**Transforming rural India with the help of digital technologies**

ICT 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. It can help the bridge gaps by providing ‘e’ and ‘m’ services. ICT offering meant for rural sector can be classified into three categories:

1. **Those solutions which aim are aimed at empowerment**
2. **Those which would do enablement.**
3. **Those for market expansion.**

With respect to empowerment- e-choupal comes up as fine example. This is example of efficient supply chain system empowering the farmers with timely and relevant information enabling them to get better returns for their produce. And due to its community centric approach, it gives other offerings also to the farmers’ like- insurance and farm management practise, etc.

The practise of e-governance, which creates transparency and governance through IT has enabled the citizens. Successful implementation of e-governance in the areas like- maintain land records is a great step in removing the malpractices and creating assurance of rightful ownership. Aadhar is another such tool, which has empowered the masses by confirming their identities and is good example of ICT solution attempting to provide access to monetary benefits by establishing the correct identity and this way rural economy is also expanding.

Market expansion with the help of ICT can be seen through various examples, such as – In 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 compared to past. Direct connect through e-commerce has facilitated large number of artisans 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. 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.

As we know development is a process which takes couple of years to change the rural life. Thus information technology will definitely be in a position to change the scenario of rural life and create a better path for rural development. Among the major States, Maharashtra was on top with the 104 out of 1,000 families had Internet in cities, followed by Kerala and Himachal Pradesh at 95 each and Haryana at 81.5

**ICT and Agriculture**

Farming and Information Technology seems to be the most distantly placed knowledge sets in the world. Farming being the most primitive and most basic of the jobs and IT related being the most advanced and most modern. However we know the importance of farming as it is essential for life maintenance on the surface of mother earth and it is important for the developments in IT to aid for the betterment of farming to produce better.

**E-Agriculture**is a new area of knowledge emerging out of convergence of IT and farming techniques. It enhances the agricultural value chain through the application of Internet and related technologies. Basically IT helps farmers to have better access to information which increases the productivity. It also enables him to get better prices through information of change in price in different markets.

The information related to policies and programs of government, schemes for farmers, institutions through which these schemes are implemented, new innovations in agriculture, Good Agricultural Practices (GAPs), Institutions providing new agricultural inputs(high yielding seeds, new fertilizers etc) and training in new techniques are disseminated to farmers through use of Information technology to ensure inclusiveness and to avoid digital divide.

Access to price information, access to agriculture information, access to national and international markets, increasing production efficiency and creating a ‘conducive policy environment’ are the beneficial outcomes of e-Agriculturewhich enhance quality of life of farmers.

Soil Management, Water Management, Seed Management, Fertilizer Management, Pest Management, Harvest Management and Post-Harvest Management are the important components of e-Agriculture where technology aids farmers with better information and alternatives. It uses a host of technologies like Remote Sensing, Computer Simulation, Assessment of speed and direction of Wind, Soil quality assays, Crop Yield predictions and Marketing using IT.

In India, there have been several initiatives by State and Central Governments to meet the various challenges facing the agriculture sector in the country. The E-Agriculture is part of Mission Mode Project, which has been included in NeGP (under National E-governance Plan) in an effort to consolidate the various learnings from the past, integrate all the diverse and disparate efforts currently underway, and upscale them to cover the entire country.

The MMP is to be operationalized by Department of Agriculture and Cooperation (DAC), and aims to provide services, such as:

* Information to farmers on seeds, fertilizers, pesticides
* Information to farmers on Govt. Schemes
* Information to farmers on Soil recommendations
* Information on crop management
* Information on weather and marketing of agriculture produce

**Government steps to provide e-aid to farmers**

* **National Policy for Farmers, 2007**

The Government had constituted National Commission on Farmers in 2004 under the chairmanship of Dr. M.S. Swaminathan. Based on the recommendations made by the Commission in its Revised Draft National Policy for Farmers and the comments/suggestions received from various Central Ministries and Departments and State Governments, the “National Policy for Farmers, 2007” has been formulated and approved by the Government of India

It has important provision for use of Technology: New technologies which can help enhance productivity per unit of land and water are needed. Biotechnology, information and communication technology (ICT), renewable energy technology, space applications and nano-technology to provide opportunities for launching an “Evergreen Revolution” capable of improving productivity in perpetuity without harming the ecology.

