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Agri-Startups: Are We Solving Farmers' Problems or Just Selling Technology?

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Agricultural startups are introducing new approaches to crop advisory services, precision farming, mechanisation, marketing, finance and post-harvest management. Yet the value of an agritech enterprise should not be judged only by the technology it develops, the funding it attracts or the number of users it registers. Its real contribution depends on whether farmers can access, understand and afford its services and whether these services produce measurable, lasting benefits. Smallholders face diverse constraints, including fragmented holdings, rising input costs, uncertain markets, limited digital confidence and climate-related risks. This article discusses the opportunities and limitations of agri-startups and proposes a farmer-centred approach based on participation, field validation, extension support and outcome-based assessment.

Keywords: Agri-startups, agritech, farmer-centred innovation, digital agriculture, agricultural extension, entrepreneurship

Introduction

Indian agriculture is increasingly intersecting with entrepreneurship and digital innovation. Artificial-intelligence-based advisories, drones, precision irrigation, digital marketplaces and new supply-chain services are being developed to address challenges across the agricultural value chain. These innovations may improve resource-use efficiency, strengthen market connections, reduce post-harvest losses and create rural enterprises. Government support, including the Innovation and Agri-Entrepreneurship Development programme under the Rashtriya Krishi Vikas Yojana (RKVY), has also helped create an incubation ecosystem for agricultural businesses (Ministry of Agriculture and Farmers Welfare, 2024; 2025). However, an important question remains: are these innovations solving farmers' priority problems, or are farmers being expected to adapt to products designed without enough understanding of their circumstances? A farmer facing unreliable irrigation may need a low-cost water-management service more than a complex digital platform. A groundnut grower facing uncertain prices may benefit more from dependable buyers, aggregation and transport than from an app that provides price information but no route to market. The issue is not whether agriculture needs innovation, but whether innovation is designed around the realities of farming.

The Promise of Agri-Startups

Agri-startups work across input supply, production, harvesting, processing, storage, transport and marketing. Digital tools can provide weather information, crop advisories and price discovery; precision-farming services can help target water and inputs; and post-harvest enterprises can support grading, storage and processing. Some startups also connect farmer producer organisations (FPOs) with buyers or help digitise records and trace produce through supply chains. Studies of digital agricultural startups have also emphasised the value of collaboration between startups and public extension agencies, particularly because each may contribute different kinds of data, expertise and farmer access (Reddy *et al.*, 2020).

The ICRIER report by Phadke, Karandikar and Gulati (2023) discusses how agritech startups and FPOs can contribute to better agricultural marketing. It describes approaches such as online trading, buyer linkages, produce traceability, grading and farm-gate storage. These examples show that innovation is not limited to gadgets: business models and institutional partnerships can be just as important. Nevertheless, potential benefits should not be treated as proof of impact. A technology becomes valuable only when it is usable, locally suitable and worth its cost to the farmer.

When Technology Meets Ground Reality

Affordability: Is innovation within farmers' reach?

Some technologies involve high initial costs, maintenance, connectivity or specialised training. Small and marginal farmers may be unable or unwilling to invest individually when returns are uncertain. Drone spraying, for example, may be more practical when offered as a paid service through trained local entrepreneurs, custom hiring centres, cooperatives or FPOs than when every farmer is expected to purchase a drone. Rental, pay-per-use and shared-service models can widen access, provided that pricing and service quality are transparent.

Digital literacy: Access does not always mean adoption

Having a smartphone or internet connection does not automatically mean that a farmer can interpret a technical advisory or use an application confidently. Language barriers, complicated interfaces and limited digital confidence may reduce the usefulness of otherwise sound information. Digital tools should be available in local languages, designed for simple use and supported by demonstrations and human assistance. Technology should make decisions easier, not create another barrier.

The last-mile gap: Who connects startups with farmers?

Developing a product is only one part of agricultural entrepreneurship. Startups must also reach dispersed farmers, build trust, provide after-sales support and adapt services to local conditions. Krishi Vigyan Kendras (KVKs), agricultural universities, research stations, extension professionals and FPOs can help organise demonstrations, test products in real field conditions and communicate farmer feedback to developers. Independent assessment is particularly important for crop-diagnosis tools and input recommendations, which should be checked against local field conditions and expert advice. Research on digital startup-extension collaboration similarly points to the importance of connecting technology providers with trusted agricultural institutions (Reddy *et al.*, 2020).

A Field Example: Technology as a Service

A useful illustration of farmer-centred technology is the experience of Shabina Khatoon, described by ICAR as a 'Drone Didi' in Ayodhya, Uttar Pradesh. With technical guidance from KVK Ayodhya and support through the NAMO Drone Didi initiative, she developed drone-based spraying services that farmers could hire rather than having to buy the equipment themselves. The ICAR account reports that she charged about ₹400 per acre and expanded her enterprise to include demonstrations and training for rural women. It also reports that she trained women from her self-help group to provide drone services. This example is relevant because it combines technology with training, local service delivery and an enterprise model. It also shows how extension institutions can help make unfamiliar technology accessible. The case is an institutional success story, however, not a controlled impact evaluation; reported income and benefits should therefore be understood as figures from the published account rather than universal results for all farmers. The wider lesson is that access to a service may be more practical than ownership of expensive equipment.

