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# IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON AGRICULTURAL SECTOR IN KARNATAKA

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## ABSTRACT

Agriculture today is looming in backwardness of application of modern technology. Though, it provides employment for nearly 60% of country's population but there is not sufficient output. In this direction, information and communication technology is an important component of knowledge based agricultural productivity in India. Disseminating the adequate information to the farmers can improve the production capacity in the country. Indian agricultural sector which is tormented with many problems like insufficient infrastructural and technological rudiments form the component on farmers' side and inefficient price for agro-products on part of market are few of many problems that exist because of lack of information. The boom of ICT came as a link to the existing problem and provided a solution. In this study focused at the ICT programmes undertaken by Centre and State Governments with special reference to Karnataka state in improving the access to information to farmers with use of technology cutting down the barriers in reaping total benefit of the system. Thus, the present study aims to explore the real economic impacts of ICT application in agriculture by using different dimensions. This study has projected the use and awareness of the ICT in building a sustainable model for agriculture.

## KEYWORDS

Agriculture, Information and Communication Technology, Programmes. Farmers.

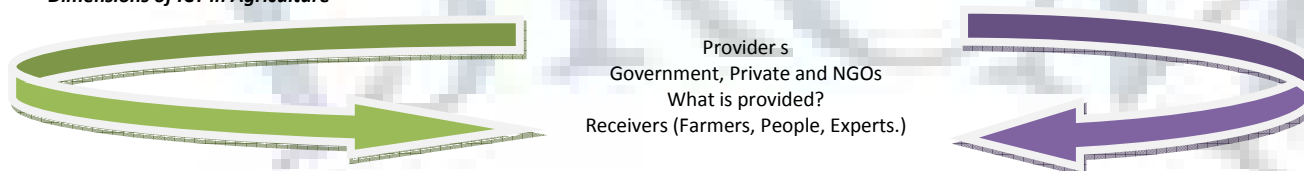
## INTRODUCTION

Information and communication technology is an important component of knowledge based agricultural productivity in India. Disseminating the adequate information to the farmers can improve the production capacity in the country. Many developing Asian countries have promoted ICT development over the past five decades to achieve broad objectives of Economic growth, Agricultural development, employment, wages, education to enhance overall Socio-economic welfare. ICT farming contributes significantly at the household level in terms of income in rural areas. Earlier, Indian agricultural sector was tormented with many problems like insufficient infrastructural and technological rudiments form the component on farmers' side and inefficient price for agro-products on part of market were few of many that existed because of lack of information. The boom of ICT came as a link to the existing problem and provided a solution. ICTs offer crucial services to the rural farmers by applying advanced and modern technology to their hands like mobile phones, computers, internet, farmers information centers, radio-television programmes etc. to disseminate information. New technology supported by appropriate services and public policies have led to agricultural revolution, improvement in production and have enhanced the productivity of agricultural commodities like rice, maize, potato, fruits etc. A hunger free country can be possible, if we pay adequate attention to improve food availability and higher agricultural productivity through the use of better ecologically sustainable methods of production.

The theoretical conceptualization of technology in economics can be traced back to neoclassical era, who considered technology to be an exogenous variable to the economic system and this is formally modeled by Solow in the year 1956. However, latter economists like Kenneth Arrow, Paul Romar considered technology as an endogenous factor into the growth process and formulated a new set theories called as new growth theories. From 1984 onwards lot of research has been done on this topic and the noble prize for the year 2001 was awarded to the research on 'asymmetric information'. Many of the central theories and principles of economics have been based on assumptions about perfect information. Starting from Adam Smith many economists have laid emphasis on the subject either directly or indirectly. Economist like Schumpeter, Kenneth J Arrow, Fredrick Von Hayek, George A Akerlof, Michael A Spence, Joseph E Stiglitz have made notable contribution to this subject. Since then technology has gone on to play a pivotal role in explaining the process of growth and the evolution of economic thought, which has led to a universal acceptance of the role of technology and knowledge as an engine of growth. But both schools differ in the duration of economic impact of technology. The neoclassical believes that the impact of technology on the rate of growth is transitory but a durable effect on the level of per capita income, which will move to higher steady level. The endogenous growth theory implies a permanent effect on the long term rate of growth.

