



## Advancing Indian Farms with Digital Solutions

*This editorial is based on “[Farm to fork goes digital: Indian agri on the cusp of a tech revolution](#)” which was published in *Business Standard* on 27/10/2024. The article discusses that the **Digital Agriculture Mission**, with a Rs 2,817 crore budget, aims to enhance farmers' welfare and productivity through improved digital infrastructure. Growing mobile and internet use in rural areas is boosting technology adoption and decision-making in farming.*

**For Prelims:** [Digital Agriculture Mission](#), [Kisan Suvidha app](#), [Agri-Stack](#), [Committee on Doubling Farmers' Income \(DFI\)](#), [Precision Agriculture \(PA\)](#), [National Agriculture Market \(eNAM\)](#), [PM-KISAN](#), [Digital Agriculture Mission](#), [Soil Health Cards](#), [BharatNet](#), [NAMO \(New Agriculture Market Order\) Drone Didi Scheme](#), [Kisan Call Centres](#), [Pradhan Mantri Fasal Bima Yojana \(PMFBY\)](#), [Farmers Producer Organisations \(FPO\)](#).

**For Mains:** Significance of Digitisation of Agriculture in Promoting Inclusive and Sustainable Agriculture in India.

The Indian agricultural sector is on the verge of the opportunity of a **digital transformation**, with the government recently approving an outlay of **Rs 2,817 crore** for the [Digital Agriculture Mission](#). This initiative is designed to establish extensive **public digital infrastructure**, empowering farmers with ICT-based tools for expert advice, real-time solutions, and improved farming skills. Digital tools are expected to streamline **land records, financial transactions, and procurement**, reducing disputes, malpractices, and boosting policy efficiency.

Other government initiatives, from the [Kisan Suvidha app](#) to **satellite-based crop monitoring** and drone technology, have paved the way for digitisation of agriculture.

### What is Digital Agriculture?

- **Digital Agriculture:** Integrates **Information and Communication Technologies (ICT)** and **data ecosystems** to enhance farming practices.
  - The goal is to provide timely, targeted information and services, ensuring farming is **profitable, sustainable**, and capable of delivering **safe, nutritious, and affordable food** for all.
  - The [Committee on Doubling Farmers' Income \(DFI\)](#) recommended increasing digital agriculture initiatives, focusing on technologies such as **Remote Sensing**, [GIS \(Geographic Information System\)](#), **Data Analytics**, [Artificial Intelligence\(AI\)](#), [Internet Of Things \(IoT\)](#), **Robotics**, [Drones](#), and [Blockchain](#).

## Why does Indian Agriculture need to be Digitised?

- **Increasing Productivity:** [Precision Agriculture \(PA\)](#) allows precise application of fertilizers, water, and pesticides, maximizing crop yields while conserving resources.
  - **Weather monitoring systems** and **satellite data** help farmers make informed decisions that improve productivity and efficiency.
  - **IoT-based sensor networks** improve real-time monitoring of environmental conditions, aiding in the early detection of stresses affecting crops.
- **Cost Reduction:** Digital solutions reduce reliance on traditional practices, lowering input costs through better resource management.
  - ICT-based tools like **soil sensors** and **digital advisory platforms** minimize unnecessary expenses on agrochemicals.
- **Enhanced Soil and Water Conservation:** Soil mapping and **remote sensing technologies** enable monitoring of soil health and water availability, crucial for sustainable agriculture.
  - Digitisation supports **water-efficient practices**, essential in water-scarce regions.
- **Socio-Economic Upliftment:** Increased income and **market access** improve the socio-economic status of farmers. Mobile applications and digital market platforms link rural producers directly to buyers.
  - For example, the [National Agriculture Market \(eNAM\)](#) platform links more than **1,000 mandis** across India, offering price information and market trends to over **1.7 crore farmers** as of 2023.
  - Knowledge dissemination enables rural communities to adopt best practices, enhancing both **yield quality** and **economic security**.
- **Financial Inclusion:** Digital technologies enhance farmers' access to credit, insurance, and other financial services.
  - For example, under the [PM-KISAN](#) scheme, the Government of India has disbursed over **Rs. 3.24 lakh crore** to more than **11 crore farmers** through [Direct Benefit Transfer \(DBT\)](#).
- **Improving Traceability and Quality Standards:** **Blockchain technology** and **AgriStack** ensure traceability across the agricultural supply chain, reducing post-harvest losses and enhancing food safety standards.
  - Better data enables **farmer-centric policies**, fostering transparency and accountability in agricultural practices.
- **Data Collection:** Advanced tools have revolutionized data collection, categorized into **scientific, geo-referenced, genomic, and socio-economic data**.
  - Technologies like **drones** and **satellite imagery** are utilized for real-time data collection, essential for precise agricultural practices.
- **Modeling and Data Analytics:** Integrated modeling and data analytics are critical for optimizing agricultural processes. Tools like **crop models** (e.g., DSSAT-CSM) predict crop growth and yields.
  - **Machine learning techniques**, particularly deep learning models, enhance yield estimation and incorporate various data sources.
- **Delivery and Control:** Digital technologies facilitate efficient farm management, including **pest identification, irrigation monitoring, and yield forecasting**.
  - These advancements improve farm practices, reduce pollution, and provide farmers with access to **market intelligence** and **financial services**.

