented successfully in many parts of India are providing to be a cost effective tool in ensuring equity health care, including improved access to specialist and bridge the geographical distances between healthcare providers in cities and underserved rural patients. ICT to improve health is through Health Information System which can provide surveillance to monitor and evaluate programmes. This is also helping in awareness to health and hygiene within the community. Government is going to set up ICT tools at community centre to enable the flow of information to and from rural healthcare workers.

### ***3.5 Citizen Empowerment***

Decentralization and devolution of powers through Panchayats have included computerization, installation of kiosks for information and networks for dissemination. ICTs work as a tool to change and restructure in the prevailing power equation. ICT can link citizen of all gender in various areas, help coordinate agenda, speed up communication, reaching a vast number of people in less time. This wide way of information is required to share ideas, proposals, documents and information that are very useful. Now days, ICTs play an important role in women empowerment.

### **3.6 E-governance**

Internet and mobile devices facilitate good governance and strengthen existing relationships and build new partnerships within civil society. This is called as e-government initiatives. ICTs provide services with higher quality, cost effective government services and a better relationship between citizens and government. ICTs encourage the holistic development of India as a nation rests on a sustained and holistic development of rural mass and reaching out to the people at grassroots level. ICTs play an important role in rural e-Governance. ICTs provide services to central agencies (like district administration, cooperative union, and state and central government departments) to the citizens at their village door steps.

ICTs act as an electronic tool to access of the state and district administration services to the citizens in villages. Many of these projects have been developed in the Internet technology and dropping of personal computers as opportunity to reach remote location. A lot of ICT projects have been made for land records, property registration and transportation through central government initiatives.

### **3.7 Environment and Natural Resource Management**

ICTs offer to great participation and involvement of human activities that are critical to protect environment and natural resources at several levels. ICTs can be critical in equipping a new generation of people who are more informed, more sensitive, and more involved in the formulation of policies that affect their communities. ICTs performed in environment monitoring and information management system at national and international level for knowledge sharing and community building around general and specialized environmental issues.

ICTs provide tool for remote sensing and constant mapping of natural resources and also for research and development in environmental sciences and for raising public awareness about environmental issues and policy implications. ICTs facilitate to make a video documentary film related with the environment degradation and other issues to aware the rural mass and also to children through CD, DVD, internet etc. at village movie theaters.

### **3.8 Cyber Extension**

Cyber Extension is a new form of ICT which is the major form of extension of technology among the millions farmer of the country. ICTs includes effective use of information and communication technology, national and international information networks, internet expert



system, multimedia learning systems and computer based learning systems to improve information access to the farmers, extension personnel, and research scientists.

### **3.9 Cultural Heritage and Tourism**

ICTs can help in preserving the cultural heritage for the communities of future generations. ICTs are going to play an important role in exchange and linkage programmes in the areas of creative and performing arts, cultural education, conservation and management of cultural and archaeological heritage, cultural enterprises and creative industries. There are lots of traditional libraries, sites, locations of important places in India where there is need of digitization to conserve the revolutionary nature and access the knowledge to remote, rural as well as disadvantaged urban communities can also assist in promoting local culture. ICTs give new opportunities for individuals and communities to the producers as well as consumers of information. This ICT can integrate with other media like radio, television etc. ICTs can be used to help rural indigenous and minority communities achieve custodial ownership and rights of interpretation and commercialization over their own cultural heritage.

### **3.10 Disaster Management**

Geographical Information System (GIS) is computer based tools which are involved in data/information collection, storage, retrieval for disaster mapping. Disaster Mapping is a tool for assessing, storing, and conveying information on the geographical location of a disaster occurrence and the spread of the actual or probable effects of disasters. GIS are used in mapping and analyzing things that exist and events that happen on the earth's surface. ICTs provide knowledge and timely dissemination of information about floods, drought, cyclone warning, assessment using to the relevant stakeholders through good communication, is fundamental to effective disaster management. ICTs are being used to improve the way to prepare for disasters, mitigate their effects, relieve suffering when disasters strike, and reconstruct the cities, towns, villages and lives of those affected. GIS mapping and Remote Sensing can help to mitigate the effects of every type of natural disaster.