* Under **National Telecom policy, 2012**major focus is being given at improving the broadband penetration. It mentions mobiles as an instrument of socio-economic empowerment for citizens
* **National mission on agricultural extension and Technology:**The aim of the Mission is to restructure and strengthen agricultural extension to enable delivery of appropriate technology and improved agronomic practices to farmers. This is envisaged to be achieved by a judicious mix of extensive physical outreach and interactive methods of information dissemination, use of ICT, popularisation of modern and appropriate technologies, capacity building and institution strengthening to promote mechanisation, availability of quality seeds, plant protection etc. and encourage aggregation of Farmers into Interest Groups (FIGs) to form Farmer Producer Organisations (FPOs).
* Under **Bharat Nirman,**has registered the increased tele-density in rural areas. And it is this base which is being used to provide ‘m’ service to farmers, giving them right information at right time.
* **Universal service obligation fund (USOF)**already launched wireless broadband Scheme in 2009. USOF is also funding the **National Optical fibre network (NOFN)**, which is being managed by Bharat Broadband Network Limited. Bandwidth from NOFN will be eligible to give wide range of services to rural India.
* Pilot project scheme for **Mobile values added services (m-VAS)**for rural women’s Self-help group (SHG) is also part of **USOF’s Sanchar Shakti programme.** In this the SHG on the basis of their activities are provided with information in local languages through SMS, outbound dialers (OBDs) and Integrated Voice response system (IVRS).
* **Bharat Nirman Kendra**, shall be a single window for providing the information on the NREGS and shall provide feedback on the quality of implementation of the program. The idea is to slowly move on the wage employment to self-employment by providing skill development facilities to the rural people and in the process give a fillip to the rural economy. In future it can also become centre for e-enabled study or e-learning centre.
* For farm credit, service of ICT is being harnessed like Smart Cards, Internet Kiosks and cell phone messaging. And also disbursement of all social security benefits through electronic benefit transfer to all rural areas.**Mobile-enabled kisan card system** to help the agricultural community engage in cashless transactions,
* **Kisan credit card**: It uses the ICT to provide affordable credit for farmers in India. It was started by the [Government of India](http://en.wikipedia.org/wiki/Government_of_India), [Reserve Bank of India](http://en.wikipedia.org/wiki/Reserve_Bank_of_India) (RBI), and [National Bank for Agriculture and Rural Development](http://en.wikipedia.org/wiki/National_Bank_for_Agriculture_and_Rural_Development) (NABARD) in 1998-99 to help farmers access timely and adequate credit.

The Kisan Credit Card allows farmers to have cash credit facilities without going through time-consuming bank credit screening processes repeatedly. Repayment can be rescheduled if there is a bad crop season, and extensions are offered for up to four years. The card is valid for three years and subject to annual renewals. Withdrawals are made using slips, cards, and a passbook

* **Kisan Choupal**in collaboration with Krishi vigan Kendra is a successful model in Bihar. It is being conducted in identified village on the basis of need assessment of the farmers by the scientists on agriculture and allied enterprises.

At Kisan chouapl, the dialogue/. Discussion /.problems solving is facilitated with help of Information technologies, showing technical videos to farmers, movies, etc. at the beginning of the choupal. This has increased the awareness of farmers on cropping practises and new techniques. This has also facilitated better and wider reach of the technologies in the farmer community.

* **Kisan Call centre:**An expert advisory system and the farmers needs to call the toll free number 1800-180-1551 to seek expert advice on different matters related to agriculture and allied sectors.
* **Kisan SMS Portal:**Here farmer keeps getting SMS messages providing information or delivering service or giving advisories on his mobile from experts, scientists and officers at various level after once opting for messages on agricultural practises / crops of his interest. In short, messages are customized based on farmer’s preferences in the language chosen by them

Existing databases of the farmers available with central and state government are being integrated with the portal. Those who are not registered, they need to register themselves with the system. They can register themselves by calling the Kisan call centre on the toll free number or through web portal or even SMS based registration is also available.

The services of the portal include crop production, including horticulture, animal husbandry, dairying and fisheries. It sends messages relating not only production aspect but also marketing of produce, weather forecast, soil testing, etc.

* The **Sandesh Pathak application**, developed jointly by C-DAC Mumbai, IIT-Madras, IIIT Hyderabad, IIT Kharagpur, and C-DAC Thiruvananthapuram will enable SMS messages to be read out loud, for the benefit of farmers who may have difficulty in reading. It is usable by people who cannot read. A large population of farmers belongs to this category. So when they receive an SMS message either containing agriculture-related advice or some other thing, this app will read aloud the content.

The app which is available for download from the Appstore of **the Mobile Seva Project** of government of India, is an Indian language SMS Reader.

The app is part of the project launched by the Indian Government to help farmers read messages which may be of the following types: advice to solve farming problems — insect, disease, fertilizer or weed management; information on weather — such as forecasts; and updates on latest technology — for improving yield and much more.

* **Village Knowledge Centre (VKC)**

Village Knowledge Centre (VKC) serves as information dissemination centre providing instant access to farmers to latest information/ knowledge available in the field of agriculture, starting from crop production to marketing. A “VKC In-charge” who looks after the operations of the VKC mans every VKC.