## What is the Digital Agriculture Mission?

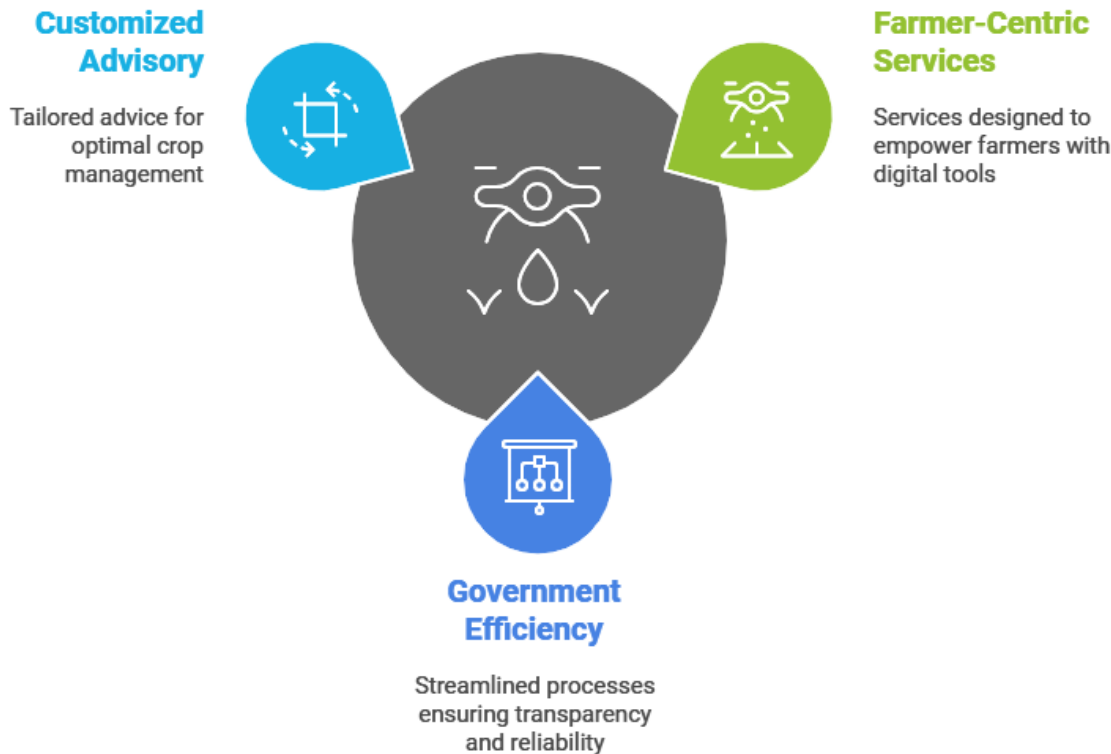
- **Digital Agriculture Mission:** The [Digital Agriculture Mission](#) was launched in **September 2024** with an outlay of **Rs. 2817 Crore** to establish **Digital Public Infrastructure (DPI)** for agriculture, as announced in the **2023-24** and **2024-25** budgets.
- **State Collaboration:** The Government of India has signed **MoUs with 19 States** to facilitate the development of these DPIs.
- **Agri Stack:** Farmers will receive a **digital identity** (Farmer ID) similar to [Aadhaar](#), with data on crops collected through **mobile-based surveys**.
  - The goal is to create digital identities for **11 crore farmers** by **2026-27**, with a nationwide crop survey set to launch within two years.
- **Krishi Decision Support System:** Launched in **August 2024**, this system will unify remote

sensing data on crops, soil, and weather, aiming to create **Soil Profile Maps** for **142 million hectares** of agricultural land.

