

A robotic arm with a blue and black body is positioned over rows of green leafy vegetables in a greenhouse. The arm has a gripper at the end and is illuminated by a bright light. The background shows the curved structure of the greenhouse and more rows of plants.

Agritech - towards transforming Indian agriculture

August 2020

The EY logo consists of the letters 'EY' in a bold, white, sans-serif font. A yellow diagonal line is positioned above the 'Y'.

Building a better
working world

Foreword

Agriculture is the life of the Indian economy. It contributes to 16% of India's gross domestic product (GDP) and employs 43% of the Indian workforce. Several industries such as consumer packaged goods, retail, chemicals and e-commerce are heavily dependent on the output produced through agriculture, thereby magnifying the impact of agriculture on the country's economy.

Multiple structural challenges are inhibiting Indian agriculture sector from reaching its full potential. Yields on crops such as cereals are lower in India by 50% compared to countries such as the US or China. Presence of numerous intermediaries throughout the value chain contributes to a reduction in farmers' income. Limited access to technology, credit and marketplaces are some of the other challenges that India's agriculture sector is grappling with. It is imperative to recognize that small and marginal farmers constitute the lion's share of India's farm holdings (86%). As a result, solutions to challenges in Indian agriculture need to be inclusive of the needs of these small and marginal farmers.

Recent policy reform announcements on removal of stock limits, liberalization of sale of produce across the country and formalization of contract farming are expected to add a fillip to the sector by encouraging private investments and help achieve the government's aim of doubling farmers income by 2022. However, widespread adoption of technology through digital platforms, analytics, artificial intelligence (AI), machine learning (ML) and the Internet of Things (IoT) is critical towards transforming India's agriculture.

India's burgeoning start-up ecosystem has been actively playing its part in disrupting the agriculture sector. Agritech start-ups are operating in an attractive market with an estimated potential of US\$24b by 2025.

Opportunity in agritech exists across the value chain:

- ▶ Facilitating input market linkages supported with robust physical infrastructure network
- ▶ Improving yield through precision agriculture
- ▶ Digitizing records through farm management
- ▶ Instituting quality management and traceability
- ▶ Facilitating output market linkages through efficient post-harvest supply chain
- ▶ Providing access to credit and insurance

Business models in the agritech space are still evolving. Revenue models could vary from margin-based to subscription-based to transaction-based depending on the segment addressed by the agritech player. As the pressure on achieving higher unit economics looms on agritech start-ups, we could witness a horizontal expansion of players into platform-based play where they own the end-to-end relationship with the farmer. Further, there could be a possibility of consolidation in the industry as larger players begin to acquire regional players to achieve scale in market linkages. Attractive market opportunity, nascency in investment funding and miniscule penetration by incumbent agritech players offer an opportunity for established players such as institutional retailers, e-commerce players and food processing companies to create impact at scale. Large scale transformation of agriculture through agritech requires investment funding at scale coupled with patient capital.



Ankur Pahwa
Partner and National Leader
E-Commerce and Consumer Internet
EY India

Executive summary

India's digital ecosystem is witnessing healthy tailwinds such as affordability and availability of high speed internet and maturing digital content ecosystem. The confluence of these factors presents an exciting opportunity for innovation in agricultural ecosystem, wherein market players can leverage next generation technology such as data digitization and data platforms, data analytics, AI, ML, the IoT and Software as a Service (SaaS) to disrupt the status quo. While the government's recent reforms such as deregulation of APMC marketplaces are expected to boost the agricultural sector, full potential of agriculture in India can only be realized through widespread adoption of technology.

Adoption of technology in agriculture (agritech) is helping in solving several pain-points across the spectrum of traditional agriculture value chain, and presents a market potential of US\$24b.

Pain-point	Agritech segment	Market potential
Volatility in input prices; sub-optimal input selection	Market linkages - farm inputs	US\$1.7b
Limited access to technology for efficient cropping	Precision agriculture and farm management	US\$3.4b
Uneven quality and lack of large scale testing	Quality management and traceability	US\$3.0b
Inefficient post-harvest supply chain	Supply chain tech and output market linkages	US\$12.0b
Lack of access to financial solutions	Financial services	US\$4.1b

Agritech players are transforming the way agriculture is traditionally being done across all stages of the value chain.

- ▶ For instance, players in market linkages: farm inputs segment are seamlessly blending technology with physical infrastructure to offer farm inputs at a greater price certainty
- ▶ Precision agriculture and farm management players are helping farmer improve their yields by up to 30%
- ▶ Quality management and traceability players are helping farmers realize better realizations by incentivizing high quality produce
- ▶ Players operating in supply chain tech and output market linkages segment are eliminating inefficiencies such as high wastage of farm produce, which is a win-win for both farmers as well as consumers
- ▶ Financial services players could serve 30% of farmer households through access to credit, and 65% of farmer households through access to crop insurance

Business models in the agritech space could be trifurcated into:

- ▶ Margin-based models where players create market linkages on the input or output side, and earn margins on the buy-sell spread
- ▶ Subscription-based models where players offer a mix of software, hardware and services to help farmers improve crop yields, track quality of produce or trace the produce across value chain
- ▶ Transaction-based models where players charge based on the number of transactions served such as loans or insurance policies

Demand side drivers such as evolving consumer dynamics towards consuming healthier food due to urbanization, imperative to reduce food wastage in India, environmental factors such as climate change and water shortage are helping drive the adoption of agritech in the country.

Agritech players operating in the addressable segments in India have received a cumulative investment funding of US\$532m as of April, 2020. A comparison with global investment funding patterns reveals that Precision agriculture and farm management

companies in India are under-funded. Global investors can harness their learnings from their global success stories in these segments to help them realize their full potential in India.

It is heartening to see both the central and state governments proactively launch initiatives to promote agritech ecosystem in the country. For instance, the National Agricultural Market (eNAM) initiative aims to remove information asymmetry in pricing through an electronic trading portal. State governments are forming technology partnerships to forecast prices of agricultural produce using AI to help farmers in efficiently planning their harvest cycle. Encouraging localized data collection on soil health and providing access to government research facilities to agritech start-ups could further help accelerate the adoption of agritech.

Lessons from countries such as the US and Israel call for building of a robust agritech policy framework in India which includes collaboration between all market participants such as farming communities, agritech companies, food processing organizations, technology providers and research institutions. Cross-country collaboration on agritech technologies and operating models could be driven through such a policy framework.

Despite the strong investment activity in the last few years, the market penetration in the sector is still very low (~1%). We believe that the untapped market potential and opportunities in agritech will continue to drive growth in this space over the next decade.

As the agritech ecosystem matures, there are a few potential scenarios that could play out in the sector. There is an opportunity for players to expand horizontally across agritech segments to own the end-to-end relationship with the farmer. There is also an opportunity for some of the large retailers and ecommerce players to expand their grocery presence through backward integration into the agritech space. Finally, food processing companies could also acquire agritech companies to keep a tight check on their quality and operations.

Going forward, we could witness an increase in penetration of segments such as financial services, precision agriculture and farm management and quality management and traceability considering the tremendous market potential that these segments offer and the degree of investment funding these segments have witnessed. Agritech startups need to develop scalable business models with higher unit economics while enabling instead of displacing traditional value chain participants to succeed in these segments.





Table

of content



01

What agriculture means to the Indian economy



Agriculture contributes to 16% of India's GDP

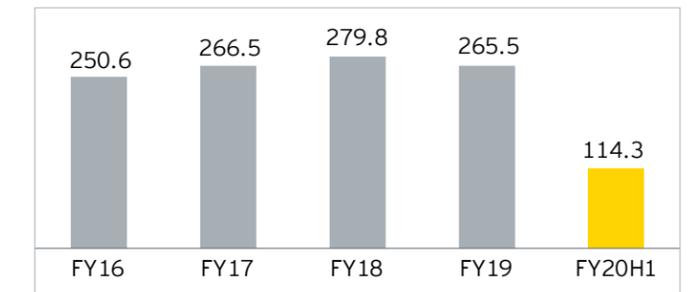
Agriculture plays a vital role in the Indian economy, contributing ~16% (US\$2,842 billion in 2018 at constant 2010 US\$) to the gross domestic product (GDP) and providing employment to 43% of the total workforce. India ranks second after China, accounting for 11.9%* of the global agriculture Gross Value Added* (GVA) of US\$3,320.4 billion.¹ Agriculture is also an important part of internal and external trade, positioning India as a significant agri-exporter, with the sector contributing 12% to India's exports.²

The sector also impacts non-agricultural segments such as consumer products, retail, chemicals and e-commerce, that are dependent on agricultural cash crops for raw material (tea, coffee, cotton, jute, sugarcane, oilseeds, etc.)

India agriculture sector snapshot

Largest producer Spices, pulses, milk, tea, cashew, jute, maize	2nd largest producer Wheat, rice, fruits, vegetables, sugarcane, cotton, oilseeds		Largest Livestock population (31% of global)
3rd largest Global fisheries output	45 of 60 Soil types present	20 Agri-climatic regions present	10th largest Arable land

Figure (I): GVA (US\$ billion)



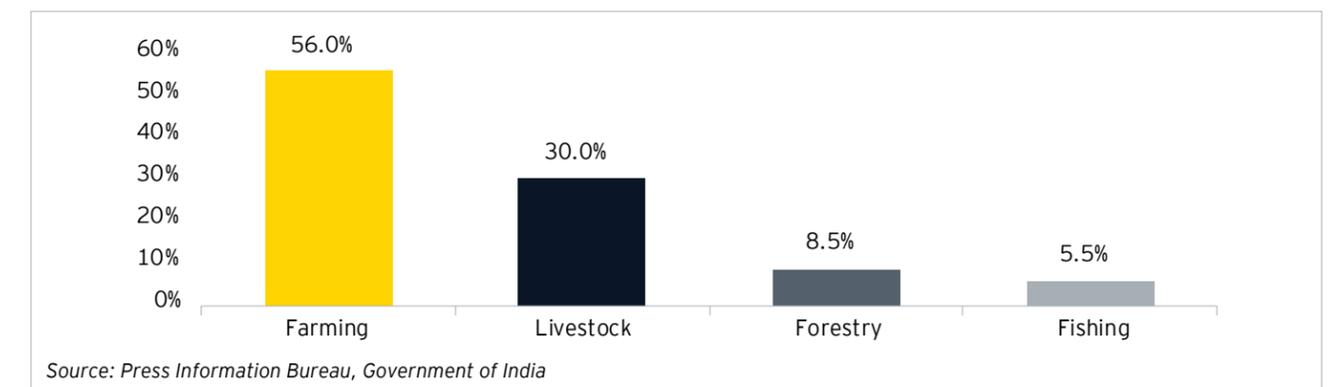
Source: IBEF

The agriculture and allied sector's GVA at constant 2011-12 prices grew at a CAGR of 3.1% during FY12-19.³ The contribution of agriculture to the GVA is on a steady decline, decreasing from 18.2% in 2014-15 to 16.5% in 2019-20.

The share has been declining on account of relatively higher growth performance of non-agricultural sectors.⁴

Indian agriculture broadly comprises of farming (crops and horticulture) and forestry, livestock (milk, eggs, meat) and fisheries.

Figure (II): Subsegment contribution to agriculture GVA



Source: Press Information Bureau, Government of India

Agriculture is a key pillar of the Indian economy, contributing significantly to GDP, employment creation and trade while also impacting non-agricultural segments.

*Gross value added provides a dollar value for the amount of goods and services that have been produced in a country, minus the cost of all inputs and raw materials that are directly attributable to that production.

Indian agribusiness ecosystem is significantly fragmented and unorganized across the value chain

The agribusiness ecosystem comprises the business activities performed from farm to fork, covering the entire value chain, from the supply of agricultural inputs, the production and transformation of agricultural products, and their distribution to final consumers. Driven by rapid urbanization, diet diversification, evolving consumer preferences and expansion of food markets, the agribusiness ecosystem has been expanding to segments such as e-commerce and hyperlocal.

Indian agribusiness remains largely unorganized and unstructured, with presence of multiple levels of intermediaries and middlemen across the agriculture value chain. The production part of the value chain remains highly fragmented and unorganized, with small and marginal farmers as the primary providers of food and nutrition to the country. Around 86% farmers in India are small and marginal⁵, with land holdings of less than two hectares, and have limited access to technology, inputs, credit, capital and market. The food retailing industry is another segment that remains highly unorganized, dominated by small kirana shops and street markets that continue to flourish, even in the e-commerce era.

Figure (III): Farmer classes

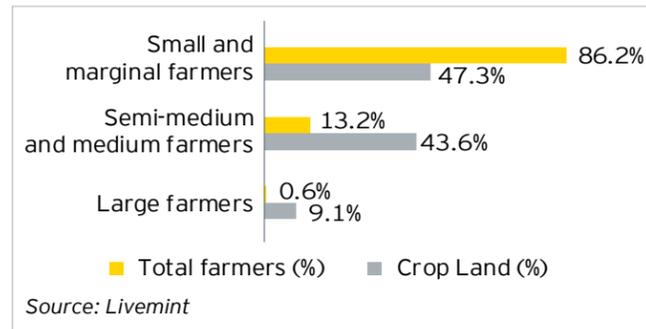
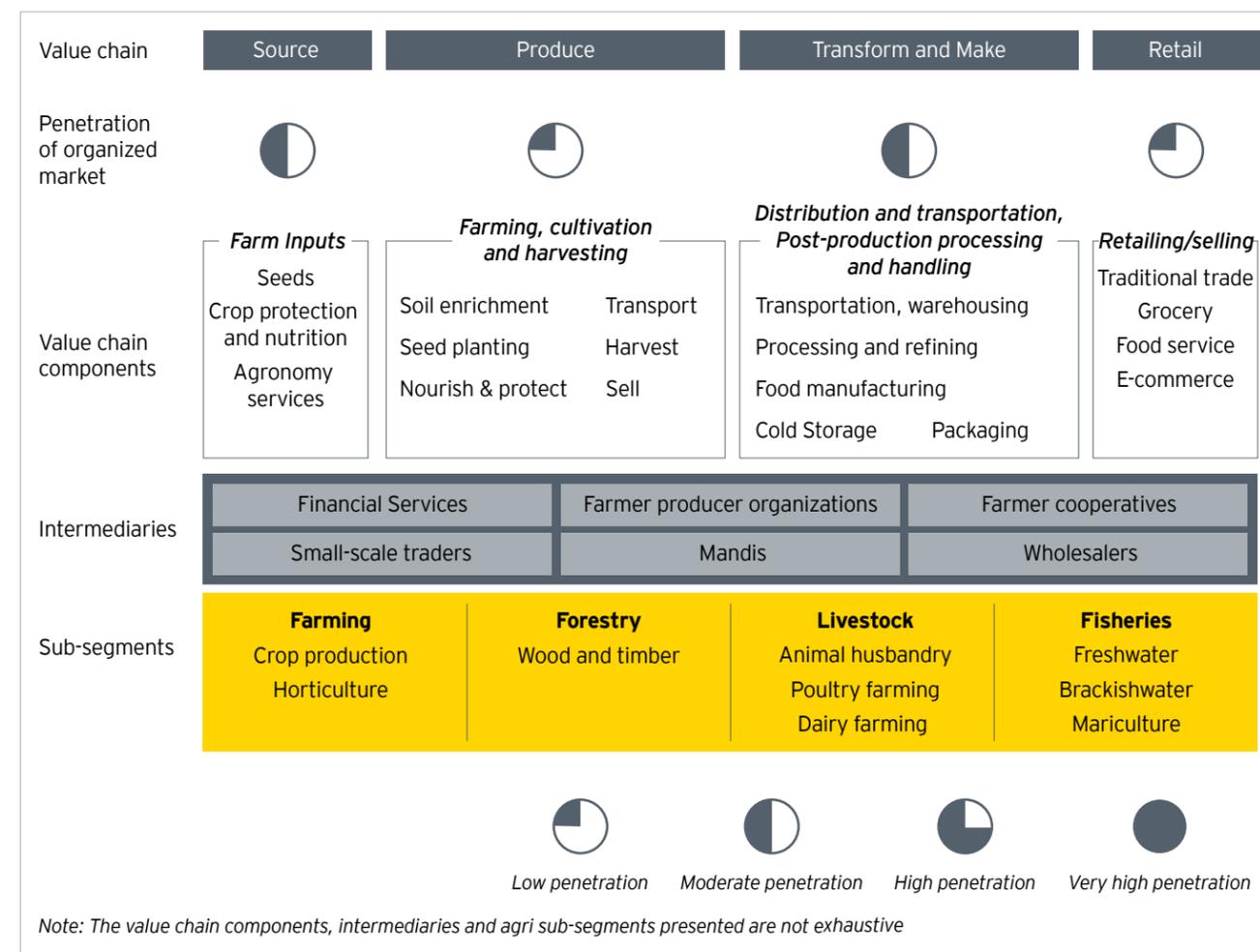


