

# Harvesting golden opportunities in Indian agriculture: from food security to farmers' income security by 2025

July 2017

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# Preface

In the 1960s, India embarked on an ambitious agricultural transformation. The use of high-yielding seeds and fertilizers ushered in the “green revolution”— a new era of immense productivity and a crucial step in the newly independent country’s journey towards food self-sufficiency. Today, with minimal dependence on imports, the agriculture sector’s contribution to GDP stands at an impressive USD 262 bn. With higher total return to shareholders than the Indian market, the Indian agribusiness companies have played a significant role in achieving this.

The Government of India has recently adopted a visionary goal of doubling farmer incomes by 2022. Boosting farmer incomes can infuse greater vitality into the sector overall. Agriculture companies and the government could work together to realize this dream, unlocking around USD 175 bn of agriculture GDP and almost doubling farmers’ income in the next 7 to 8 years.

This paper highlights the megatrends expected to drive the next wave of growth in Indian agriculture and identifies a broad set of investible themes as potential focus areas for players. The six emerging trends shaping Indian agriculture are: rising food demand; a shift in consumption patterns; scarce natural and labour resources straining supply; the potential to improve yields; scope to cut wastage in the food chain and technological disruption.

Against this landscape, agriculture and related companies (e.g., equipment, financing, etc.) could focus on seven investible themes towards directly or indirectly enhancing farmer incomes:

1. Invest in food and vegetables and pulses value chain to meet demand.
2. Invest in the fast-growing cold chains and cold-storage markets.
3. Establish market linkages between farmers and buyers.
4. Unlock a large opportunity through digital and analytics.
5. Invest in ecosystem partnerships for disruptive solutions.
6. Enter the agriculture services market.
7. Offer agriculture financing and crop insurance to strengthen the ecosystem.



India’s pursuit for food self-sufficiency since independence shaped the growth of the agriculture sector. Between now and 2025, the new vision could rejuvenate the sector and transform the quality of life for India’s farmers.

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# Harvesting golden opportunities in Indian agriculture

India's determined pursuit of agricultural self-sufficiency since independence has led the country to have a high-growth agriculture sector today. Despite this, India's farmers are not faring too well and only a third of all agriculture companies posted a profit in recent years. The government's recent shift in approach, by adopting the goal of doubling farmer incomes, is a welcome attempt to transform the sector. There is scope for agriculture companies and the government to ride emerging megatrends and successfully be a part of this transformation.

## The outlook for Indian agriculture and farmers

Minimally dependent on imports, India's agriculture sector's GDP stands at an impressive USD 262 bn. This is due in great measure to the agribusiness companies which have demonstrated higher growth than several other sectors in the last few decades. Growth in the total return to shareholders in agriculture in the last 10 years is 28 percent, an impressive 17 percent higher growth than that earned by the Indian market.

Around 33 percent of the agriculture companies have generated positive economic profit over 2010 to 2015 (Exhibit 1). These companies have used several strategies to generate value, such as de-risking the business through diversifying geographies, ensuring proximity to customers and achieving operational excellence to drive profitability.

Recent trends are prompting an increasingly urgent question around the sustainability of value creation in the future. The extreme weather volatility, growing food demand and wide gap in productivity between India and its closest peers, and the need to manage food prices and import pulses to meet demand have all highlighted that India needs to rethink its approach.

In a significant mindset shift, the government's focus is moving from increasing farm output to improving farmer incomes—it has set an aspiration to double farmers' incomes by 2022. This will enhance productivity and have multiplied effects on the larger ecosystem.

## Boosting farmer incomes in India

Indian farmers face multiple challenges, primary among these are excessive stress on land, water and soil health, lack of knowledge/information about high value/growth products, limited exposure to high productivity practices, weak market linkages, inefficient supply chains with high levels of food wastage and an acute dependence on rainfall.

Increased farmer incomes will:

- Foster the use of mechanized techniques to efficiently use stressed resources.
- Increase farmers' knowledge of the high productivity practices and high value product choices available to them.
- Help farmers to better navigate market inefficiencies rather than settling for lower prices set by the middlemen.