- **Digital General Crop Estimation Survey (DGCES)**: This initiative will provide yield estimates and roll out nationwide from **2024-25**.
- **Krishi Sakhis**: A **MoU** signed in **2023** promotes the **Krishi Sakhis** initiative, training women in agricultural practices.
  - Krishi Sakhis are trained in agro-ecological techniques and receive refresher courses on **natural farming** and **soil health**.
  - They will be certified as **Para-extension Workers** after passing a proficiency test.
  - It is estimated that certified Krishi Sakhis can earn over **Rs 50,000 annually**, enhancing their role in supporting rural agriculture.

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## Digital Agriculture Mission Objectives



## What are Other Government Initiatives to Promote Digital Agriculture?

- **National e-Governance Plan in Agriculture (NeGP-A)**: Launched in **2010-11**, this plan promotes **ICT in agriculture**, facilitating access to information and fostering **digital literacy** in **rural communities**.
  - Expanded nationwide, it includes **e-extensions** of support services to guide farmers through **digital transformation**.
  - Funds were allocated for site preparation, establishing **computer training labs**, hardware and software procurement, backup power arrangements, setting up **State Project Management Units (SPMUs)**, and ensuring connectivity for hardware installations.
- **Unified Farmer Service Platform (UFSP)**: UFSP acts as a **central agency**, consolidating infrastructure, data, applications, and tools that facilitate **interoperability** between public and private **agricultural IT systems**.
  - **UFSP** simplifies **registration processes** for service providers, ensuring faster **service delivery** for farmers.
- **Farmers Database**: The Farmers Database aims to create a **nationwide record** linked to land records, enhancing agricultural planning and policy-making. It provides unique farmer IDs (FIDs) to track benefits from various schemes.

- This centralized database supports issuing **soil health cards**, **crop advisories**, **precision farming**, and **managing subsidies**.
- **BharatNet**: It is India's rural broadband initiative, aiming to connect over **250,000 Gram Panchayats** via high-speed **optical fiber networks**.
  - In agriculture, **BharatNet** enables **digital access** to weather forecasts, market prices, and modern farming techniques, empowering rural farmers to make **informed decisions**, boost productivity, and connect with **wider markets** for better income.
- **NAMO Drone Didi Scheme**: The **NAMO (New Agriculture Market Order) Drone Didi Scheme** offers specialized training in **drone technology**, empowering women with essential skills for modern agriculture.
  - This initiative fosters the development of a drone ecosystem, with the vision to enhance women's roles in the agricultural sector, thereby promoting the **digitization of agriculture**.
- **Other Supporting Initiatives**: **Kisan Suvidha App**, **Kisan Call Centres**, and **Agri Market App** enable farmers to access **market rates**, **weather forecasts**, and **technical advice**.
  - **Soil Health Card Portal** and the **Pradhan Mantri Fasal Bima Yojana (PMFBY)** leverage digital tools to provide **soil health insights** and **insurance coverage** for crop losses.