Figure (IV) : Agribusiness ecosystem in India^{6,7,8}

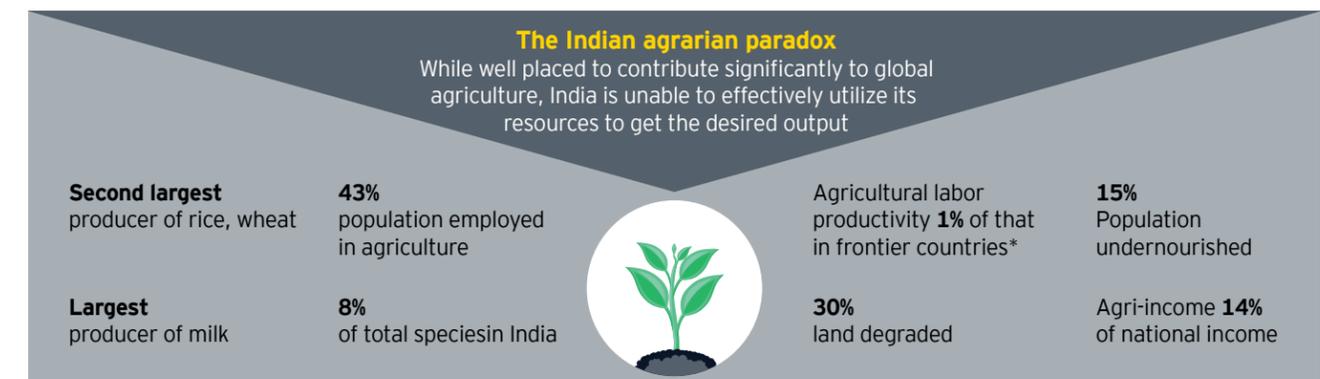


*Agri inputs includes seeds, crop protection and nutrition and farming equipment; Produce indicates total value of crop and animal production using constant 2004-2006 global average farmgate prices, in \$1000 purchasing-power-parity dollars; Transform and Make is the size of the Food processing industry; Retail includes food retailing and food service

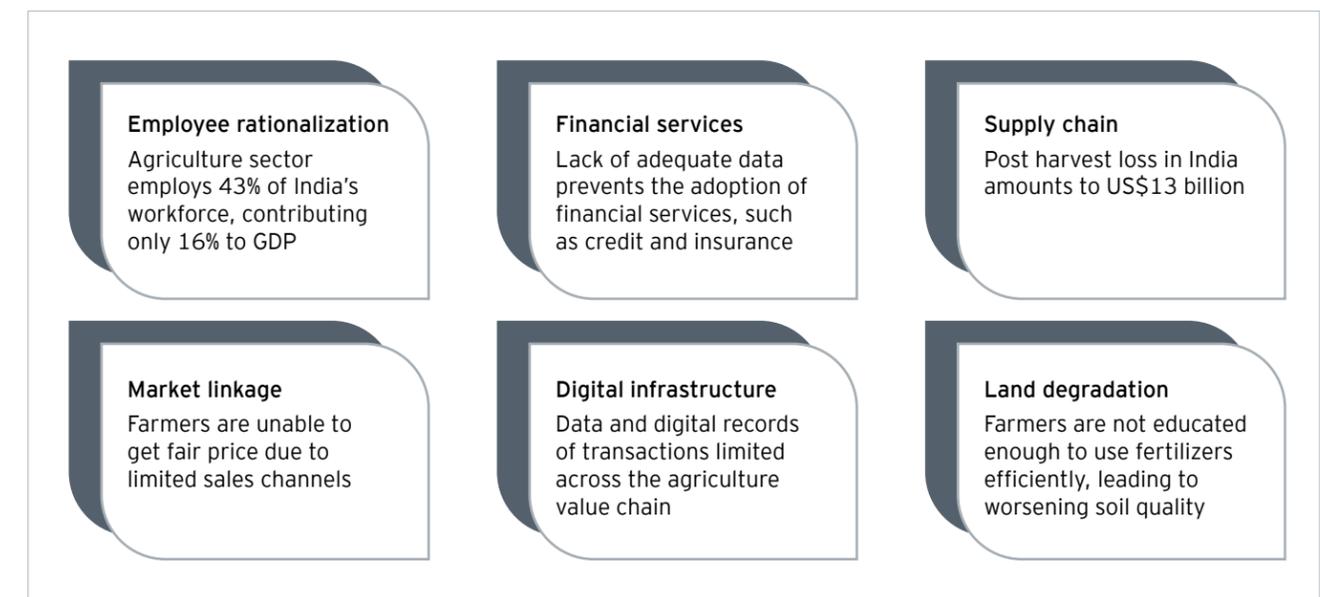
Challenges in the sector offer an imperative for technology-led interventions to disrupt the market

India has been pursuing agricultural self-sufficiency since its independence. While achieving food sufficiency in production, India still faces concerns of resource-intensive agriculture and low farmer productivity resulting in poverty and undernourishment.

Agriculture employs around half of the country's workforce and uses three-fourths of the country's fresh water resources, however, it contributes only one-sixth of the GDP. This indicates a low worker productivity and an inefficient use of resources in the agricultural sector in India. This is due to the fact that a majority of agricultural production comes from small family farmers and stock breeders who do not have the capacity or necessary technological support to improve farm efficiency.



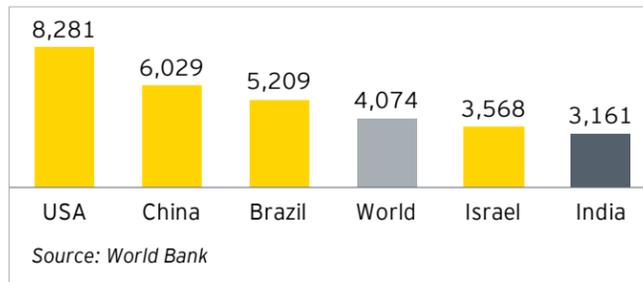
The unorganized and fragmented nature of Indian agriculture coupled with challenges such as lack of infrastructure, supply chain inefficiencies and low digital adoption holds back the sector from performing to its full potential. Below are some aspects of Indian agriculture that need to be addressed⁹.



Several challenges are inhibiting Indian agriculture from reaching its full potential and rapid adoption of digital technologies will be pivotal towards addressing these challenges

Note: * Frontier countries include pre-emerging markets that are more developed than the least developed countries, but too small, risky, or illiquid to be generally considered an emerging market

Figure (V) : Cereal yield (kg per hectare)



As an example, agricultural yield for cereals in India is lower when compared to its global peers.¹⁰ Widespread adoption of technology in agriculture will be pivotal in improving India's yields and helping achieve the government's aim of doubling farmers' income.

Key reform measures announced by the government are in the right direction

The central government plays a major role in shaping the agriculture sector through its regulatory frameworks and various support mechanisms. Recently, along with increasing farm output, the government has also been focusing on improving farmer incomes. The government has set a target to double farmers income from US\$1,481 per annum to US\$2,962 by 2022. More recently, after the COVID-19 impact on the agriculture sector, the government announced reforms to encourage private investments in the sector and support farmers.

Recent reforms announced for the agriculture sector

Reform	Details of the measure
Amendments to the Essential Commodities Act (ECA)	<ul style="list-style-type: none"> ▶ Stock limits on the produce can only be imposed under exceptional circumstances like national calamities or a famine (for cereals, pulses, edible oils, oilseeds, potato and onion) ▶ The stock limit would not be applicable to processors and other value chain participants <p>What it can accomplish</p> <ul style="list-style-type: none"> ▶ Reduce risk on investments in infrastructure, thus encouraging private investment in areas such as warehousing, post-harvest infrastructure and cold chain storage
Reforms for the produce selling process	<ul style="list-style-type: none"> ▶ Under the proposed reforms, ~146 million farmers and cultivators would be allowed to sell their produce to any person/organization anywhere in the country with a PAN card ▶ This would remove state-wise restrictions for farmers where they could sell their produce only to state mandis, regulated by the APMCs <p>What it can accomplish</p> <ul style="list-style-type: none"> ▶ More incentives and lesser overall cost for aggregators and agritech start-ups that procure produce from farmers to sell to wholesalers and retailers and dismantling of the APMC monopoly ▶ Better expected returns and transaction transparency for the farmers, depending on the price they can negotiate
The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Ordinance, 2020	<ul style="list-style-type: none"> ▶ The ordinance provides a legal basis for farmers to enter into contract farming practice ▶ A farmer can enter into a written agreement with a buyer which specifies terms and conditions of quality, grade, time of supply price and extension service (for a period of one to five years) ▶ The price of the produce has to be a part of the agreement. For any additional amount over the agreed price, the prevailing price in APMC will be the benchmark <p>What it can accomplish</p> <ul style="list-style-type: none"> ▶ Better prices and returns for the farmers with higher transparency on the contracts and terms ▶ Better safeguards for farmers due to formalized contracts and pricing arrangements



FPOs* are a step in the right direction towards increasing incomes for small and marginal farmers, however execution remains a challenge. Government should offer policy support to integrate warehouse storage facilities with FPOs for farmers.

Rajeev Kaimal, Co-founder & MD at PayAgri

02

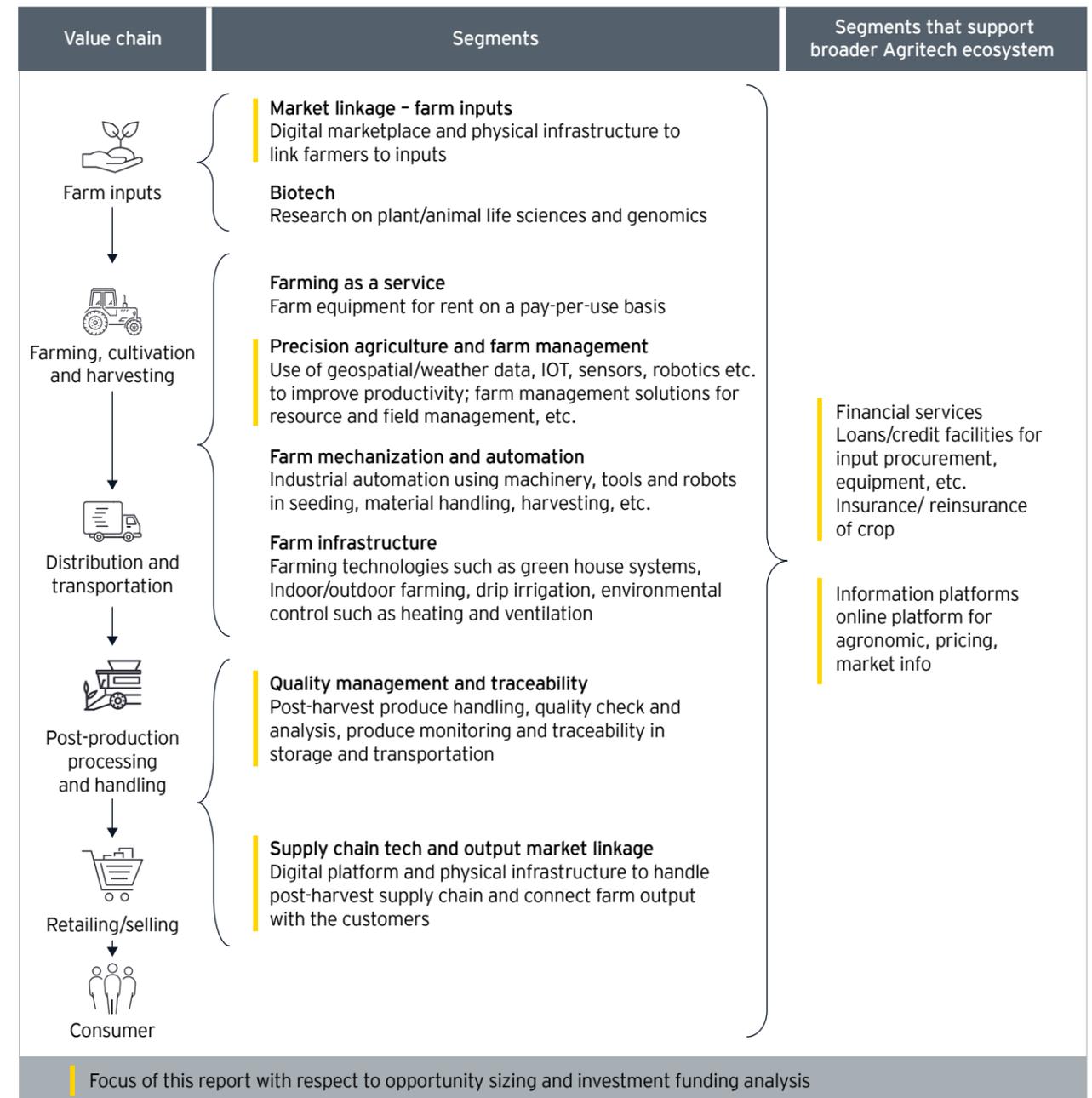
Unlocking value from agriculture through agritech



AgriTech market can be segmented across each stage of the agriculture value chain

What is agritech?