### **3.11 Microfinance ( Banks and MFIs)**

ICTs have opened new window of opportunities from the microfinance institutions (MFIs) to reach out to more people, controlling the risks making the business sustainable and transparent and bringing down the cost of operation and it brings the poor section of the society on the ambit of the microfinance services. ICTs also bring about business processes

re-engineering because they provide efficient, transplant and cost-effective mechanisms to run the business of MFI. ICT tools for best possible management and reduce costs, time and efforts. Management Information System (MIS) is the backbone of ICT innovation for the delivery of microfinance services. For example mobile computing applications and palmtops at the hands of the loan officers who can directly record the transaction into the MIS can make this system more efficient and up to date. The Bank correspondents should also be “ICT-enabled”, generally equipped with equipments such as an Electronic Funds Transfer at point of sale (EFTPOS) device, barcode readers or keypads, a personal computer.

### **3.12 Rural water supply and sanitation**

ICTs play an important role in water supply and sanitation scenario of rural India. ICTs imparts knowledge and information for liquid and solid waste disposal, food hygiene, personal, domestic and environmental hygiene, safe drinking water, sanitation and hygienic education to the rural population that leads to overall well-being of the people, with a significant bearing on the infant mortality rate, death rate, longevity and productivity.

## **4. ICT-based initiatives**

There are various public, private institutions; Non-Government Organizations (NGOs) various projects and three academic institutes like DA-IICT, Gandhinagar, IIIT, Hyderabad, NAARM, Hyderabad and Self Help Groups (SHGs) have taken up several ICT based initiatives of dissemination of information. These initiatives vary in purpose, type and nature of information, methodologies and modes of information.

Now ICT-based initiatives taken by following institutions:-

### **4.1 Public Institutions**

Public institutions are as follows-

**4.1.1 Nation-wide Computer Communication Network (NICNET):** NICNET is set up by National Information Center has close cooperation with State Governments as well as District Administration. NICNET is being used for information exchange among districts, states and regional centers in the country. NIC has launched Information Network Program to strengthen Agricultural Information and Communication over NICNET for sustainable agricultural development in India and to establish Close User Group (CUG). Number of information system have been developed to cater information needs in various areas that include crops, fertilizers, seed, animals production and health, horticulture, plant-protection, agricultural

extension, fisheries, agricultural marketing and credit, agricultural research, agricultural economics and statistical land information etc.

**4.1.2 Agricultural Marketing Information System Network (AGMARKNET):** It is meeting the information need of the farmers by providing daily prices of agricultural commodities in various *mandies* (market) for helping the farmer to decide where to sell his produce.

**4.1.3 Agricultural Research Information System Network (ARISnet):** Encouraging them to develop web-portals and databases for their routine work. Indian Agricultural Statistics Research Institute (IASRI), an institute under the ICAR, has developed on-line Project Information Management System Network (PIMSnet) financed by the National Agricultural Technology Project (NATP) for online monitoring of research projects and has proved very effective in providing needed reports whenever required.

#### **4.2 Private institutions**

The private institutions are as follows:

**4.2.1 Ikisan:** Ikisan limited is an initiative of Nagarjuna group of companies that launched Ikisan Portal and Information kiosks to disseminate information on agricultural practices, agricultural news, animal husbandry, agricultural machinery, aromatic plants and medicinal plants, agricultural credit, insurance and prices of input, marketing and weather block/village level. Farmers can access this portal free of cost

**4.2.2 E-choupal:** E-choupal is a web-based initiative was established by the Indian Tobacco Company (ITC) by networking 1,200 *choupals* at the village level in Madhya Pradesh. The service support is provided through a *choupal sanchalak* (a lead farmer) who acts as a interface between computer terminal and the farmer. Soya-*chopal*'s portal in Hindi offers the latest information on weather, farming practices, and market prices of soybean to farmers at the village level that helps them in deciding where to sell their produce. It is a direct marketing channel, virtually linked to "Mandi System", eliminating intermediaries and improving sale value as realized by farmers.

