

Information and Communication Technologies as a Catalyst for Change in Indian Agriculture

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Indian agriculture has been showing a great resilience in being a major contributor to Indian economy as India have second largest agriculture land in the world and generate employment for more than 50 per cent people of country. As the population of India increasing rapidly the demand of agriculture products increases throughout the nation. Thus, to enhance the agriculture growth it is important to conduct and adopt need based and demand driven latest technologies in agriculture.



As the digital revolution in India was started in previous decades, Information and Communication Technologies (ICTs) has been emerged as a transformative force in various sectors and it also make numerous changes in agriculture sector but relatively slow in terms of technology adoption and digitalization as compared to other sectors. ICTs modernizes the traditional approaches for disseminating knowledge and information related to sustainable farming techniques, crop management, market linkages, pest and disease control, provide easy access to public services, allow user to conduct secure financial transactions, etc. Information and Communication Technologies (ICTs) refer to the networks of computers,

telecommunications and internet linked together to collect, store, process, analyze and share data and information to individuals, groups and organizations. Sometime Information and Communication Technology (ICT) is often used as a synonym for the term Information Technology (IT), but these two terms are having slightly difference when used in different context. IT is the term which is used as the subset of the term ICT that deal with the technical aspects of managing information and deals with hardware, software, networking technologies, etc. while ICT is a broader term that contain both IT and communication technologies such as telegraph, telephone, radio, television, smartphones, etc.



The integration of ICT tools with agriculture has redefined the way in which information shared, accessed and utilizes among the farming community. Mobile phones, internet, community radio, video communication, e-commerce platforms, remote sensing, etc. are the tools that have gained prominence in agriculture sector. These tools enable real time communication, expand knowledge resources, empower small and marginal farmers and develop efficient and instant feedback system which helps to strengthen the linkages between research institutions, extension services, and farmers. In India, during the last one decade many of ICT based projects were implemented on grassroot level but yet we have not got the sustainable results to increase our agriculture production. At the same time, it is observed that ICT are going to play a greater role in private sector like agribusiness, market information, farm information and market intelligence.

In recent years, the role of ICTs in agriculture is increases as public and private sector comes together to grow agriculture sector by starting different initiative based on Information and Communication Technology to enhance farmers knowledge and productivity. These initiatives are generally categorized in two categories-

1. Mobile based initiatives
2. Internet portal-based initiatives.



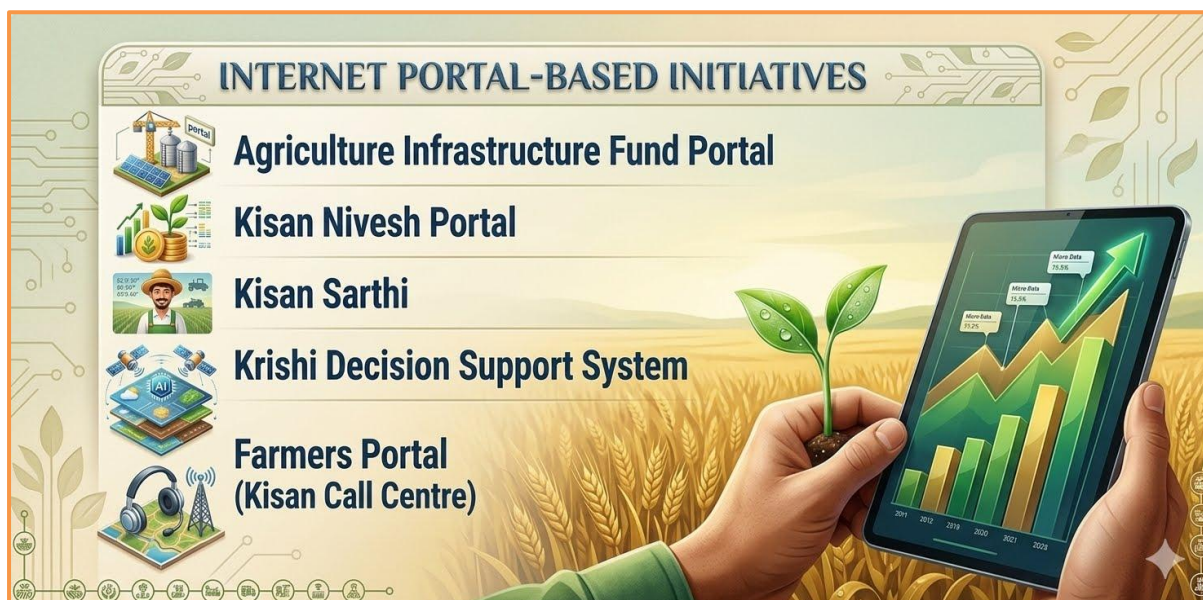
Mobile application-based initiatives are the initiatives that provide different services to the farmers on a mobile application. Some of the applications are Jio-Krishi, ITCMAARS, Bhu-Parikshak, Kisan Rath, National Pest Surveillance System, etc. whereas Internet portal-based

initiatives are the ICT based initiative which provides different services to the farmers through their portals. Some of the initiatives are Agriculture Infrastructure Fund Portal, Kisan Nivesh Portal, Kisan Sarthi, Krishi Decision Support System, Farmers Portal (Kisan Call Centre), etc.