While the definition of agritech could be very broad depending on the stakeholder. Our definition comprises of an ecosystem of companies that are leveraging technology to provide products or services for increasing overall performance (yield), efficiency (time/cost) and profitability (revenue/ROI) for farmers across the agriculture value chain. Specifically, the current study includes the application of technologies such as data digitization and data platforms, data analytics, AI, ML and SaaS.



Numerous technologies are being leveraged by agritech players to drive efficiencies

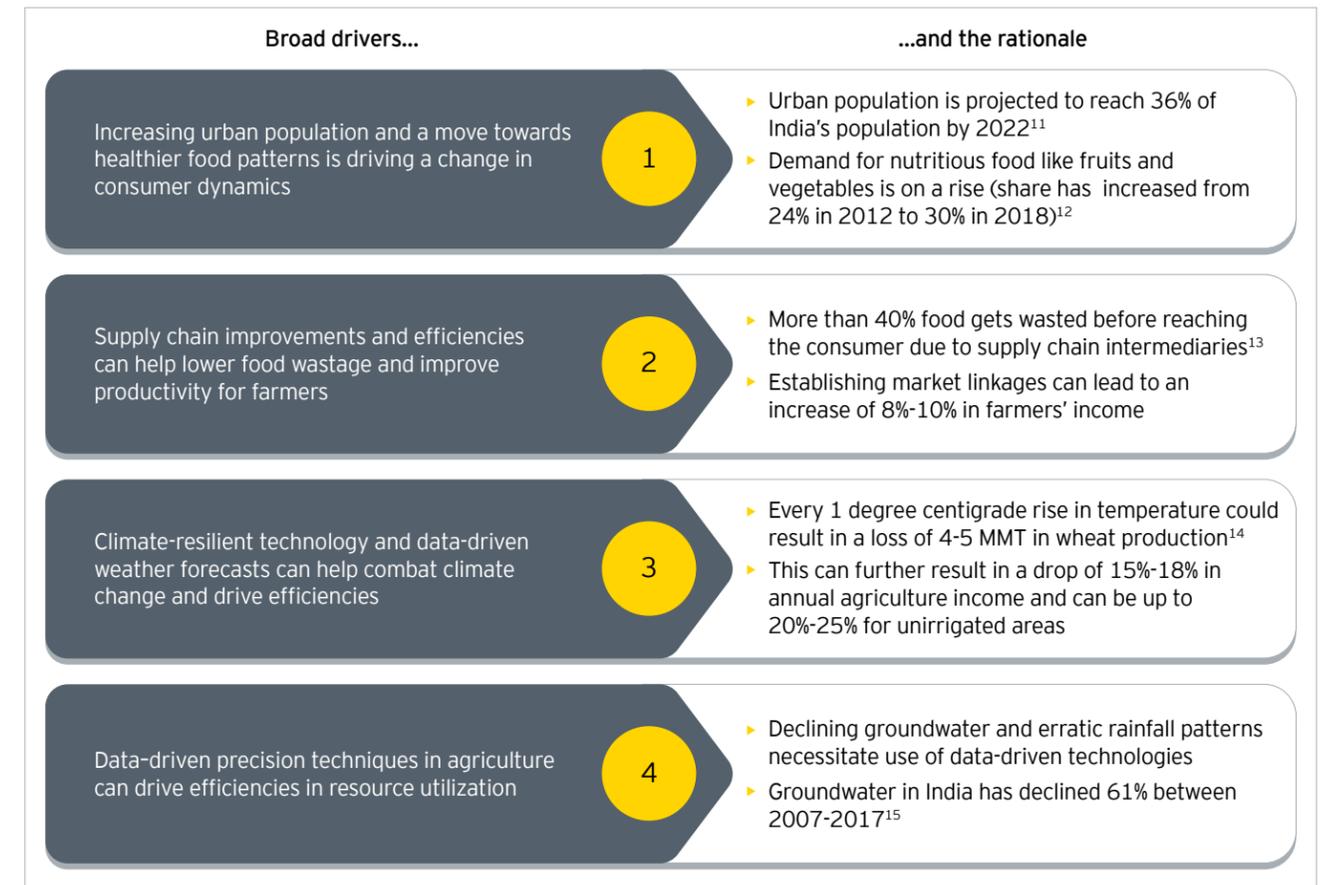
Use cases for leveraging technology across segments

Segment	Description	Challenges addressed	Illustrative players
 <p>Data analytics and machine learning</p>	<ul style="list-style-type: none"> Precision agriculture and farm management Financial services 	<ul style="list-style-type: none"> Improved productivity through insights on weather and soil health Data and insights to guide use of resources, such as water and labour Risk models to predict farmers' credit profiles 	<p>CropIn BharatAgri</p>
 <p>Data and platforms for price transparency</p>	<ul style="list-style-type: none"> Market linkage - farm inputs Supply chain tech and output market linkage 	<ul style="list-style-type: none"> Better returns for farmers through higher transparency and online platforms for price discovery for inputs and outputs 	<p>DeHaat BigHaat</p>
 <p>Imaging and AI to monitor crop quality</p>	<ul style="list-style-type: none"> Quality management and traceability 	<ul style="list-style-type: none"> Crop quality monitoring and improvement through imaging or AI Automation in output grading and yield classification 	<p>Intello Labs Agricx</p>
 <p>Platforms for produce traceability</p>	<ul style="list-style-type: none"> Supply chain tech and output market linkage 	<ul style="list-style-type: none"> Increased visibility and transparency across supply chain Better data in emergency situations 	<p>SourceTrace Frontalrain</p>
 <p>Robotics and drones for cultivation/harvesting</p>	<ul style="list-style-type: none"> Farm mechanization and automation 	<ul style="list-style-type: none"> Help overcome labor shortage Improve time to market for produce 	<p>TerraCroit Tartan Sense</p>

Use cases for leveraging technology across segments

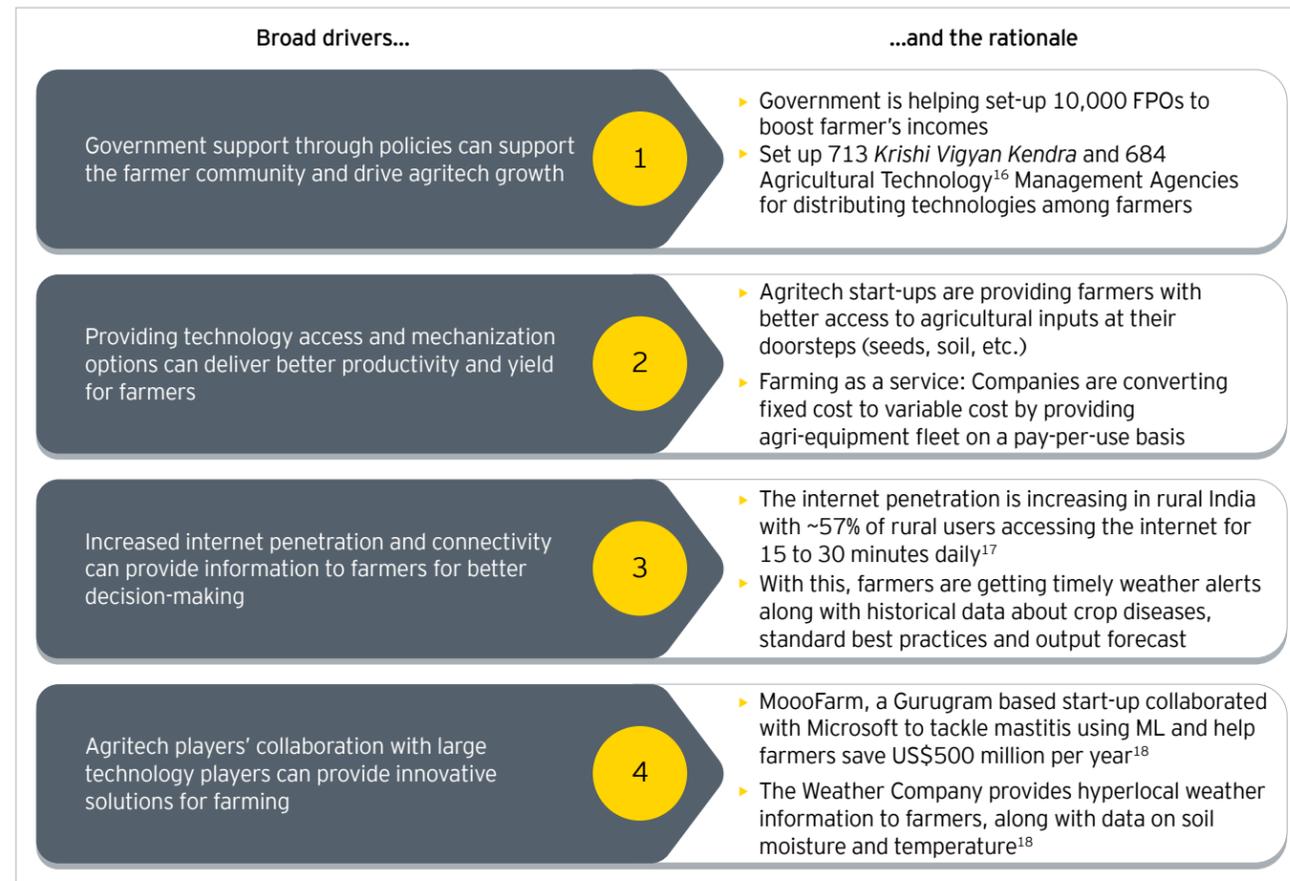
Evolving consumer behaviour and supply chain efficiencies are key demand drivers for agritech

Innovations in the agriculture sector are changing the way food has been grown and distributed. These innovations were triggered by factors including climate change, reduction in water availability, continuous increase in tolerance of pests to crop protection measures, decrease in quality of soil due to unsustainable farming and labor shortage.

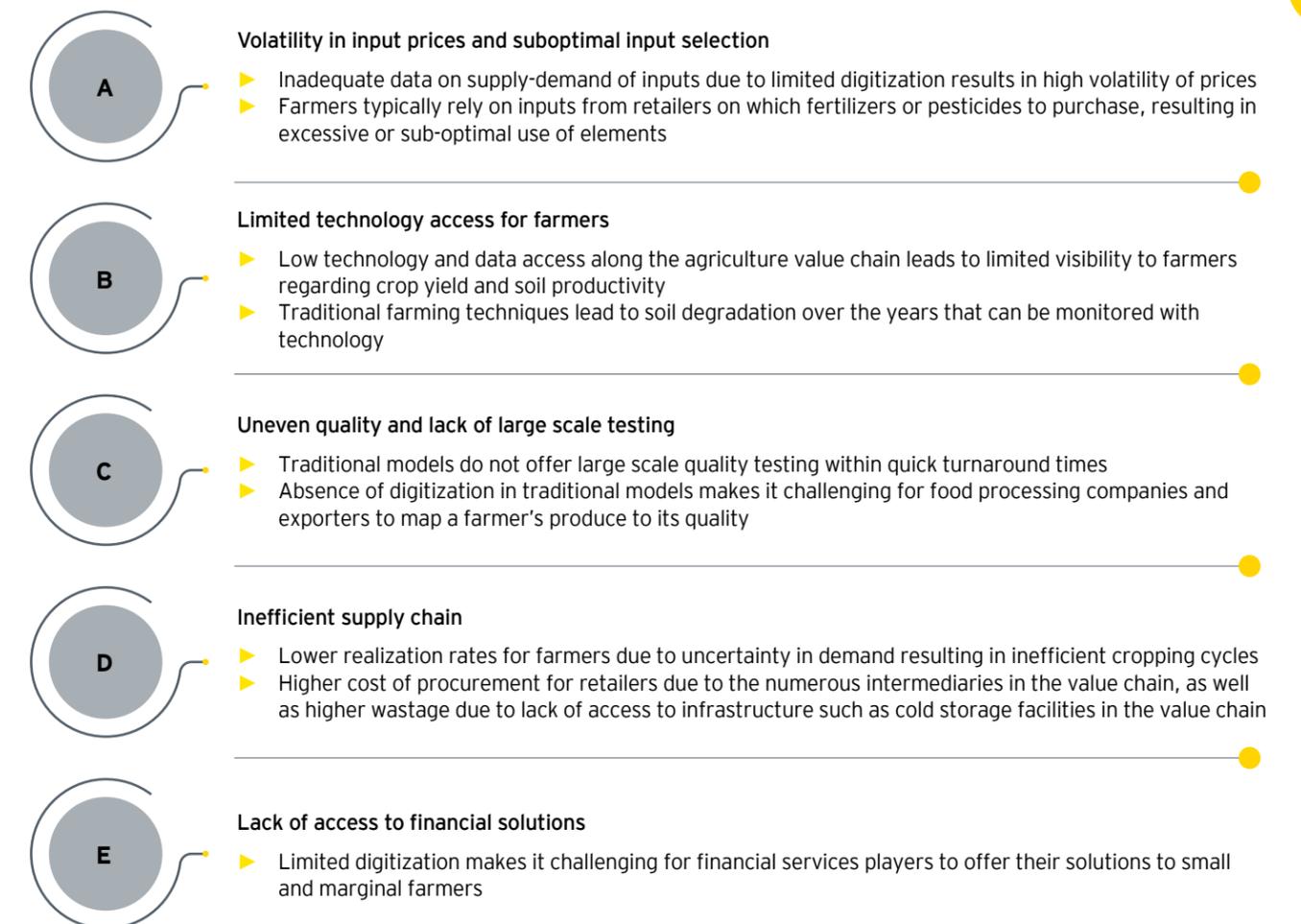


Government support and improved digital infrastructure are key supply side drivers

Over the last few years, the government has provided increased support to farmers through policies and given an impetus to the agritech sector. Increased connectivity amongst farmers is also leading to availability of more information for decision making.



