Role of Information and Communication Technologies in Indian Agriculture: An Overview

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Role of Information and Communication Technologies in Indian Agriculture: An Overview

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Information and Communication Technology (ICT) and Agriculture

The agricultural sector in India is currently passing through a difficult phase. India is moving towards an agricultural emergency due to lack of attention, insufficient land reforms, defective land management, non-providing of fair prices to farmers for their crops, inadequate investment in irrigational and agricultural infrastructure in India, etc. India's food production and productivity is declining while its food consumption is increasing. The position has further been worsened due to use of food grains to meet the demands of bio fuels. Even the solution of import of food grains would be troublesome, as India does not have ports and logistical systems for large-scale food imports.

ICT or Information and Communications Technology in simple terms, can be defined as the basket of technologies, which assist or support in storage, processing of Data/Information, or in dissemination/ communication of Data/Information, or both. ICT thus includes technologies such as desktop and laptop computers, software, peripherals and connection to the Internet that are intended to fulfil information processing and communication functions.

ICTs explicitly include the field of electronic communication, in addition to IT. The term IT is defined as "the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware." IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit and retrieve information, securely. The relevance of ICTs for Agricultural Development in general and for Agricultural Extension in particular is extremely high for a country like India.

The application of Information and Communication Technology (ICT) in agriculture is increasingly important. E-Agriculture is an emerging field focusing on the enhancement of agricultural and rural development through improved information and communication processes. More specifically, e-Agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use information and communication technologies (ICT) in the rural domain, with a primary focus on agriculture. All stakeholders of agriculture production system need information and knowledge about these phases to manage them efficiently.

ICTs are most natural allies to facilitate the outreach of Agricultural Extension system in the country. Despite large, well-educated, well-trained and well-organized Agricultural extension manpower, around 60% of farmers in the country still remain un-reached, not served by any extension agency or functionary. Of the 40%, who have some access to Agricultural Information, the major sources of this information are Radio and Television. The telephone has just started to make its presence felt on this scenario. Internet-supporting Information-Kiosks are also serving the farming community, in many parts of the country. Hence ICTs are highly relevant for Agricultural Extension scientists, researchers, functionaries and organizations. The various applications of ICTs, have been discussed in sections below, which have a relevance in agricultural research, education and extension.

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ICTs and Farmers’ Advisory Services

The most widely used and available tools of farmers’ advisory services are- telephone based Tele Advisory Services, the mobile based Agri Advisory services, television and radio based mass media programmes, web based online Agri Advisory services, video-conferencing, Online Agri video

Channel, besides traditional media like, printed literature, newspapers, and farmer’s exhibition/fair etc. Most of the agricultural institutes and organizations have their own telephone based advisory services for farmers which provide telephone based Agri advisory services through a dedicated telephone number to provide real-time information and advisory. The on-line phone based expert advice service, Kisan Call Centres (KCC), launched by the Ministry of Agriculture, Government of India is available for all within the country since January 2004.A toll-free telephone number “1800-180-1551” has been provided that is operational on all days from 6.00 am to 10.00 pm.

Beyond these hours the calls are attended in the Interactive Voice Response System (IVRS) mode. The mobile based Agri Advisory services offers text, voice and video content based Agri information services through mobile phones. Mobile phones are becoming an essential device for all types of users irrespective of the age group. In India mobile technology has unleashed a paradigm shift in the communication medium to reach out to the masses. Community radio is one of the important tools of ICT that offer farmers and the people a voice and help development of the community. Community radio is owned and operated by a community or members of a community.

ICTs in Animal Disease Management

The use of ICT in animal husbandry and hospital management dates back to the period of arrival of computers. Since then various ICT tools are used at different levels. Conventional communication modalities like print media, radio broadcastings, television, CD-ROMs, Handheld computers have been very widely used. Recent concepts like Internet, Geographical Information System (GIS), Global Positioning System (GPS), Database Management, Computer Aided Design (CAD), computer Networking, Artificial Intelligence adds strength and efficiency to the ICT in animal disease management. Most of the ICT tools currently used are in Herd Health management.

