

10. Examine the role of science and technology in agriculture marketing in India? What are the different Govt schemes involved in it?

In a country where two-thirds of the population depends on agriculture for their livelihood, accounts for nearly 17 per cent of the country's GDP and feeds 1.3 billion people.

Role of technology in agriculture can monitor, predict and advise on efficient agricultural marketing and management. They improve farm productivity and yields, reduce risks of crop failure, reduce input and labour costs. This can be used to achieve the vision of doubling farmer's incomes by 2022.

Various Potential Technologies:**ICT (Information and Communication Technologies):**

- Kisan Call Centres, Kisan Suvidha App, Agri Market App, support the development and delivery of timely, targeted information and services to make farming profitable and sustainable.
- From mobile technology a farmer can control his irrigation, crop sensors help apply fertilizer in effective manner maximising uptake. This will also help in better market utilization using internet and real time prices.

Internet of Things:

- Use of wireless sensors, Drones to measure parameters like humidity, temperature, light, soil moisture etc for interventions in real time and effective market delivery.
- Pest management and Livestock management which forms a good amount of chunk in farmer's income can be tracked and diseased animals can be separated promptly.

Space Technology:

- Remote sensing satellites provide key data for monitoring soil, snow cover, drought and crop development.
- Kerala in partnership with CISCO has developed an agriculture digital infrastructure platform which does the same for fishing communities and farmers in Kannur district. This platform uses UAV's, sensors, satellite images.

Artificial Intelligence and Machine learning:

- Predictive agricultural analytics can be developed which aid in decisions such as when and which crops to sow, which fertilizers to be used, when and for how much time should irrigation be done etc.
- Climate monitoring and weather forecasting helps in reducing global warming related risks to farmers which eventually will lead to better marketing prospects.

Ultrasounds for livestock

- Ultrasound is not only for checking on baby animals in the womb. It also can be used to discover what quality of meat might be found in an animal before it goes to the market.
- The testing of DNA helps producers to identify animals with good pedigrees and other desirable qualities.

Block chain:

- Blockchain technology in agriculture market like distributed ledgers and smart contracts have the ability to weed out counterfeits in agri-food production and supply chains, handing healthier products to consumers.
- Blockchain can help farmer's by:
 1. Improving quality of products and fewer diseases originated from food.
 2. Fair pricing through the whole value chain for all actors.
 3. Sustainable business and reduction of waste.
 4. Financing and insurance for small farmers.
 5. Facilitation of financial transactions in emerging economies.
 6. Traceability throughout the value chain.
 7. Emissions reductions and support for environmentally friendly initiatives.
 8. Consumer awareness and increased consumer satisfaction.
 9. More informed consumer purchasing decisions.
 10. Decreased transaction fees and less dependence on intermediate services.
- Land records digitization and management: States like Andhra Pradesh, Telangana have started using blockchain for this. Such tamper proof land records aid in contract farming.

Advantages related to these Technologies:

1. Crop and Soil Monitoring – using sensors or Internet of Things to understand the level of soil moisture and predicting the right time to start sowing.
2. Predicting the amounts of fertilizers needed to maximize the farm yield using Artificial Intelligence and Machine learning Tools.

3. Smart Supply Chain – Applications are developed to solve the crop marketing and logistical issues, reducing the intervention of middle men, addressing price volatility, wastage, and unfair trade practices. Ex- eNAM
4. Quality Assessment: Use of computer vision and deep learning tool can be used to provide monitoring and grading solutions which adds value to product.
5. Real time Data Analytics to build an efficient and smart supply chain
6. Weather based advisories using data analytics to provide accurate advice to the farmers.
7. Pest and disease management through use of Drone technology along with sensors enabled with AI.

Challenges related to these Technologies:

- No skilled manpower to provide extension services in these technologies.
- High costs of equipment: Sensors, precision irrigation, data storage systems are all costly for individual farmers.
- Lack of digital infrastructure: Internet, electricity is must for exploiting these technologies.
- Land fragmentation prevents use of these emerging technologies due to cost benefit considerations.
- Data security: Without enabling data security legal framework, enormous data collected by emerging technologies can be misused by monopolies and transfer out of country.

Initiatives taken by Government**e-NAM:**

- National Agriculture Market or e-NAM is an online trading platform for agricultural commodities in India.
- The market facilitates farmers, traders and buyers with online trading in commodities.
- The market is helping in better price discovery and provide facilities for smooth marketing of their produce.

Digital Agriculture Mission:

- This has been initiated for 2021 -2025 by the government for projects based on new technologies like artificial intelligence, block chain, remote sensing and GIS technology, use of drones and robots etc.

National mission on agricultural extension and Technology:

- The aim of the Mission is to strengthen agricultural extension to enable delivery of appropriate technology and improved agronomic practices to farmers.
- This is envisaged to be achieved by interactive methods of information dissemination, use of ICT, popularisation of modern technologies, capacity building etc.

Agri-Market app:

- The mobile application has been developed with an aim to keep farmers updated with the crop prices and discourage them to carry-out distress sale.
- Farmers can get information related to prices of crops in markets within 50km of their own device location using the Agri-Market Mobile App.

Agri-Stack

- It will create a unified platform for farmers to provide them end to end services across the agriculture food value chain.

Unified Farmer Service Platform (UFSP)

- UFSP is a combination of Core Infrastructure, Data, Applications and Tools that enable seamless interoperability of various public and private IT systems in the agriculture ecosystem across the country.
- Enables Registration of the Service Providers and the Farmer Services.
- Enforces various rules and validations required during the service delivery process.
- Act as a medium of data exchange amongst various schemes and services to enable comprehensive delivery of services to the farmer.

Conclusion:

We need a new phase in Indian agriculture which will be defined by innovation and technology. Sustained efforts towards these emerging technologies by the government, universities and research institutions can achieve twin demand of food security as well as doubling farmer's incomes.

Indian agriculture needs to be made more market-oriented through reform in existing policies, even as the government provides enabling environments for digital innovation. There is a need to build a robust digital infrastructure in the country consisting of satellite imaging, soil health information, land record, cropping pattern and frequency, market data, and others.

