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Role of Agri-Tech Startups across the Agricultural Value Chain

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India's agriculture sector, long regarded as the backbone of the nation, is now undergoing a remarkable digital transformation. Once slow to embrace technology, it has witnessed a surge of innovation through the rise of Agri-tech startups. From fewer than 50 in 2013 to over 1,000 today, these startups are redefining how farming is practiced, using data, digital tools, and mobile applications to address challenges related to soil health, weather prediction, pest management, and market access. Fueled by increasing internet penetration and smartphone usage in rural areas, farmers are now engaging directly with technology to improve productivity, reduce costs, and secure better market returns. The sector's immense potential is evident, as India's Agri-tech market is projected to reach USD 24.1 billion by 2025 (Inc42). Supported by growing venture capital investments and corporate partnerships, these startups are bridging gaps between farms and markets, enabling a shift from traditional to smart, data-driven agriculture. This evolving Agri-tech ecosystem marks a new chapter in India's development story, where innovation meets inclusivity and digital solutions empower farmers to become integral players in a modern, technology-driven agricultural value chain.

Agri-Tech startups are playing a transformative role across the agricultural value chain by integrating technology, data, and innovation into every stage of farming. These startups contribute to pre-production through services such as digital soil testing, weather forecasting, and customized crop planning. During the cultivation phase, they support precision farming by using tools like sensors, satellite imagery, and drones to optimize input use and monitor crop health. In the post-harvest stage, they offer solutions for quality assessment, storage, traceability, and market connectivity. Additionally, many startups facilitate access to credit, insurance, and government schemes. By addressing critical inefficiencies and enabling informed decision-making, Agri-Tech startups are modernizing traditional agricultural practices and supporting farmers in becoming more productive, resilient, and market-ready. The information in the table 1 outlines the general role of startups across each segment of the agricultural value chain along with illustrative examples.

Table 1: Role of Agri-Tech Startups Across the Agricultural Value Chain (with Examples)

S. No	Stage of Agri Value Chain	Key Functions/Activities	Role of Agri-Tech Startups (with Examples)
1.	Pre-Production	1. Crop planning and input advisory 2. Soil health monitoring 3. Weather forecasting	1. BharatAgri offers personalized crop calendars using AI. 2. Fasal and KhetiGaadi provide predictive weather and agronomic tips. 3. Krishitantra offers instant digital soil testing kits.
2.	Input Supply	1. Access to seeds, fertilizers, and chemicals 2. Price transparency	AgroStar, DeHaat, and BigHaat offer online input marketplaces with doorstep delivery. They help farmers compare prices and ensure input quality.

3.	Production (On-Farm)	1. Crop health and irrigation monitoring 2. Real-time guidance on pests and nutrients	1. CropIn offers satellite-based crop monitoring tools. 2. Fyllo uses IoT sensors to optimize irrigation and fertilizer use. 3. AgriBot provides AI-based pest advisory.
3.	Precision Agriculture	1. Site-specific crop and soil management 2. Automation and robotics	1. Marut Drones offers aerial spraying and crop surveillance. 2. TartanSense builds small agricultural robots for precision weed control. 3. Farmsio enables satellite and GIS-based analysis.
4.	Harvesting	1. Crop maturity prediction 2. Harvest planning	1. Satsure uses satellite data to recommend ideal harvest windows. 2. GramworkX combines weather and soil data to optimize harvest timing and reduce loss.
5.	Post-Harvest Handling	1. Sorting, grading, and packaging 2. Loss reduction through better handling	1. Intello Labs and AgNext use computer vision and AI for quality testing and digital grading of produce. 2. Ecozen provides cold storage powered by solar energy.
6.	Storage and Logistics	1. Access to warehousing 2. Transport and delivery optimization	1. Arya.ag offers digital warehouse booking, remote inventory control, and financing options. 2. LEAF (Lawrencedale) helps manage end-to-end produce movement and cold chains.
7.	Processing and Value Addition	1. Small-scale processing 2. Branding and certification assistance	1. TESSOL provides cold chain storage solutions for processed goods. 2. TraceX supports end-to-end digital traceability for branded products and exports.
8.	Marketing and Distribution	1. Linking farmers with buyers 2. Online produce sales	1. Ninjacart connects farmers with retailers and wholesalers using an app-based B2B platform. 2. Bijak enables transparent trade between farmers and traders.
9.	Export and Institutional Sales	1. Quality compliance and traceability 2. International documentation	1. TraceX and AgNext enable blockchain-based traceability to meet export requirements. 2. Arya.ag and DeHaat are exploring global market entry for farmer groups.
10.	Retail and Consumer Linkage	1. Farm-to-home delivery 2. Subscription-based models	1. Farmizen offers organic produce subscriptions directly to urban consumers. 2. Freshokartz connects farmers to residential buyers in semi-urban areas.
11.	Financial Services (Agri-Fintech)	1. Access to loans and insurance 2. Crop insurance settlement support	1. Jai Kisan offers digital loans and BNPL for agri-inputs. 2. Samunnati provides structured finance to FPOs. 3. GramCover and Skymet enable satellite-based crop insurance validation.
12.	Capacity Building and Training	1. Skill development 2. Real-time virtual advisory	1. Digital Green uses videos for local-language training. 2. KisanGPT and Kisaan Helpline offer chatbot-based 24x7 guidance on farming practices.
13.	ICT and Digital Services	1. Digital recordkeeping 2. Product-level traceability	1. CropIn and TraceX allow traceable farm-to-fork supply chains. 2. Agri10x helps FPOs digitally manage inventory, pricing, and sales.
14.	Policy Linkages and Convergence	1. Awareness and access to govt. schemes 2. Digital compliance	1. AgriVijay and DeHaat assist farmers in accessing subsidies, soil health cards, and PM-KISAN benefits which act as interfaces for DBT and compliance verification.

Conclusion

Startups have emerged as powerful enablers in strengthening India's agricultural value chain. By integrating technology with traditional farming practices, they are enhancing productivity, efficiency, and transparency from farm to fork. Agri-tech startups facilitate better input management, precision farming, market linkages, logistics, and financial inclusion for farmers. Through digital platforms and data-driven solutions, they reduce information asymmetry, minimize post-harvest losses, and ensure fair pricing. Moreover, their

collaboration with FPOs, agribusinesses, and government initiatives is creating a more resilient and inclusive ecosystem. As agriculture evolves into a knowledge- and technology-driven enterprise, startups continue to play a pivotal role in empowering farmers, improving sustainability, and driving rural economic growth

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