**4.2.3 Mahindra & Mahindra Ltd:** Samridhhi Centers has been started in Jamnagar, Gujarat for farmers to boost the crop productivity and enhance rural prosperity. The Samridhhi Centers offer farmers a wide range of agri-related services under one roof. These include

insurance products, sales and service of tractors and implements, productivity demo farms, soil and water testing facilities, knowledge updates on the weather, crops, eradication of pests and diseases, mandi prices, etc., via the internet, finance facilities and agri counseling. Mahindra Kisan Mitra (MKM), a website which provides farmers with the latest information relating to crops, weather conditions, loans, insurance schemes, commodity prices, government policies, news and events.

**4.2.4 RCOM:** Reliance Communication aimed at growing the mobile telecom and internet penetration in Rural India. RCOM started three plan for rural mass (a) BharatNet Plan, the high-speed wireless internet service in over 20,000 rural locations for just Rs. 98/week with downloads up to 350MB (b) Grameen VAS, would cover several specialized services including mandi bhav, agriculture & animal husbandry updates, weather forecast, local info, samachar etc. all in multiple Indian Languages. These solutions can be categorized broadly under mLearning, mHealth, mCommerce, mUpdates and Group Sampark (Community Messaging) (c) M 2 M ( Machine to Machine), mobile applications that aid automation, surveillance, remote monitoring, and data gathering. This will give opportunity for rural market includes automation of agro & irrigation services, water level monitoring, and data gathering for milk & agro-cooperatives, fisheries, poultry, and soil analysis.

**4.2.5 Soya-chopal's portal in Hindi:** It offers the latest information on weather, farming practices, and market prices of soybean to farmers at the village level that helps them in deciding where to sell their produce is a direct marketing channel, virtually linked to “Mandi System”, eliminating intermediaries and improving sale value as realized by farmers.

**4.2.6 Tata Chemicals Limited (TCL):** The Tata Kisan Sansar (TKS) provides extension services to help farmers and cultivators in North India. TKS aimed to be one-stop resource centre, offering a wide range of agricultural services and products, information, and training. The centers particularly aim to facilitate access to technology and information for precision farming. Every sansar is equipped with an administrative office, a training hall, a crop clinic, a soil-testing laboratory. Tata Krishi Vikas Kendras (TKVK) are performing three functions like (a) advisory services (b) access of technology (c) library (d) training and exhibit halls (e) products and services.

**4.2.7 TARahaat Information & Marketing Services Ltd. (TARahaat):** [www.TARahaat.com](http://www.TARahaat.com) is an internet portal which was launched in the year 2000 in Bundelkhand near Jhansi, U.P which aims to connect rural India to external world. Since then, it has expanded in U.P, Panjab, and Haryana and had 38 centers by the end of 2005. There are following areas where TARahaat are working: (a) Literacy (TARAakshar), a literacy program (in Hindi) to literate village people (b) Education (TARAgyan), Education division of TARahaat that develops educational courses for people of rural areas. The courses are delivered through ICT Centers in UP, MP, Haryana, Punjab, Bihar and Jharkhand (c) Agri Advisory, valuable advices related to farming are provided to village farmers. (d) TARA bazaar, TARA vans which are franchised to local people are used to deliver the products ordered by the villagers at their door-step. TARA cards are provided to regular users enabling them to make transactions without paying money in advance.

### **4.3 Non-Government organization (NGOs)**

The following NGOs are as follows:-

**4.3.1 M S Swaminathan Research Foundation:** The information village project implemented by M.S. Swaminathan Foundation Research in collaboration with International Development Research Centre (IDRC) is aimed at bringing the benefits of modern ICTs to the rural mass. The objective is to access a variety of information for rural families through the impact of ICTs in fostering transition to sustainable agriculture and rural development and document their role in promoting the process of knowledge empowerment of rural families. According to *Internet society* magazine (2000) revealed that less than 7% of rural information use (in an ICT based center) is related to agriculture. M S Swaminathan Research Foundation, under the project “Village Knowledge Center” in Pondicherry in 1998.