* **Village resource centres (VRC)**

The VRCs are connected to Knowledge/Expert Centres like Agricultural Universities, Skill Development Institutes and Hospitals. Over 6500 programmes have been conducted by the VRCs in the areas of, Agriculture/horticulture, Fisheries, Live stock, Water resources, Tele health care, Awareness programmes, Women empowerment, Supplementary education, Computer literacy, Micro credit, Micro finance, Skill development / vocational training for livelihood support etc. So far, over five Lakh people have availed VRC services.

**More advanced use of ICT in farming**

1. **Irrigate via smart phone:**Mobile is playing a big role in monitoring and controlling crop irrigation systems. With the right equipment a faremer can control his irrigation systems from a phone or computer instead of driving to each field.

Moisture sensors in the ground are able to communicate information about the level of the moisture present at the certain depth of the soil. This gives more precise control of water and other inputs like fertilizer that are applied by irrigation pivot.

1. **GPS mapping**for an input to the field using **variable rate technology**, which helps farmer in accessing the need i.e. where they need to put more fertilizer or less, according to the requirement of the soil. GPS enabled services are also helping in field documentation about yield, moisture, maps for field drainage, etc.
2. Various farmer friendly applications (apps) are being launched by companies, which helps farmers in discovering prices for their products, delivering their product, getting soil report, etc.
3. One of the best use of IT in farming is being done by one vegetable farmer outside Hyderabad using webcams to monitor the crops and to take the scientists’ expertise to address problems without taking them to the field.

**Benefits of e-aid to farmers**

IT has made its way into the agricultural sector, and with positive results. To name a few, here are some of its effects:

* **Improved decision making** – By having the necessary information, farmers—big and small can make better and more informed decision concerning their agricultural activities. May it be about who to get their grains from or perhaps who to sell it to, the communication channels that information technology brings makes production up to distribution easier for the farmers. The exchange of knowledge from various countries and organization also helps farmers be more aware of factors to consider before making their decisions.
* **Better planning** – IT has paved the way to come up with farming software which can keep better track of crops, predict yields, when to best plant and what to plant, to intercrop or focus on just one product, or determine the current need of the crops—just about everything needed to improve production and income. By adjusting to the modern farming methodologies, farmers can have better control of their crops. Gaining information from their farm is essential in sustaining its success and fuelling further growth.
* **Community involvement** – There are several programs which are made possible by IT applications, and community involvement in agriculture can be increased as well. When a community adopts modern methods for agriculture, the production of local goods can be increased. There are some places where people greatly benefit from the land and their resources for agriculture, and with IT, there can be improved union in local farmers which can lead to their community’s overall improved production that may lead to better income for everyone involved.
* **Agricultural breakthroughs** – IT makes the spread of information concerning the latest agricultural breakthroughs more possible. When scientists develop new and improved grains or find techniques to help winter crops become stronger against the cold, farmers from all over the world may benefit from the same breakthroughs simply by being connected to the rest of the agricultural world. Sharing information to help everyone progress is made much easier through resources made available and accessible by IT.
* **Agriculture for everyone** – Farmers have in-depth knowledge when it comes to their trade. However, interested individuals who may be called backyard farmers may also benefit from how modern technology has changed how agriculture is seen. Growing your own sustainable garden of herbs, fruit trees, and other agricultural produce can be possible in a smaller scale. Planting is beneficial in more ways than one, and having your own produce even helps assure the freshness and quality of the food your family eats.
* **Precision agriculture (PA)**
or satellite **farming** or site specific crop management (SSCM) is a **farming**management concept based on observing, measuring and responding to inter and intra-field variability in crops.
* This technique focuses on utilising resources optimally to improve the quality and quantity of crops while lowering the cost of production. It reduces fertiliser and pesticide use, prevents soil degradation, utilises water optimally and raises productivity. Globally, this is done with the aid of modern, eco-friendly farming practices and technology, including satellite imagery and information technology. “This innovation can go a long way in tackling many of our country’s farm ills, including excessive use of water and other inputs, which has hurt soil quality apart from making farming unprofitable as a profession,

**Problems in effective use of Technology**

Though lots of problems like technical feasibility of connectivity in rural areas, cost involved in ensuring services, need for basic computer literacy and literacy hinders the fast development of e-Agriculture, it will definitely be an engine of growth in Rural India once the initial hiccups are overcome. Some of those problems are:-

* The reach of the technology is still very poor and large chunk of farmers are still ignorant about such advancements. The distribution of technologies is not uniform throughout the country. Farmers of prosperous states are at the receiving end like- Punjab, Haryana, Maharashtra and the farmers of backward states still practise their age old techniques and knowledge.
* The use of technology is being used by the already rich farmers and utilising these services they are further prospering. The small and marginal farmers are again being left out in the process of development.

* Due to low literacy rate among farmers and digital divide, there is a rise of new class of middle man, who provide ICT services to farmers. They are also believed to distort the information for their own benefit.
* The rural infrastructure for the use of ICT is also not uniform and lot of regional disparity persists.