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Nurturing Growth through Precision Agriculture

A Deep Dive into India's AgriTech Startups

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About Pusa Krishi
Nestled in the agricultural landscape of India, Pusa Krishi is a renowned agri-startup incubator, well-known for its cutting-edge technology, extensive industry expertise, and groundbreaking potential. Originally founded in 2014 as an incubator under ICAR-Indian Agricultural Research Institute, it grew into a DST-supported Technology Business Incubator (TBI) and a meta-incubator for agriculture under the Ministry of Agriculture & Farmers' Welfare in 2018. Serving as the exclusive nodal organisation for the Ministry of Agriculture & Farmers' Welfare, Government of India, Pusa Krishi is in charge of the biggest programme for agribusiness incubation, called Rashtriya Krishi Vikas Yojana (RKVY) – Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RAFTAAR). It oversees a network of 24 RAFTAAR Agri Business Incubators and 5 Knowledge Partners across India. Under several pre-incubation, incubation and agripreneurship development programmes, the unit has worked with more than 350 startups thus far, providing them with a wide range of services and support.

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Introduction

India precision agriculture market was valued at over $57 million in 2019 and is anticipated to grow at CAGR of over 10% to reach $ 99 million by 2025 owing to growing concerns for food security and increasing awareness related to the applications precision agriculture and surging need to ensure maximum yield from limited sized farms.

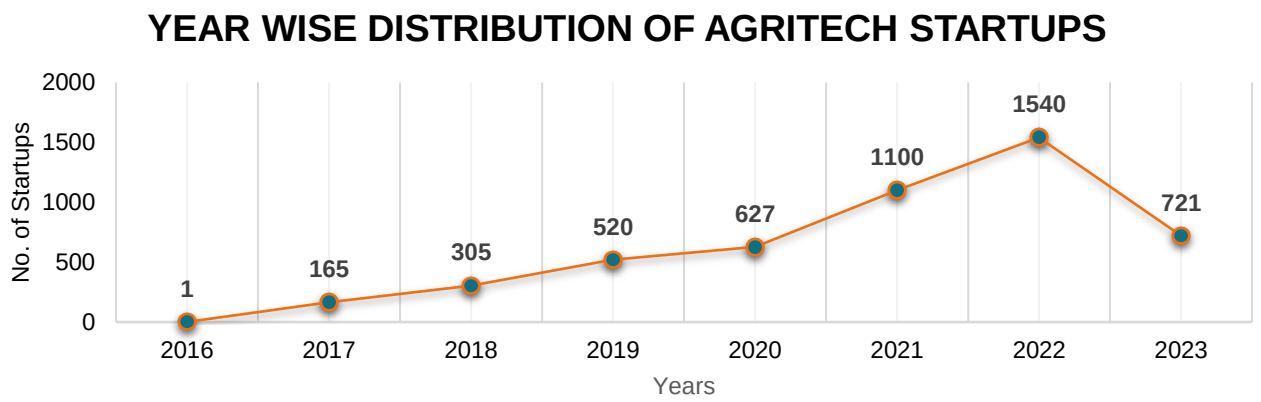
Precision agriculture helps to optimize use of resources and effectively meet the increasing demand for food, which is anticipated to drive India precision agriculture market until 2025.

Additionally, application of advanced analytics, increasing adoption of Internet of Things (IoT) in agriculture sector coupled with an increase in supportive government initiatives for the adoption of modern agriculture technologies is further driving the market for India precision agriculture market.

Moreover, increasing demand for obtaining data related to the condition of crops, local weather predictions and soil is further anticipated to boost demand for precision agriculture during forecast period. However, high cost and lack of awareness about technologies and advantages are acting as major challenges for precision agriculture market in India.