Geo-informatics technologies

At present, Geographic Information System (GIS), Remote Sensing (RS) and Global Positioning System (GPS) are used in convergence for animal disease management. Both GPS and GIS collect and analyze the data with geographical reference respectively. These geo-reference points are based on the longitude and latitude coordinates of the location under study.

Computer-aided design and drafting (CADD), is the use of computer technology for the process of design and design-documentation. With the introduction of Computer-assisted drug development (CADD) in pharmaceutical industry for drug development based on the integration of mathematical modelling and simulation, the cost of synthesizing and validating a new molecule becomes cheaper as the CADD reduces almost 50% of the cost. This methodology provides knowledge based decisional tool on alternative development strategies based on the evaluation of potential risks on drug safety, and the definition of experimental design of new trials with expected power and probability of success.

ICTs in Rural Development

The agricultural sector is confronted with the major challenge of increasing production to feed a growing and increasingly prosperous population in a situation of decreasing availability of natural resources. Factors of particular concern are water shortages, declining soil fertility, effects of climate change and rapid decrease of fertile agricultural lands due to urbanisation. However, the growing demand, including for higher quality products, also offers opportunities for improving the livelihoods of rural communities. Realising these opportunities requires compliance with more stringent quality standards and regulations for the production and handling of agricultural produce. New approaches and technical innovations are required to cope with these challenges and to enhance the livelihoods of the rural population. Although it is a relatively new phenomenon, evidence of the contribution of ICT to agricultural development and poverty alleviation is becoming increasingly available.

ICT promises a fundamental change in all aspects of our lives, including knowledge dissemination, social interaction, economic and business practices, political engagement, media, education, health, leisure and entertainment. ICTs can play a significant role in combating rural and urban poverty and fostering sustainable development through creating information rich societies and supporting livelihoods. If ICTs are appropriately deployed and realize the differential needs of urban and rural people, they can become powerful tools of economic, social and political empowerment.

ICTs for Empowerment of Women

Women face enormous challenges to use ICT for their own economic empowerment. Using and benefiting from ICT requires education, training, affordable access to the technology, information relevant to the user and a great amount of support [to create an enabling environment]. Access to affordable services and availability of infrastructure is without doubt a major requirement if ICTs are to be used for women's economic empowerment.

ICTs for Soil Quality Assessment

Assessment of soil quality can be done in farm level and also for regional level. In regional level it can be done based on soil, climate and land uses. Some useful technologies aid to understand nature of soil and its problems due to management practices. ICTs have developed several folds in the recent past. The vision on identifying the status of natural resources also widened. Soil quality assessment is being done with some useful technologies, like remote sensing.

Remote sensing is a process that collects data about an object from a remote location. Geographers use a number of mechanical devices to achieve this process. These devices contain advanced sensors that can capture information via the reflection or emission of radiation from objects. Devices used for remote sensing are constructed to sense certain wavelength bands. The objects that are sensed have particular spectral signatures and one has to match the object to the sensor. The area reported with productivity decline is demarcated. Remote sensing products are collected and interpreted for low productivity with visual observations.

ICTs for Market Information

The lack of accurate and timely market information in the agri-input sector is an issue at continental, regional, national and local levels, and remains a key constraint to the development of agricultural business linkages and trade around the world. Significant progress continues to be made by public and private institutions to implement market information services using advanced information and communication technology (ICT) tools. However, the complexities of fertilizer, seed and crop protection product value chains remain major constraints for integration into broader information systems. With rapidly increasing access to cell phones and computer centres, even the more remote areas of the continent are benefiting from the information offered through this advanced technology.

Some Successful ICT initiatives in India:

In India ICT applications such as Warana, Dristee, E-Chaupal, E-Seva, Lokmitra, E-Post, Gramdoot, Dyandoot, Tarahaat, Dhan, Akshaya, Honeybee, Praja are quite successful in achieving their objectives. Some of these have been dealt in detail below:

e-Extension (e- Soil Health card Programme): The Deptt. Of Agriculture, Gujarat State is one of the ambitious programmes which aims to analyse the soil of all the villages of the state & proposes to provide online guidance to farmers on their soil health condition, fertilizer usage and alternative cropping pattern. The website is www.agri.gujarat.gov.in/ www.shc.gujarat.gov.in/ .

