

## The Future of Agriculture-Based Startups

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### INTRODUCTION

Agriculture, historically viewed as a labor-based and conventional industry, is in the midst of a digital and technological renaissance. With the emergence of agritech startups, the industry is adopting innovations such as artificial intelligence (AI), Internet of Things (IoT), drone technology, biotechnology, and blockchain to enhance productivity, sustainability, and profitability.

Agriculture-based startup growth is not just a trend; rather, it signifies a larger movement toward climate-resilient, resource-saving, and market-efficient farming systems. The startups are filling important gaps in supply chains, streamlining farm input delivery, facilitating real-time monitoring of data, and facilitating market access for smallholder farmers.

### 2. Key Drivers of Agritech Startups

#### 2.1 Increasing Food Demand

By 2050, the global population is expected to reach nearly 10 billion. To meet this demand, food production must increase by 60-70%, necessitating advanced and efficient agricultural practices. Startups are innovating in areas like precision farming, vertical farming, and genetic improvement to meet this goal.



Source: Alejandro Cremades

#### 2.2 Technological Advancements

Startups are making use of AI-based crop advisory, remote sensing, and soil health analytics to help farmers make informed decisions. With the presence of affordable sensors, satellite information, and mobile networks, it has become possible to avail smart farming systems that were beyond the reach of smallholders.

### **2.3 Climate Change and Resource Scarcity**

Agriculture is susceptible to fluctuating weather conditions, floods, and droughts. Startups are creating climate-resilient crops, water-saving irrigation systems, and early warning systems for pest and disease infestations, enabling farmers to cope with new climate realities.

### **2.4 Youth Engagement and Urbanization**

Young entrepreneurs are increasingly turning to agriculture, combining traditional wisdom with cutting-edge technology. Urban farming startups are also emerging, emphasizing hydroponics, rooftop agriculture, and container-based production systems.

## **3. Emerging Trends in Agriculture Startups**

### **3.1 Precision Agriculture**

Precision agriculture leverages GPS, sensors, and data analytics to track field variability and manage resource utilization efficiently. Startups such as CropIn, Fasal, and Gramophone are empowering farmers to take calculated decisions, minimize waste, and maximize yield.

### **3.2 Agri-fintech Solutions**

Credit, insurance, and digital payments are crucial for small farmers. Fintech companies such as Samunnati and Jai Kisan offer farm data-based credit scoring and facilitate loans and subsidies more easily.

### **3.3 Supply Chain Digitization**

Startups are making the farm-to-market process smoother by digitizing procurement, storage, and logistics. Platforms such as Ninjacart and DeHaat bring farmers directly in touch with retailers, cutting middlemen and ensuring higher prices.

### **3.4 Drones and Robotics**

Drones are transforming field monitoring, crop spraying, and crop damage assessment. Robotics is being brought in for crop harvesting, weeding, and sowing. Startups such as TartanSense are pioneering innovations here.

### **3.5 Biotechnology and Genetic Engineering**

Biotechnology startups are researching high-yielding, disease-resistant, and stress-resistant crops to minimize the use of chemicals and enhance the nutritional value.

### **3.6 Vertical Farming and Controlled Environment Agriculture (CEA)**

Urban agritech companies are driving soil-less cultivation in controlled environments through the use of aeroponics, aquaponics, and hydroponics, particularly in space-limited cities.

## **4. Issues Confronting Agriculture Startups**

### **4.1 Farmer Awareness and Adoption**

Among the greatest challenges faced by agriculture-based startups is low technology adoption by farmers, even when new solutions exist. The greatest reason for this is ignorance, illiteracy, and mistrust of new systems. Small and marginal farmers in most cases are not aware of digital tools, new equipment, and advisory services through mobile apps. Cultural momentum and incredulity about outside interventions also prevent widespread adoption. To fill this gap, there is an urgent need for strong extension services, hands-on demonstration plots, and farmer field schools clearly demonstrating the advantage of new technology. Trust creation through local champions and farmer producer organizations (FPOs) can also enhance adoption levels.

### **4.2 Funding and Scalability**

Obtaining early-stage funding is a recurring challenge for most agri-startups. In contrast to urban sector tech startups, agriculture startups tend to be in low-margin, high-risk settings, which dissuade most investors. The absence of established business models in rural configurations and the latent nature of returns make fundraising even more difficult. While startups try to scale operations region, crop, and weather-wise, they need not only money but also guidance, marketplace access, and partnership opportunities. Incubators of agribusiness and impact funds committed to rural innovation development are needed to sustain their growth.

### **4.3 Regulatory Barriers**

Agriculture is an industry that plays within a broad interwoven regime of laws dealing with biotechnology, use of drones, use of pesticides,

and platforms of digital agriculture. Unclear, inconsistent, and unsupportive policy regulations create uncertainty that depresses the confidence of new startups. Consider an instance when drone spraying or genetically modified plants is subjected to intense scrutiny or refused approval in most cases. In order to boost innovation, governments must lay out clear, science-based, startup-friendly regulation which safeguards customers and allows experiments to take place.

#### 4.4 Infrastructure Constraints

One of the key constraints in rural change is the absence of basic infrastructure, such as stable internet, power, transport, and storage facilities. These constraints hinder the ability of startups to roll out tech-based solutions, leading to inefficiencies in operations and increased costs. Development of infrastructure needs to be complemented by innovation to facilitate last-mile delivery and uptake.

#### 5. Government and Institutional Support

Institutions and governments are responding to the need for agritech innovation. A number of initiatives are developing startup ecosystems:

- Agri-Infra Fund and Start-up India Program of India
- Incubation facilities in agricultural universities (RKVY-RAFTAAR)
- eNAM (National Agriculture Market) for enhancing online agri-markets
- FPO (Farmer Producer Organization) support schemes for improving market access

International entities such as the FAO, World Bank, and IFAD are also providing funding and assistance to innovation in smallholder farming.

#### 6. Case Studies of Successful Agri-Startups

##### 6.1 De Haat (India)

De Haat provides end-to-end agribusiness platform for small holder farmers with provision of agri-inputs, customized advisory and market linkages. With services to over 1 million farmers, it's an excellent instance of integrated rural agribusiness.

##### 6.2 Plenty (USA)

A leader in vertical farming, Plenty employs AI, robots, and data science to cultivate crops indoors using 95% less water. It's transforming the way food is produced in cities.

##### 6.3 Twiga Foods (Kenya)

Twiga links small farmers in Kenya with urban retailers via a mobile-based supply chain platform, minimizing food loss and increasing farmer incomes.

#### 7. Future Outlook

The coming decade will see exponential growth in agriculture-based startups fueled by:

- Growth of digitization and connectivity in rural regions
- Embracing regenerative and climate-resilient practices
- Using AI, blockchain, and satellite technologies
- Public-private partnerships and agritech accelerators

By 2030, agriculture-startups won't just transform the way food is produced, distributed, and consumed but also enable millions of farmers around the world. Yet, its success relies on inclusive policy, capacity development, and stakeholder collaboration.

#### CONCLUSION

Agriculture-startup ventures are the future of farming-technology-enabled, green, and inclusive. With proper combinations of innovation, investment, and policy, these startups can address global food issues, improve rural livelihoods, and ensure environmental resilience. As we are heading towards a digitally interconnected and ecologically responsive age, agritech entrepreneurship is at the cutting edge of transforming global agriculture.

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