Source: Techsci Research

Agritech Industry Growth Scenario Over the Years



4979 Startups

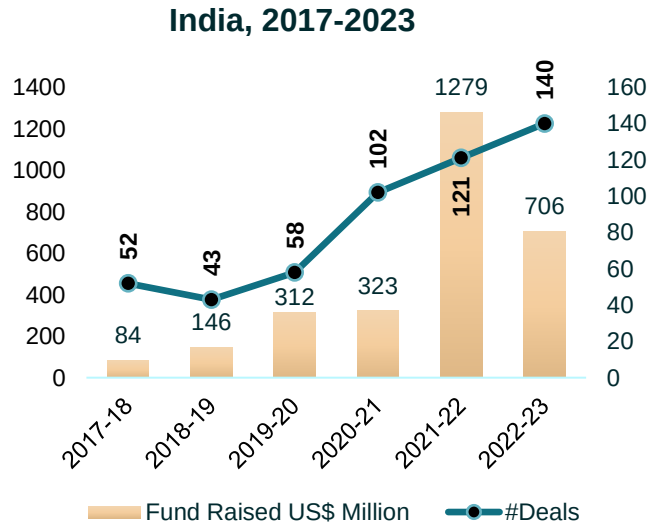
45000 Employment

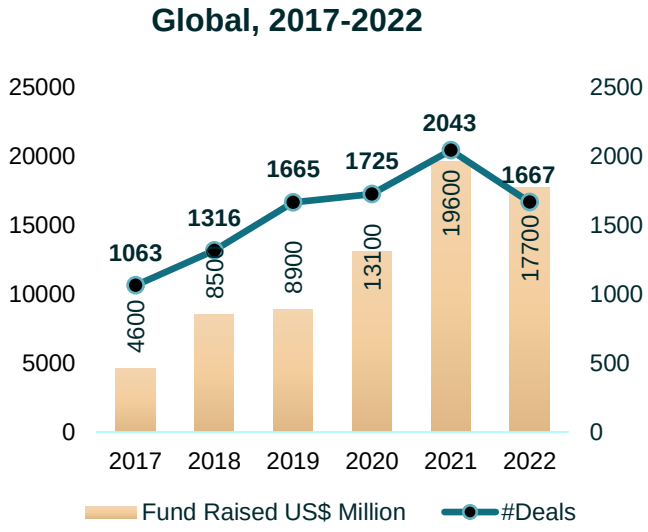
523 Districts with Startups

Source: Startup India May 2023 Newsletter

Trend Setting Investments Across Agritech Space

Comparing Indian and Global Agritech Startup Funding from FY 2018 to FY 2023. The graph denotes fund raised in US$ million and number of deals.





For the Indian context, the fund raising have increased from $84 Million USD in FY 2018 to $706 Million USD in FY 2023 showing a staggering change of 740.4% and increasing at the rate of 53% CAGR.

In Global context, the fund raising have increased from $4600 Million USD in CY 2017 to $17700 Million USD in CY 2022 showing a staggering change of 284.7% and increasing at the rate of 30.9% CAGR.

Investment Trends in Indian Precision Agriculture

As with disintermediation, start-ups are first-movers in in-farm and novel farming solutions, offering a diverse but nascent range of innovations. Investments in in-farm innovations, including artificial intelligence (AI) and Internet of Things (IoT) solutions, robotics/drones, and farm management software, have been growing exponentially.

Source: FSG: What's next for Indian agri-tech? and FSG: India's Unfolding Agri-Tech Story

EMERGING TECHNOLOGIES IN PRECISION FARMING FOR INDIAN AGRICULTURE

Remote Sensing

Becoming pivotal in gathering crucial data on soil moisture, crop health, and crop yields. Remote sensing enables farmers to monitor large areas efficiently, which is facilitated by satellite imagery and ground-based sensors. It offers actionable insights into the condition of their crops and soil.

Unmanned Aerial Vehicle (UAV)

Drones are cornerstone of modern agriculture. They can be employed for various purposes, such as crop monitoring, aerial surveys, and even spraying pesticides. Drones are also crucial for collecting valuable data, helping farmers assess crop health, growth patterns, and potential problem areas.