## What are the Challenges of Digitisation in Indian Agriculture?

- **High Initial Capital Requirements**: Adoption of technologies like **drones**, **satellite imagery**, and **sensor-based systems** requires significant investment, which is difficult for **small farmers**.
  - Many farmers rely on **government subsidies** and **financial schemes**, which are often insufficient for large-scale adoption.
- **Small Land Holdings**: According to the **Situation Assessment Survey (SAS)** of Agricultural Households conducted by **NSO**, **89.4%** of agricultural households own **less than two hectares** of land, which complicates the implementation of **scalable digital solutions**.
  - Small farms cannot always justify the **cost of digitisation**, leading to low adoption rates in **rural regions**.
- **Digital Literacy Constraints**: **Rural illiteracy** and limited understanding of digital tools prevent many farmers from using **advanced ICT solutions** effectively.
  - The disparity in tele-density, with **Urban Tele-density** at **133.72%** and **Rural Tele-density** at **59.19%** as of March 2024, presents a significant challenge for the **digitization of agriculture** in India, limiting rural farmers' access to essential **digital tools**.
  - Lack of **training programs** hinders the adoption of even basic digital tools like **soil sensors** and **yield monitoring apps**.
- **Inadequate Rural Infrastructure**: Inconsistent **internet connectivity** and **power supply** issues in rural areas slow the adoption of **digital tools**.
  - Infrastructure like **broadband access** and **mobile towers** remains limited in **remote regions**, creating a digital divide.
- **Limited Access to Credit and Financing**: Many small farmers lack access to **formal credit** due to poor **creditworthiness** or absence of **collateral**, making it difficult to invest in digitisation.
  - The **formal banking sector** needs to develop farmer-friendly **financial products** to support technology adoption.
- **Data Trust and Security**: Ensuring **data trust**, **privacy**, **security**, **validation**, and **storage** remains a significant hurdle in digital agriculture.
  - Collaborative efforts between **researchers** and **IT experts** are essential to enhance **agricultural data management**, leveraging **IoT technology** for effective solutions.
- **Complexity in Data Capture**: The diverse range of **crops**, **climate zones**, and **soil conditions** presents a challenge in integrating these variables under a unified **digital framework**.
  - This complexity can hinder the widespread **adoption** of digital agriculture solutions.

## What Should be Way Ahead for Digitisation of Agriculture in India?

- **Strengthening Digital Infrastructure**: **Broadband internet access**, **mobile towers**, and **digital literacy programs** are essential to expand digital reach in **rural areas**.



- Investment in **satellite imaging, soil health information systems, and land mapping** will improve data accuracy, empowering **data-driven decisions**.
- **Encouraging Public-Private Partnerships:** Collaborations with **tech startups, Farmers Producer Organisations (FPO),** and **private agri-tech firms** can foster faster adoption of **digital tools**.
  - **FPOs** can facilitate group purchases of **digital resources** for **small farmers**, reducing costs and increasing adoption rates.
- **Improving Financial Accessibility:** Banks should provide **low-interest loans, subsidies,** and **microfinancing** specifically for **digital agriculture investments**.
  - Introducing **flexible credit options** and incentives for adopting digital tools will improve **financial viability** for farmers.
- **Enhancing Farmer Capacity and Digital Literacy: Government-led training programs** and **awareness campaigns** can bridge the digital literacy gap, ensuring rural communities can leverage **digital tools** effectively.
  - **Extension workers** should be trained to assist farmers in using ICT solutions, ensuring **hands-on guidance**.
- **Data Security and Privacy Measures:** With increased reliance on **data** through initiatives like **AgriStack,** robust data protection policies are essential to safeguard **farmers' personal information**.
  - **Clear guidelines** on data usage, transparency, and **farmer consent** should be established to protect data integrity.

## Conclusion

**Digital agriculture** is revolutionizing Indian farming, enhancing **efficiency, productivity, and sustainability**. Initiatives like the **Digital Agriculture Mission, Agri-Stack,** and **Krishi Decision Support Systems** empower farmers with **real-time data, expert advice,** and **direct benefits**. Rising internet use in rural areas fosters a tech-driven culture, improving productivity, reducing costs, and enabling **informed decisions**. **Public-private partnerships, policy support,** and **training** are vital, positioning Indian agriculture for **self-reliance** and **global competitiveness**.

### **Drishti Mains Question:**

Discuss the objectives and expected outcomes of the Digital Agriculture Mission in India. How does it aim to transform the agricultural sector?

## UPSC Civil Services Examination, Previous Year Question (PYQ)

### **Prelims:**

**Q. What is/are the advantage/advantages of implementing the 'National Agriculture Market' scheme? (2017)**

1. It is a pan-India electronic trading portal for agricultural commodities.
2. It provides the farmers access to nationwide market, with prices commensurate with the quality of their produce.

**Select the correct answer using the code given below:**

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

**Ans: (c)**

**Mains:**

**Q.** How is science interwoven deeply with our lives? What are the striking changes in agriculture triggered off by science-based technologies? **(2020)**

PDF Refernece URL: <https://www.drishtias.com/printpdf/advancing-indian-farms-with-digital-solutions>