AGRISNET- uses state-of-the-art broadband satellite technology to establish the network within the country. The website is http://www.apgrinet.gov.in for Andhra Pradesh and http://agriculture.up.nic.i n for UP.

AGMARKNET is a comprehensive database which links together all the important agricultural produce markets in the country (http://www.stockholmchallenge.se/data/agmarknet/).

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 machinary 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 ICT by collecting and delivering real time information,online. It makes the operations more effective, totally transparent, benefiting all stake holders (farmers, traders & the government), empowering them through accurate and timely information for effective decision making.

Query Redress Services: Empowering the farmer community through effective, need-based interventions. It enhances livelihood promotion of farmer community through information dissemination and extension services, using ICT as 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. The service caters to information and knowledge needs of the farmers, professional members of ISAP, individuals and other stakeholders involved in the wider agricultural and allied sectors.

Kisan Call Centres: Kisan call centres have been established across the country with a view to leverage the extensive telecom infrastructure in the country to deliver extension services to the farming community. The sole objective is to make agriculture knowledge available at free of cost to the farmers as and when desired. Queries related to agri. 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.

ITC's Agri Business Division launched **"e-Choupal** " 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 & 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**, an ICT based personalized agro-advisory system is being developed since 2004.The The word 'Sagu' means 'cultivation' in Telugu language. It aims to improve farm productivity by delivering high quality personalized (farm-specific) agro-expert advice in a timely manner to each farm at the farmer.s 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.

AKASGANGA (Meaning "milky way" in hindi) was established in 1996 under the banner of Shree Kamdhenu Electronics Private Ltd. (SKEPL) by a group of young entrepreneurs. 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. AKASHGANGA's experience indicates 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 Systems

Decision Support Systems (DSS) are a specific class of computerized information system that supports business and organizational decision-making activities. A properly designed DSS is an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions. DSS are data-driven, as the entire process feeds off of the collection and availability of data to analyze using various tools, which use input data/information and produce output/ decision after certain processing based on some set rules/criteria. DSS facilitate users in understanding the impact of various factors/constraints on the system. With the advent of computers, DSS are being developed and used in almost every field. By employing DSS a farmer/planner/policy maker can prioritize the important activities having more impact under existing constraints. DSS in agriculture are also used as convincing tools to explore, suggest and propagate technologies/strategies capable of enhancing agricultural production, income and livelihood security of farmers.

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. DSSAT has been in use for more than 15 years by researchers in over 100 countries. DSSAT is a microcomputer software product that combines crop, soil and weather databases into standard formats for access by crop models and application programs. 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.

Decision Support System for Water Resources Management

Decision support systems (DSS) are customized software applications that add value to water resources models and help managers to make informed decisions using information generated by water resources models. A water management DSS would likely consist of the following components:

a) *Data Measurement and Collection System* receiving various data (e.g., water level and temperature, precipitation, air temperature, concentrations, etc.) from stations throughout the river basins being managed, as well as weather data and forecasts;

b) *Data Processing System* to store the data related to the processes of interest in the basins, both spatial and feature related as well as time series data;

c) *Analytical System* of models and tools designed to predict watershed response and provide river forecasts, using data from the Data Collection System, and historical and river basin data needed to calibrate hydrologic models.

d) *Decision Formulation and Selection System* for gathering and merging conclusions from knowledge-based and numerical techniques and the interaction of users with the computer system through an interactive and graphical user interface.

e) *Decision implementation System* for disseminating decisions regarding water use under normal conditions, and flood warnings, river forecasts, and disaster response in affected areas.

ICTs under Changing Climate

In the intersection between climate change and agriculture there are several tools available, because of the high number of crops and because of the complexity of replicating the same conditions across different regions. Every tool allows analyzing different processes of the agricultural sector, from local crop modelling under climate change conditions to the management of economic impacts of climate change on the agriculture sector (soil value variations, demand and supply, production, etc.), and so on. As many tools exist, it's interesting to focus on their common aspects rather than their specific peculiarities. Some of the tools allow simulating the growth of specific crops, verifying their variations under different climate change scenarios. Usually these tools are site-specific, but they can be applied at national and/or regional level through a link to an appropriate Geographic Information System (GIS).

