An Overview Of Digitization Of Agriculture In India

Dr Dinesh N Patel*

*VNSB Ltd Arts and Commerce College, Vadnagar

Abstract:
The world is speeding towards a digital economy, the importance of which has been reinforced by the pandemic. With a move towards digitization leading to greater efficiency and transparency across all sectors of economy, it was only a matter of time that agriculture sector too would experience its inevitability and follow suit.As per NitiAyog's report on Artificial Intelligence, to maintain an annual growth rate of 8-10%, agriculture must grow at 4% or higher rate presently. To achieve this kind of success, digitization is critically important. The use of technology includes sensor-assisted soil assessment, which is backed by digitization, automated monitoring of free-ranging animals on pastures, and the targeted control of agricultural machinery. Modern farming methods should enable the management of spatial and temporal variability within plots of land. The produce and the farm products management, logistics, and retail sellers are using digitization in a big way and reaping the benefits of reduction in Agri-waste, efficiency in cost optimization. Internet of Things, nanotechnology along with digital education are the 3 main elements that form the foundation of digitization in farm sector.

Introduction:
Digital agriculture refers to tools that digitally collect, store, analyze, and share electronic data and information along the agricultural value chain. Other definitions, such as those from the United Nations Project Breakthrough, Cornell University, and Purdue University also emphasize the role of digital technology in the optimization of food systems.Sometimes known as "e-agriculture," digital agriculture includes precision agriculture. Unlike precision agriculture, digital agriculture impacts the entire agri-food value chain-before, during, and after on-farm production. Therefore, on-farm technologies, like yield mapping, GPS guidance systems, and variable-rate application, fall under the domain of precision agriculture and digital agriculture. On the other hand, digital technologies involved in e-commerce platforms, e-extension services, warehouse receipt systems, blockchain-enabled food traceability systems, tractor rental apps, etc. fall under the umbrella of digital agriculture but not precision agriculture.

Technology :
Digital agriculture encompasses a wide range of technologies. These technologies include:

- Cloud computing/big data analysis tools
- Artificial intelligence (AI)
- Machine learning
- Distributed ledger technologies, including blockchain and smart contracts
- The Internet of Things, a principle developed by Kevin Ashton that explains how simple mechanical objects can be combined into a network to broaden understanding of that object.
- Digital communications technologies, like mobile phones
- Digital platforms, such as e-commerce platforms, agro-advisory apps, or e-extension websites
- Precision agriculture technologies including :
- Sensors, including food sensors and soil sensors
- Guidance and tracking systems
- Variable-rate input technologies
- Automatic section control
- Advanced imaging technologies, including satellite and drone imagery, to look at temperature gradients, fertility gradients, moisture gradients, and anomalies in a field.

Environment :
Boosting natural resource efficiency is the "single most important need for a sustainable food future," according to the World Resource Institute. As mentioned in the on-farm efficiency section, precision farming - including variable rate nutrient application, variable rate irrigation, machine guidance, and variable rate planting - could minimize use of agricultural inputs for a given yield. This could mitigate resource waste and negative environmental externalities, like greenhouse gas emissions, soil erosion and fertilizer runoff. However, precision agriculture could also accelerate farms' depletion of natural resources because of a rebound effect, increasing input efficiency does not necessarily lead to resource conservation. Also, by changing economic incentives, precision agriculture may hinder environmental policies' effectiveness: "Precision agriculture can lead to higher marginal abatement costs in the form of forgone profits, decreasing producers' responsiveness to those policies." Digital agriculture has the potential to improve environmental monitoring

and food system traceability. The monitoring costs of certifying compliance with environmental, health, or waste standards are falling because of digital technology. Together, technologies like these can form digital agriculture traceability systems, which allow stakeholders to track agri-food products in near-real-time. Digital traceability yields a number of benefits, environmental and otherwise:

- **Reduced food waste**: Of all the food calories produced in a year, 25% are wasted between on-farm production and consumers.Traceability systems facilitate better identification of supply-side weaknesses - where is food lost downstream of the farm, and how much is wasted? Emerging digital innovations, such as milk cartons that track milk from "farm to fridge," can address demand-side waste by providing consumers with more accurate expiration dates.
- **Consumer trust**: Ensuring food safety, quality, and authenticity has become an important regulatory requirement in high-income countries. Use of RFID tags and blockchain technologies to certify agri-food products' characteristics could provide near-real-time quality signals to consumers.
- **Improved producer welfare**: Producers who can leverage environmental certification could sell their products at a premium, because blockchain technologies could enable greater trust in labels like "sustainable," "organic" or "fair trade."

Agricultures Role in the Economy :

The significance and structure of a country's agricultural sector will affect digital agriculture adoption. For example, a grain-based economy needs difference technologies than a major vegetable producer. Automated, digitally-enabled harvesting systems might make sense for grains, pulses and cotton, but only a few specialty crops generate enough value to justify large investments in mechanized or automated harvesting. Farm size also affects technology choices, as economies of scale make large investments possible. On the other hand, digital agriculture solutions focused on ICTs and e-commerce would benefit an economy dominated by smallholders. In China, where the average farm size is less than 1 ha, Alibaba's customer-to-customer e-commerce platform called Rural Taobao has helped melon growers in Bachu County market their produce all over the country. Other structural factors, such as percent of the population employed in agriculture, farm density, farm mechanization rates, etc. also impact how difference regions adopt digital agriculture.

Conclusion:

Digital transformation will provide access to finance through exposure and awareness due to digitization, forecasts on climate change enables right decisions, accessibility of farm equipment and new technology, inputs for better soil fertility and soil structure, access to markets, access to information, small holdings utilization and enables predictive analysis. It requires planning, capacity building, identification of right stakeholders, mechanisms for governance and monitoring and provide buyers and sellers one platform. This technology platform will reduce costs, improve productivity and quality, improve prices, reduce risks and rate sustainable ecosystem. Digital technologies offer the potential to achieve the necessary conditions for scale, with distributed low cost and customized delivery, creating a unique opportunity for private enterprise and innovation to thrive. High and inclusive growth can be well promoted with digitization. For India, at a time when national, regional and international research institutes have already developed technologies, farmers need motivation and encouragement to adopt this confirmed yield- attractive, cost-efficient and environment- outgoing technologies. Finally digitization will change the scene of Indian agriculture in future and guarantee higher income to farmers and reduce distress.

References:

1. "Digital Agriculture: feeding the future". Project Breakthrough. Retrieved 2019-07-25.
2. "Digital Agriculture: Cornell University Agricultural Experiment Station". Cuaes.cals.cornell.edu. Retrieved 2019-07-25.
3. "Home". Purdue University Digital Agriculture. Retrieved 2019-07-25.
4. "Technology and digital in agriculture - OECD". www.oecd.org. Retrieved 2019-07-25.
5. FAO 2019. "Digital technology in agriculture and rural areas: Briefing paper." Food and Agriculture Organization of the United Nations, Rome.
6. Rose and Chilvers (2018). "Agriculture 4.0: Responsible Innovation in an Era of Smart Farming". Frontiers in Sustainable Food Systems.
7. Frankelius, Charlotte, Johansen,(2017). "Agricultural Innovation and the Role of Institutions: Lessons from the Game of Drones". Journal of Agricultural and Environmental Ethics.
8. https://flore.unifi.it/retrieve/handle/.pdf
9. Schwab, Karl : The Fourth Industrial Revolution. Crown Publishing Group.2018
10. Schwab,(2018) : The Fourth Industrial Revolution. Encyclopedia Britannica.
11. Allen, Robert C. (1999) : "Tracking the agricultural revolution in England". The Economic History Review 52 (2).