



An analysis on use of Information and Communication Technology (ICT) in agriculture with reference to India

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Abstract

Agriculture is an important sector of Indian economy as it employs more than 50 per cent of the total workforce in India and contributes around 17-18 percent to the country's GDP. The economic growth of the country depends on the performance of the agriculture sector. Indian agriculture still faces the problem of declining total productivity, diminishing and degrading natural resources, a rapidly growing demand for quality food, crop failure and unfavourable climate change. To overcome all these problems digitalization in agriculture has been introduced. This paper tries to explain the concept of ICT in agriculture and what are the technologies used for implementation of digital agriculture which help in development of Indian agriculture. It explains the advantages and challenges that India has to face for introducing digital technology at massive level in agriculture. It also focuses on measures taken by government for increasing the use of technology in agriculture and how will it help for meeting supply- demand mismatch in food for the increasing population of India.

Keywords: ICT in agriculture, economic growth, Indian economy

Introduction

Agriculture is an important sector of Indian economy as it employs more than 50 percent of the total workforce in Indian and contributes around 17 percent to the country's GDP. (Economic survey, 2018). It is the core sector for food security, nutritional security and poverty alleviation. However even now it faces the problem of declining productivity, crop failure and unfavourable climate change. To overcome these problems India is using digitalization in agriculture which is in its evolving stage, despite the fact that India is the world largest sourcing destination for information technology (IT) industry accounting for approximately 67 percent of the US \$ 124-130 bn market (WIPO, 2005). ICT allows people to seek, acquire, and share expertise, ideas, services, and technologies locally, nationally, regionally, and around the world. It boosts efficiency

and productivity; reduces risks, transaction costs, and barriers to entry; provides the means for sweeping reorganization of business; and generally makes governments, markets, and networks work better.

Prime Minister Narendra Modi launched digital India on 1st July, 2015 to create digital infrastructure for empowering citizen across India. Rural communities is also availing the benefits of digital delivery system and thereby promoting use of digitalization in agriculture.

Digital agriculture can be explained as ICT and data eco system to support the development and delivery of timely, targeted (localized) information and services to make farming profitable and sustainable (socially, economically and environmentally) while delivery safe, nutritious and affordable food for all.

Objectives

1. To identify the advantages and challenges in implementation of ICT in agriculture.
2. To highlight the measures taken by government in promoting digitalization in agriculture.

Research Methodology

The research paper is descriptive in nature and study is based on secondary data collected from newspaper, journal and websites. The scope of the study is restricted to agriculture only.

ICT and agriculture

ICT includes any device, tool, or application that permits the exchange or collection of data through interaction or transmission. ICT is an umbrella term that includes anything ranging from radio to satellite imagery to mobile phones or electronic money transfers. (World Bank, 2017)

Technologies used in agriculture are as follows:

Soil Moisture sensor

In order to receive a great yield of crops, it is very important to ensure that the water levels in the soil stay consistent. Since surplus flow or absence of water causes stress amongst crops, it can ultimately affect the yield of the crop. Therefore, these sensors are imperative as they help in monitoring the level of soil moisture. Additionally, these sensors measure properties of the soil such as the density of the soil, electrical resistance, temperature of the soil amongst others. The soil moisture sensors provide real time data which can be downloaded wirelessly on computers.

Drone Monitors

While drones are making great strides towards agriculture globally, closer to home; drones are still at a nascent stage. Though drones have been in the limelight for logistics and mass video-photography, the future of drone technology seems promising in agriculture. Drones can help the farmer by mapping and monitoring the temperature of crops to determine how much water the crops would need

Weather application

Even though the India Meteorological Department (IMD) does its best to forecast the weather it is of very less use for farmers in making informed decisions that can lead to conserving water. Data from mobile applications that monitor and predict weather should be considered while planning irrigation cycles. Factors such as wind, humidity, temperature, rainfall and more affect the soil and crop condition and thus, should be assessed and analysed to regulate water usage and conserve the resource.

Internet of Things (IoT) in irrigation

In the agriculture sector, IoT solutions can provide a gamut of opportunities to revolutionize the sector. IoT sensors can be installed in irrigation pumps to detect wear and tear, defect, leakage and more. These IoT sensors can also measure the quality of freshwater and determine whether the water is suitable for farming or otherwise.