Agriculture development is central to India's economic development. The socio economic dimensions of development are basically gained through agriculture. Due to rapid population growth we are not able to produce sufficient food for nutritional security for each and every one. Malnutrition incidents have had occurrence in Maharashtra and Orissa recently. Agriculture is the backbone of many developing countries like India. The livelihood of more than 55percent of Indian population is dependent on agriculture and allied sector. 13.7percent of National Gross Domestic Product (GDP) and 12.28percent of the country's export income comes from agriculture sector. Understanding the role of agriculture in the country's economy, our first prime minister, Jawahar Lal Nehru opined, "Everything else can wait but not agriculture". Hence "everything can wait but not ICT" (Samwel Kakuko lopoyetum et.al, 2011). ICT application in enhancing agricultural productivity in this twenty first century is therefore imperative.

## Dimensions of ICT in Agriculture



Above picture shows the relationship between providers, receivers and what is actually available to receivers. Online services provides needful and useful information's to the farmers or to receivers at grass root level, which are based on agriculture and train them to get high quantum of production through the help of ICT tools. This process also covers monitoring, consultation, and diagnosis of the problem and solve that immediately. Another splendor of ICTs is it would build a bridge between local producers, traders, retailers and suppliers in a one roof. It also conducts an interaction between farmers and researchers with field experts under the circle. This dimensions also have block wise and district level officers to give clear and perfect solutions with in the available time frame. Particularly, in this system, receivers get the information on farm business, tele- education, market status, weather forecasting, credit availabilities. This includes creation of databases with details of the resources of local villages and villagers, site-specific Information systems, expert systems, etc.

## DIMENSIONS OF ICT IN AGRICULTURE

In the Agriculture sector we can see the 3 dimensions, which are

**1. WHAT IS PROVIDED:-** Some agricultural development services that can be provided in the developing world, using ICT, are:

- Online services for information, education and training, monitoring and consultation, diagnosis and monitoring, and transaction and processing;
  - E-commerce for direct linkages between local producers, traders, retailers and suppliers;
  - The facilitation of interaction among researchers, extension (knowledge) workers, and farmers
  - Question-and-answer services where experts respond to queries on specialized subjects ICT services to block- and district-level developmental officials for greater efficiency in delivering services for overall agricultural development
  - Up-to-date information, supplied to farmers as early as possible, about subjects such as packages of practices, market information, weather forecasting, input supplies, credit availability, etc.;
  - Provision of early warning systems about disease/ pest problems, information regarding rural development programmes and crop insurances, postharvest technology, etc.;
  - Facilitation of land records and online registration services;
  - improved marketing of milk and milk products;
  - Services providing information to farmers regarding farm business and management;
  - Increased efficiency and productivity of cooperative societies through the computer communication network and the latest database technology;
  - Tele-education for farmers;
  - Websites established by agricultural research institutes, making the latest information available to extension (knowledge) workers and obtaining their feedback.
  - Creation of databases with details of the resources of local villages and villagers, site-specific Information systems, expert systems, etc.
- 2. PROVIDERS:-** The services providers are mainly Government, along with private sector and NGOs.
- 3. RECEIVERS:-** Large farmers, small farmers, marginalized farmers, people, experts.

### IMPORTANCE OF ICTS APPLICATION IN AGRICULTURE

Improving Information Access and Delivery of Services for sustainable agricultural growth and livelihood is the main objectives of providing ICTs services to the farming community. The well accessed information through the ICTs results in increasing productivity thereby, increasing sustainability of agriculture. The importance of ICTs application is summarized on the following accounts;

- Improved information access and delivery of services to the farming community.
- Improved transparency and accountability.
- Direct feedback from farming community to the decision makers in the state.
- Better monitoring of government schemes, which directly impact the farmers.
- Efficient management (Development, Conservation, allocation and utilization) of Resources
- Improved productivity and profitability of farmers through better advisory systems.
- Efficient and Increased utilization of information by stakeholders for their decision making.
- Faster and efficient Redressal of farmers' grievances.

The dissemination of information through both new and old ICT's happen in different form and context reaching the farmers with varied effect. It is interesting to see how the farming communities have adopted the means of communication for a holistic development not only with regards to agriculture but in life as a whole as better agriculture will lead to a better standard of living. The respective state governments and central government have taken initiative to provide certain essential services using ICTs.