A few key pain points exist along the agriculture value chain



Agritech companies are addressing these pain points through new business models

Business models in the agritech space could be trifurcated into:

- ▶ **Margin-based model:** Segments such as “market linkage - farm inputs” and “supply chain tech and output market linkage” operate through this model where the agritech player earns margin by creating marketplace linkages at the input or output side, and by offering fulfilment services
- ▶ **Subscription-based model:** Agritech players in “precision agriculture and farm management”, “quality management and traceability” segments offer a mix of hardware, software and services based solutions across the year and levy monthly or annual subscription charges from their customers
- ▶ **Transaction-based model:** Players in the “financial services” segment deal follow a transaction-based pricing model based on the number of loans or insurance policies served

A Market linkage - farm inputs : Addresses volatility in prices and sub-optimal input selection

<p>Traditional model</p>	<p>Figure VI: Price of tomato seed at various stages of the value chain (indexed)</p>
<p>Agritech model</p>	<p>Players which enable farmers to purchase farm inputs such as seeds and agrochemicals through online marketplaces</p> <p>Figure VII: Price of tomato seed at various stages of the value chain (indexed)</p> <p>Source: Industry discussions, EY analysis</p>
<p>Strengths and path to scalability</p>	<ul style="list-style-type: none"> ▶ Agritech player procures directly from the manufacturer / first level distributor and leverages its own network of warehouses to offer the same product at a nominally cheaper price point to retailer (and indirectly the farmer) ▶ Agritech players can make data-led decisions to accurately predict supply and demand of inputs and therefore, offer inputs at prices with lower uncertainty than traditional models ▶ Scalability in this segment depends on the player’s ability to offer credit to farmers for their working capital management without displacing traditional distribution model, and the player’s ability to offer advisory on selecting the right inputs
<p>Illustrative players</p>	<p>DeHaat, BigHaat, EM3, Gramophone, UGAOO</p>

Start-ups in the market inputs segment need to build trust with the farmers and work with intermediaries and dealers, instead of thinking of replacing them. Providing access to credit for working capital management is also critical in the input linkages segment.”

“There is a need for customised lending solutions for farmers and credit needs to be provided to them at affordable rates through sachet loans and value financing models.

Jinesh Shah, Founder & Managing Partner, Omnivore

B Precision agriculture and farm management solutions: Addresses low technology access

<p>Traditional model</p>	<p>Crop selection is based on what farmers used to sow historically or based on anecdotal data on which crops are expected to yield higher in the given year</p>															
<p>Agritech model</p>	<p>Players in this space offer the below solutions:</p> <ul style="list-style-type: none"> ▶ Collect data such as soil samples, weather, socio-economic parameters, using sensors, drones, satellite imagery, etc. ▶ Organize data through digital applications and run analytics and data science algorithms to create micro-profiles of farms ▶ Offer recommendations to the farmer to improve realizations through better crop selection and improve yields and control costs through better input selection <p>Figure VIII: Illustrative business model of a player in the space</p> <table border="1"> <thead> <tr> <th></th> <th>Farmer</th> <th>Retail collection center</th> <th>Testing labs</th> <th>Agritech player</th> </tr> </thead> <tbody> <tr> <td>Pays</td> <td>INR 1,500-2,000 per year for testing</td> <td>Pays to logistics companies to transport soil samples</td> <td></td> <td>Pays to collection centres and testing labs</td> </tr> <tr> <td>Receives</td> <td>Receives inputs on crop and input selection</td> <td>Receives commission for collection (5-8%) and lead generation (~20%)</td> <td>Receives revenue of INR 600 - INR 800 per test</td> <td>Receives INR 1,500-2,000 from farmer annually</td> </tr> </tbody> </table> <p>Source: Industry discussions, EY analysis</p>		Farmer	Retail collection center	Testing labs	Agritech player	Pays	INR 1,500-2,000 per year for testing	Pays to logistics companies to transport soil samples		Pays to collection centres and testing labs	Receives	Receives inputs on crop and input selection	Receives commission for collection (5-8%) and lead generation (~20%)	Receives revenue of INR 600 - INR 800 per test	Receives INR 1,500-2,000 from farmer annually
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<p>Strengths and path to scalability</p>	<ul style="list-style-type: none"> ▶ Precision farming could lead to an improvement in yield by more than 30% ▶ Establishing trust with farmer community and developing risk sharing models to mitigate affordability constraints are critical towards scaling up the model 															
<p>Illustrative players</p>	<p>DeHaat, BigHaat, CropIn, SatSure, AIBONO, FarmERP, Fasa, Stellapps</p>															

For farmers to invest in precision agriculture practices, there need to be incentives in terms of risk sharing/ buy-back models or contract farming initiatives

Rema Subramanian, Co-Founder & Managing Partner, Ankur Capital

C Quality management and traceability: Addresses uneven quality and lack of testing

Traditional model	Produce is tested in limited quantities at laboratories, which has a turnaround time of two to three days, and is expensive (INR 2,000 - 3,000 per test)
Agri-tech model	<ul style="list-style-type: none"> ▶ Players which conduct quality testing of agricultural produce through <ul style="list-style-type: none"> ▶ imagery based technology such as Optical Character Recognition (OCR) embedded in mobile applications to assess the quality externally ▶ chemical analysis using dedicated hardware to detect chemicals such as pesticides ▶ hyperspectral analysis to test internal damages in the produce ▶ Players which offer SaaS based platforms to trace produce across the post-harvest value chain <p>Figure VIII: Illustrative business model of a player in the space</p> <p>Source: Industry discussions, EY analysis</p>
Strengths and path to scalability	<ul style="list-style-type: none"> ▶ Farmers with high quality produce are rewarded with higher realizations, while food processing companies get access to quality produce ▶ Scalability depends on the Agri-tech player's ability to forge partnerships with both farmer producer organizations (on supply) and food processing companies (on demand)
Illustrative players	SourceTrace, Intello Labs, Agricx

Opportunities exist across the value chain, and there is scope for technology interventions in infrastructure, logistics, and quality management for agriculture. Traceability and food safety are also going to be important after Covid-19 situation. Technology can help improve returns for farmers and overall produce quality for consumers.

Emmanuel Murray, Caspian Investments

Computer Vision/AI has the potential to drive 80-85% of the quality inspection needs across the channel and crop types.

Saurabh Kumar, Founder & CEO, AgricxLab

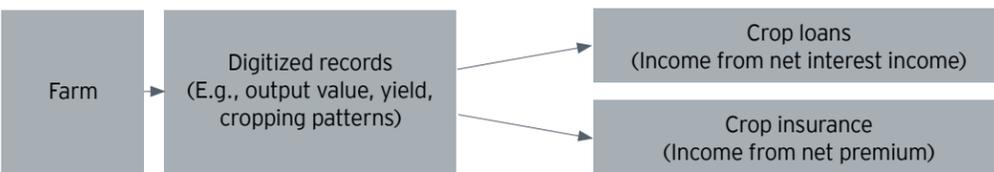
D Supply chain tech and output market linkage: Addresses inefficiencies in supply chain

Traditional model	<p>Figure X: Price of onion at various stages of post-harvest value chain (indexed)</p> <p>Source: Industry discussions, EY analysis</p>
Agri-tech model	<p>Players which realize efficiencies in post-harvest supply chain through technology and disintermediation of middlemen to offer better realization for farmers as well as cheaper cost of procurement to retailers</p> <p>Figure XI: Price of onion at various stages of post-harvest value chain (indexed)</p> <p>Source: Industry discussions, EY analysis</p>
Strengths and path to scalability	<ul style="list-style-type: none"> ▶ Higher effective realization for farmers due to efficient demand estimation and lower effective cost to retailers due to efficient supply chain and lower wastage ▶ Scalability depends on the agri-tech player's ability to consistently maintain the quality of produce through quality management
Illustrative players	Farmzen, Waycol, Crofarm, Cropin, Ninjakart, Dehaat, Jumbotail, Farmlink

Price discovery is an important value proposition for players in the market; agricultural commodities have volatile pricing and it can be predicted by leveraging data.

Shashank Kumar, Co-founder, DeHaat

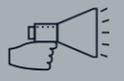
E Financials services: Addresses the lack of access to financial solutions

Traditional model	Banks and insurance companies traditionally cater to the needs to semi-medium, medium and large farmers
Agritech model	<p>Players which offer financial services such as crop loans and crop insurance by leveraging technology to accurately assess the farmer's risk profile</p> <p>Figure XII: Illustrative business model of a player in the space</p>  <p>Source: Industry discussions, EY analysis</p>
Strengths and path to scalability	<ul style="list-style-type: none"> ▶ Access to organized lending to ~30% of farming households and crop insurance to ~65% of farming households ▶ Players need to first develop risk profiles of farmers through digitization of their records before offering lending or insurance solutions ▶ Agritech players will also need to develop lending models which are customized for farming segments (e.g., sachet loans)
Illustrative players	PayAgri, Samunnati, CropIn, FarMart, Gramcover

“An emerging opportunity area for market inputs and output players is to venture in the financial services space and provide loans to farmers by leveraging the data they have collected in the market.

Venkat Maraju, CEO, SourceTrace

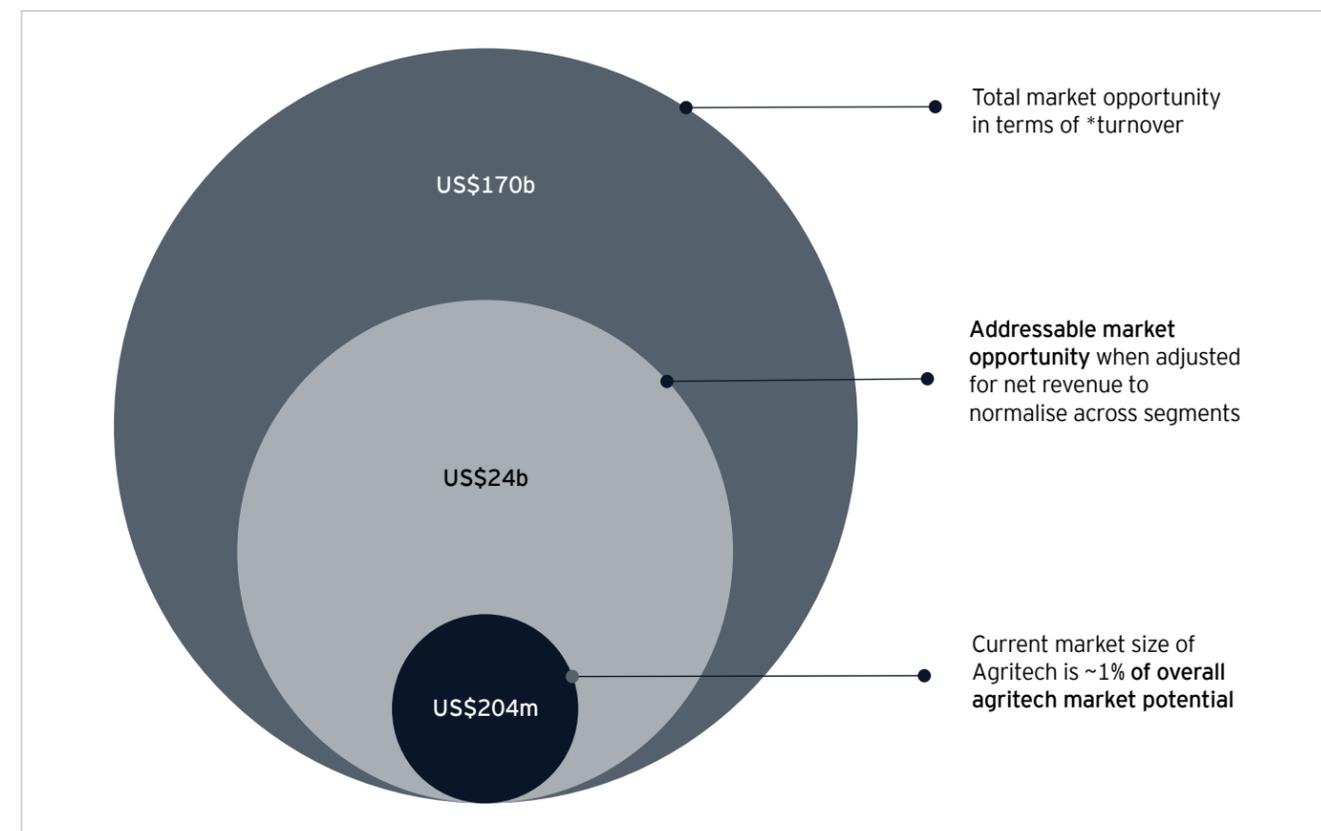
Other agritech companies are also addressing challenges faced in traditional agriculture models

Segment	Description	Challenges addressed	Illustrative players
 Biotech	<ul style="list-style-type: none"> ▶ Research on plant and livestock animal life sciences such as gene editing 	<ul style="list-style-type: none"> ▶ Low crop yield due to low-quality inputs ▶ Pest and crop disease control 	Nuziveedu Seeds Advanta
 Farming as a service	<ul style="list-style-type: none"> ▶ Renting out or providing farm equipment on a pay-per-use model 	<ul style="list-style-type: none"> ▶ High capital expenditure for farm equipment ▶ Utilization and idle time for equipment 	EM3 TRRINGO Gold Farm
 Farm mechanization and automation	<ul style="list-style-type: none"> ▶ Industrial automation using machinery, tools and robots in seeding, material handling, harvesting, livestock/aqua rearing 	<ul style="list-style-type: none"> ▶ Labor shortage in peak season ▶ Labor cost and productivity issues 	GRoboMac Tartan Sense TerraCroit
 Farm infrastructure	<ul style="list-style-type: none"> ▶ Components for farming technologies such as green house systems, indoor/outdoor farming, aquaponics, etc. 	<ul style="list-style-type: none"> ▶ Low crop yield ▶ Seasonality and inconsistency in inputs and produce 	Flybird Urban Kissan
 Information platforms	<ul style="list-style-type: none"> ▶ Online platform for agronomic, pricing, market info ▶ Insights informing better farm outcomes through data (e.g., weather, performance data, social media) 	<ul style="list-style-type: none"> ▶ Limited access to market information for farmers ▶ Lack of transparency in transactions 	KisanHub

Indian agritech market potential is estimated at ~US\$24b; current market penetration is ~1% ...

Agritech market opportunity is spread across multiple segments, therefore, assessing the market potential for each segment is critical to understand the headroom left for growth in this sector. A bottom-up approach has been used across each segment to first estimate the size as well as growth of the underlying market (e.g., agricultural output is the underlying market for "Supply chain tech and output market linkages" segment). Constraints such as relevance of the corresponding segment towards serving the needs of small and marginal farmers are used to further estimate the addressable market potential for the segments.

Figure (XIII): Market opportunity in agritech



Intermediaries in the agriculture value chain have built trust with farmers over generations and Agritech players need to therefore aim to enable these intermediaries through technology-led solutions instead of work with a mindset of replacing them. Creating a partnership oriented approach is the most effective way to enhance value and scale this sector to serve the growing needs of both farmers and consumers. Such technology-led interventions and on ground partnerships present an opportunity of ~US\$25b.