Future projections of climate change using Global and Regional Circulation Climate Models with different IPCC emission scenarios indicate an increase of about 5-10% in summer monsoon rainfall over India (NATCOM, 2004). It is also projected that number of rainy days may decrease by 20 to 30%, which would mean that the intensity of rainfall is expected to increase. Extremes in rainfall also show increase in their frequency and intensity by the end of the year 2100. Within this framework, it is crucial to identify ICTs that the farmers need in order to cope with the new conditions. This is particularly true for poor smallholder farmers; farmers do not have access to the scientific and technological advances that support agricultural decision-making because of the lack of reliable communication networks.

Information is vital to tackle climate change effects: for this reason, a shift is needed in the agriculture sector to disseminate appropriate knowledge at the right time to the ones who are at the frontline in the battle: the farmers, in both developed and developing countries. At the same time, information per se is not enough, but appropriate communications systems are needed to ensure that information come to farmers in an effective, accurate and clear way. This means that the information provided to farmers must have the following properties: timing: farmers need to access to information on time, especially if it implies a change in production strategy; reliability: information must necessarily be correct and comprehensive, including any degree of probability and/or margins of error, in order to result as transparent as possible to the recipient; clearness: indications, to be properly applied, must essentially be created and processed taking into account the recipient' peculiarities, thus adapting the content of the message to his own culture.

Global Positioning System

The Global Positioning System (GPS) is a satellite-based navigation system that can be used to locate positions anywhere on the earth. GPS provides continuous (24 hours/day), real-time, 3- dimensional positioning, navigation and timing worldwide in any weather condition. GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilian use. There are no subscription fees or setup charges to use GPS. Any person with a GPS receiver can access the system, and it can be used for any application that requires location coordinates. The development of the publicly available global positioning system (GPS) has opened new doors in opportunities for spatial data. More recently farmers have gained access to site specific technology though GPS. GPS makes use of a series of satellites that identify the location of farm equipment within a meter of an actual site in the field. The availability of GPS approaches to farming will allow all field-based variables to be tied together. This tool has proven to be the unifying connection among field variables such as weeds, crop yield, soil moisture, and remote sensing data.

Remote Sensing Technique

Remote sensing (RS) is the science of making inferences about material objects from measurements, made at distance, without coming into physical contact with the objects under study. A remote sensing system consists of a sensor to collect the radiation and a platform–an aircraft, balloon, rocket, satellite or even a ground-based sensor-supporting stand-on which a sensor can be mounted. Currently a number of aircraft and spacecraft imaging systems are operating using remote sensing sensors. Some of the current image systems from spacecraft platform include Indian Remote Sensing Satellites (IRS), French National Earth Observation Satellite (SPOT), IKONOS, MODIS etc. However, using RS data for mapping has many inherent limitations, which includes, requirements for instrument calibration, atmospheric correction, normalization of off-nadir effects on optical data, cloud screening for data especially during monsoon period.

Geographic Information System (GIS)

A geographic information system (GIS) is a technological tool that analyzes and presents information tied to spatial location. GIS is a computerized data storage and retrieval system, which can be used to manage and analyze spatial data relating crop productivity and agronomic factors. It can integrate all types of information and interface with other decision support tools. GIS can display analyzed information in maps that allow (a) better understanding of interactions among yield, fertility, pests, weeds and other factors, and (b) decision-making based on such spatial relationships.

Many types of GIS software with varying functionality are now available. Many farm information systems (FIS) are available, which use simple programmes to create a farm level database. A comprehensive farm GIS contains base maps such as topography, soil type, N, P, K and other nutrient levels, soil moisture, pH, etc. Data on crop rotations, tillage, nutrient and pesticide applications, yields, etc. can also be stored. GIS is useful to create fertility, weed and pest intensity maps, which can then be used for making maps that show recommended application rates of nutrients or pesticides. These GIS tools can be used for creating spatial maps of different crop, weather, and soil parameters from point data set.