**The following are the Common Services providing through ICTs**

1. Agricultural Resources Improvement
2. Inputs Supply
3. Agricultural Production Monitoring
4. Agricultural Produce Management
5. Agricultural Marketing and Sales Management
6. Knowledge Management
7. Risk Management
8. Agro-Advisory and Extension Services
9. Farmers Help Desk
10. Scheme Monitoring
11. Enterprise Resource Management

### NATIONAL POLICY ON ICT IN AGRICULTURAL EXTENSION

**National policy framework for agricultural extension (2000)** stated that information technology revolution is unfolding and has very high visibility. Harnessing information technology for agricultural extension will receive high point in the policy agenda. Extensive use of modern information technology will be promoted for communication between researchers, extension workers and their farmer clients to transfer technologies and information more cost effectively. Further, it emphasised IT application in marketing, wider use of electronic mass media for agricultural extension, farmer participation in IT programmes and support to the state government for using IT in agricultural extension, promoting IT based information kiosks and capacity building for use of IT (DoA&C, 2000).

**National policy for farmers (2007)** indicated that the potential of ICT would be harnessed by establishing gyan chaupels (Knowledge centers) in villages. Further, the Common Service Centers (CSCs) of the Department of Information Technology, Ministry of Communications and Information Technology, Government of India and those set up by the state governments and private initiative programmes will be evolved for inclusive broad-based development. Last mile and last person connectivity would be facilitated with the help of technologies such as broadband internet, community radio or internet-mobile phone synergies (NPFF, 2007).

Document of ICAR Framework for Technology Development and Delivery System in Agriculture (2008) outlined the need for the construction of Agri – India knowledge portal – A single electronic gateway to be developed through a peer review process with the help of 15 content accreditation centres from 15 agro – climatic regions of the country. Each accreditation centres will be coordinate with other Agricultural Universities and agricultural institutions in their region for development of content in regional language as well as in English and also do its validation, which will be collected in the central data warehouse integrated in the knowledge portal. The portal will also serve as a platform for facilitation of interaction among researchers and extension personnel in the KVKs through high speed server intranet (ICAR-FFTDSSA, 2008).

**National e-Governance Plan** indicated that the typical services envisaged in Agriculture as a Mission Mode Projects (MMP) to provide information to the farmers on seeds, fertilizers, pesticides, Govt. Schemes, Soil recommendations, Crop management, Weather and marketing of agriculture produce. Several projects such as ASHA in Assam, KISSAN and e-Krishi in Kerala and Krishi Maratha Vahini in Karnataka have been initiated by the Department of Agriculture and Cooperation (DoA&C), Government of India. To spearhead implementation of MMP in Agriculture, DoA&C has adopted twin strategy through AGRISNET & two portals AGMARKNET & DACNET (Mathur et al., 2009).



**ICTS INITIATIVES FOR AGRICULTURAL DEVELOPMENT IN INDIA**

The Central Ministry of Agriculture and National Informatics Centre (NIC) Emphasized Informatics for Agricultural Development through their National Conference on "Informatics for Sustainable Agricultural Development. As a follow-up action, the following major informatics network services were initiated to provide information access and services. The major initiatives are

- **AGRISNET** - an Infrastructure network up to block level agricultural offices facilitating agricultural extension services and agribusiness activities to usher in rural prosperity
- **AGMARKNET** - with a road map to network 7000 Agricultural produce wholesale markets and 32000 rural markets
- **ARISNET** - Agricultural Research Information System Network
- **SEEDNET** - Seed Informatics Network;
- **COOPNET** - To network 1:40000 Agricultural Primary Credit Societies (PACS) and Agricultural Cooperative Marketing Societies to usher in ICT enabled services and rural transformation
- **HORTNET** - Horticultural Informatics Network;
- **FERTNET** - Fertilizers (Chemical; Bio and Organic Manure) Informatics Network facilitating "Integrating Nutrient Management" at farm level
- **VISTARNET** - Agricultural Extension Information System Network
- **PPIN** - Plant Protection Informatics Network
- **APHNET** -Animal Production and Health Informatics Network
- **FISHNET** - Fisheries Informatics Network
- **LISNET** - Land Information System Network linking all institutions involved in land and water management for agricultural productivity and production systems; which has now evolved as "Agricultural Resources Information System" project during the Tenth Plan
- **AFPINET** - Agricultural & Food Processing Industries Informatics Network
- **ARINET** - Agricultural and Rural Industries Information System Network to strengthen Small & Micro Enterprises (SMEs)
- **NDMNET** - Natural Disaster Management Knowledge Network