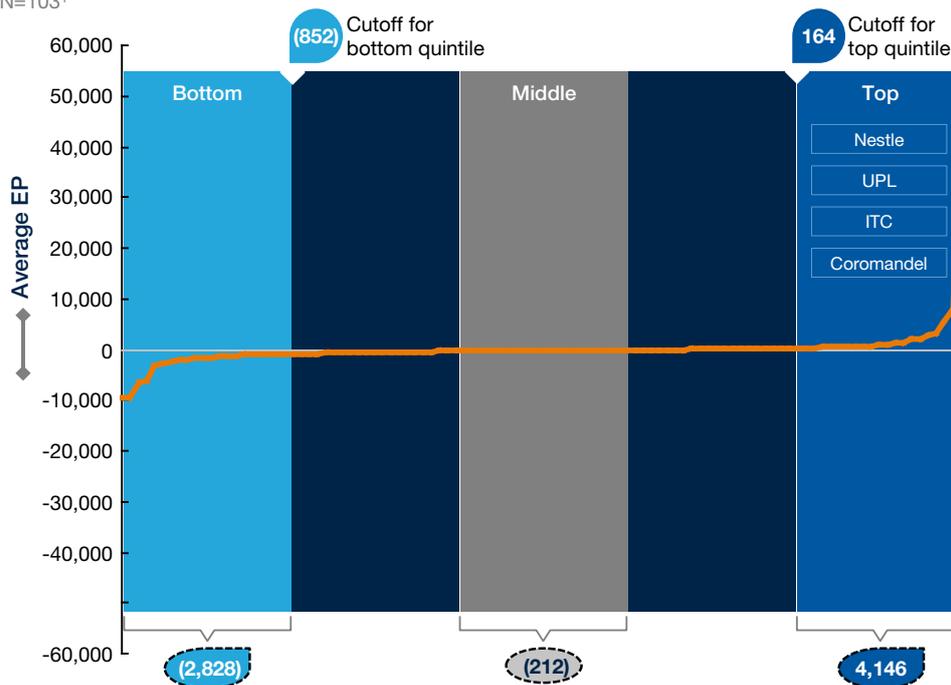
Exhibit 1

## ~33% of the agriculture companies in India have created value or had positive economic profit over the last 5 years

Average economic profit, 2011–15  
(INR million)

 Total annual EP generated by all companies put together in the respective quintile

N=103<sup>1</sup>



### Learning from top players

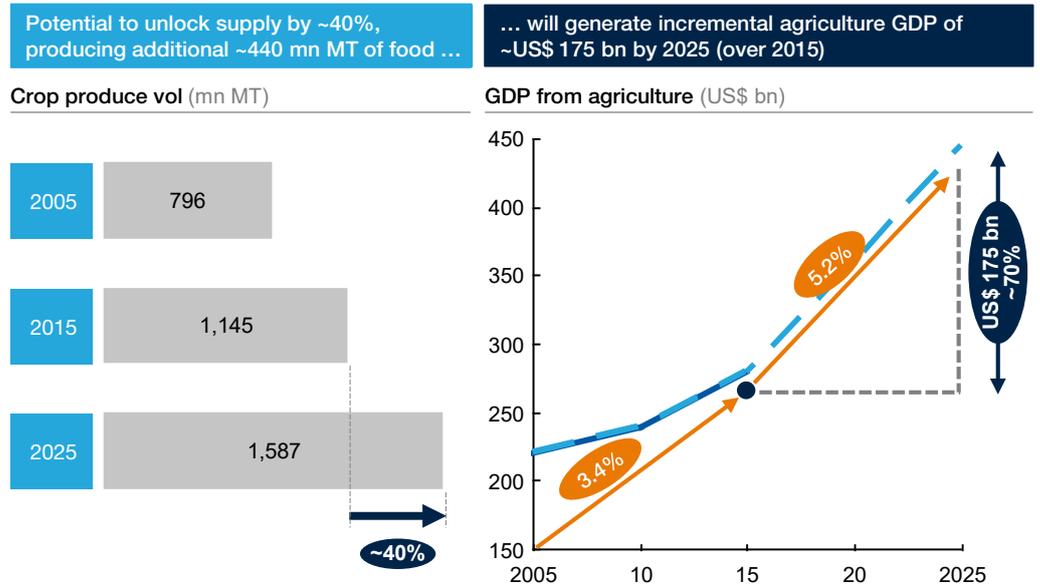
- **De-risking of business and portfolio** through geographical diversification and exports
- **Proximity to customers**, value added products and investment in brand building
- **Operational excellence** to drive margins and efficiency

<sup>1</sup> Analysis includes 103 firms across different sub-sectors of agriculture and food industry. Revenue cut of INR 200 cr has been considered. Within diversified, machinery, irrigation and input equipment, storage and logistics firms, only agri. related firms have been considered. Firms with less than 40% of revenue from food and agri. industry have been omitted

SOURCE: McKinsey Strategy Practice (Beating the Odds model v19.0) and Corporate Performance Analytics™

To increase farmer incomes, India needs to adopt a higher value mix of farm output, capture greater value through better storage and processing, and make market mechanisms more efficient for farm inputs, financing and sale of output. Doing this will require all stakeholders to make bold bets by building partnerships, adopting granular crop and micro-market approaches and developing new business models. We estimate that such measures could unlock roughly USD 175 bn of agriculture GDP and increase farmers' income by 85 percent by 2025 (Exhibit 2).

## Unlocking supply by ~40% will increase agricultural output by ~US\$ 175 bn (~70%) over current output



SOURCE: FAOSTAT; OECD FAO Agricultural Outlook 2014; NITI Aayog

### Understanding the megatrends

While pursuing the objective of doubling farmer income, it is important to keep an eye on the emerging trends in Indian agriculture. These will continue to shape growth and will lead towards the themes for transforming the sector:

1. **Additional food demand of around 400 mn tonnes by 2025:** A four-fold growth of the Indian middle class in the last decade, combined with urbanization and higher GDP, have prompted a higher demand for food. If current trends continue, food demand is likely to grow by over 2.5 percent year-on-year over the next 10 years (Exhibit 3).
2. **Shift in consumption towards fruits and vegetables, and pulses:** Unlike the consumption of rice or wheat, which is linearly related to GDP, the consumption of fruits and vegetables (F&V) and pulses follows an S-curve relation to GDP (Exhibit 4). Over time, the Indian diet has seen a significant shift to higher protein intake. India is entering a hot zone in this space with projected demand growth at a CAGR of 8 to 11 percent (Exhibit 5).