At present, the majority of applications and systems on climate change issues within the agricultural sector are related to scenario development, impact assessment and adaptation planning. In many of these cases the systems are the result of single R&D efforts, rather than collaborative programmes: one of the side effects is a lack of interoperability among different applications. Using an Open Source approach could open the road to the creation of a collaborative community-led environment, as it happened within spatial technology thanks to the Open Source Geospatial Foundation.

In addition, it should be underlined that a gap still exists between global and local applications: promoting the development of an integrated framework for information sciences, agro-environmental sciences and communication at different levels is essential in order to fill it.

ICTs in Weather Forecasting

Weather plays an important role in agricultural production. It has a profound influence on the growth, development and yields of a crop, incidence of pests and diseases, water needs and fertilizer requirements in terms of differences in nutrient mobilization due to water stresses and timeliness and effectiveness of prophylactic and cultural operations on crops. The poor, especially the rural poor, are particularly vulnerable to the negative effects of extreme weather and natural disasters. Yet accurate forecasting and timely warning can mitigate the effects of natural disasters such as floods, and improved weather forecasting can improve crop yields and lessen the effects of severe weather or drought. ICT has a crucial role to play in all links of the chain, from detection to modelling and forecasting to advance warning and localization. Yet the vast majority of the poor in developing countries still have very poor access to such information and very little advance warning of adverse events.

Accurate forecasting and the increasingly sophisticated computer models that under gird it, depends on a vast array of data at a global scale, and national meteorological organizations play a key role both as suppliers of data for global forecasting and as consumers of information and forecasting that they localize and share. The costs of upgrading meteorological detection, analysis and reporting systems is substantial, but the benefits of improved forecasting and advance warning are substantial and have a strong pro-poor impact. For this reason, there is a strong case to be made for international donors to partner with governments and local partners to invest in improving and upgrading these systems and assuring that the poor, particularly the rural poor, obtain more timely and accurate weather and natural disaster information.

Dissemination of Met Information and Weather Warnings

IMD through its various forecasting centres disseminates weather bulletins/ forecast/ warnings as a routine daily twice. It disseminates these information through regular communication channels to various user agencies/ general public, etc. During cyclones and depressions they are issued frequently. With the advent of technology, data and information exchange being carried out through AMSS, Internet, Satellite phones (important when all modes of communication fail, like during cyclones) etc.

ICT use in monitoring climate change

ITU work focuses on the use of ICTs (including radio and telecommunication technologies, standards and equipment) for weather and climate change monitoring, for instance in predicting, detecting and mitigating the effects of typhoons, thunderstorms, earthquakes, tsunamis, manmade disasters, etc. The WWW (World Weather Watch) is composed of three integrated core system components: The Global Observing System (GOS) provides observations of the atmosphere and the earth's surface (including the surface of the oceans) from all parts of the globe and from outer space .The GOS mainly acts as relay for remote sensing equipment placed on satellites, aircrafts, radiosondes (a type of weather probe), as well as meteorological radars on the earth and at sea. The Global Telecommunication System (GTS) combines radio and telecommunication equipment capable of providing real time exchange of a huge volume of meteorological data and related information between international and national meteorological and hydrological centres. The Global Data Processing System (GDPS), based on thousands of linked mini, micro and supercomputers, processes an enormous volume of meteorological observational data and generates meteorological products such as analysis, warnings and forecasts.

National Knowledge Network (NKN): Expanding the ICT Network

The project NKN is funded by DIT and is currently being managed in multiple phases by National Informatics Centre (NIC). The idea of setting up of a NKN was deliberated at the office of Principal Scientific Advisor to the Government of India and the National Knowledge Commission. Collaborative engagements were held with key stakeholders including experts, potential users, telecom service providers and educational and research institutions. These discussions have yielded a consensus on the optimal approach to be adopted for setting up such a network, to provide a unified high speed network backbone for all the sectors. National Knowledge Network (NKN) is an initiative which has enabled India to leapfrog to Knowledge Society. It aims at establishing connectivity for Knowledge & Information Sharing by