The above mentioned are some of the popular networking's under the central government. The state government of Karnataka also provides some of the quintessential services which have changed the way farmers look at the technology and its uses. Some of the popular services by Karnataka government are; **BHOOMI**: Bhoomi (meaning land) is the project of on-line delivery and management of land records in Karnataka. It provides transparency in land records management with better citizen services and takes discretion away from civil servants at operating levels. For the same, a farmer can now walk into any of taluk offices and ask land record for a mere RS.15 from the booth. The Revenue Department in Karnataka, with the technical assistance from National Informatics Centre (NIC), Bangalore, has built and operationalised the BHOOMI system throughout the state. The BHOOMI has computerized 20 million records of land ownership. The project has seen 100% accomplishment in Karnataka.

BHOOMI has reduced the discretion of public officials by introducing provisions for recording a mutation request online. Farmers can now access the database and are empowered to follow up. In the BHOOMI project, a printed copy of the Rights, Tenancy and Cultivation (RTCs) Certificates can be obtained online by providing the name of the owner or plot number at computerized land record kiosks in 177 taluk offices, across Karnataka. A second computer screen faces the clients to enable them to see the transaction being performed. A farmer can check the status of a mutation application on Touch Screen Kiosks. If the revenue inspector does not complete the mutation within 45 days, a farmer can approach a senior officer person with his grievance.

In the next phase of BHOOMI, the 'LAND RECORDS ON WEB' has been established wherein, all the taluk databases are getting uploaded to a web-enabled central database so as to allow the private agencies to set up the village – level kiosk to download the land records documents at the village and issue it to the farmers. In this Private Public Participation (PPP) model, all the stakeholders will be benefited in land records delivery. This is one striking example as to how ICT can bring change in the way farmers perceive and apply technology.

**KISSAN CALL CENTER**: The Department of Agriculture & Cooperation (DAC), Ministry of Agriculture, Govt. of India launched Kissan Call Centers on January 21, 2004 across the country to deliver extension services to the farming community. The purpose of these call centers is to respond to issues raised by farmers, instantly, in the local language. There are call centers for every state which are expected to handle traffic from any part of the country. Queries related to agriculture and allied sectors are being addressed through these call center. In Karnataka, Kissan call center took prominent role to disseminate the information to farmers, farmers obtaining information at free of cost through Toll free number, that is 1800-180-1551 by landline or mobile phones. This service comes under the Private Public Participation (PPP) model, government of India and IFFCO have jointly initiated this program. This is slowly picking up in Karnataka and many farmers are getting involved in process of better livelihood through technology.

**FARMERS HELP LINE (Raitha Sahaya vani)**: This help line was started in 2001, Karnataka. It is one of the Karnataka state government programme to promote, awareness among the farmers regarding farm cultivation. It would work 24/7 to provide information the contact toll free number is: 1800 425 3553. Currently, most of the farmers have benefited from this programme as per the help line records they have been getting more than 100 calls per day. It shows the significance of ICT in agriculture.

**KISSAN SMS PORTAL**: During celebrations 85th ICAR (Indian Council of Agricultural Research) Foundation Day, Hon'ble President of India launched on 16.07.2013 a SMS Portal for Farmers created by the Department of Agriculture & Cooperation, Government of India Officers, Scientists and Experts of Department of Agriculture & Cooperation, Indian Council of Agricultural Research, Department of Animal Husbandry, Dairying & Fisheries, India Meteorological Department and Food grain Procurement Agencies will use this portal for disseminating relevant information, giving topical & seasonal advisories and providing services through SMSs to farmers in language of the State.