**4.3.2 Datamation Foundation:** A non-Government Organization has established grass-root level multipurpose Village Information Centers in few Panchayats across the country. The Village Information Center partners actively with the local Government run programmes such as “Akshya” of the Kerala State Information Technology Mission (Mallapuram District) and Rajasthan (Jaipur District) Information Technology Department and provides information and retrieval services to the rural communities apart from building their capacities in vocational skill enhancement. Local content development is one of the key goals at the Datamation Foundation. The delivery of the local content in all form digital, audio, video deploying large

number of innovative Indian Communication Technology delivery tools gets facilitated through Village Information Center.

**4.3.3 Vaancha ICT Association:** A Delhi based NGO started a project that provides training and technical assistance to disadvantaged youth in rural and semi rural areas of the country which can be very effective in providing employment potential in rural India.

#### 4.4 Projects

Projects are as follows:-

**4.4.1 Lokmitra Project:** This project was launched in May 2001 in the Hamirpur district of Himachal Pradesh. The main object of the this project is to provide easy access to government information at remotest corners of the state, redressal of complaints to respective departments and getting their grievances addressed within ten days. This may help in transparency in working of government schemes, saving in time and responsible and responsive administration. The district administration in village of Himachal Pradesh encourages people with computer system, modem, and a telephone line for obtaining user ID from the district offices to star a citizen information centre in villages.

**4.4.2 Warana Wired Village:** This project was launched in Kolhapur district of south western Maharashtra. The 50 project connects the farmed in the area comprising of 70 villages with internet facilities at Primary Milk Co-operative society. Detailed information regarding animal husbandry and dairy practices and also as marketing of milk and milk products is provided to the farmers.

#### 4.4.3 Others projects:

- i. Gyandoot, MP
- ii. EID Parry's Agri-line project (AP & TN)
- iii. Bhoomi, Karnataka
- iv. Computer on Wheel (COW), Hyderabad
- v. Drishtee, Haryana & Rajasthan
- vi. n-Logue Communication (Chirag Kiosk), TN
- vii. IIT Mumbai, Kanpur( [www.deal.org.in](http://www.deal.org.in) )
- viii. ICRISAT, Hyderabad( [www.VASAT.org](http://www.VASAT.org) )
- ix. Dairy Information Services Kiosk (DISK), NDDDB

- x. Mahiti Shakti, Gujarat
- xi. SEWA, Gujarat and
- xii. Others.....

## **5. Limitations**

- a) The effective use of ICTs cannot be done without trained professionals i.e. human resource constraints.
- b) Many technologies are electrical power dependent, which is not available at most of the rural places.
- c) The illiteracy of general masses regarding the use and understanding of ICTs is tumbling block in ICT based projects.
- d) User- friendly ICT are lacking in many areas.
- e) In remote areas there is no penetration of ICT infrastructure.
- f) Only the progressive farmers are major benefactors.

## **6. Conclusion**

For the successful implementation of extension development projects, the integrated use of ICT is a must, as is signified by the examples of e-chaupal, ARISnet etc. There is need of professional experts in handling various components of ICT. ICT can be helpful in tackling the agricultural production and productivity and developmental roadblocks faced by our society as a whole and then increase the poverty alleviation for the farmers and rural mass. Still there are many illiterate and remote areas of our country which have not been touched by developmental activities so far.

Therefore ICTs offer an opportunity for development, but not a panacea. For the potential benefits of ICTs to be realized in developing countries, many prerequisites need to be put in place: prompt deregulation, effective competition among service providers, free movement and adoption of technologies, targeted and competitive subsidies to reduce the access gap, and institutional arrangements to increase the use of ICTs in Agriculture and Rural Development. So, India has large number of initiatives in applying ICT to improve the livelihood and income security of the small and marginal farmers. ICTs still need to be modified according to the need of social diversity right down to the grass root people.

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