Exhibit 3

## High value crops like F&V, pulses and oilseeds could drive the additional food demand of ~400 mn MT per year by 2025

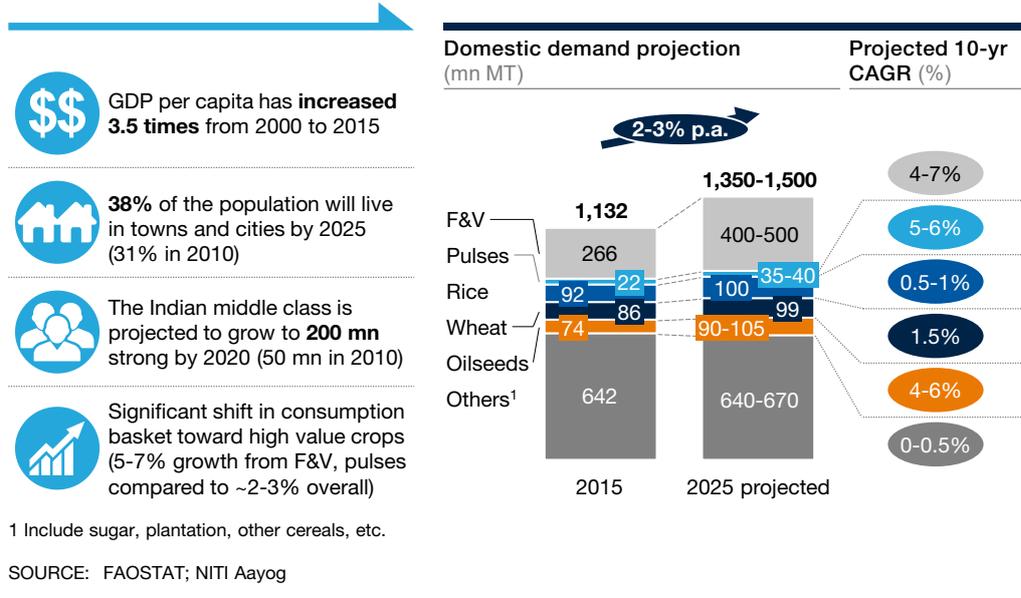
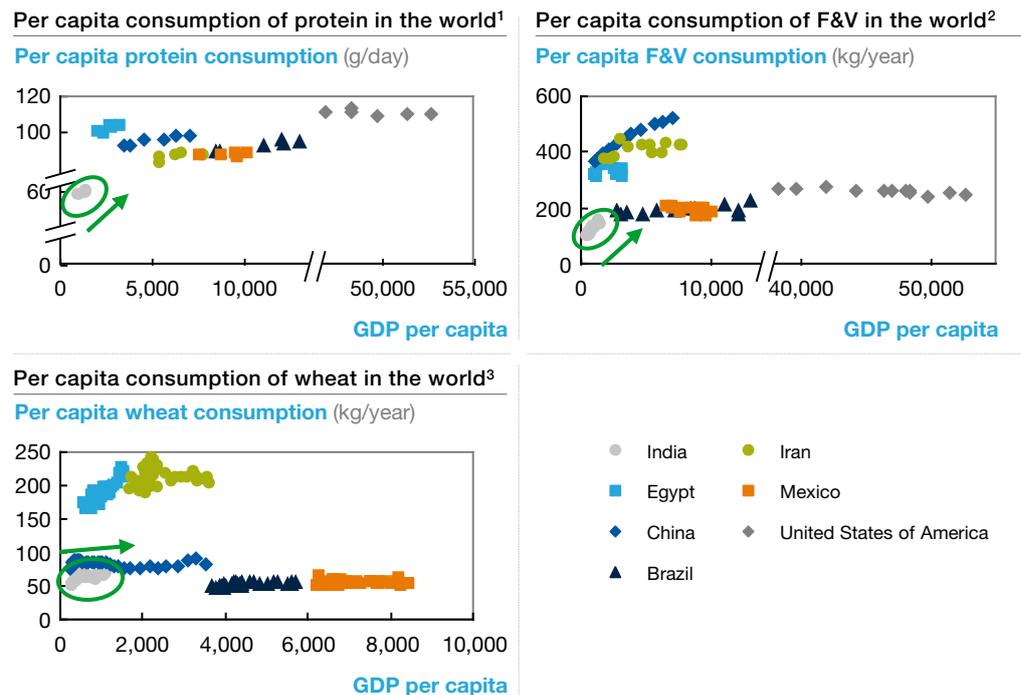


Exhibit 4

## The growth will be majorly driven by F&V and protein consumption increase, while wheat will only grow at population growth



1 Data for the year 2008-13; 2 Data for the year 2002-13; 3 Data for the year 1980-13

SOURCE: FAOSTAT; World Bank

## Trends and opportunities shaping the future of agriculture in India

### 1 Additional food demand of 400 mn MT by 2025

- Increase in urbanization from 31% in 2010 to estimated 38% by 2025 and 4x growth in middle class over the decade