Nukul Upadhye, Cofounder, Bijak

Just ~1% of the market potential has been tapped, implying a large opportunity to expand

Note: * Turnover includes the value of seeds, fertilisers and pesticides within inputs segment, Gross income from whitespaces in crop loans and crop insurance, and value of produce from cereals, pulses, oilseeds, spices & condiments, and fruits & vegetables within output linkages segment

...with market linkages (output) and financial services contributing ~65% of the market potential

Figure (XIV): Market potential for agritech segments

Segment	Market potential	Key assumptions
 Market linkage - farm inputs	US\$1.7b	<ul style="list-style-type: none"> Market for agri-inputs (seeds, fertilizers and pesticides) is estimated at US\$21.0b in 2025 Agritech players in this space typically earn a margin of ~8% on the value of agri-inputs
 Precision agriculture and farm management	US\$3.4b	<ul style="list-style-type: none"> On a bottom-up basis, total base of farm units (projected at 169m in 2025) has been considered. Subsequently, an ARPU of US\$20 per farm unit has been applied to estimate market potential From a top-down perspective, North America's penetration of precision agriculture to its GVA for agriculture (0.7%) has been applied to India's projected GVA for agriculture in 2025
 Quality management and Traceability	US\$3.0b	<ul style="list-style-type: none"> Market for rapid quality testing in North America stands at 0.5% of agriculture GVA. India's total market potential has been projected at similar penetration Market for source traceability has been projected by applying an annual ARPU of US\$3 over the base of farm holdings in India
 Supply chain tech and output market linkage	US\$12.0b	<ul style="list-style-type: none"> Value of agricultural output from fresh produce (fruits & vegetables), cereals, pulses, oilseeds, and spices & condiments is projected at US\$406b Addressable market has been filtered by applying the share of urban areas for demand generation (33%). A blended margin of 8% has been applied on addressable turnover to estimate the net revenue for Agritech players
 Financial services (for farming communities)	US\$4.1b	<ul style="list-style-type: none"> Market for lending has been projected by estimating the loan book from informal lending in farmer units (30% farmers). Average ticket size of INR1.5l has been applied over a Net Interest Margin of 3% to estimate net income Market for crop insurance has been projected by estimating the whitespace from current insurance (65% of farmers unserved)
Total market potential	US\$24.1b	

Source: EY analysis

Government initiatives and incubators are supporting the agritech start-up ecosystem

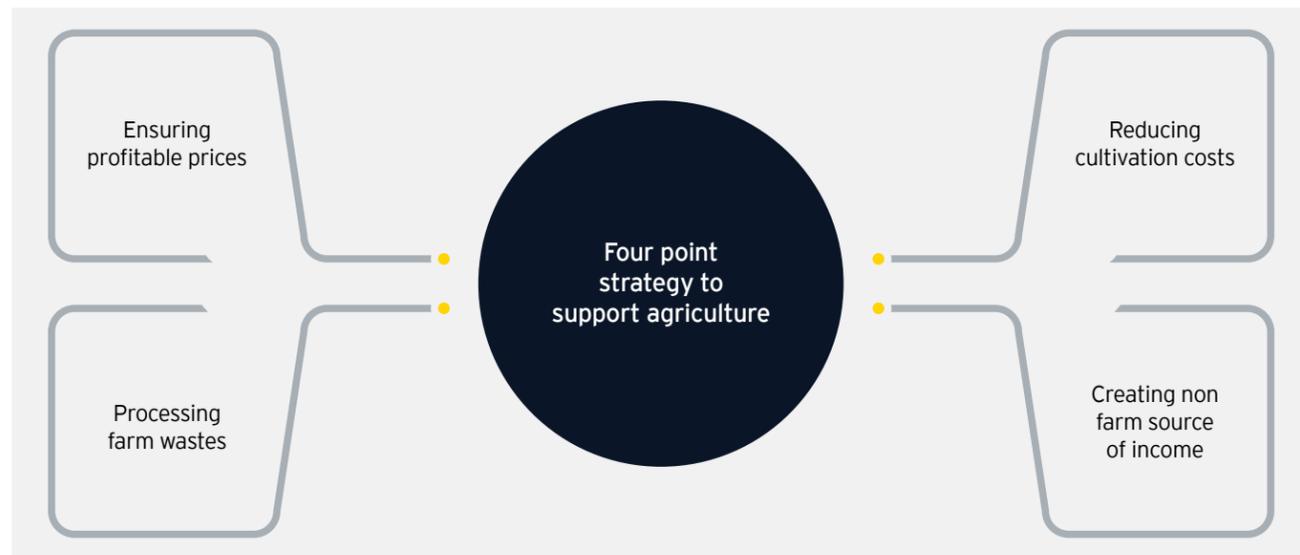
The agritech ecosystem comprises of various think tanks, research labs, government, incubators and accelerators.

Policy support¹⁹

Indian Government offers multiple incentive schemes to support start-ups in agriculture and technology such as Aspire and AIM* among others. The government has come up with a four point strategy to support agriculture in India.

The Government of India has taken several initiatives to develop the sector. These include distributing 100 million Soil Health Cards* (SHCs) offering crop-wise recommendations of nutrients and fertilizers during 2015-17 and a soil health mobile app to help Indian farmers. The government also launched Pradhan Mantri Krishi Sinchai Yojana with an investment of US\$7.7 billion aimed at development of irrigation sources.

Figure (XV): Government strategy

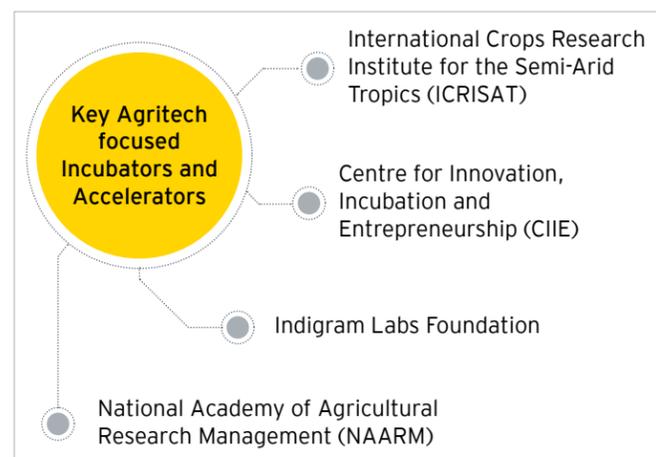


The government has also set up **National Agriculture Market (eNAM)** in 2016, which is a pan-India electronic trading portal to connect existing APMC mandis. eNAM helps remove information asymmetry between buyers and sellers, and promotes real-time price discovery for commodities by listing the min/max price for commodities based on the supply/demand dynamics. As of today, 1000 markets in 18 Indian States and 3 UTs have been integrated and over 90 commodities have been incorporated for listing and trading on the eNAM platform.

Incubators and accelerators²⁰

Goa has an agri-focused incubator called Centre for Innovation and Business Acceleration (CIBA). TIE (Tie Young Entrepreneurs) Bangalore and start-up accelerator NUMA have held start-up showcases in collaboration with Villgro, featuring agri-entrepreneurs. The Indian Society of Agribusiness Professionals (ISAP) has set up more than 1,800 agri-based ventures through its Agri-Clinics and Agri-Business Centres (ACABC) programme and has around 50 agri-business experts in various verticals who help in mentoring incubates.

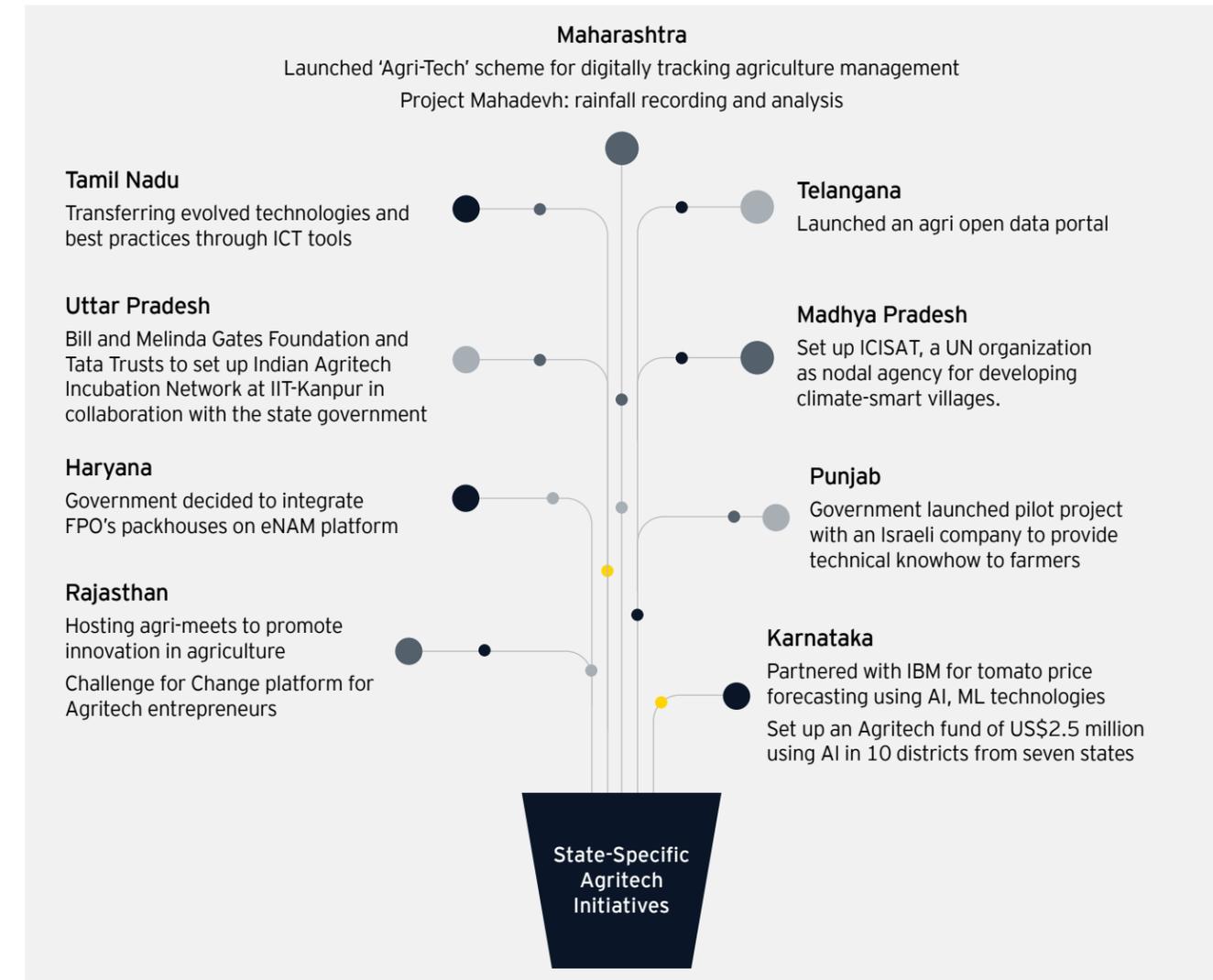
Figure (XVI): Key Agritech focused Incubators and Accelerators



State governments have also started to implement localized agritech solutions

Various Indian states are also setting up policies to accelerate the growth of agriculture start-ups. Some of these state-specific initiatives are highlighted below.

Figure (XVII): State-Specific Agritech Initiatives²¹



Soil health cards are prepared on an aggregate block/revenue division/village levels, but more localised data collection needs to happen to accurately assess soil health and improve yields.

Raj Kancham, Managing Director at Agribuddy India

Testing the efficacy of our data algorithms through 3rd party validators is expensive. The Government could increase the affordability of these trials by regulating prices at 3rd party validators or by giving us access to centralised research facilities.

Sai Gole, Co-founder at BharatAgri

03

Agritech - where do we stand currently

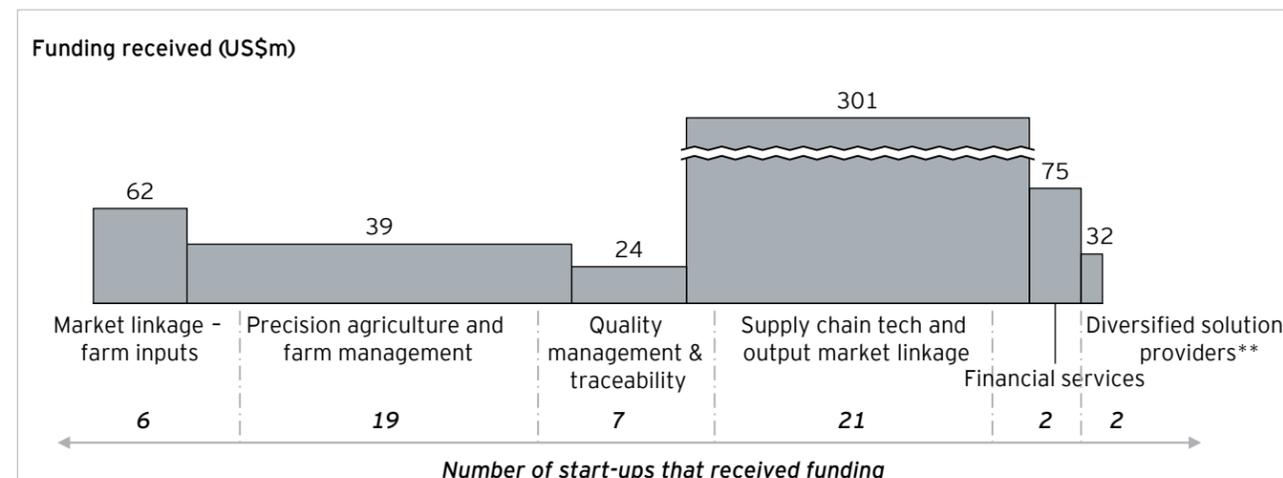


Investment activity in India is dominated by supply chain tech and output market linkage segment

The agritech segment in India is witnessing a number of upcoming start-ups, disrupting traditional methods of farming through organic farming, equipment rentals, connected supply chains and cloud-based analytics. The use of big data, IoT, AI, drones and ML are being harnessed for multiple applications, such as farmer decision support, precision farming and insurance claims assessment.