Geospatial Technology

This has a significant role in generating maps and analyzing spatial data. These technologies help farmers better understand their land, plan irrigation systems, and optimize planting patterns based on soil variability and topography.

Machine Learning

Algorithms are helping to examine intricate datasets to make predictions about various factors, such as crop yields. These insights empower farmers to make informed decisions about planting times, fertilization, and pest control, ultimately leading to improved productivity.

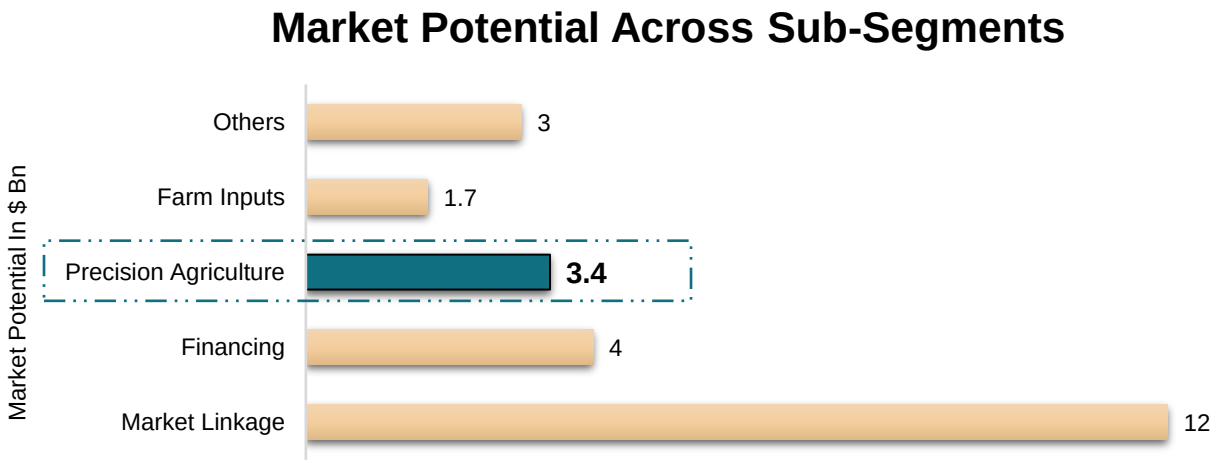
Artificial Intelligence

Automation is also helping to manage agricultural tasks more efficiently. AI-powered systems can automate irrigation, predict disease outbreaks, and optimize resource allocation, making crop management more precise and effective.

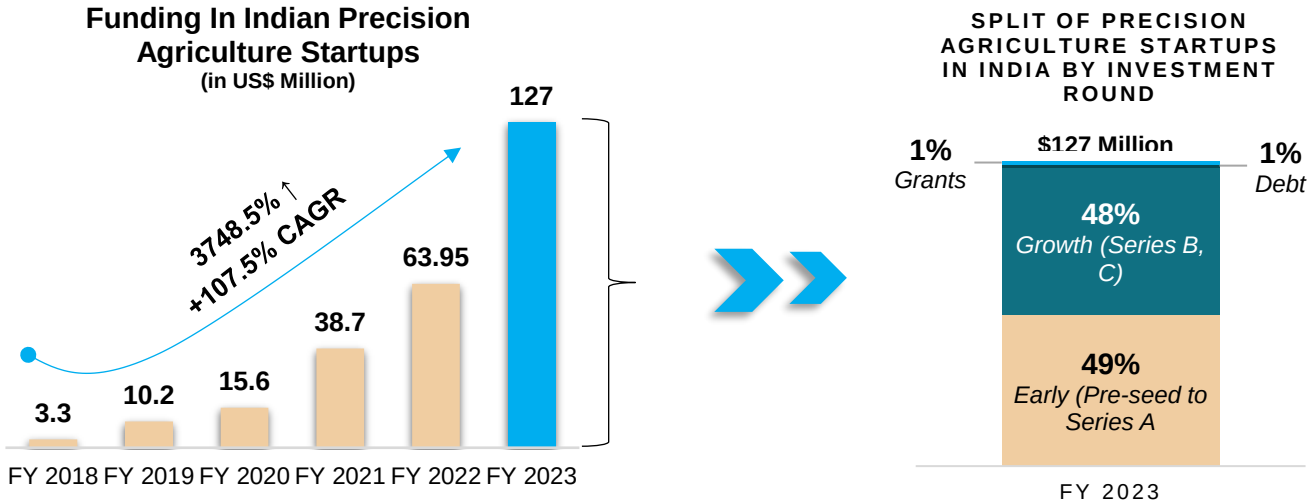
The adoption of precision farming technologies is driven by the need to enhance crop yields, enhance sustainability and reduce input costs. The government of India is also actively promoting the adoption of these technologies through various policies and schemes.

