

Digitalization of Agriculture-The Future of Indian Agriculture

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Abstract

Digitization and e-agriculture opens up opportunities for traditional non-players in the agriculture value chain. It provides reliable data for research and policy-making and fills the current information gap. Farmers' income can be increased, and positive effects on agriculture are seen through the emergence of farm technologies and connected robust information communication technology (ICT). Digital transformation will provide access to finance through exposure and awareness due to digitization, forecasts on climate change enable right decisions, for better soil fertility and soil structure, access to markets, access to information, smallholdings utilization and enables predictive analysis. Adopting a holistic ecosystem approach to address challenges faced by the Indian agriculture sector is of national interest to achieve objectives, like doubling farmer incomes and sustainable development. Finally, digitization will change the scene of Indian agriculture in the future and guarantee higher income to farmers and reduce distress. This paper explains the scope of digitization in agriculture and reviews the on-going digital agricultural and e-agriculture initiatives.

Keywords: Digital Agriculture, e-Agriculture, India,

Introduction

In India, high agriculture growth is needed for the overall growth of the economy and to provide employment and food security to the majority population. Growth may be higher during the previous two decades, but

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inclusive focus on agriculture and the allied sector has been missing. The agriculture sector, currently valued at US\$370, is one of the major sectors in the Indian economy. According to the Economic survey 2020-21, GDP contribution by the agriculture sector is like to be 19.9% in 2020-21, an increase from 17.8% recorded in 2019-20. Digitization is an essential variable for fast growth in this sector if we want high agricultural growth and rising incomes for farmers.

Dr. A.P.J Kalam quoted that "Enhancing agriculture productivity is key for agro-food processing and related industries, manufacturing, and service sector growth". This requires a great revolution in research, technology development, agricultural extension services, and effective marketing, storage, and distribution networks.

The study is conceptual and based on secondary data collected from company websites, newspapers, and journals. The scope of the study is restricted to the agricultural sector only.

Scope for Digitization in India

Digitization and e-Agriculture opens up opportunities for non-traditional players in the agriculture value chain. Better data will allow government and non-government organizations to design farmer-friendly policies and planned interventions. "E-agriculture is a multi-stakeholder process that involves bringing together many different ministries and departments as well as private sector players such as insurance, banking, and mobile network operators. Countries have been experimenting with technology for agriculture for a long time. Today, the term agricultural digitization refers to the process of integrating advanced digital technology like Artificial Intelligence, Big Data, Robotics, and Communication Networks, all connected through the Internet of Things (IoT), into the farm production system. ICT Development Index (IDI) 2020, published by UN International Telecommunications Union, measures information and communication technology access. It ranked India a low 131 out of 167 nations. This is reflective of the poor access of the population to ICT services.

The Internet penetration rate in India went up to nearly around 45 percent in 2021 from just about four percent in 2007. Although these figures seem relatively low, it meant that nearly half of the population of 1.37 billion people had internet access that year. This also ranked the country second in terms of active internet users.

With a higher level of ICT, services become more efficient, and their productivity increases; as a result, income increases at a high rate. The digitization of the agricultural sector can play a significant role in increasing employment opportunities, improving the standard of living in the agricultural sector, and reducing the risk and uncertainties that our farmers have to deal with presently.

Technology is vital in increasing growth through providing better services and innovative delivery models. Mobile telephony is connected to satellites and data delivered to centralized servers, which are instrumental in converting grain into monetized assets. Crop health can be measured from pest infestation levels to moisture readings of the crop to satellite imagery of the warehouses. This type of high-tech intervention will allow financial institutions to use agri-crop as the primary collateral to promote financial inclusion.

Digital farming provides a real-time data flow from the fields to the company office about day-to-day farming operations. This enables taking care of the entire value chain, from sowing to harvesting through agribusiness. With the help of digital systems, advice can be given to farmers, and field staff attached to them can ensure best practices in their fields. Through digital monitoring, fields are digitally managed by giving the proper course correction advice and taking regular updates on the health of the farm through pictures.

The digitization of agricultural practice provides traceability across the entire supply chain. It also helps farmers connect with the buyers and initiate sales by availing online marketplace, giving farmers more independence and choosing a buyer.

IoT adoption is growing in India, but enterprises struggle with legacy setups, connectivity protocols, and high costs associated with large-scale IoT departments. IoT vendors can help enterprises in their digital transformation. The Indian IoT is expected to expand at a compound annual growth rate of 13.2% from 2020 to 2025.