Advantages of ICT in agriculture

Low cost and pervasive connectivity

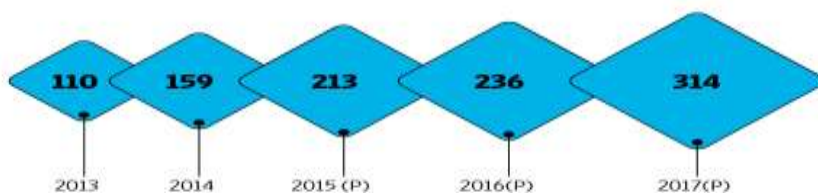
Today the use of mobiles, internet and other wireless devices has become easily available due to low cost, increase in competition and expansion of IT infrastructure. By the end of 2011, over 6 billion mobile phone subscriptions—or more accurately, subscriber identity module (SIM) cards—were expected to be in use worldwide (Wireless Intelligence 2011).

Adaptable and affordable tools

The reach and affordability of broadband internet is also improving dramatically though somewhat slow in rural areas. Internet mobile has become more affordable due to stiff competition among service provider. Mobile based application are also becoming more suitable for poor and farming communities especially through smart phones. (image 1) Other publicly and privately provided services, such as extension and advisory services, are delivered over mobiles, which are increasingly not just “phones” but are actually multifunctional wireless devices. Geospatial information is also becoming easier to access and use as mapping tools, such as Microsoft Earth or Google Maps, bring geographical data information to nonspecialist users.

Image 1

MOBILE INTERNET USERS IN INDIA 2013-17 (E) (in million)



Source: Iamai-IMRB Mobile Internet in India 2014 report; KPMG-Ficci M&E industry report 2015

Advancement in data storage and exchange

The increased data storage has also contributed in ability to access data remotely and share it easily.

Information dissemination in agriculture through ICT by private players

Farm Advisory through Mobiles – Green SIM: This programme is implemented by IFFCO Kisan Sanchar Limited (IKSL). The features of IKSL services include delivering up to four free voice messages on areas of interest, and have a helpline services managed by experts and organize phone-in programmes and mobile-based quizzes. Farmers' queries are given in 22 local languages. IKSL is covering 19 states and 108 zones in those states and have a subscriber base of 11 lakh. IKSL provides messages through both push- and pull-based approach. The messages are delivered daily in regional languages and have content in 16 different categories which includes Agriculture, Horticulture, Animal Husbandry, Floriculture, Poultry, Irrigation, Fertilizers, Insurance, Banking, Rural Health, Government Schemes, Market Prices, Sericulture, Employment Opportunities, Human Health and CoOperatives. To increase the access of information, IKSL have an online portal (voice, text and images) which can be accessed by anyone anytime and even on a mobile app. Users can customize the app as per their needs and receive information in the preferred language.

i – Kisan: A Nagarjuna Group initiative, Ikisan.com is a comprehensive Agri Portal addressing the Information, Knowledge and Business requirements of various players in the Agri arena viz., Farmers, Trade channel partners and Agri Input / Output companies. Leveraging Information Technology and extensive field presence, i – kisan is positioned as an Information/Knowledge exchange and an e-Marketplace.

Facebook for Farmers and Extension Workers: The social media platform such as Facebook is being effectively used in Kerala for reaching out to farmers and extension workers. Based on the success of using Facebook by the VattamkulamKrishiBhavan (Malappuram District, Kerala), the Government of Kerala has decided to officially include Facebook as an important tool to strengthen the extension activities of the Department of Agriculture. The state agriculture department has urged all the officials under it to extend the activities of the department through the social media to enhance the productivity and profitability of farming. All the farmers registered with the department.

Another project, Krishiworld net provides information about medicinal and aromatic plants, biotechnology, crops, soils, fertilizers, weather, market watch, farm equipment, plant protection, and disease control. It is dubbed as the 'best' portal on agriculture in India.

Challenges for Indian agriculture

Agriculture is facing new and severe challenges in its own right. With rising food prices that have pushed over 40 million people into poverty since 2010, more effective interventions are essential in agriculture (World Bank 2011). The growing global population, expected to hit 9 billion by

2050, has heightened the demand for food and placed pressure on already-fragile resources. Feeding that population will require a 70 percent increase in food production (FAO 2009). It is also critical because one of the most effective ways of reducing poverty is to invest in and make improvements in the agricultural sector.

