

Transformation of Agriculture



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Context

- Agriculture has been 'industrialised' by adoption of modern technologies in many developed countries, where Digital technologies are finding increasing use in the agricultural value system, and farmers are progressively becoming more informed
- In emerging economies such as India, the increasing availability of energy and internet connectivity to the large rural landscape, there is tremendous scope to accelerate adoption of High-tech farming
- Digital technologies such as Artificial Intelligence (AI), Big Data Analytics, Blockchain Technology, Internet of Things (IOTs), sensors, logic controlled systems can play a transformational role in modernising agricultural activities and rural India



Technology : A Rescuing Ship(1/3)

- ❖ Technology has convincingly played its role of 'rescuing ship' in the past when it turned around agri-India to one of net food exporting countries from net food importing country.
- ❖ There is every reason to belief that the technology will continue to help agriculture economy
- ❖ While a section of farmers in India is forward looking and takes advantage of technology and various support services, not all of them do so
- ❖ Only about one-fourth of farmers in India are reported to had ever been exposed to any kind of demonstration and training



Technology : A Rescuing Ship(2/3)

- Farmer **FIRST** concept needs to be strengthened and up-scaled across the country to focus on empowering farmers and to promote group based technology adoption. Here FIRST is acronym for **Farm-Innovation-Resources-Science-Technology**)
- The linkage between the research in labs and its use by the farmers needs considerable strengthening
- To reach unreached, We need to Make Research – Extension - Farmer - Market continuum more dynamic and interactive



Technology: A Rescuing Ship (3/3)

- Appropriate and timely adoption of technologies can lead to SMART farming
- Here **SMART** means **Specific, Measurable, Attainable, Relevant, and Time-bound**



Why Transformation Necessitated?

- 🌱 **Climate Change**
- 🌱 **Competitiveness Augmentation**
- 🌱 **Food and Nutrition Security**



Climate Change

- Cause increase in frequency, intensity and duration of occurrence of natural disasters such as droughts, floods, cyclones, hailstorms, heatwaves
- Such disasters lead to extreme agrarian distress and hardship to most farmers
- Technology offers solutions to mitigate the problem and future agriculture can benefit from agro-ecological intensification
- An urgent need to deepen the understanding and breaking the nexus of drought, land degradation and poverty for improving livelihoods through sustainable intensification of natural resources using **high tech** led approach



Competitiveness Augmentation

- Technology helps augment productivity, reduce cost of production and make products globally more competitive
- The cost of labour is going to be far more expensive in relation to cost of capital in next 10 - 15 years hence there is scope for more automation in agriculture
- With spread of technology, there is a greater emphasis (demand) on trimming of number of working hours
- Implicit in this is to reduce drudgery and thereby it will spur the demand for higher level of farm mechanisation



Food and Nutrition Security

- ❖ The transformation in agriculture necessary not only from perspective of food and nutrition security, but also needed to secure raw material for a vast multitude of industries that depend on agriculture
- ❖ Imperative to empower and handhold farmers in adoption of high technology, given the dominance of marginal and small farm holdings in India
- ❖ They are the ones who get affected more by increasing climate aberrations
- ❖ Incentivise such farmers for the adoption of technologies



Farming as a Service (FaaS) (1/5)

- Technology exists, but the barrier to its adoption in agriculture lies in taking it to the farm gates.
- Farming as a Service (FaaS)** offers a solution on a **pay-per-use** model
- help reach out to a larger base of farmers, as capital investments and financial hurdles will be avoided in FaaS



Farming as a Service (FaaS) (2/5)

- 🌱 FaaS converts fixed upfront costs into variable ongoing costs for farmers, thus making the techniques more affordable for a majority of small farmers
- 🌱 **Pay-per-use** service models are one of the solutions to the enduring challenge of raising farm productivity without burdening the farmer with significant capital expenditure



Farming as a Service (FaaS) (3/5)

It essentially entails innovative, professional-grade solutions for agricultural and allied services via a subscription, pay-per-use service across three broad categories:

- Farm Management Solutions, such as precision farming tools, low productivity, lack of farm mechanization, access to markets and data asymmetry;
- encourages product innovations and tools for real-time data capturing and analysis.
- information management between farmers, government, financial institutions and advisory bodies



Farming as a Service (FaaS) (4/5)

- ❖ FaaS can provide various services, including land preparation, crop harvesting, management, renting of equipment that help production, labour services and utility services, tools for real-time data capturing and analysis, aggregation of farmland and farm produce, and technology for farmers and many more
- ❖ Market Linkages, connecting farmers with suppliers through digital platforms, of input services as well as consumers of farm produce
- ❖ Coordination between all the direct stakeholders (start-ups, investors, governments and corporations) and indirect stakeholders (local entrepreneurs, implement suppliers, agronomists and IT vendors)