### 2 5-6% CAGR growth of F&V and pulses in India (~2x the global growth)

- Increase in GDP per capita, change in customer preferences towards healthy food are the key factors
- Pulses preferred as they are cheap source of proteins
- Food processing sector entering hot zone (S curve), expected to grow at 8-11% pa

### 3 Increasing stress on supply due to scarcity of resources

- Land, labour migration to non-farm jobs, water stress, climate change; 54% of India faces high or extremely high water stress

### 4 157 MT (~30% of total yield) of food wastage across the value chain

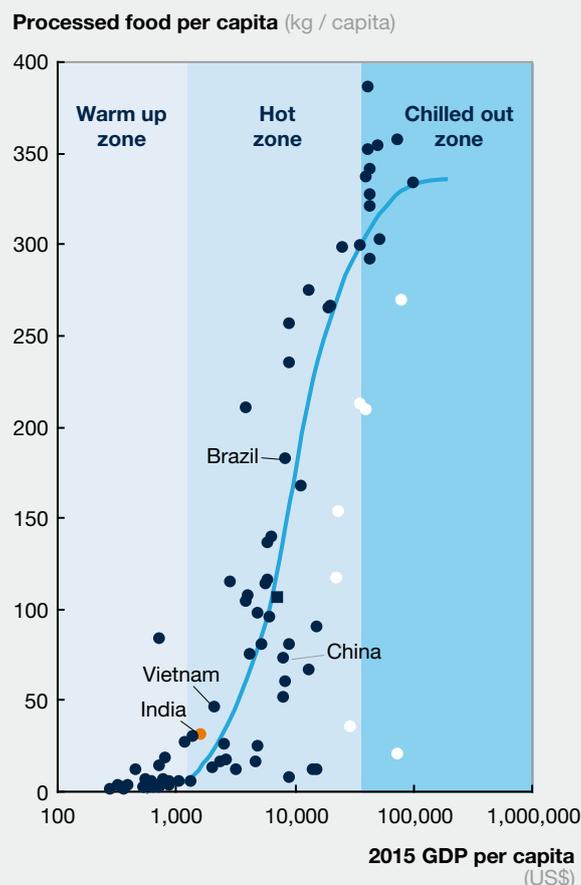
- This accounts for half the food wasted in South and South East Asia
- F&V and cereals are the biggest contributors with 37% and 25% food losses

### 5 Significantly lower yields than Asian averages, headroom for 2x improvement

- Average rice yield is 3.6 t/Ha compared to 6.7 t/Ha in China

### 6 Technological disruption reaching farmers directly

GDP per capita vs. processed food per capita, 2015



SOURCE: FAOSTAT; WTO; NSSO

3. **Stress on supply due to scarcity of resources:** India's farm resources like land, water and soil health are hugely stressed. More than half the country faces water stress with withdrawals at 40 to 80 percent of available supply. Similarly, the labour supply is stressed too; India's labour market is making a natural structural transition from farm to non-farm jobs—agricultural jobs declined by 25 mn between 2011 and 2015, while non-farm jobs rose by 33 mn. The rising wages for farm labour make it imperative to improve farm productivity through mechanization and other measures.
4. **Scope to improve yield:** Indian crop yields are still significantly lower than Asian averages (Exhibit 6). For example, the average rice yield in India is 3.6 t/ha compared to 6.7 t/ha in China. This could improve by at least 40 to 70 percent with suitable interventions. If productivity does not improve, the country could fail to meet the

projected food demand for 2025 and remain dependent on imports of rice, pulses and F&V. To meet the growing demand for pulses, India will need to import around 13 mn to 17 mn MT of pulses by 2025. India would then constitute a very large percentage of global trade volumes in pulses.

Exhibit 6

## Indian crop yields are still significantly lower than Asian averages

Yield (in tonnes/ha)

Crop	India	China	Vietnam	Thailand	Malaysia	Indonesia	Asian average	World top quartile	Incremental opportunity <sup>2</sup> mn MT
Oilseeds	0.3	–	–	–	1.2	–	1.2	1.2	150-170
F&V	10.1	15.7	16.0	12.9	15.4	11.4	14.3	15.7	109-147
Rice	3.6	6.7	3.9	3.1	3.9	5.2	4.9	5.4	38-54
Pulses	0.5	2.3	–	1.2	–	0.6	1.2	1.9	21-40
Wheat	3.2	5.1	–	1.3	–	–	3.2	4.1	15-30

~400 mn<sup>1</sup> MT of additional production is possible if India moves current yields to half of the current Asian averages or half of world top quartile

1 Calculated considering production of all crops at the current yield in India and world top quartile yield

2 Calculated from the yield difference between India and the Asian average yield and the yield at global 75<sup>th</sup> percentile

