

Farlense 

Technology in Indian Agriculture

Imparting Sustainability in Small Farming Businesses



According to a recent report by Agfunder, investments in startups functioning in the upstream agrifood value chain in India constituted 16.7% (\$771 million) of the overall investment in the sector in 2022. This is a sharp rise in comparison to last year when their share was a meagre 6% at \$132 million. Even the number of deals closed in this section of the value chain have increased from 32 (19% of the total in agrifood space) in 2018 to 90 (38%) in 2022. Farmtech investment also remained relatively strong, raising \$1.1 billion in 2022, only a modest 15% drop from 2021.

These trends indicate that the space is finally starting to receive the much needed attention of both funders and budding entrepreneurs in India. Reasons behind this may be the increasing demand for traceable food items, higher technology adoption due to the penetration of mobile phones and internet connectivity in hinterlands, and the global push towards encouraging sustainable farming practices.

This article aims to look at the latest developments in the agritech space, with a special focus on upstream solutions, and the challenges that need to be addressed to ensure that the intended beneficiaries (i.e., farmers) are able to gain from them.

Farmer as an Entrepreneur

Indian farmers are entrepreneurs. In terms of numbers, perhaps they are the largest body of entrepreneurs in the country. The output produced by this group constitutes one-fifth of the country's GDP. They buy almost \$44 billion worth of inputs (including seeds, crop protection, crop nutrition, and farm equipment) in a year. By any standards, theirs is a huge business space that, just like other sectors, has witnessed an increased influence of technology in the recent times.

Technology in Agriculture

Over the years, the agricultural sector has evolved in sync with the phases of industrial revolution—incorporating technological advancements to optimise the process of farming at each stage. All these advances have successfully helped India reach a stage of becoming agri produce surplus – with farmers not only feeding the burgeoning population of the country, but also the world.

Today, as we move further on the journey of integrating agriculture with the rest of the economy by means of improved infrastructure and market development, a new wave of technology – digital technology, has started creating an incremental impact in the sector.

The Evolution of Agriculture



Agriculture 1.0

High levels of farm drudgery, dependence on manual and animal draft with limited indigenous tools.

Agriculture 2.0

The onset of Green Revolution boosted farm mechanisation – with farmers using tractors, fertilisers, pesticides, and hybrid seeds.

Agriculture 3.0

Availability of electricity and electronic items at farm level has triggered the automation of farm processes & the onset of precision farming.

Agriculture 4.0

AI-ML is gradually bringing in the age of smart agriculture with autonomous operations and end-to-end traceability.

Major Digital Technologies & Their Application

1. IoT: Includes sensors, actuators, gadgets, appliances, and machines that are used to measure and collect data regarding the farm including light, temperature, humidity, soil moisture, nutrient content, and crop health. IoT devices play a major role in automating operations by eliminating the need for constant human intervention for monitoring farm activities.

2. AI/ML: Allows the data that is collected by IoT devices to get processed and subsequently used for predictive analytics of farm operations like forecasting crop yield and quality, decision making regarding time of harvest and pricing, generating a demand-based cropping plan, among others.

3. GIS: Spatial data like rainfall, topography, land slope and elevation, wind direction, and others can be visualized, analysed, and interpreted using this technology. Subsequently, complex exercises like soil and levelling, irrigation and drainage planning, soil degradation assessment, and carbon sequestration monitoring can be executed with ease.

4. Blockchain: This technology improves supply chain management by imparting the features of transparency and traceability for all stakeholders. Thus, issues surrounding food safety, subsidy and insurance disbursement, and commodity transaction management can be tackled efficiently.



Digital Technology Solutions Available for Farmers

Farm Management

- Weather data analytics & improved crop planning
- Tracking daily farm activities
- Enhanced monitoring of plant health & pest infestations
- Smart fertigation system - digitised scheduling & optimal application
- Yield monitoring and estimation
- Aerial application of pesticides w/ drones

Agri Finance

- Better access to digitised credit and insurance services

Marketplaces

- E-market platforms for inputs purchase and output sales
- Price discovery & forecasting
- Traceability feature to enhance profitability and surety of produce quality
- Digitised management of farm produce logistics to markets

All these technologies promise long term sustainability and efficiency across the agri value chain by enhancing productivity, reducing resource use, and thereby costs for farmers

However, while the other sectors have witnessed rapid and widespread adoption of technology, things seem to be moving slowly in agriculture.

So, why is it that these interventions are yet to become effective on the ground for every farmer entrepreneur of the nation and what can we do expedite large scale adoption of tools that technology offers?

Plugging in the Loopholes

1. Strained spending power: The average cost of setting up a demonstration plot with IoT-based facilities ranges between INR 2.5 to 3 lakh for an area of one acre.⁵ Most farmers would not be able to afford such an installation in their agricultural land.

Solution: There is a need for an active engagement between solution providers, project implementing organisations, and government bodies to identify synergies so that technology augmentation programs are implemented on the ground. One way to do this is by encouraging companies to take up CSR projects related to rural development and technology transfer among farmers. Also, large scale adoption will reduce unit costs of adoption.

2. Lack of digital literacy: Various studies indicate that less than 10% of the active farmers in India use smartphones. While IVR and SMS have been the good old modes of connecting with farmers, the dissemination, monitoring and impact of various new age technologies can be best brought out in smartphones. There also exist trust issues and apprehensions due to lack of familiarity. This prevents product trials and scalability.

Solution: With prices of smartphones coming down drastically in the last 4-5 years and their availability in rural areas improving, studies estimate that more than 25% of the Indian farmers would be using smartphones by 2030. This will give a fillip to technology providers and they would be better able to demonstrate their value proposition to farmers.

3. Low credibility of the quality of data collected: The performance of AI-enabled technologies depends heavily on the accuracy of data that is collected. Given the current state of limited accessibility and aggregation of the country's agricultural data, star-tups require a huge on-site workforce for creating data baselines and pools⁶ to generate meaningful results from their systems. These efforts require significant capital and may not be feasible for every startup to execute.

Solution: There is a need for a systematic push – introducing courses related to the latest

technological solutions in agriculture in the curriculum of colleges and universities, so as to increase the number of graduates that can work with startups and aid in the generation of high quality datasets. This will, in the long run, improve the accuracy of output generated by these technologies.

4. Scalability issues in upstream agri-value chain:

Unlike the downstream agri value chain, upstream activities are highly dependent on edaphic factors. To make matters trickier, 85% of the farming households in India consist of small and marginal farmers. Their lands are highly fragmented. Thus, developing an efficient one-size-fits-all solution for pan-India farmers is not possible, especially for startups due to high R&D costs.

Solution: Given the diverse nature of challenges that the sector grapples with, India requires an ecosystem of multiple start-ups solving specific issues in particular geographies, in-depth. Tangible results on the field for farmers will make widespread adoption faster.



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