There are more than 500 agritech start-ups operating in India, out of which 57 start-ups in the segments addressed by this report have raised a total funding of US\$532 million with the "Supply chain tech and output market linkage" segment emerging as the top funded segment. Indian start-ups in this segment have raised over US\$301 million across 33 deals till date.²²

Figure (XVIII): Funding received by Agritech players as of April 2020*



Source: Secondary press coverage, EY analysis

Start-ups that have scaled up are gradually expanding their presence across segments. Such diversified solution providers aim to offer holistic solutions across the agricultural value chain by leveraging technology. For instance, Agrevolution (DeHaat) enables farmers to procure inputs, sell their produce and also receive information on efficient yield management.²³

Figure (XIX) : Top funded Agritech start-ups as of April 2020 (in US\$m)²⁴

Start-Up	Funding	Segment	Investor
Ninjacart	162.1	Supply chain tech and output market linkage	Tiger Global Management, ABG Capital, Steadview Capital
Samunnati	74.8	Financial services	Elevar Equity, responsAbility, Accel Partners, Nuveen
Waycool	64.9	Supply chain tech and output market linkage	Lightbox, LGT Lightstone Aspada, FMO bank
Agrostar	47.1	Market linkage -farm inputs	Bertelsmann India Investments, Accel, Chiratae Ventures
Jumbotail	25.3	Supply chain tech and output market linkage	Heron Rock, William R Jarvis, Cristina Berta Jones

Key segments that have attracted investor funding include: Supply chain tech and output market linkage, Financial services, Market linkage - farm inputs, and Precision agriculture and farm management

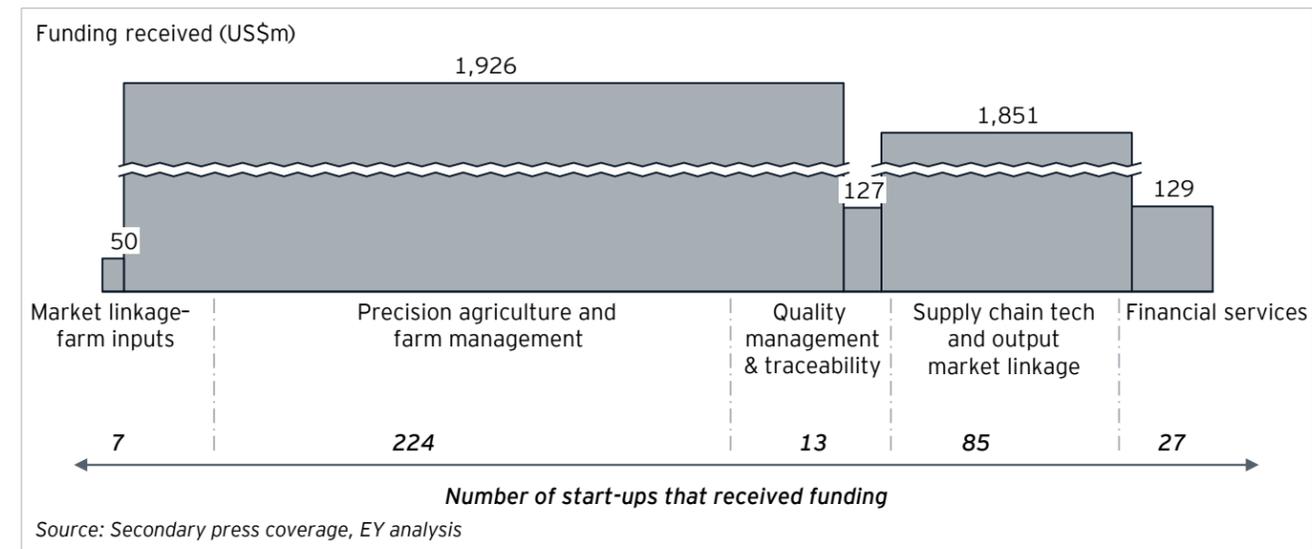
Notes: * Funding in the Supply chain tech & Output market linkages segment is skewed due to 3 players with US\$252m funding

** Diversified solution providers are players that operate across the value chain and in multiple Agritech segments

Internationally, however, precision agriculture and farm management leads in overall funding

Agritech is witnessing continued growth across key geographies in the world. As of April 2020, the global funding for the segments under consideration was US\$4,083 million (all countries excluding India) as compared to India's total funding of US\$532 million. In terms of leading geographies, China and North America received the highest funding. Due to heavy investments in technology in agritech around the world, the "Precision agriculture and farm management" segment leads the charge in terms of funding as well as the number of start-ups as contrasted with India where "Supply chain tech and output market linkage" is the leading segment.

Figure (XX): Funding received by global Agritech players as of April 2020*



The "Supply chain and output market linkage" segment is a close second in terms of funding. While the number of start-ups that received funding is lesser than the precision agriculture segment, the overall funding numbers are significantly higher than all other segments.

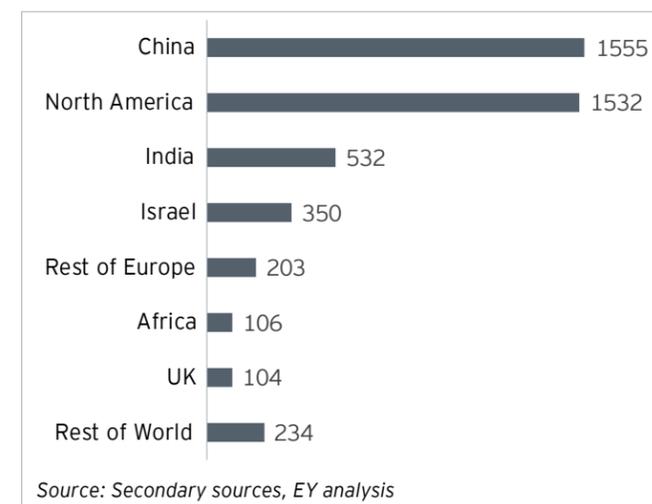
The "Financial services" segment has multiple players that are working to provide farmers with modern financing solutions using advanced technologies such as cryptocurrency and blockchain.

"Quality management and the Market linkage"-input segments are still at a nascent stage in terms of funding and the number of start-ups operating in the space, both globally as well as in India.

China and North America are relatively evolved geographies in agritech where players operate across segments and provide solutions across the value chain. Moreover, the technology leverage in agriculture is significantly higher in these countries.

While agritech funding and start-up infrastructure in India are growing at a fast pace, there is a lot to be done in terms of technological investments to take Agritech to a level that is comparable to global funding levels.

Figure (XXI): Top geographies by funding (US\$b, 2020)



Globally, the investments in technology in agriculture are far ahead than that in India; China and North America are leading the charge in funding numbers

* Note: Global funding in the farm inputs segment is concentrated towards production of seeds through biotech rather than digital marketplaces

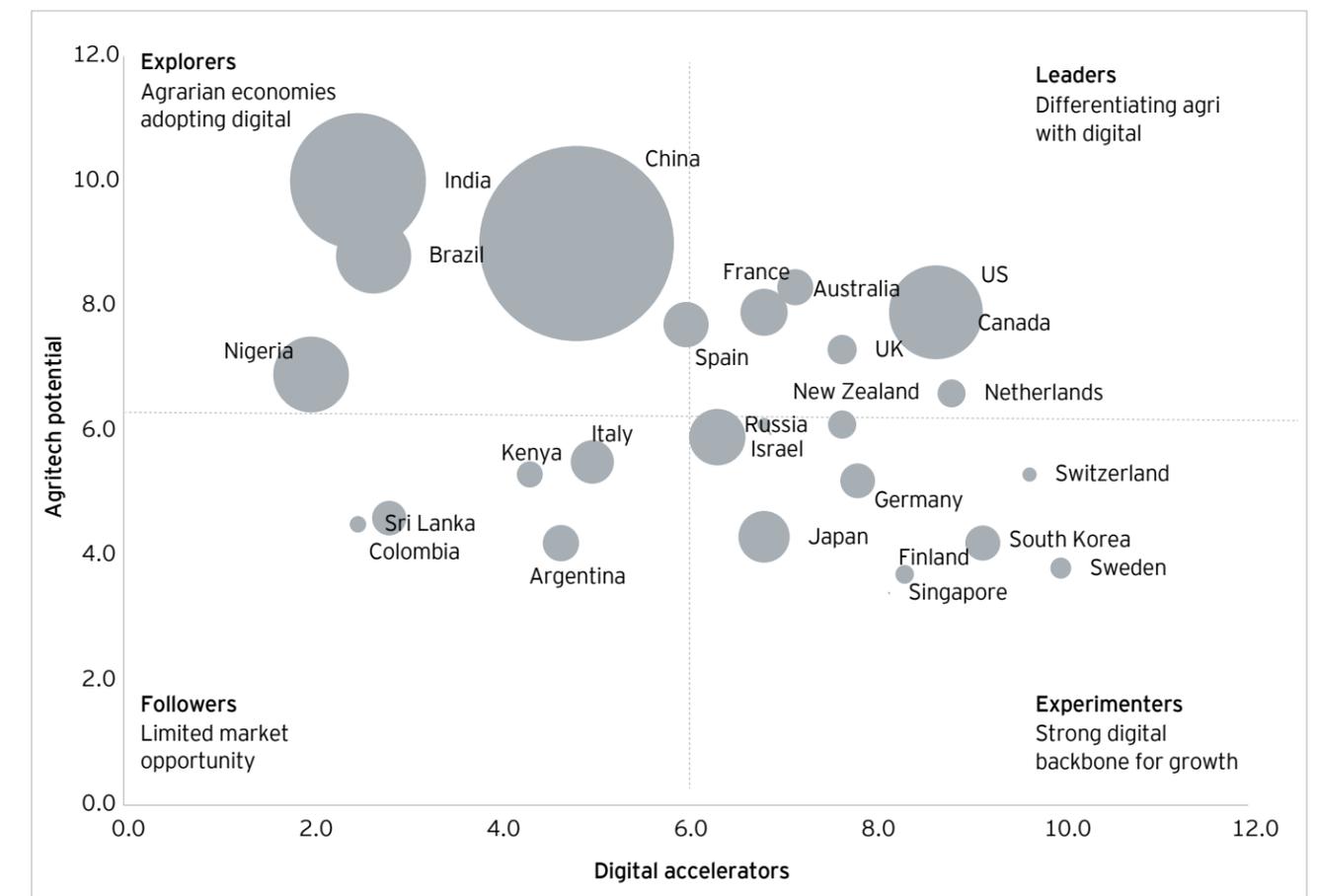
India's agritech market has significant runway for growth given the nascency of digital solutions coupled with the large base of agriculture sector

Multiple factors such as the size and significance of agriculture industry, its contribution to the country's economy and the robustness of the digital ecosystem define the agritech maturity of a country. With comprehensive research and market study, a global maturity matrix was developed to showcase the agricultural ecosystem of a country as compared to its digital capabilities. A combination of these metrics helps in presenting the potential of the market with respect to the present advancements in the technology adoption and deployments in the sector.

Leaders are the countries which have already deployed disruptive technologies within agriculture and include countries such as the US, the UK, Israel and Netherlands. Explorers include large agrarian economies such as India, China and Brazil which have the maximum growth potential through investments in Agritech sector. Experimenter countries have the advanced digital technologies to implement agritech solutions, but have relatively smaller market potential as a result of a small agriculture market. Followers are the countries where agritech is expected to have limited impact as a result of low market potential.

For detailed information on the segments, refer to the Appendix section.

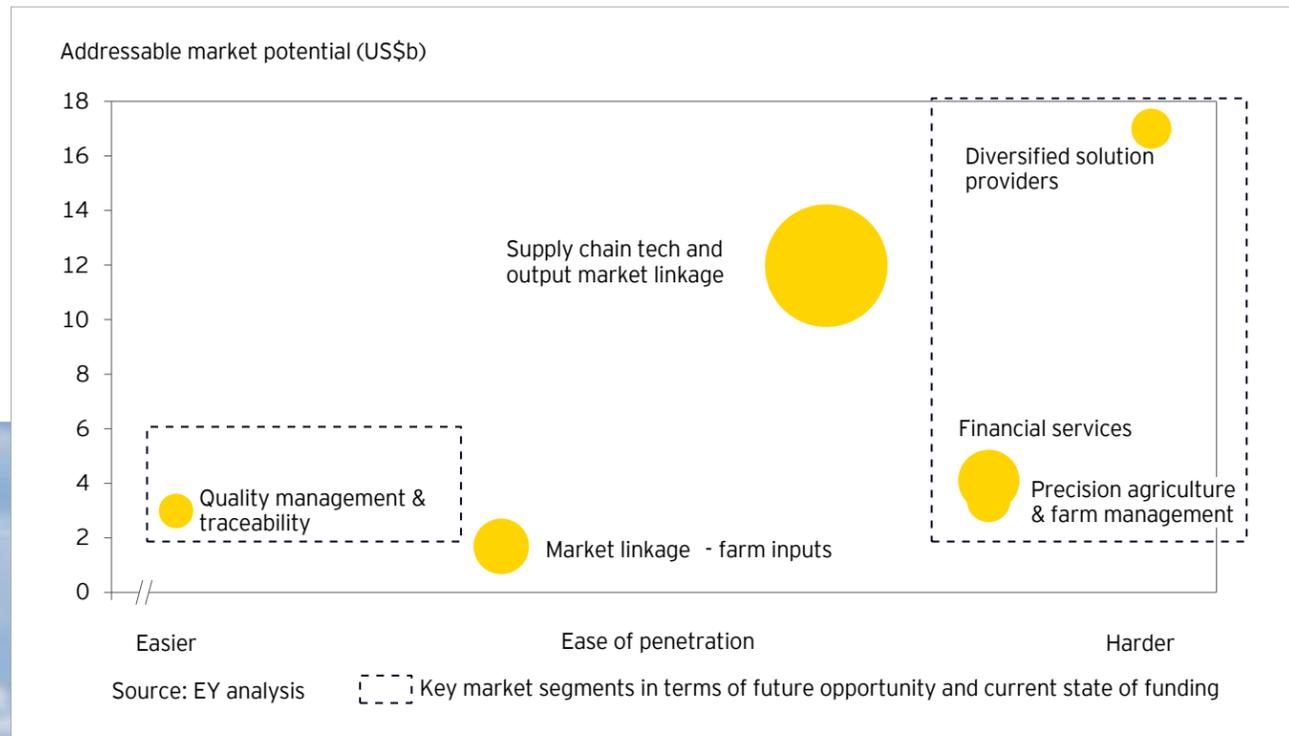
Figure (XXII): Country-wise Agritech Maturity Matrix



Note: Size of bubble indicates Gross Value Added (GVA) by agriculture sector in the respective country

Financial services, precision agriculture and farm management, and quality management and traceability could drive the next leg of growth in India's agritech

Figure (XXIII): Mapping of demand and supply within agritech ecosystem



Notes:
 1. Size of bubble indicates funding raised by agritech players in the segment
 2. Ease of penetration is estimated based on barriers to entry in the corresponding segment. Presence of organised players in the value chain, degree of perishability, requirement for expertise in R&D from a hardware and software point of view, and ease of scalability contribute to the score of the respective segment

Mapping of demand (in terms of market potential and ease of penetration) with supply (start-up funding across segments) provides the below insights:

- ▶ Diversified solution providers have the largest addressable market opportunity. As the agritech market matures, the market could witness a consolidation of start-ups across segments to offer one-stop solutions to farmers. However, players need to build capabilities across segments to realize this potential.
- ▶ An opportunity of US\$4.1b exists in the Financial services segment. The market has room for multiple players to establish their presence. Agritech players need to develop lending solutions which are different from existing urban lending solutions (e.g., sachet loans) to win in this segment.
- ▶ Precision agriculture and farm management offers a significant market potential of US\$3.4b, and has witnessed lower investment activity compared to supply chain tech and output market linkages segment. Start-ups need to offer comprehensive solutions in hardware, software and services to attract attention from investors in this segment. Start-ups also need to develop appropriate risk sharing models or engage in contract farming to solve the constraint of affordability in this segment.
- ▶ Players in market linkage - farm inputs segment need to provide credit to farmers to help them manage their working capital requirements. Further, players operating in this segment can attain scale by partnering with intermediaries such as distributors or retailers, instead of aiming to displace them.
- ▶ Quality management and traceability is also relatively under-funded and is attractive in terms of scalability if players manage to tie-up with FPOs and food processing companies to expand their footprint.