SOURCE: FAOSTAT

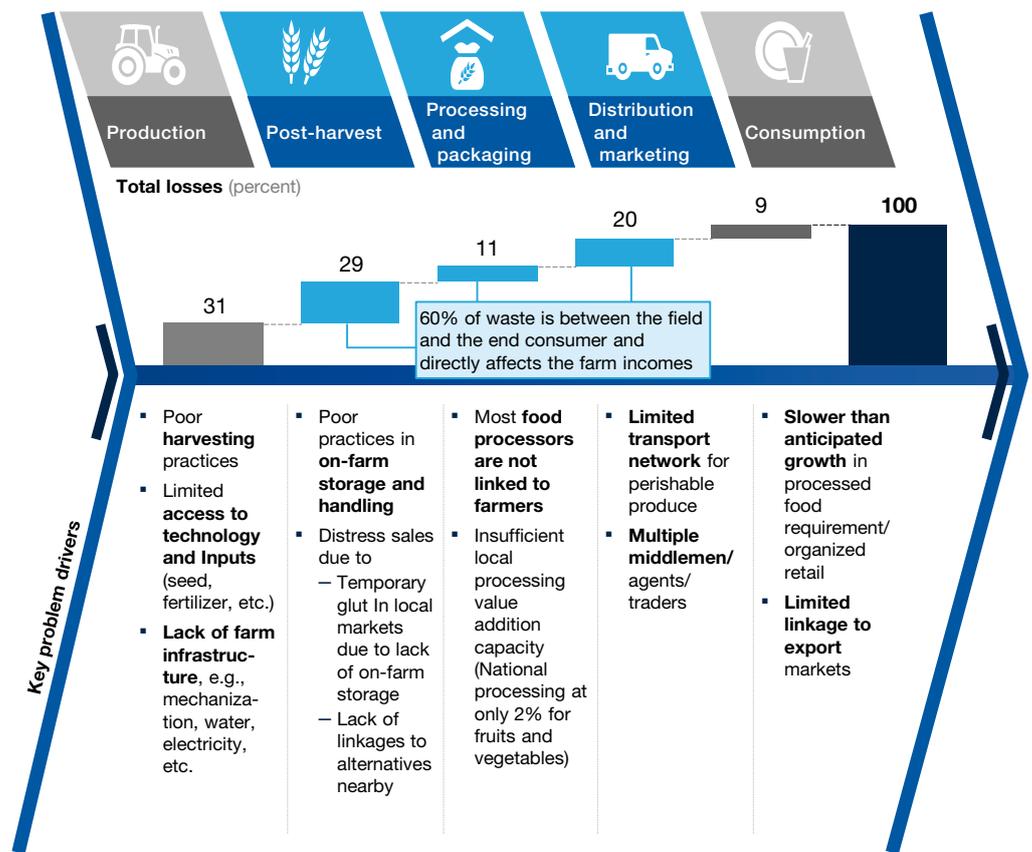
- Opportunity to cut losses in the food chain:** Around 60 percent of food loss and waste in India happens between the field and the end-consumer, and this is concentrated in a few crops (Exhibit 7)—especially F&V and cereals. Several challenges limit cold chain penetration and adoption—high cost of stable power supply, low capacity utilization and limited financing options. These challenges offer a significant opportunity to improve farmer incomes by addressing the storage and handling of food as well as creating market linkages to customers.
- Technological disruption reaching farmers directly:** Several companies are using technology to disrupt existing models and directly reach farmers. While technology is helping some companies to strengthen their sales force, others are leveraging it to offer agri-advisory services to the farmers. These include providing weather-related information (e.g., Skymet), integrating *mandis* (e-NAM), offering agronomic advisory services, and connecting farmers directly to consumers (e.g., farmerfriend.in).

These innovations will force incumbents to change their business models, and shift the focus to creating value for farmers and increasing their share-of-wallet.

Exhibit 7

## There is food waste across the agriculture value chain

Food wasted in India across value chain



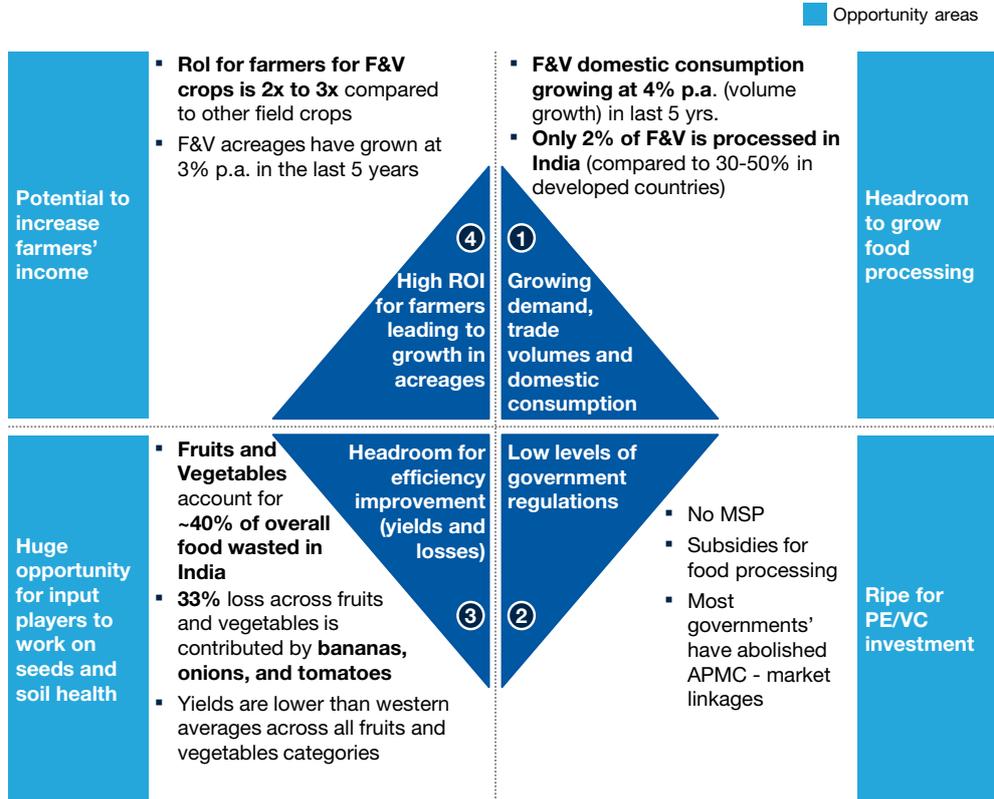
SOURCE: FAO 2011 food balance data, adjustments based on SIK 2009 methodology, World Research Institute, 2013