Source: INC42

PRECISION AGRICULTURE MARKET OF INDIA



Source: INC42: India's Agritech Market Landscape



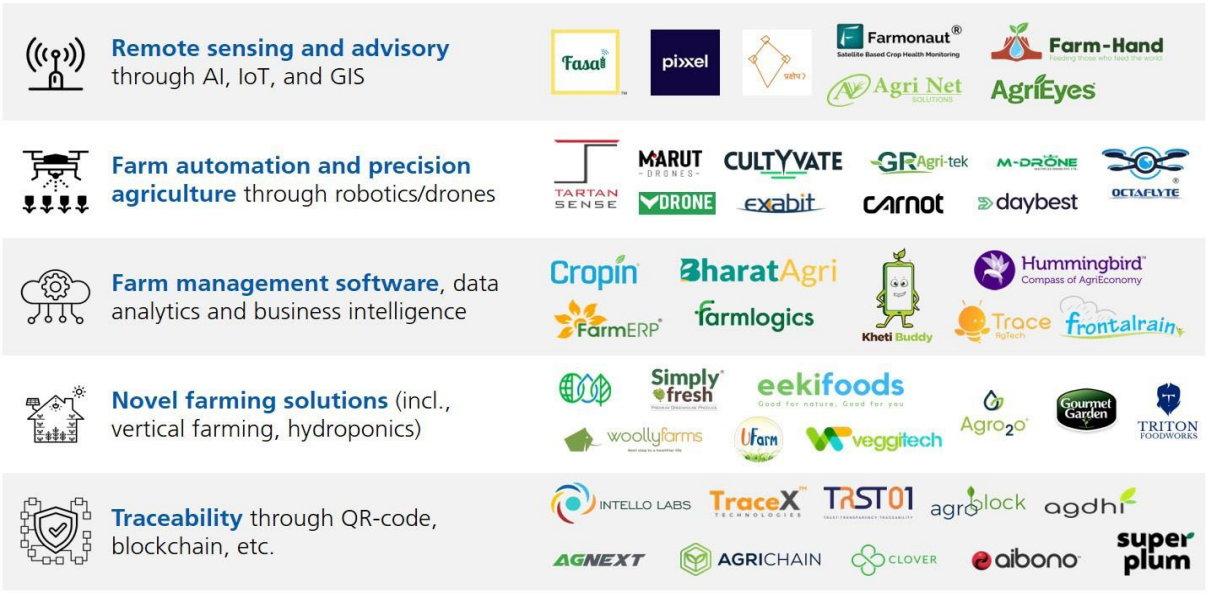
There is significant diversity in start-ups within this category, ranging from SaaS (software-as-a-service) platforms to AI- and IoT-integrated hardware for sensing, monitoring, and farm automation. Farm automation solutions address the growing labor shortage.

Solutions such as remote sensing and monitoring and technology-integrated farm management software improve farmers' ability to make data-driven decisions manage and plan their resources, and improve farm productivity. Most of these innovations, however, are early-stage.

