# Enabling Food for All – Can India Realise its Food Security Dream?

Strategy paper for Global Economic Summit by The World Trade Centre Mumbai in association with BIG Strategic Management Consultants

November 2015

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# Foreword

To be added later

# Acknowledgements

The strategy paper titled ‘Enabling Food for All – Can India Realise its Food Security Dream?’ has been jointly prepared by the World Trade Centre, Mumbai and BIG Strategic Management Consultants. The contents of this document are based on the experience of World Trade Centre’s and BIG SMC’s research team and extensive interactions with agriculture-related agencies and individuals.

This study could not have shaped up the way it has without the profound insights and inputs provided to us by several industry experts and veterans. We would like to extend our sincerest thanks to each one of them, especially Dr. Narayan Hegde, Dr. Jayant Desai, Dr. Sushama Chaphalkar, Prof. Nilesh Nalawade, Mr. V. M. Bhoite, Mr. M. V. Ashok, Dr. Abhay Gaikwad, Ms. Nidhi Srinivas, Mr. Madan Sabnavis, Ms. Prerna Desai and Dr. K. G. Karmakar, for extending their valuable support to us and the endeavour.

We also want to express our gratitude to all the experts and industry leaders whose opinions have been included in the study, and to all the successful enterprises who have been gracious enough to allow us to include their efforts as case studies.

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# Executive Summary

Food security and safety in developing countries is an issue that is widely discussed across all spheres but is also something that seldom finds any concrete, unanimous solution. In a characteristically agrarian socio-economic set up like India, any issue pertaining to food is even more complex due to significantly high population, deep-rooted poverty and often-conflicting viewpoints of multiple stakeholders involved.

This document looks at food security from two main perspectives: the supply side and the demand side, with greater focus on the former. The supply side perspective assesses India's agriculture sector in detail to understand its efficacy in providing food to its citizens, in terms of quantity as well as quality. Food security is often confused with food availability. However, having enough food is only a part of the idea; available food must also be accessible to all and should fulfill basic nutritional requirements of its seekers. These three aspects represent the ethos of food security in its entirety. Studying Indian agriculture thoroughly involves throwing light on the following: What is the capacity of the sector, whether it is technologically adept at producing enough food to sustain internal requirements, how feasible is the sector for farmers and allied professionals, what kind of assistance is available from governmental and similar entities for the betterment of the sector, to cognize if growth of the sector is proportionate to growth in population and demand, what impact do policies of various international regulatory bodies have on domestic farming sector, is the value chain developed enough to handle increasing demand and expanding scope, what role does problem of food wastage play in food security or lack thereof. This analysis aims to identify deficits in the current structure and causes behind inability to achieve food security.

The second perspective, giving the demand side, reviews capacity of the citizens to avail adequate and good quality food. It considers income levels of individuals, market conditions, knowledge about nutritional aspect of food, etc. to arrive at knowing how mature the market for food in India is, why and how it ends up facing food insecurity. It must be noted that this side of the story doesn't appear in the document separately. It lies in the background of every segment.

The ultimate goal of food safety and security can be achieved if both these sides reach equilibrium.

The segment of fisheries and animal husbandry is an inevitable part of India's food segment as it has great demand as well as export potential. A brief overview of those sectors also finds mention in the document.

# Executive Summary

The role of food processing industry in the overall scheme of things is also an area that this document tries to explore. Food processing in India is an extremely able and strong sector. However, it needs proper integration and coordinated, well designed and focused policy support. If provided with a solid regulatory backing, food processing can bring in the desirable results in India's quest for adequate, affordable and accessible food.

Interactions with industry players and experts reveal that the supply side of food security, i.e. India's agricultural sector needs strengthening. It has great potential and despite getting the maximum attention from all quarters, farming is not gaining anything in real terms. The biggest trouble is extensive faults in the agricultural value chain. These faults give a dual blow to the entire system with farmers getting extremely unfavourable treatment and returns on the one hand; and consumer bearing the brunt on the other, due to being at the receiving end in the form of high prices, low quality, restrictions of availability and accessibility.

The bigger concern, however, is that the notions about 'food security' are highly patchy and imperfect. If India wishes to keep pace with the demands of growing population, in the long term, then there must be a systematic and coordinated plan of action, involving all stakeholders. This is what is exactly lacking at the moment.