### Tapping seven investible opportunities

All these megatrends help to identify seven investible themes for companies. These could create value and boost farmer incomes.

- Invest in food and vegetables and pulses value chain to meet demand:** These investments could unlock around USD 15 bn to 20 bn by 2025 and boost farmer income by 35 percent. The value chain of fruits and vegetables will grow disruptively (Exhibit 8), with demand concentrated in six crops—mango, tomato, potato, pomegranate, onion and grapes. By 2025, these six crops will account for around 65 percent of the incremental produce value, through a combination of exports and food processing (Exhibit 9). In pulses, the demand will be driven by a need for packaged and branded pulses, fortified pulses and the market for ready-to-eat snacks, which is growing at 20 percent CAGR.

## 4 key factors that could make F&V an interesting value chain in terms of opportunity for private sector



SOURCE: FaoStat, FAO 2011 food balance data; World Research Institute, 2013; Rockefeller foundation – Food Loss and Waste

Exhibit 9

## Within F&V, six crops to contribute ~65% of incremental produce value

Crop	2015 volume <sup>1</sup> (mn MT)	2015 value <sup>2</sup> (US\$ mn)	Last 5 year growth rate (%)	Amenability to food processing	Amenability to exports	Projected growth rate <sup>3</sup>	Incremental produce value <sup>2</sup> in 2025 (US\$ mn)	Total market size in 2025 (US\$ mn)	Key end markets
Mango	19	820	5%	●	●	8%	1,200	1,800	Juice, pulp, nectar
Tomato	18	550	8%	●	●	11%	1,100	1,600	Ketchup, purees
Potato	46	1010	5%	●	●	7%	1,000	2,000	Raw, chips, frozen
Pomegranate	2	190	12%	●	●	18%	900	1,000	Shelf, juice
Onion	20	520	7%	●	●	10%	800	1,300	Raw, flakes, powder
Grapes	3	190	11%	●	●	15%	600	800	Wine, shelf
Orange	8	390	5%	●	●	7%	500	800	Juice, nectar, shelf
Banana	30	1010	3%	●	●	4%	400	1,500	Raw, chips
Guava	4	130	10%	●	●	14%	400	500	Raw, juice
Peas	4	150	8%	●	●	11%	300	400	Frozen
Apple	2	230	3%	●	●	5%	200	400	Juice, cider
Brinjal	13	300	4%	●	●	6%	200	500	Raw
Papaya	5	140	7%	●	●	11%	200	400	Raw, shelf
Others	82	2600	2%			3%	1,000	3,600	Raw, Juice, Nectar, Frozen, Shelf, Canned, Export
<b>Total</b>	<b>256</b>	<b>8230</b>	<b>4%</b>			<b>7%</b>	<b>8,700</b>	<b>16,200</b>	

1 Refers to 3 year rolling average

2 At FY 15 wholesale prices

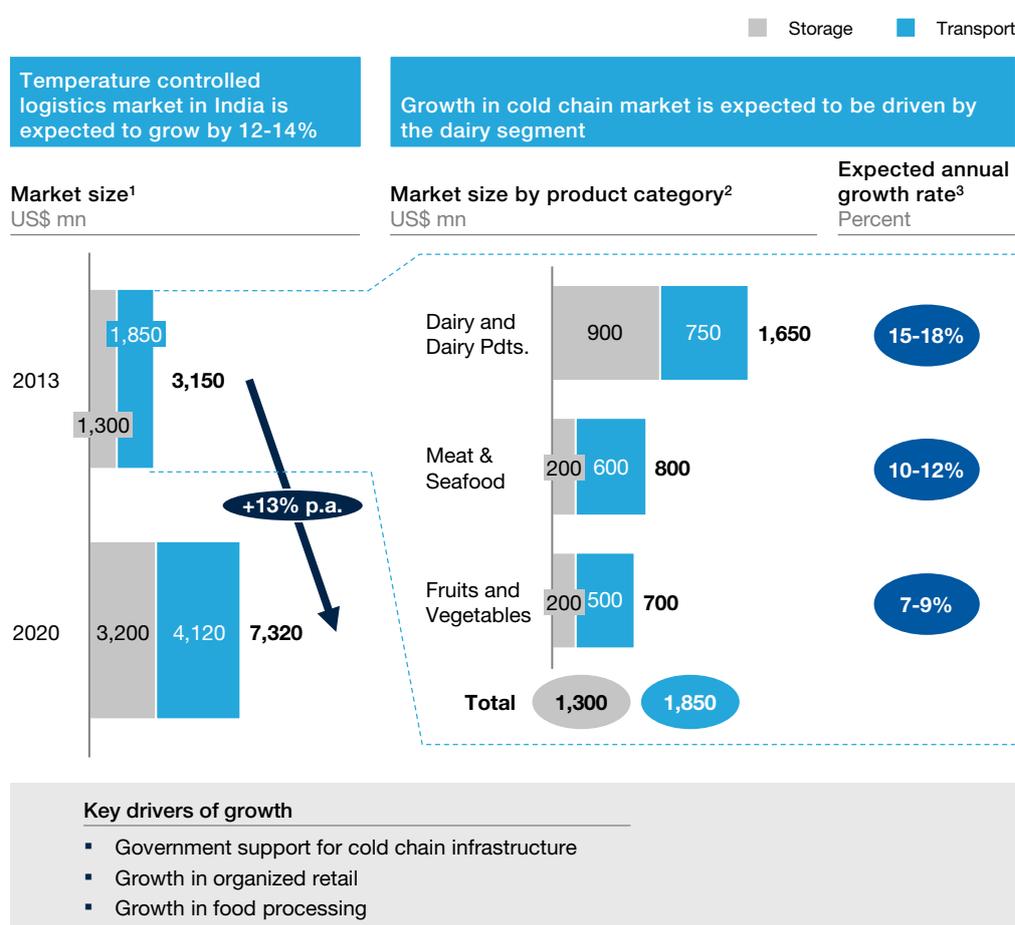
3 Projected Growth consists of Historical growth trends combined with the crops outlook to processing and exports obtained through expert interviews and government policies