- a) Jio-Krishi is the application launched by Jio foundation in 2020 with aim to integrate agriculture with Internet of Things (IoT) as it provides two smart farming services to the farmers i.e. automatic weather station and evapotranspiration app-based sensor less smart agriculture solutions having 8 sensors in a IoT advice. It also provides services related to weather, pest alerts, irrigation advisory, expert advice and buy inputs or sell outputs.
- b) ITC MAARS, it is a mobile application which was launched by Indian Tobacco Company in 2022 to provide all market related information and services such as sell crops and buy inputs to the farmers through Farmer Producer Organizations (FPOs). ITC MAARS has aim to provide market services to 20 value chain and links 4000 FPOs with this application. At present, ITC MAARS has empowered over 15 lakhs farmers through 1,650 FPOs. It also provides other services such as information on Government subsidies, apply for agriculture loans, crop doctor, chat with community, geo tagging of farm, crop calendar and expert advice.
- c) Bhu-Parikshak, it was launched by IIT Kanpur in 2022. It is a device which is capable of detecting soil health in just 90 seconds through an embedded mobile application i.e. Bhu-Parikshak by using chemical free Near-Infrared spectroscopy (NIRS) technology. It can simultaneously determine several soil parameters, including Nitrogen, Phosphorus, Potassium, Organic Carbon, Clay content and Cation exchange capacity.
- d) Kisan Suvidha, it was launched by Department of Agriculture and Cooperation and Ministry of Agriculture and Farmers welfare in 2016. This application aims to provide relevant information to the farmers quickly. Some of the information provided by this application are weather reports, dealers information, market prices, pest management, soil health card and cold storages, etc.
- e) Kisan Sarathi, it was launched by ICAR in 2021 which is ICT based interface solution available in 13 languages. It is an intelligent online platform for supporting agriculture at local niche with national perspective which is intended to provide a seamless, multimedia, multi-ways connectivity to the farmers with the latest agricultural technologies, knowledge base and the pool of large number the subject matter experts.

At present, it has 2.4 crores registered farmers and 746 registered institutions in this portal which covered 3 lacs villages of India.

- f) Krishi Decision Support System, it was launched by Government of India in 2024 which is developed by Ministry of Agriculture and Department of Space. It is first geospatial platform specifically designed for Indian agriculture which provides seamless access to comprehensive data including satellite images, weather information, reservoir storage, groundwater levels and soil health information, which can be easily accessed from anywhere at any time. It also gives near real-time information on various indicators such as soil moisture, water storage, crop condition, dry spells, etc. One nation-one soil information system of Krishi-DSS will give comprehensive soil data with embedded information on soil type, soil pH (potential of hydrogen), soil health, etc.
- g) National Pest Surveillance System (NPSS). It was launched by Government of India in August 2024. NPSS is a collaboration of Directorate of Plant Protection, Quarantine & Storage and ICAR-National Research Centre for Integrated Pest Management (ICAR-NCIPM). It is an Artificial Intelligence (AI)-based platform aimed at connecting farmers with agricultural scientists and experts to enhance pest control measures. This initiative is part of a broader strategy to reduce farmer's reliance on pesticide retailers and promote a scientific approach to pest management. The app will help farmers avoid unnecessary pesticide purchases by providing accurate advice on pest management.



In conclusion, the integration of Information and Communication Technologies (ICTs) into the agricultural sector has emerged as a transformative force, significantly enhancing the knowledge and productivity of farmers. The collaboration between public and private sectors has led to the development of various mobile and internet portal-based initiatives, each tailored to address specific challenges faced by farmers. Applications like Jio-Krishi, ITC MAARS, and Bhu-Parikshak exemplify the innovative use of technology to provide real-time information, market access, and soil health diagnostics, thereby empowering farmers to make informed decisions. Furthermore, platforms such as Kisan Sarathi and the Krishi Decision Support System offer comprehensive data and expert advice, fostering a more connected and informed agricultural community. The National Pest Surveillance System represents a significant step towards sustainable pest management, utilizing AI to reduce dependency on chemical pesticides. Collectively, these initiatives not only enhance agricultural productivity but also promote sustainable practices, ultimately contributing to the growth and resilience of the agricultural sector. As these technologies continue to evolve, they hold the potential to further revolutionize farming practices, ensuring food security and improving the livelihoods of farmers across the nation.