The State Governments and their field formations down to the Block level (including State Agriculture Universities and KVVs) also have come forward in a big way to use this integrated Portal. Considering availability of more than 33 crore mobile connections in the rural area, Kissan SMS Portal is likely to be very useful to farmers and all other stake-holders as timely and relevant information will be provided to farmers in their own language. The SMSs will get transmitted only to the farmers within the territorial jurisdiction of an officer, scientist or experts for the crops or agricultural practice that such a farmer might have opted for. Search facility (by text and by topic) for going through previous advisories has also been created to avoid duplication and contradiction in advisories.

**RAITHA SAMPARKA KENDRA (RSK) ("Farmer's Interaction center")**: In Karnataka Raitha Samparka Kendra took a prominent role to disseminate the information to the farmers at grass root level, which means Hobli level. Farmers can visit these RSK's personally & get the required information or they can contact the RSK's over phone to obtain the information. An 'Interaction' register is maintained in the RSK. Farmer's name, address and the purpose of visit are entered in the register.

Raitha samparka kendra has covered entire state in Karnataka, the scheme is implemented in all 30 Districts, 177 Taluks and 747 Hoblis of the State. The scheme is funded by Government of Karnataka & India. In Karnataka 747 Raitha Samparka Kendra's are working.

**RAITHA MITHRA: (Raitha Snehi)** Department of Agriculture has redesigned the existing "Raitha Mitra" website (bilingual) in order to strengthen the Extension System by greater use of modern Information and Communication Technology (ICT) applications for bringing administration to the door steps of farmers by strengthening the system of provision of information for various initiatives pertaining to Service delivery, Extension Services, Information-Communication, Grievance handling, providing latest up-to-date information on various Government initiatives, Tender Notifications and most important of them all involving the farmers by providing a platform to share knowledge, wisdom and better practices with others. Raith mitra website with Raitha Shehi –Interaction platform was launched on 03-03-2014.

For the first time in the State, the Department has developed and provided a platform, "Raitha Snehi – Interaction" - in order to address the queries of the farmers / public. The farmers / public can send queries related to agriculture either in Kannada or English to the Department through this platform and receive solutions to their mobiles and e-mails. Once the reply is given, the answer remains on the e-platform for further accessing the information at any moment of time by any interested person.

**KRUSHI MARATA VAHINI:** It is one of the online marketing information systems; this service helps farmers or public to easily get the national, state and local market information on agricultural commodities. Govt. launched Toll Free No: 1800-425-1552 to disseminate the Market Information to farmers and public in general. Prominently, maximum and minimum price for all agricultural commodities in the market are displayed on the website. The whole idea of this site is bringing in all commodities prices under one roof so as to get easy access whenever and wherever on fingertips.

Though, there are several measures taken and implemented by both national and state governments from time to time there have been a gap in implementation of the same. It is very disappointing to know that the effectiveness of these services is not coming across with same rigour as it should have been due to certain lacunae in the system.

### BARRIERS IN ICT IMPLEMENTATION

Educating and catering to the information needs of farmers across nearly seven lakh villages in India indeed sounds unrealistic as this would require immense financial investment. A one-time major investment in establishing communication technologies in the required places restricts the government's objective of covering more people regularly because of insufficient power availability in rural areas, poor ICT infrastructure, ICT illiteracy, non availability of timely relevant content, non-integration of services, poor advisory services and lack of localization, and in particular non availability of agricultural information kiosks/ knowledge centers at the grass root level.

Moreover, farmers sometimes become averse to adopting technology as they think that it might result in their losing their traditional methods of cropping practices. They simply do not want to use such systems, even if the cost incurred is negligible. Therefore, the attitude and mindset of farmers needs to be changed first. There is a need to win their confidence and create awareness about the benefits of ICT in agriculture.

### CONCLUSION

By this study, the authors conclude that the Indian Govt as well as state Govt of Karnataka were being made a remarkable achievements especially in the area of agriculture by giving various facilities to the farmers in which the ICT services is one among which is helping the farmers to understand the modern cultivation methods, availability of agriculture inputs, irrigational sources, availability of pesticide and fertilizers for increasing the production and productivity of crops. India is a developing economic country where agriculture forms the backbone of Indian economy. For a long period of time, Indian rural communities especially farmers have been facing number of socio-economic problems. So various policies and programmes on ICT of the agriculture dept. of the government must consider the threats faced by farmers to protect their interest as well as the interest of the nation. By reducing the level of problems faced by the farmers on lack of information of agro activities etc.

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