04

Learnings for India agritech from global markets



Learnings of best practices from leading countries will aid growth of agritech in India

While agritech in India has been receiving support from the government as well as start-ups in the country in the last 5-10 years, some of the learnings from countries that are ahead in their journey can help accelerate the growth of the segment:

Development of a robust agritech ecosystem

Agritech growth can be accelerated by building a robust ecosystem of multiple stakeholders including start-ups, technology providers, agricultural enterprises, research institutions and the government. This will help drive the implementation of cross-industry technologies and applications such as IoT, data-driven farming, chatbots, drone technology and precision agriculture to increase farm output and overall productivity levels, while maintaining cost efficiency.



Strong technology and R&D investments

A strong research and development base for technology innovations is essential to build the foundational blocks of agritech development. Israel and the US, for instance, have leveraged their strong capabilities in emerging technologies and further developed them through extensive R&D efforts. While Israel's research and development investment has helped the country establish a flourishing start-up ecosystem, farmers in the US have moved towards farm consolidation to realize the benefits of technology adoption at scale.



Cross-country collaboration for innovation

One of the ways to close the innovation and technology gaps in agritech is by leveraging cross-country collaborations to drive innovation. India and Brazil recently entered into a partnership promoting the exchange of agricultural technologies and expertise between both the countries. Brazil has also partnered with China and several African nations to help drive growth in the agritech segment, while focusing to develop the nation's core competencies in agricultural research and models such as green agriculture and marketplace model.



Favorable regulatory environment

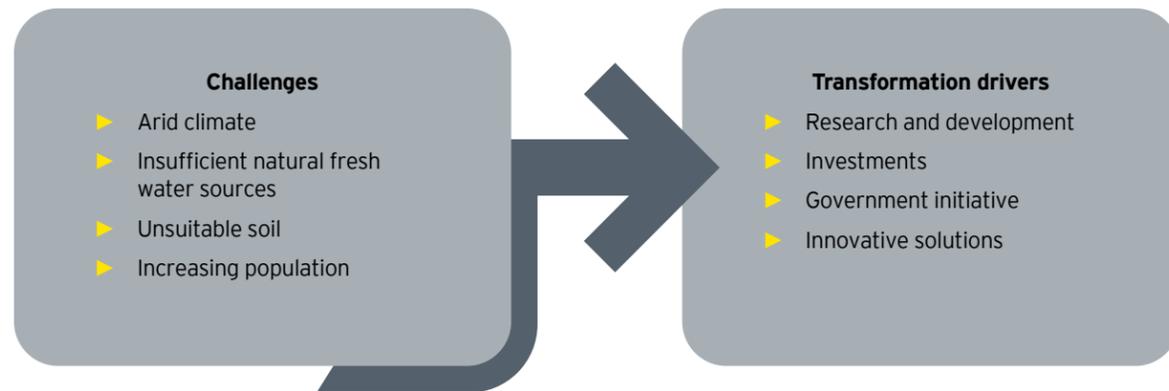
In conjunction with these strategies, government support is essential to create a favorable regulatory environment for agritech companies, ensure increased availability and accessibility of new-age technology to the farming community and promote agricultural research to build a strong agritech ecosystem.



Strong R&D base and government initiative driving Israel's agritech sector

Case study: Israel²⁵

Israel was among the early countries to have started on agricultural innovation. With an ever growing population and just 14% arable land, Israel has utilized its R&D capabilities to become a leading nation in agriculture.



Transformation drivers:

Research and development:

Heavy investment in education and research helped move the country towards a path of scientific innovations with the country now becoming a global R&D hub. Much of this research was focused on building agritech solutions to cater to the ever-increasing population of the country.

Investments:

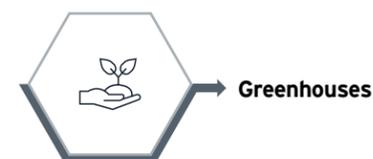
Israeli agritech start-ups raised over US\$592 million in 2019. These investments are providing an impetus to a large number of innovative agritech firms.

Government initiative:

- ▶ Yozma, an Israeli government initiative to invest in start-ups has proved to be a catalyst for Israel's venture capital industry
- ▶ Technological Incubator program, an initiative of Israel Innovation Authority, targets disruptive, early stage ideas that are deemed too risky for private investors

Innovative solutions:

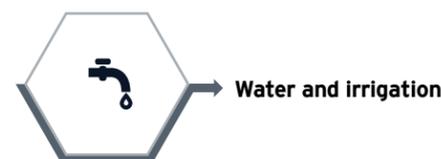
Some of the innovative solutions widely used in Israel include:



Greenhouses

Farmers have developed greenhouses that deal with ventilation, heating, efficient use of water and have resulted in increased crop quantities and improved crop quality.

Example, an Israeli greenhouse projects company is now supplying greenhouse structures, drip products, climate control systems to other countries including Vietnam.



Water and irrigation

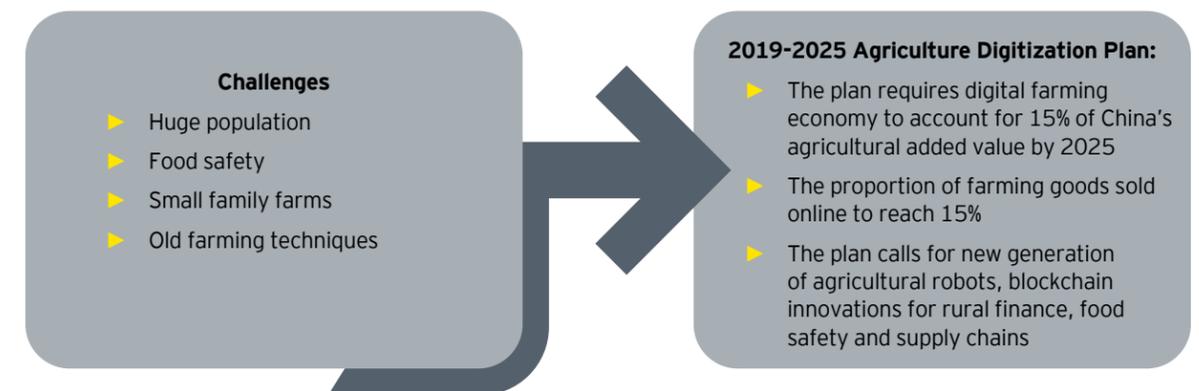
Drip irrigation which saves huge quantities of water and makes it possible to fertilize the soil, was first implemented in Israel.

Israeli products such as automatic valves, controllers, automatic filtration devices, low discharge sprayers and other irrigation systems are being used worldwide with exports accounting for 80% of the Israeli irrigation industry production.

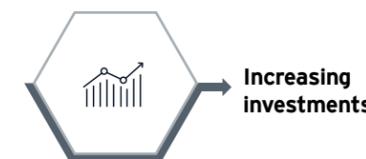
Technology giants and start-ups leading China's agritech growth from the front

Case study: China²⁶

With the responsibility to feed over one-fifth of the world's population with less than one-tenth of the land, China is leveraging its technology leadership in 5G, AI, advanced drones and digital trading platforms to move away from traditional farming practices.

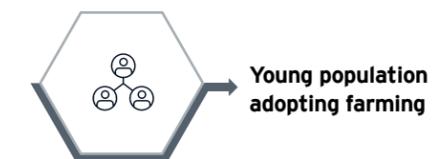


Key success factors contributing to Chinese agritech:



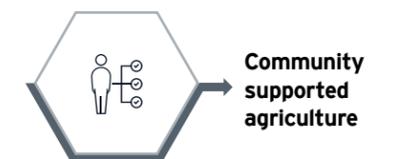
Increasing investments

China-based food and agriculture start-ups raised over US\$5.8 billion in 283 deals in 2018 with a growth rate of 222%



Young population adopting farming

In China, ~7 million people had returned from cities to the countryside with 60% of them starting to work in agriculture sector



Community supported agriculture

Large family farms, co-operative farms and farms run by agribusiness companies are increasingly promoting sustainably-farmed foods



Technology giants investing in agritech solutions

Leading Chinese internet company launched an AI-based voice recognition tool for farmers to help improve the pig livestock output. The platform has been adopted by several leading pig raising enterprises. Some other solutions include ML-based farm monitoring and rural finance services. The company has also launched an insurance solution that not only enables calculation of payouts but also notifies farmers about impending hurricanes using weather data.



Start-ups offering innovative farm solutions

Mobile app Meicai connects farms directly to restaurants, cutting out middlemen such as distributors and wet markets. The platform handles its own cold chain logistics network including delivery, storage and data-streams to allow it to stock just the produce that it needs in each warehouse

Farm 66, an indoor vertical farm in the middle of Hong Kong produces over 150 tonnes of lettuce, endives and cabbage for more than 100 supermarkets every year. Its produce is watered autonomously from tanks

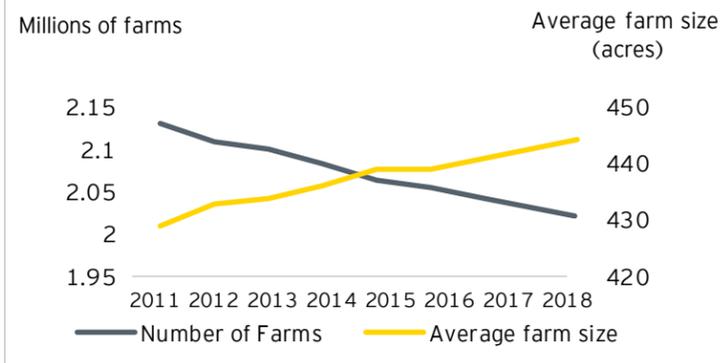
Rising farm consolidation and mechanization driving US agritech growth

Case study: USA²⁷

US agriculture underwent a tremendous transformation from being labor intensive to developing a number of large, specialized farms employing a tiny share of US workers. This was supported by a number of drivers:

Transformation drivers:

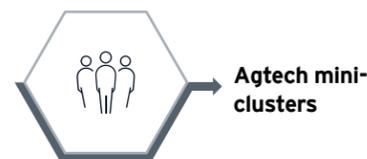
- ▶ Technological advancements: Drone-mapping, precision agriculture, remote sensing are helping monitor large areas of land
- ▶ Changing consumer preference: Increasing consumer age and household income are shifting demand towards healthier foods
- ▶ Increased mechanization: Automated harvesters and separators are increasing farm output



This has led to a decline in the number of total farms and an increase in average farm size.

This transformation is further supported by a focus on agritech research and development and improvements in labor productivity. The sector now has over 1,412 companies with a combined value of US\$11.8 billion.

Evolving market dynamics giving way to a robust Agritech ecosystem:



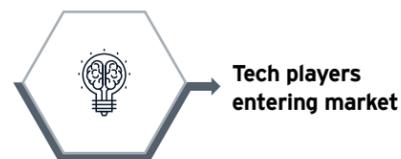
Agtech mini-clusters

Agtech mini-clusters and new fund investors are emerging in regions like Iowa, Missouri and Tennessee with an increasing number of international start-ups also seeking a US presence.



Participation/Collaborations

Big agriculture companies are joining forces and investing in agritech start-ups to gain competitive edge.



Tech players entering market

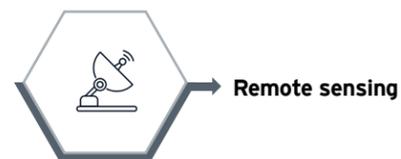
Many technology giants are using their core competencies to develop agritech solutions and focussing on data, food supply chain and connecting and selling inputs and seeds to farmers.

Technology advancements and enablers:



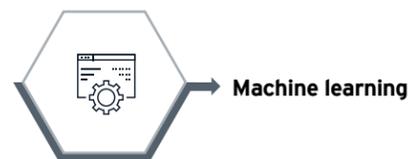
Blockchain

Louis Dreyfus, a commodity trader, partnered with a few France and Dutch-based financial services companies to complete agriculture sector's first blockchain commodity transaction, executing a soybean shipment transaction from the US to China. The transaction got completed at five times the speed of a paper-based trade, increasing transparency, traceability and efficiency.



Remote sensing

The US Department of Agriculture (USDA) was among the early users of remote sensing technology, using it for acreage estimation. The technology provides farmers with high-cadence, broad-area coverage with field-level details allowing them to act accordingly.



Machine learning

Harvest CROO Robotics has developed a robot to help strawberry farmers pick and pack their crops. Machine learning can predict which traits and genes will be best for crop production and helps in giving recommendations to farmers.

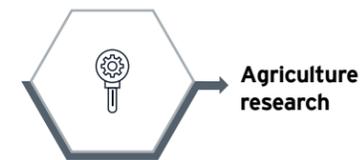
Government policies and research enabled Brazil to become a huge agricultural exporter

Case study: Brazil²⁸

Brazil, a net importer of food in the 70's, is now the largest exporter of sugar, coffee, orange juice, soya and chicken meat with the sector accounting for 46% of the country's total exports. The country has also successfully converted its semi-arid land into agricultural pasture, further increasing the agricultural productivity.

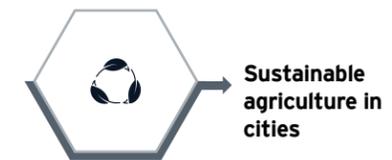
Brazil's success in agriculture can be attributed to the continued support of government and research innovations. There is also strong intervention through credit sector, with the government providing rate subsidies and banks being required to allocate at least 29% of their demand deposits to agricultural lending.

Evolving market dynamics giving way to a robust Agritech ecosystem:



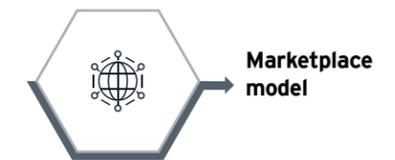
Agriculture research

Embrapa, Brazil's agriculture research corporation, is the largest tropical agriculture research institute in the world. One of the institute's research areas is working on genetic code edition to create new varieties of sugar cane and drought resistant corn.



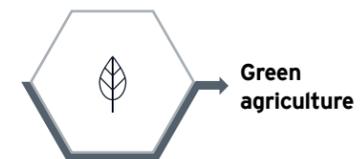
Sustainable agriculture in cities

The government has started teaching modern planting techniques to producers so that they can farm in a more sustainable, organic way and increase their overall production.



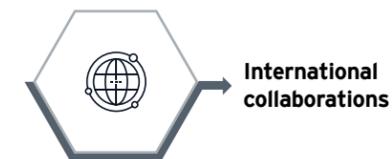
Marketplace model

Uller, a mobile app is helping farmers rent machines from a bigger farmer. Agrofy launched a digital marketplace for agribusiness in Brazil, focussing on agricultural machinery and equipment.