Traceability, for example, is an important use case for AI- and IoT-enabled technologies, which cuts across pre- and post-harvest stages, and improves farmers' ability to demand higher prices for high-quality produce, but has very few at-scale solution providers in India. CropIn, the oldest start-up in this category,

was among the first to introduce seed-to-shelf traceability using QR code stickers, but only did so in 2018-19.

Illustrative Map: In-Farm & Novel Farming Solutions



Several more early-stage traceability start-ups have emerged recently, each with a different business model or technological innovation. For example, Superplum and Clover are B2B suppliers of demand-backed, traceable, high-quality fresh produce, while TraceX Technologies' blockchain-powered mobile application streamlines farmers' pre-harvest activities, and Intello Labs' image-recognition-based hardware and software automate grading of fresh produce.

Source: FSG: What's next for Indian agri-tech? and FSG: India's Unfolding Agri-Tech Story

Market Segmentation & Highlights

Among components, hardware segment is expected to acquire the largest share during forecast period as it helps to collect crucial information pertaining to the soil. Amongst these, hand-held remote sensing dominated the market in 2019, while software-based sensing segment is expected to exhibit faster growth until 2025.

Precision agriculture market finds application in yield monitoring, crop scouting, field mapping, weather forecasting & tracking, among others. Among these, yield monitoring segment grabbed the highest market share in 2019 and field mapping segment is expected to witness extensive adoption through 2025.

Based on regions, India precision agriculture market is segmented into South, North, East and West. Out of these, south region accounted for the highest share of more than one-third of the market in 2019 on account of high penetration of internet and larger smartphone user base in the region. South Indian states, such as Andhra Pradesh, Telangana, and Tamil Nadu, are increasingly adopting various precision agricultural methods to boost crop yields.

Source: Techsci Research and Simple Booklet: Indian Precision Agriculture Market Growth Overview

Relative Focus: Start-Ups & Traditional Companies

Traditional agriculture companies lag behind in most categories. Large agrochemical players benefit from in-house R&D and a greater investment capacity compared to start-ups. They are therefore ahead in developing, producing, and marketing sustainable and specialized inputs such as bio-fertilizers and organic fertilizers.

However, traditional agriculture companies focused on the upstream and midstream value chain, including in-farm mechanization solution providers, lag behind start-ups in most other agri-tech innovation, precision, blockchain, AI and ML categories.

A comparative summary of start-up and traditional player activity in the sector is as follows:

Value Chain Stages	Relative Focus	S Start-ups	T Traditional Players
R&D/ Biotechnology 		High capital cost limit entry of new players but a few exceptions (e.g., Bio Prime) **are focused on emerging market for sustainable inputs**	**Rising consumer demand and supportive policies** are driving most agrochemical players to invest in R&D for sustainable specialized inputs
Input & Equipment Linkages 		Startups saw **early opportunity to improve availability and affordability** of inputs; several have scaled and are moving to **'full-stack'** (e.g., DeHaat)	Traditional players are **expanding retail presence** (e.g., Coromandel) or **partnering with FPOs** (e.g., DFPCL) to sell inputs and other advisory to farmers.
In-farm & Novel Farming Solutions 		**Several diverse but early-stage** innovations are leveraging recent socio-economic (e.g., rise in mobile usage) and policy shifts (e.g., drone-use rules)	Early efforts by equipment companies to offer **rental solution** (e.g., Mahindra) and by agrochemical companies to offer **drone spraying services** (e.g., Syngenta)

Output linkages & quality Management 		Startups saw **early opportunity** in direct linkages to **reduce wastage** and **increase farmers share of final price**; several have scaled and are moving to **'full stack'** (e.g., WayCool, Arya.ag)	Traditional players are **leveraging partnerships** (e.g., Bayer, Jain Irrigation), or making **direct investment** in market linkage platforms (e.g., Mahindra in MeraKisan)
Miscellaneous (e.g., fintech, agri-carbon) 		**Fintech startups are scaling** (e.g., Samunnati, Jai Kisan), biofuel/biomaterial (e.g., Boheco) are nascent but **agri-carbon remains unexplored**	Nascent initiatives for monetizing carbon credits and **boosting climate smart agriculture** (e.g., UPL, Mahyco) and investments in **agri-fintech** (e.g., Yara)

Source: FSG: What's next for Indian agri-tech?