In the coming decade, India has a growing opportunity in the agriculture sector to improve lives, making India a true leader in agriculture IoT by revolutionizing the way farmers plant, fertilize, and harvest in the next decade. Advancement from chipmakers is making the computer and connectivity hardware and software technologies more affordable. Almost 50 percent of the population is employed in the agricultural sector and it will increase the overall growth of the country this sector should avail the benefits of the huge potential of IoT-driven solutions for improving supply chains and farm practices which will enhance yield and higher monetization of the sector.

Farmers' income can be increased and positive effects on agriculture are seen through the emergence of farm technologies with well-connected robust Information Communication Technology (ICT). Technology in Indian agriculture helps overcome productivity stagnation, strengthen market linkages, and improve farm management. Farming can also be modernized by adopting technology-driven production practices to ensure consistent annual returns, reduced risk of crop failure, and increased yields. Digital technology can be applied in remote sensing via satellites, geographic information systems, crop and soil health monitoring, and livestock and farm management.

Current Initiatives under Digital Agriculture in India

Demand for digitization in Indian agriculture is well understood and acknowledged; likewise, efforts have also been made toward digitizing the prevailing value chain. In 2021, the Union Minister of Agriculture & Farmer Welfare announced the initiation of the Digital Agriculture Mission 2021-2025 while signing five MoUs with CISCO, Ninjacart, Jio, ITC, and

NCDEX e-markets to forward digital agriculture through pilot projects. The Digital Agriculture Mission 2021-2025 aims to support and accelerate projects based on new technologies like AI, Blockchain, Remote sensing and GIS technology and use of Drones and Robots.

Cisco developed in Agricultural Digital infrastructure (ADI) in 2019, enhancing farming and knowledge sharing. This ADI is likely to play a vital role in the Department of Agriculture's data pool under the National Agri Stack. The pilot project for this initiative will take place at Haryana and Madhya Pradesh.

The Jio Agri platform launched in 2020 digitizes the agricultural ecosystem along the entire value chain to empower farmers. The platform's core function uses stand-alone application data to provide advisory; the advanced function uses data from various sources, feeds the data into AI/ML algorithms, and provides accurately personalized.

ITCs e-Chaupal has proved to be a comprehensive digital knowledge hub for farmers, which has 6,100 installations covering 35,000 villages serving 4 million farmers. It was launched in 2000, benefiting farmers doing business through their network and producing a ripple effect on the public sector managed food grain management system leading to up-gradation.

Tata Consultancy Services (TCS) offers personalized advisory services in voice and visual formats through communication devices such as mobile phones through its mKRISHI platform. With mobiles, farmers can connect with other farmers and traders and utilize their mobile phones for information on input availability or market prices and allow them to get competing prices and choose the best one and availing information about, selecting seed varieties appropriate to a particular farm, adopt best activation practices, bear weather risks and coping with plant diseases.

The ekgaon One Village One World Network is leveraging mobile communication technology to encourage the sustainable development of Self Help Groups (SHG) and small farmers across India. The platform has

over 9,00,000 women and 3,00,000 farmers spread across villages in India.

Digital India was launched on July 1, 2015 to create a digital infrastructure for empowering rural communities, enabling digital delivery of services, and promoting digital literacy. Digital agriculture can be defined as ICT and data ecosystems to support the development and delivery of timely, targeted localized information and services for profitable and sustainable agriculture through providing safe, nutritious, and affordable food for all.

In 2021 The Ministry of Agriculture and Farmer Welfare signed with MoU with Microsoft to run a pilot program for 100 villages in 6 states. Under the MoU, Microsoft will create a Unified Farmer Services Interface through its cloud computing services. This is a significant part of the ministry's plan to create 'Agristack.'

Conclusion

Digital transformation will provide access to finance through exposure and awareness due to digitization, forecasts on climate change enable right decisions, for better soil fertility and soil structure, access to markets, access to information, smallholdings utilization and enables predictive analysis. Indian Agriculture and the allied sector are on the verge of adopting modern technologies, such as IoT, AI, and agro-drones for unmanned aerial surveying; Indian and foreign agritech players can play a vital role in supplying these advanced technologies to farmers.

Adopting a holistic ecosystem approach to address challenges faced by the Indian agriculture sector is of national interest to achieve objectives, like doubling farmer incomes and sustainable development. For India, when regional, national and international research institutes have already developed technologies, farmers need motivation and encouragement to adopt this proven yield-enhancing, cost-efficient, and environment-friendly technologies. Thus a multi-stakeholder approach will be required for the wide-scale adoption of digital agriculture in India, with the Government playing a key enabler's role in the ecosystem.

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