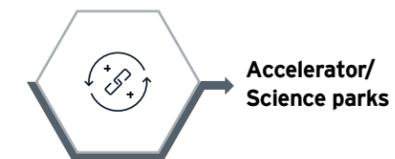
Green agriculture

70% of products in Brazil come from small family farmers. Many of these are now adopting agroecology practices, without pesticides. Brazil's agriculture sector has also proposed to contribute to green initiatives with the recovery of 15 million hectares of grassland and supplying the raw materials for biofuels.



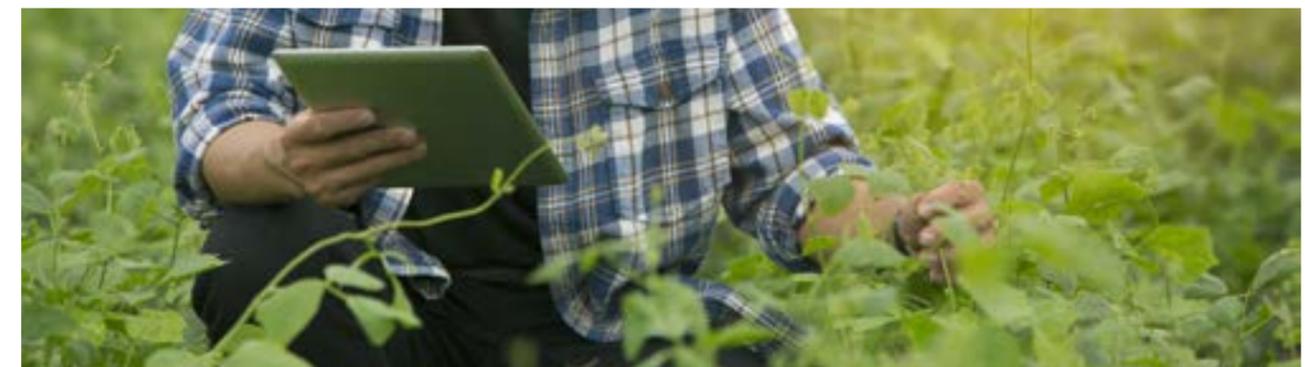
International collaborations

Brazil is now partnering with countries such as India, China and several African nations to help develop the Agritech ecosystem. In 2019, India and Brazil launched the "Maitri Indo-Brazil Agritech Cross Border Incubation Program" for Brazil to understand the Indian ecosystem and trade aspects.



Accelerator/Science parks

Brazil's government provides continuous support to develop the agritech ecosystem. Raizen, world's largest sugar and ethanol group launched an agtech accelerator which is now in its second cohort of start-ups. ESALQ is another science park and start-up incubator.



05

Evolving themes in India's agritech sector



Scenarios that may play out in future

As agritech start-ups proliferate and begin realizing the US\$24b potential, we could witness multiple developments in the space as per the below themes

Theme 1 Emergence of end-to-end agritech players

- ▶ Even though the opportunity size in the agritech space is large (US\$24b), thin margins (8-10%) across segments makes it challenging for players operating in silos to sustain their business. Moreover, achieving scalability with pressure on generating higher unit economics may also drive consolidation across the segments
- ▶ Agritech players would therefore like to own the end-to-end relationship with the farmer, right from input selection and delivery to crop management using precision agriculture to quality grading and procurement of produce. Players could leverage data across these stages of the value chain to also offer financial services to farmers

Theme 2 Entry of retail grocery players and e-commerce players into the sector

- ▶ Large retail players are faced with the perennial challenge of razor thin margins, especially in case of FMCG products. Fresh produce and grocery is an attractive segment where players are also building their private labels
- ▶ Through vertical integration of their supply chain and by adopting technology to drive process efficiencies, large retail players can procure their produce at a cheaper cost while also minimising losses from wastage
- ▶ Similarly, horizontal e-commerce players are aggressively expanding their grocery play due to higher margins coupled with a greater frequency of purchase. Engaging in farm-to-fork models could propel the next leg of growth in these companies

Theme 3 Entry of food processing companies into the sector

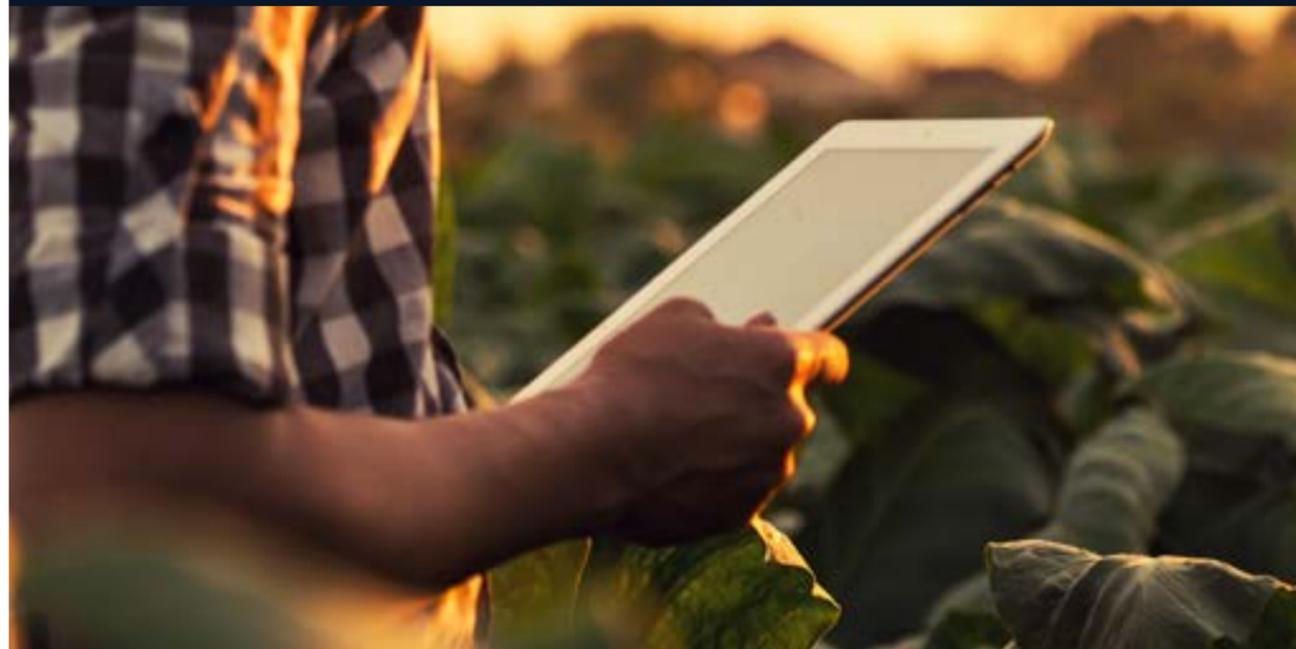
- ▶ Large food processing companies operating in the space of consumer staples have limited pricing power in the market and are therefore looking for cost-efficient procurement strategies to sustain their margins
- ▶ Such companies could play a greater role in agritech by offering solutions such as precision agriculture and farm management software to the farmers from whom they procure. Further, introducing rapid quality management technology could help ensure a consistent quality of their products





06

Conclusion



Conclusion

AgriTech in India is still in infancy stages with just 1% penetration of the addressable market potential of US\$24b. Increased investment activity in the last few years has helped accelerate growth in the sector. However, for the Indian agriTech market to reach its potential, stakeholders across the agriTech ecosystem need to intervene including

AgriTech start-ups

Start-ups need to demonstrate scalability and higher unit economics to receive support from investors. Success in agriTech landscape depends on the start-ups' ability to innovate the agriculture value chain without disrupting traditional channels, and their ability to establishing partnerships with stakeholders such as FPOs, distributors, and food processing organizations.

Government

Recent government announced reforms are expected to revolutionize the state of agriculture in India. However, the government could propel the growth of under-funded segments such as financial services and precision agriculture and farm management through localized data collection on soil health, and providing access to government research facilities.

Farming community

FPOs could help increase digital literacy within small and marginal farmers so that the adoption of agriTech accelerates in the country. Further, FPOs could establish partnerships with food processing companies and institutional retailers to incentivize farmers for better quality of produce and in turn drive the adoption of agriTech in this process.

Investors

Comparison of Indian agriTech investment funding with that of global benchmarks reveals that segments such as precision agriculture and farm management are significantly under-funded in India. Global investors with experience in helping start-ups successfully achieve scale in such segments could contribute to the Indian agriTech growth story by transferring knowledge from their global success stories.



07

Appendix



Agritech Maturity Model

Leaders:

Differentiators include countries such as the US, the UK, Israel and Netherlands which have already deployed disruptive technologies within agriculture. They are utilizing their digital strength to improve agricultural output and efficiencies. The Canadian federal government, for instance, is investing in the sector including a US\$49.5 million grant to Canadian Agri-Food Automation and Intelligence Network (CAAIN) to help develop exportable farming solutions based on AI, robotics and precision technology.²⁹ France, with over 132 agritech start-ups is increasingly using precision farming to map and monitor geological and plant data for a field to provide ultra-localized inputs. It has partnered with European Space Agency and is using two satellites to provide permanent and precise images of crop and the exact size of the plots of land.³⁰

Explorers:

These include large agrarian economies such as India, China and Brazil which have the maximum growth potential through investments in agritech sector. These countries have started their agricultural transformation journeys by investing into digital technologies. Nigeria has adopted the Agricultural Promotion Policy to highlight the need of commercializing agritech technologies and the need to improve agricultural finance. Brazil and India recently partnered to create a cross-border incubator for agritech start-ups to provide mentoring, networking and experience workshops.³¹ With the help of agritech, Colombia has built nine different varieties of cacao crops for use by farmers across the country. This has helped the country improve their harvest and income, with farmers now increasingly growing cacao instead of coca.³²

Experimenter:

These include Sweden, Singapore, Finland and Japan among others which have the necessary digital technologies available but their agricultural sector forms a small portion of their economy. Because of this, the market potential and relative impact of leveraging agritech might be lower. Nevertheless, digital intervention is instrumental in driving farm efficiency with several countries developing their agritech strategies. Singapore, a country with less than 1% of its land dedicated to agriculture, is investing in agritech R&D to increase the country's reliance on local produce.³³ Similarly, South Korea is building smart farm innovation valleys, an agriculture cluster based on ICT to promote mutual growth of the agriculture and allied industry and to promote innovation in the sector.³⁴

Follower:

These are the markets with limited digital technology penetration along with limited agricultural market. To help agritech industry grow, these countries would have to significantly improve their digital infrastructure, invest in technical education and agricultural output.



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Contact us

Ankur Pahwa

Partner and National Leader
E-commerce and Consumer Internet
Ankur.Pahwa@in.ey.com

Sailesh Rao

Partner and National Leader
EY Parthenon - Strategy
Sailesh.Rao@parthenon.ey.com

Authors

Aseem Madan

Vice President
EY Parthenon - Strategy
Aseem.Madan@parthenon.ey.com

Ramprasad Putrevu

Senior Associate
EY Parthenon - Strategy
Ramprasad.Putrevu@parthenon.ey.com

Swati Khurana

Senior Associate
EY Parthenon - Strategy
Swati.Khurana@parthenon.ey.com

Swati Goenka

Supervising Associate
EY Knowledge
Swati.Goenka@gds.ey.com

Divya Sinha

Senior Associate
EY Knowledge
Divya.Sinha@gds.ey.com

Harshit Mor

Senior Associate
EY Knowledge
Harshit.Mor@gds.ey.com

Sector Expert

Rajeev Aiyappa
CEO Platforma Asia

With a background of close to 25 years in agricultural technologies and traditional agricultural practices, Rajeev coaches agri corporations on business strategy, operational transformation and digital integration.

Rajeev's experience includes working with a Singapore-headquartered public listed agri trading enterprise and founding an agri technologies start-up two decades ago which he continues to run with presence across 14 countries. A majority of his work today involves working with CEOs of Series A and B firms backed by VC firms in Europe, Asia and the Americas.

Rajeev is a partner with an Operational Agritech Platform - Platforma Asia, focussed on building companies in agriculture and food technology, platforms, marketplaces and tools with South and South East Asia focus. In these capacities, he has backed and advised over 25 companies, most of them involving board

Our offices



Ahmedabad

22nd Floor, B Wing, Privilon,
Ambli BRT Road, Behind Iskcon
Temple, Off SG Highway,
Ahmedabad - 380 015
Tel: + 91 79 6608 3800

Bengaluru

6th, 12th & 13th floor
"UB City", Canberra Block
No.24 Vittal Mallya Road
Bengaluru - 560 001
Tel: + 91 80 6727 5000

Ground Floor, 'A' wing
Divyasree Chambers
11, O'Shaughnessy Road
Langford Gardens
Bengaluru - 560 025
Tel: + 91 80 6727 5000

Chandigarh

Elante offices, Unit No. B-613 & 614
6th Floor, Plot No- 178-178A,
Industrial & Business Park, Phase-I,
Chandigarh - 160002
Tel +91 172 6717800

Chennai

Tidel Park, 6th & 7th Floor
A Block, No.4, Rajiv Gandhi Salai
Taramani, Chennai - 600 113
Tel: + 91 44 6654 8100

Delhi NCR

Golf View Corporate Tower B
Sector 42, Sector Road
Gurgaon - 122 002
Tel: + 91 124 443 4000

3rd & 6th Floor, Worldmark-1
IGI Airport Hospitality District
Aerocity, New Delhi - 110 037
Tel: + 91 11 4731 8000

4th & 5th Floor, Plot No 2B
Tower 2, Sector 126
Noida - 201 304
Gautam Budh Nagar, U.P.
Tel: + 91 120 671 7000

Hyderabad

THE SKYVIEW 10
18th Floor, "Zone A"
Survey No 83/1, Raidurgam
Hyderabad - 500032
Tel: + 91 40 6736 2000

Jamshedpur

1st Floor, Shantiniketan Building
Holding No. 1, SB Shop Area
Bistupur, Jamshedpur - 831 001
Tel: + 91 657 663 1000

Kochi

9th Floor, ABAD Nucleus
NH-49, Maradu PO
Kochi - 682 304
Tel: + 91 484 433 4000

Kolkata

22 Camac Street
3rd Floor, Block 'C'
Kolkata - 700 016
Tel: + 91 33 6615 3400

Mumbai

14th Floor, The Ruby
29 Senapati Bapat Marg
Dadar (W), Mumbai - 400 028
Tel: + 91 22 6192 0000

5th Floor, Block B-2
Nirlon Knowledge Park
Off. Western Express Highway
Goregaon (E)
Mumbai - 400 063
Tel: + 91 22 6192 0000

Pune

C-401, 4th floor
Panchshil Tech Park
Yerwada
(Near Don Bosco School)
Pune - 411 006
Tel: + 91 20 4912 6000

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