Key Metrics of Prominent Precision Agriculture Startups

These startups belong to the following categories under Precision Agriculture.

Remote Sensing and Advisory *through AI, IoT and GIS*

S. No.	Startup Name & Logo	Total Funding	No. of Round	Investors		Latest Funding Round	Valuation
				Institutional	Angel		
1	FASAL	$7.31 M	5	17	7	$982K Seed, 12 Dec'22	$14.2M as on 12 Dec, 22
2	Pixxel	$76.7 M	8	21	6	$36 Million Series B, 01 Jun'23	NA
3	Prakshep	$507K	1	1	3	$507K Seed, 20 Dec, 17	$4.93M As on 20 Dec, 17 – Acquired by Arya

4		Farmonaut® Technologies	Not Raised	0	0	0	0	NA

Farm Automation and Precision Agriculture *through robotics/drones*

S. No.	Startup Name & Logo	Total Funding	No. of Round	Investors		Latest Funding Round	Valuation
				Institutional	Angel		
1	Niqo Robotics	$8.17M	3	4	3	$5.06M Series A, 25 Aug, 21	$15.7M as on 02 Sep, 2021
2	Marut Drones	$100K	1	0	2	$100K. Seed, Jan 05, 2020	$1.06M as on Jan 24, 2020
3	Cultyvate	$793K	2	24	17	$723K Seed, Nov 02, 2021	$2.01M As on Nov 02, 2021
4	Carnot Technologies	$2.19M	6	3	2	$329K Seed, Mar 17, 2022	$4.13M as on Mar 10, 2018 Acquired by Mahindra
5	Octaflyte	$6.81K	1	2	0	$6.81K, Grant (prize money), Apr 07, 2021	NA

Farm Management Software, *data analytics and business intelligence*

Sno.	Startup Name & Logo	Total Funding	No. of Round	Investor		Latest Funding Round	Valuation
				Institutional	Angel		
1	Cropin	$68.9M	15	28	15	$14M Series C, Dec 09, 2022	$95.6M as on Apr 27, 2022
2	BharatAgri	$17.3M	9	22	22	$4.3M Series A, Oct 19, 2023	$19.6M as on Jan 05, 2023
3	FarmERP	$1.99M	3	1	5	$91.8K Series A, Apr 04, 2022	$4.76M as on Apr 04, 2022

4		Hummingbird	$818K	4	4	31	$328K Seed, May 09, 2019	$2.2M as on May 09, 2019
5		FrontalRain Technologies	$1.74M	2	1	0	$785K Seed, Dec 31, 2014	$1.57M as on Dec 31, 2014

Novel Farm Solutions *including vertical farming, hydroponics*

Sno.	Startup Name & Logo	Total Funding	No. of Round	Investor		Latest Funding Round	Valuation
				Institutional	Angel		
1	Absolute Foods	$116M	4	12	3	$100M, Series B, Feb 09, 2022	$500M as on May 06, 2022
2	Simply Fresh	$34.1M	3	5	8	$1.93M Series A, May 23, 2022	$28.4M as on Aug 09, 2018
3	Eeki Foods	$10.9M	6	17	50	$6.5M Series A, Apr 20, 2022	$26.9M as on May 11, 2022
4	Woolly Farms	$768K	3	15	40	$579K Seed, Apr 03, 2022	$4.2M as on Jun 30, 2022
5	Agro2o	$36.5K	1	3	3	$36.5K Seed, Jun 14, 2020	$695K as on Jun 14, 2020
6	Gourmet Garden	$6.16M	4	14	13	$1.56M Series A, Jun 18, 2022	$26.5M as on Jun 18, 2022