The most effective way of eliminating these shortcomings would be to transform agriculture into a profitable business enterprise. Farming and more importantly, farmers, must be brought to a level where there is no dependence on external assistance. Farmer empowerment will have a ripple effect and result in greater production, better resource utilisation, arrival of better technology, etc. among others.

Customised food processing ideas would be a valuable strategy to adopt. Processing at source, for instance, will help achieve lower wastage, value additions and self sustenance. Private enterprises, with or without the background of food processing, could be utilised to realise this objective. Capacity building and resource mobilisation can be undertaken via modern business-styled incubation efforts wherein farmers can get formal and organised impetus.

In the essence, food for all is not an unattainable goal. India has everything that it takes to become a food secure nation. The only requirement is a radical change in the attitudes of cultivators, consumers, policy makers and enterprises.

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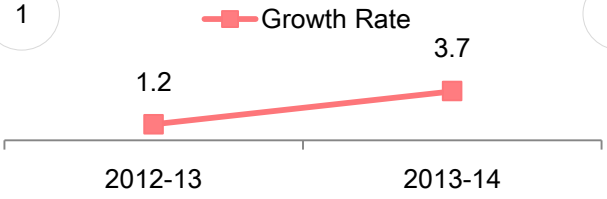
# CHAPTER ONE

## OVERVIEW OF INDIAN AGRICULTURE

# Overview of India's Agriculture

For a country once synonymous with the word 'Agriculture', India has transformed greatly in the last few years. Agriculture remains to be one of the most important sectors of the economy, albeit the sector has undergone paradigm shift in the way it is viewed by the people, both associated with the profession and by those who aren't. Agriculture in India still enjoys a rather sacrosanct status, but the fact is that not all of its adherents are equally privileged. Agriculture is at the cusp of transformation and failure to take judicious measures to smoothen this change may result in permanent damage to the sector. When talking about Food Security (or lack thereof), it is imperative to carry an exhaustive assessment of India's agriculture in terms of its current standing, outreach, challenges and outlook; in order to see how can it positively affect the greater goal of food for all.

1

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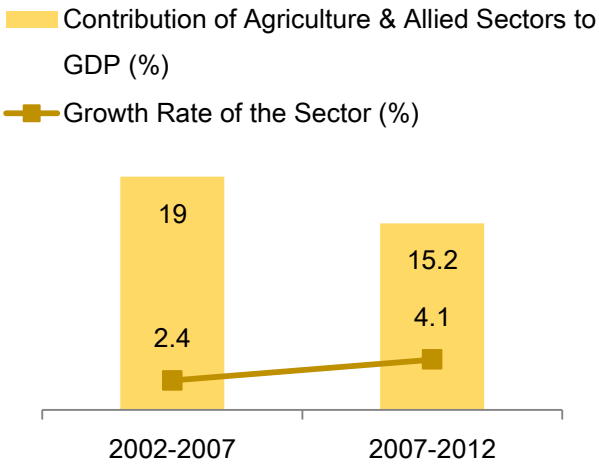


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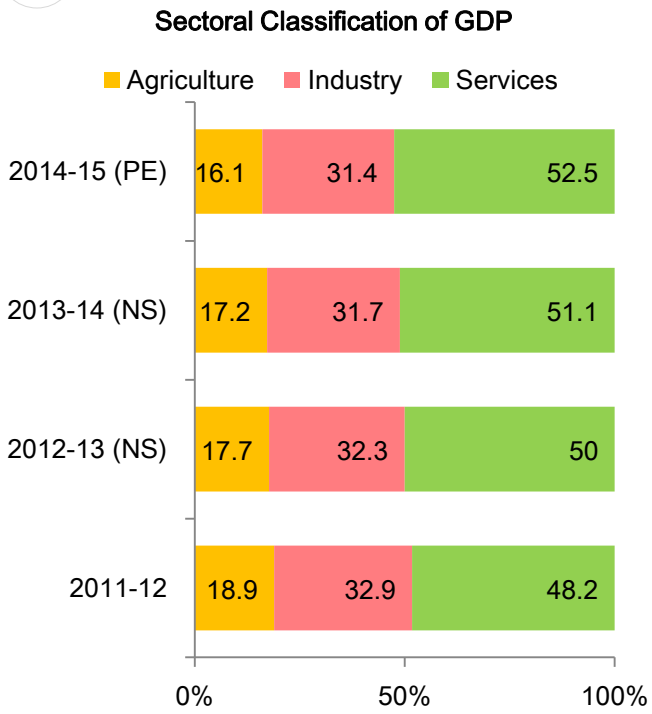



Y-o-Y growth rate of agriculture sector witnessed a substantial rise, in the two years from 2012-2014. If previous two five-year plan periods are considered, then it can be observed that agriculture, despite showing a positive independent growth rate, sees its contribution in overall GDP declining. This can be considered as the sign of a diversifying economy. The declining trend is continued even when yearly data is observed.