SOURCE: Ministry of Horticulture, APEDA

2. **Invest in the fast-growing cold chains and cold-storage markets:** Despite current challenges, this segment is expected to enjoy significant growth on the back of rising food demand, supply deficits and improved market economics. The cold chain market is expected to double in size to reach USD 7 bn to 9 bn by 2020 (Exhibit 10). Cold chain players could invest in alternate energy technologies like solar-powered systems, they can explore chemical treatments to extend the shelf-life of produce, set up pack houses and reefer transport. They could also optimize the use of existing facilities by opening them up for multiple crops instead of a single crop or product.

Exhibit 10

### Cold chain market is expected to reach US\$ 7 bn to 9 bn by 2020



1 Only includes cold chain for agri use – does not include pharmaceuticals, ice cream and QSR markets

2 Includes storage and logistics

3 Expected growth rate till 2020

SOURCE: Euromonitor; TechNavio insights; Frost & Sullivan report

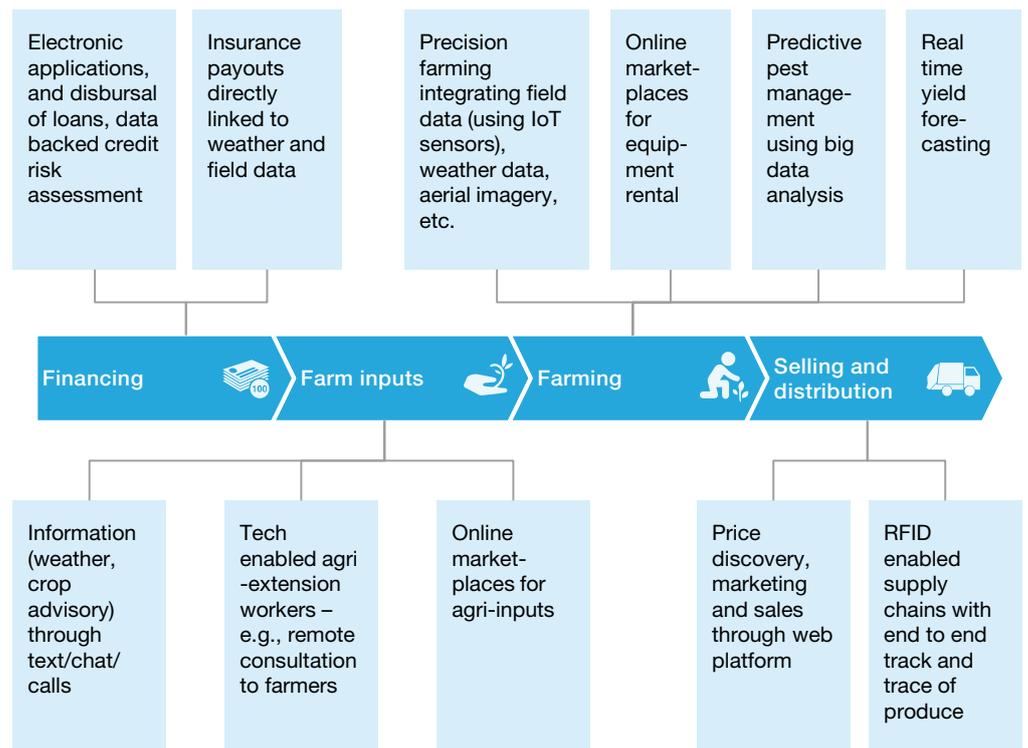
3. **Establish market linkages between farmers and buyers:** This will establish transparency in pricing and better value, especially for perishable products. It could also help to increase farmer incomes by at least 8 to 10 percent. In addition, it will enable the downstream players to source more effectively by eliminating intermediaries.