From Selling Products to Solving Problems

A fundamental shift is needed in how agri-startup success is defined. Instead of beginning with 'What technology can we develop?', entrepreneurs should begin with 'What problem is the farmer trying to solve?' If farmers repeatedly lose value because of poor market access, the solution may require aggregation, grading, transport, storage and dependable buyer relationships, not simply another stand-alone marketplace. If pest management is the concern,

a useful service may combine field diagnosis, integrated pest management advice and timely access to appropriate inputs. Farmers should be involved in identifying problems, testing prototypes, evaluating costs and reviewing results. This participatory approach helps prevent technically impressive products from being developed for needs farmers do not prioritise. It also allows startups to identify practical constraints early, before investing heavily in a solution that may be difficult to use or sustain. Recent evidence from Telangana and Chhattisgarh also indicates that farmers' perceptions of startup–FPO integration and access to training matter for the effective use of digital advisory services (Praneeth *et al.*, 2026).

What Should Count as Evidence of Impact?

The existence of a startup, the launch of an application or the number of registered users is not sufficient evidence of improved farmer welfare. Assessment should consider outcomes such as changes in cultivation costs, net returns, yield stability, time and labour requirements, market access, post-harvest losses, resource-use efficiency and farmers' ability to manage risk. Results should be examined across different farm sizes, crops and social groups so that the benefits and limitations are visible. The ICRIER study highlights the potential of startup–FPO partnerships to improve market efficiency, while also drawing attention to the institutional arrangements needed to make those partnerships work (Phadke *et al.*, 2023). For startups and public programmes alike, field validation and transparent reporting should be part of scaling a product not an activity carried out only after promotion has begun. Research on FPO performance in India also finds that organisations engaged in a wider range of entrepreneurial activities tend to perform better, reinforcing the importance of viable business models and collective services (Kumar *et al.*, 2023).

Policy Support: Building an Ecosystem That Serves Farmers

Government support for incubation and agri-entrepreneurship can help early-stage enterprises develop and test solutions. The Ministry of Agriculture and Farmers Welfare has identified areas such as artificial intelligence, precision farming, drones and climate-smart agriculture within its broader support for agri-tech development (Ministry of Agriculture and Farmers Welfare, 2025). To translate this support into meaningful outcomes, the ecosystem should give equal attention to farmer engagement, field testing, service delivery and long-term sustainability.

Link startup support with field validation and clear evidence of farmer benefit.

Strengthen partnerships among startups, KVKs, agricultural universities, research institutions and FPOs.

Encourage affordable delivery models, including rental services, pay-per-use options and community-based access.

Support local-language training, demonstrations, digital literacy and continued technical assistance.

Assess outcomes such as costs, net returns, reliability, accessibility and resource use—not registrations or downloads alone.

Promote rural youth and agricultural graduates as local service providers in areas such as drone operations, machinery rental, soil testing and post-harvest management.

The Role of Agricultural Extension: From Technology Transfer to Innovation Facilitation

Agricultural extension can connect farmers, researchers, entrepreneurs and policymakers in a two-way process of learning. Extension professionals can help identify unmet needs, assess the suitability of proposed solutions, organise field demonstrations and relay farmers' experiences to startup developers. They can also help farmers compare options, understand costs and risks, and make informed decisions rather than adopting a technology simply because it is new or heavily promoted. KVKs and agricultural universities can act as neutral platforms where farmers test innovations under local conditions. Collaboration with FPOs can help startups reach groups of farmers and understand collective needs. In this model,

extension does more than transfer technology: it facilitates innovation, supports informed choice and helps ensure that farmers' voices influence product development.

A Farmer-Centred Road Map

A practical roadmap begins by identifying a clearly defined farm problem through consultation with farmers and extension professionals. The proposed solution should then be tested on a limited scale under representative field conditions. Its cost, usability, reliability and benefits should be assessed before wider promotion. Farmers should receive clear information about pricing, limitations, data use and service responsibilities. After adoption, startups should continue to monitor whether the solution delivers meaningful benefits. Where it fails to meet farmers' needs, redesign should be treated as a normal part of responsible innovation.

Conclusion

Agri-startups have considerable potential to make Indian agriculture more efficient, resilient and market-oriented. Their work in digital advisory services, mechanisation, marketing, finance and post-harvest management can help address important challenges. Yet technological advancement alone cannot guarantee better livelihoods. The real test is whether farmers can access, understand, afford and trust a solution and whether it creates measurable benefits over time. Achieving this requires farmer participation, locally appropriate design, strong extension support, effective institutional partnerships and transparent impact assessment. Agriculture is not merely a market waiting for new products; it is a complex livelihood system shaped by local conditions, risk and practical priorities. The future of agri-startups will depend not on how many technologies they sell, but on how many agricultural problems they genuinely solve. Innovation becomes meaningful when it moves beyond the screen, reaches the field and creates lasting value for farmers.

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