Challenges Associated with Application of ICT in Agricultural Growth

- Vandalism and tampering – If a farm security camera is vandalized or tampered with, the signal could be lost. Consider vandal-proof housing for cameras located in high-risk areas.
- Weather – Weather-proof cameras might be required for certain locations. Farm surveillance can pose challenges for cameras not equipped to handle low temperatures and changing weather conditions.
- Infrastructure- lack of basic infrastructure such as inadequate power supply, high cost of hardware and software with respect to average rural population, low water level etc
- Lack of knowledge – low literacy and lack of basic skill of using ICT facilities in agriculture further aggravates the problem (Singh et.al,2014)
- Lack of supportive services- weak extension services, weak access to credit, lack of supportive policies, access/ no adoption of new agricultural technologies and restricted access to training and education (Agu,2013)

In addition to above mentioned challenges a study by Gelb and Voet (2009) aim to analyze ICT adoption trends in agriculture. It was revealed that the key challenges were lack of customized ICT application, lack of harmonization with production, marketing and essential ongoing end-user extension training that will enhance farmers knowledge.

Government measures to provide e-aid to farmers

National policy for Farmers 2007

The GOI had constituted National Commission on Farmers under chairmanship of Dr,M.S.Swaminathan. it has made an important provision for use of technology which can help enhance productivity per unit of land.

National Telecom Policy, 2018

The draft talks of establishing a ‘National Broadband Mission – Rashtriya Broadband Abhiyan’ to secure universal broadband access for implementation of broadband initiatives, to be funded through USOF and Public Private Partnerships -- BharatNet for providing 1Gbps to Gram Panchayats upgradeable to 10 Gbps, GramNet for connecting all key rural development institutions with 10Mbps upgradeable to 100 Mbps, NagarNet for establishing one- million public Wi-Fi Hotspots in urban areas , JanWiFi for establishing two-million Wi-Fi Hotspots in rural areas -- and

implementing a 'Fibre First Initiative' to take fibre to the home, to enterprises and to key development institutions in tier I, II and III towns and to rural clusters.

KrishiVigyanKendras (KVKs)

It would take up training and lab-to-land demonstrations in the area of post-harvest technology, agro-processing and value addition to primary products to provide skilled jobs in villages. The farm schools with linkages to KVKs can speed up the process of technological upgradation of crop and animal husbandry, fisheries and agroforestry.

National e-Governance Plan in Agriculture

This scheme aims to achieve rapid development of agriculture in India through the use of ICT for ensuring timely access to agriculture related information for the farmers of the country. Such information is intended to be provided to farmers through multiple delivery channels such as internet, government offices, touch screen kiosks, KrishiVigyanKendra , KCC, common unstructured supplementary service data and voice recognition.

Farmers' Portal

It is one stop solution for all problems relation to agriculture and allied activities. It provides information on crop and seed varieties, common pests, dealer network for seeds, machinery and tools etc.

Kisan Call Centres (KCC)

The scheme of Kisan Call Centres was started in 2004 with basic objective to provide information to farming community through toll free telephone number (1800 180 1551) on all seven days a week from 06.00 AM to 10.00 PM..the current KCC are more advanced and equipped with voice/media gateways, dedicated leased line broadband, call barging etc.

MKisan Application

It brings together SMS (both Push and Pull), interactive voice response system, unstructured supplementary services of DATA or USSD (which is essentially Interactive SMS and can facilitate data entry and query on Web Portals without internet), mobile apps and services

Bhuvan Hailstorm App

This app collects data about hailstorms in real time along with photographs and geographical coordinates

DD Kisan Channel

'DD Kisan', India's first television channel dedicated to farmers was launched in May 2015. This 24x7 channel disseminates real-time inputs to farmers on new farming techniques, water conservation and organic farming.

Crop Insurance App and Agri-Market App

These two apps were launched by the Government in December 2015 to provide all relevant information to farmers and other stakeholders in real time to create a conducive environment for raising farm productivity and income to global levels.

AgriMarket Mobile app

It can be used by farmers to get the market prices of crops in the mandi within 50 km radius of the device. It can automatically track the location of a person using mobile GPS and fetches the market prices of crops in those markets.

Conclusion

The development of agriculture in any country depends on knowledge, infrastructure and a supportive delivery mechanism. Use of ICT in agriculture caters to these three important aspects directly and thus enabling developing countries to overcome the challenges existing in agriculture. The GOI is making all its efforts in promoting technology-led growth in order to ease access and affordability of technology adoption among farmers.

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