



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?

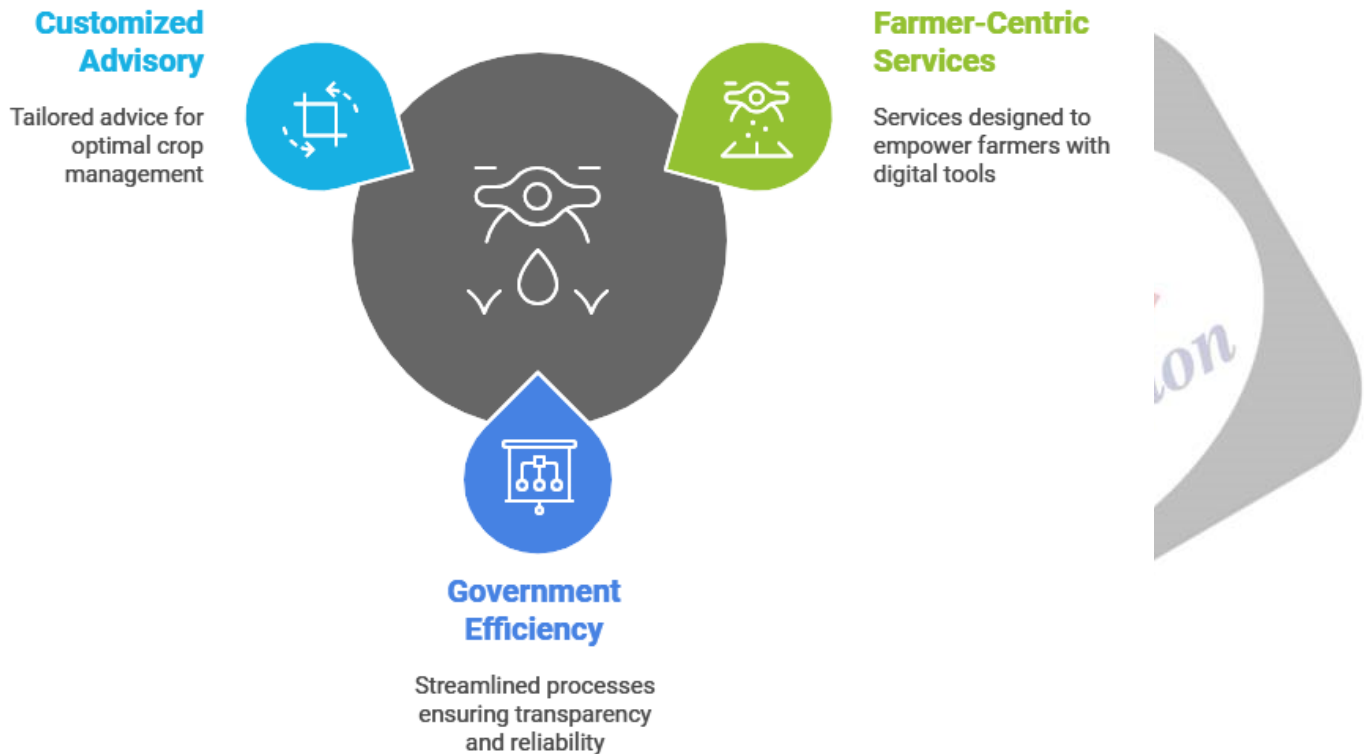
- **Digital Agriculture Mission:** The [Digital Agriculture Mission](#) was launched in **September 2024** with an outlay of **Rs. 2817 Crore** to establish **Digital Public Infrastructure (DPI)** for agriculture, as announced in the **2023-24** and **2024-25** budgets.
- **State Collaboration:** The 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>