Farming as a Service (FaaS) (5/5)

- ❖ Data regarding quality of supplies (such as seeds, and fertilisers), soil quality and weather is collected directly through farmers, market agents, government agencies and high-tech equipments like drones and satellites
- ❖ This data - processed and analysed with technology, big data support.
- ❖ The information then disseminated *via* mobile alerts or dashboards; and
- ❖ Stakeholders are trained using assimilated data



Blockchain in Agriculture (1/2)

- ❖ Blockchain seeks to help in establishing direct link between farmers and consumers/retailers.
- ❖ It empowers small farmers to organize themselves and get together to reach the market without taking any help from middlemen
- ❖ Lends transparency in supply chain, enabling farmers to get the real price for their produce
- ❖ With Blockchain, expect an efficient supply of products, fair pricing, and improved product tracking



Blockchain in Agriculture (2/2)

- ❖ In Blockchain the information is highly secure and tamperproof
- ❖ Enables to put all the information about the entire cycle of agricultural events onto blockchain for transparent and trusted source of information for the farmers.
- ❖ Farmers can get instant data related to the seed quality, soil moisture, climate & environment related data, demand and sale price- all at one platform



Artificial Intelligence (AI)

- With the help of AI, farmers can analyze a variety of things such as weather conditions, water usage or soil conditions collected on real time basis
- Precision farming uses **AI** technology to aid in detecting diseases in plants, pests, and poor plant nutrition on farms and take suitable action accordingly
- Helps farmers with the labour shortage, AI agriculture bots can be employed. **AI-enabled agriculture bots** help farmers to find more efficient ways to manage their on-farm and off- farm business
- Bots can harvest crops at a higher volume and faster pace than human labours, more precise and by having a round the clock labor force



Internet of Things (1/3)

- Internet of things (**IoT**) - a system which requires no human-to-human or human-to-computer interaction
- With technology penetration, it has gained a lot of significance, of late



Internet of Things (2/3)

Ways in which IoT can improve agriculture:

- ❖ Huge Data collected by smart agriculture sensors can be used to track the state of agri- business in general
- ❖ Better control over the internal processes and, as a result, lower production risks. The ability to foresee the output of production allows farmers to plan better distribution and evacuation of production in full.
- ❖ One can make sure that product won't remain unsold
- ❖ Cost management and waste reduction



Internet of Things (3/3)

- ❖ Increases business efficiency through process automation.
- ❖ Farmers can automate multiple processes across their production cycle, e.g. irrigation, fertilizing, or pest control, by using smart devices
- ❖ Enhanced product quality and volumes.
- ❖ Achieve better control over the production process and maintain higher standards of crop quality and growth capacity through automation.
- ❖ Used to determine machine performances and satellite images to look into the health of the crops and harvesting status



Future R&D (1/2)

Future R&D approach should be reoriented to address the following:

- ❖ Propagating More crop per drop of water, given water scarcity
- ❖ Digitization of soil nutrition maps & precision farming
- ❖ Data capture from field using sensors, weather gauge stations and satellite technologies for weather forecast.



Future R&D (2/2)

- ❖ Demand & Price forecasts well ahead of sowing and plantation season
- ❖ The large parts of India's rainfed agricultural systems including the hilly tracts, also deserve to become the core of research and technology innovations



Way forward (1/2)

- Technology has no upper bound and adoption of high tech in agriculture is crucial to transform the sector
- In India, increasing availability of energy and internet connectivity to large rural landscape has formidable potential to accelerate adoption of technology in the sector
- High Tech can penetrate even in a small holder-dominated agrarian society
- IT & ICT be deployed at the multiple touch points along the supply- value chain



Way forward (2/2)

- ❖ As we start adopting High Tech, transformation will get more robust and help expanding linkages with international markets
- ❖ Transformation should be based on the fulcrum of sustainable technology
- ❖ Scaling up of transformation of agriculture by adopting high tech in a mission mode is the way forward to ensure farmers welfare



Quiz

1. Why Transformation in Agriculture Necessitated?

- a) Climate Change b) Competitiveness Augmentation
- c) Food and Nutrition Security d) All these

2. Which of the following is not a constituent of 'SMART' Farming?

- a) Specific b) Measurable c) Attainable d) Transform

3. Farming-as-a-Service (FaaS) offers:

- a) Pay per use model b) Pay only model c) Use only model
- d) No pay no use model



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Thank you