- Enabling Collaborative Research
- Facilitating personalized life-long leaving education.
- Providing an ultra high speed e-governance backbone

- Creation of unified network which can act as a carrier of all kinds of networks in the field of research, education and governance

Conclusions

Information and communication technologies (ICTs) refer to technologies that provide access to information through telecommunication. It is similar to information technology (IT) but focuses primarily on communication technologies which include the internet, wireless networks, cell phone and other communication technologies have created a “global village” in which people can communicate with others across the world as if they were living next door. For this reason, ICTs after studied in the context of how modern communication technologies affect society. There are several initiatives way in India to demonstrate the significant benefits of ICTs for rural populations. However, it is almost a paradox of introducing modern technologies before satisfying basic needs. The implementation or rural ICTs involves organizational and social change. Besides, an important barrier to realizing the economic benefits of ICTs is the often substantial high level of investment in new infrastructure – both hardware and software. In developed countries, large potential customer bases and efficient capital markets help overcome this barrier, hardware and software designed for developed countries can easily be adapted to serve higher income consumers in developing countries, but this leaves out the majority of the population in developing countries. In this scenario, one potential consequence of IT use is an increasing in equality as only higher income groups enjoy its benefit – this is the so called “Digital DIVIDE”.

On the other hand, because government provide goods and services, including redistributive transfer payment, are often aimed at lower income groups, to the extent that ICT use can increase the efficiency and effectiveness of government, the benefits of IT will be more widely spread, partly reducing “digital divide” concerns. Private providers may therefore have also a role in delivering IT – based information services that are complementary to government services, as well as in providing conventional private goods and services. The lack of access to ICTs in developing countries means a growing knowledge gap is inevitable. Seventy percent of population in developed countries, in some countries close to 100% have access to the internet, while in close to 100 developing countries the figure is less than 10%. However about 7% population have access to internet connections in India in the year 2010. There has been sharp increase in internet users in India from only 14 lack in 1998 to 7 crore in 2010.

The Indian telecommunication industry is the world’s fastest growing telephone (landlines and mobile) subscribers and 670.60 million mobile phone connection in Aug. 2010. It is the second largest telecommunication network in the word in terms of number of wireless connection after china. The ICTs are expected to exert positive inference on Education, Health, Employment and Agriculture which will have impact on Socio-economic aspects of rural poverty.

Information and communication technologies (ICTs) are crucial in improving access to health and education services and creating new sources of income and employment for the poor section of society. Being able to access and use ICTs has become a major factor in driving competitiveness, economic growth and social development. In particular, mobile phones are opening up new channel for connectivity and contributing to the free flow of ideas and opinions. The real challenge is to develop better measurement. In the context of ongoing agricultural development programmes, farmers are likely to become more exposed to the vagaries of global markets, empowering then with information access which may improve the reality of decision-making quality in more complex environments. Beyond giving farmers more and better information, their choice sets can also be expanded. The ICT infrastructure may also be used to bring down the cost as delivery of credit and crop insurance to farmers.

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Information is vital to tackle climate change effects: for this reason, a shift is needed in the agriculture sector to disseminate appropriate knowledge at the right time to the ones who are at the frontline in the battle: the farmers, in both developed and developing countries. At the same time, information per se is not enough, but appropriate communications systems are needed to ensure that information come to farmers in an effective, accurate and clear way. This means that the information provided to farmers must have the following properties: timing: farmers need to access to information on time, especially if it implies a change in production strategy; reliability: information must necessarily be correct and comprehensive, including any degree of probability and/or margins of error, in order to result as transparent as possible to the recipient; clearness: indications, to be properly applied, must essentially be created and processed taking into account the recipient' peculiarities, thus adapting the content of the message to his own culture.

Thus, any knowledge transfer should take into account farmers' point of view, with the aim of building on their knowledge and capitalize on it. The evolutions and availability of ICT's has been the greatest communications revolution in recent years. The decreasing cost of hardware, increase in reach of communication network and availability of the same at district and below district level is open –up huge potential for agricultural scientists and extension worker to reach the farming community in more focus, precise and specific manner.

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