Traceability *through QR-code, blockchain etc.*

Sno.	Startup Name & Logo	Total Funding	No. of Round	Investor		Latest Funding Round	Valuation
				Institutional	Angel		
1	Intello Labs	$16.6M	11	21	38	$2.82M Series B, Dec 08, 2022	$82.5M as on Dec 13, 2022
2	AgNext	$25.3M	5	7	5	$21M Series A, Aug 19, 2021	$52.4M as on Aug 24, 2021

3	TraceX	TraceX Technologies	$1.19M	3	6	9	$1M Seed, Mar 31, 2022	$5.12M as on Apr 01, 2022
4	TRST01	TRST01	$925K	3	1	13	$38.4K Angel, Jun 10, 2022	$4.58M as on Jun 10, 2022
5	agdhi	Agdhi	$300K	3	4	0	$70K Grant (prize money), Aug 17, 2021	NA
6	CLOVER	Clover Ventures	$16.5M	7	8	1	$4.86M Series B, Sep 26, 2022	$32.9M as on Sep 26, 2022
7	AIBONO	Aibono	$5.48M	4	15	14	$2M Seed, Jul 07, 2020	$12.2M as on Jul 07, 2020
8	superplum	Super Plum	$6.8M	1	0	7	$3.8M Seed, Jun 21, 2021	NA

Source: Tracxn

Challenges Faced by the Startups in Precision Agriculture

Though there is an increased presence of technology in the agricultural sector, giving a boost to Agri-tech, startups in India still face many challenges unique to the sector. A few of these are:

Limited access to quality data

Access to data on weather patterns, soil conditions, market trends, and historical farming practices

Fragmented agricultural ecosystem

Smallholder farmers, diverse crops, and varying regional practices

Financial constraints

Lack of funding support to early-stage startups & long gestation periods

Building trust

Agriculture comes down to hand-to-mouth financial situation. Not easy to persuade farmers for tech-based solutions.

Diversity in language, geography, and regional crops

India is home to more than 100 languages, different culturally and geographical diversity. Also known for its diverse crop patterns.

Increasing competition

More than 600+ agritech startups. Some established networks, distribution silos, data, and deep pocket creating difficulties to stand out in a crowded market.

Lack of Mentorship & Proper Business Model

Struggling to address diverse stakeholder needs in the value chain. Need guidance in selecting mentors, networking, resource acquisition, and business plan development for effective problem-solving.

Strategic Outlook

In many developing nations, the advancement of precision farming is gaining traction, emphasizing the crucial need for both public and private sector support to accelerate its widespread adoption. The journey towards successful implementation involves three key phases: exploration, analysis, and execution.

Precision agriculture offers promising solutions to the economic and environmental challenges plaguing modern agricultural practices. While concerns persist regarding cost-efficiency and optimal utilization of available technological resources, the fundamental principle of executing actions precisely where and when needed resonates strongly.

Given the pressing demands of our times, there's a compelling call for leveraging innovative technologies to transform the traditional 'Green Revolution' into a sustainable 'Evergreen Revolution'.

Ultimately, the success of precision agriculture is the swift acquisition and application of knowledge necessary to effectively leverage these new technologies.

Conclusion

Considering the value chain stage of in-farm and novel farming solutions, agrochemical players are considering partnership with existing in-farm solution providers like Syngenta and DJI's partnership for drone spraying of inputs. While mechanization players are allocating capital towards scalable automation innovations in precision agriculture, remote sensing, SaaS and novel farming systems

Both traditional players and agri-tech start-ups must keep an ear to the ground to stay abreast of the ever-changing trends and developments in the sector, and be ready to adapt and innovate. India's agri-tech advancements, if utilized correctly, present an excellent opportunity for sustainable and equitable growth, ensuring not only profitability for agribusinesses but also improved livelihoods for farmers.

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