Farmer–producer organizations (FPOs) are already aggregating supply and supporting farmers towards this goal.

4. **Unlock a large opportunity through digital and analytics:** Digitization and analytics will play a critical role in building India’s farms of the future (Exhibit 11). Potential disruptions that could unlock value through the food-chain are:
- Precision farming including integrating field data, weather patterns to drive agronomic advice to farmers and yield forecasting
  - Efficient farm lending with electronic applications, disbursal of loans, insurance payouts linked to weather, field data, Direct Benefits Transfer in agriculture
  - Universal platform integrating farmers and wholesale markets, to provide timely information for price realization
  - Supply chain management
  - IoT based advanced analytics in manufacturing plants to improve availability, throughput and save costs
  - Commercial excellence in micro-markets, pricing and channel management.

Exhibit 11

### Digital and advanced analytics applications across the value chain



5. **Invest in ecosystem partnerships for disruptive solutions:** A slew of startups are playing in one part of India's agriculture value chain to disrupt prevalent business models. In response, larger players could partner with them or incubate their own new businesses. The effort would ultimately result in innovative solutions for farmers.
6. **Enter the agriculture services market:** Rising wages, growing awareness of farm mechanization, and easier credit lending to farmers will all boost the market for a shared farm-economy. There is potential to create a marketplace for equipment rentals. Given the small and scattered land holding patterns in Indian agriculture, the services market is bound to increase in the years to come. Such agriculture services will increase the adoption of farm mechanization, which in turn could increase farmer income by around 5 percent.
7. **Offer agriculture financing and crop insurance to strengthen the ecosystem:**
  - Invest in end-to-end value chains, particularly in F&V and pulses, where demand is expected to grow disruptively.
  - Provide innovative equipment-financing models to farmers through partnerships with manufacturers, weather forecast agencies, and digital partners.
  - Offer easy financing for FPOs for community infrastructure for storage and transportation.
  - Create digital ecosystems for financing and crop insurance.

### The government's pivotal role

The government can continue to support businesses to create value in the agriculture sector. In particular, it could enable the shift towards improving farmer incomes through a focus on six crucial areas:

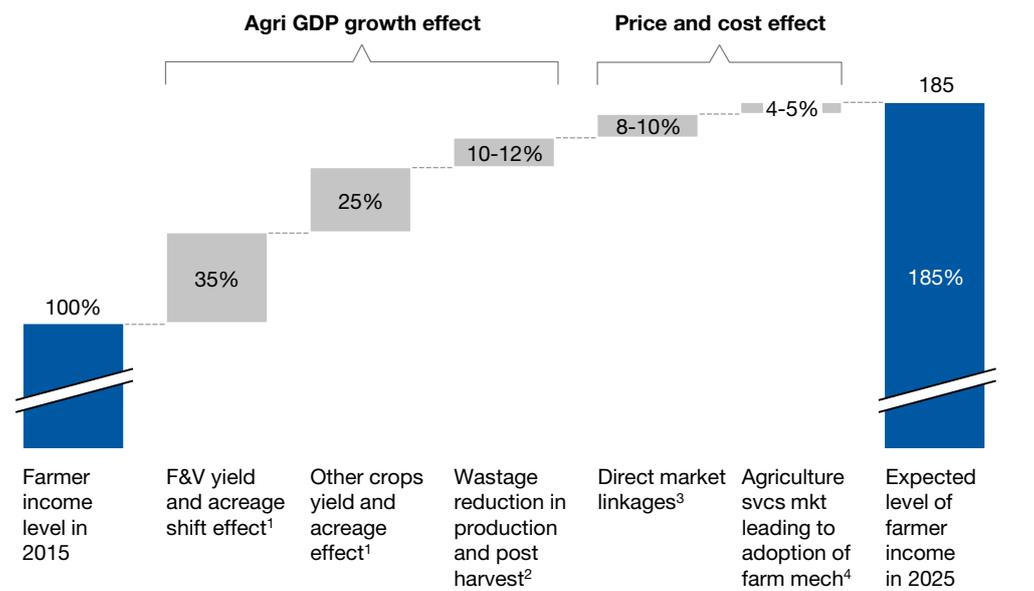
- Modernization of farm production, agriculture input markets, storage, and market access to serve local, national and export demand
- Enable portfolio shift towards high value crops through differentiated value chain strategies
- Shift in focus from primary production towards processing and retail
- Increase in land and labour productivity in agriculture
- Greater private sector engagement
- Concrete projects and well-defined performance indicators to track transformation and collaboration between stakeholders.



An incremental agricultural GDP of around USD 175 bn could help almost double the farmers' income in the next 7 to 8 years. This will require all stakeholders to tap emerging opportunities. Understanding current megatrends in this context can help to chart a clear course of action towards achieving these aspirations.

## Focusing on the 7 investable themes could almost double the farmers' income by 2025

Contribution to doubling farmer income  
Index



1 Due to increase in yield because of better farm inputs and digital & analytics initiatives as well as shift of acreage to higher value crops

2 ~50% wastage reduction from current levels by supply chain improvements and cold storage developments

3 Connecting farmers directly to end consumers/market by removal of intermediaries

4 Assuming ~20% reduction in labor cost as a result of farm mechanization

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