Sources: 1 & 2. Economic Survey 2014-15, Government of India
3. Office of the Economic Advisor, Government of India / Central Statistical Office
NS = New Series Estimates PE = Provisional Estimates

# Overview of India's Agriculture

**Box 1. "Indian agriculture is at the cross roads"**

Renowned agriculturalist and the man behind India's Green Revolution, Dr. M. S. Swaminathan, recently expressed deep concerns over the fact that farming has become non remunerative with inputs costs getting higher and output returns being unfavourable. He termed India as a nation characterized by Grain Mountains and hungry millions. His concerns included market economy being unfriendly to small farmers, farmers being at the mercy of monsoons and climate change having extremely adverse effects on cultivation practices. He believes that agriculture is the largest private sector enterprise in India but the time has come when the country needs to develop and popularise what is commonly known as 'Climate Smart Agriculture'.

The opinions of Dr. Swaminathan reflect the precise status of India's agriculture and are echoed by almost all stakeholders involved in agriculture whom we met during the research stages.. Farmers from various strata, researchers and industry experts, food value chain players and even the experts working with government – all believe that the Indian farming sector is has the potential to grow multi-fold and emerge as one of the world's strongest food creator, however it is constantly being marred by complex internal factors. Identification of these issues has been done on multiple levels but there is serious lack of coordination when it comes to finding and implementing timely solutions to these.

Certain features of Indian agriculture are extremely peculiar and are also potential hindrances to the sector's development. For instance, average size of land holdings is far low and is decreasing day by day. This doesn't allow any scope for the farmer to implement mechanisation and modern framing methods effectively. Land ownerships are extremely ambiguous and multiple stakeholders claim stake on a single piece of land. This distorts decision making powers. Cropping pattern is still almost entirely dependent on weather due to which yield varies significantly. All these factors have a lasting impact on the ultimate performance of the sector and these must be understood thoroughly to undertake comprehensive review of farming in India. Healthy agriculture is the most crucial pillar of food security as it is the origin of food.

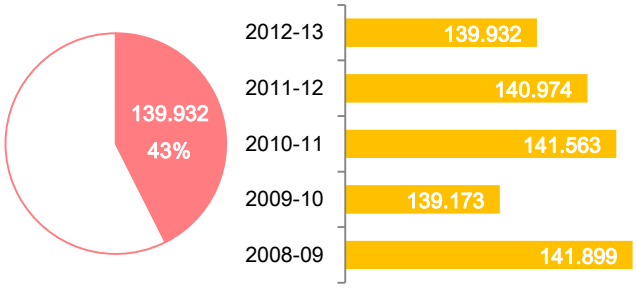
Sources: Business Standard, BIG Analysis

# Overview of India's Agriculture

**Land:**

43% of India's total geographical area of 328.725 million hectares fell under the net sown area in 2012-13*. The total cropped area (inclusive of area which was sown more than once a year) in the same year was 194.399 million hectares (59%).

**Net Sown Area & Total Cropped Area in India (Million Ha)**




**Crops and Seasons:**

India is the top producer country for many crops. The main crops can be divided into the following categories:

| Foodgrains | Cash Crops |
|---|---|
| Rice, Wheat, Maize, Millets, Pulses. | Cotton, Jute, Sugarcane, Tobacco, Oilseeds |
| **Plantation** | **Horticulture** |
| Tea, Coffee, Coconut, Rubber. | Fruits and Vegetables |

India has as many of seven climatic types and this has an obvious impact on the features of its farming sector. Crops in India are primarily divided into three seasons:

| | Kharif | Rabi | Zaid (Kharif) | Zaid (Rabi) |
|---|---|---|---|---|
| Duration | April to October | November to April | August to January | February to March |
| Sowing Season | May to July | October to December | August to September | February to March |
| Harvesting Season | September to October | February to April | December to January | April to May |
| Major Crops | Jowar, Bajra, Rice, Maize, Cotton, Groundnut, Jute, Hemp, Tobacco etc. | Wheat, Barley, Gram, Linseed, Mustard, Masoor & Peas | Rice, Jowar, Rapeseed, Cotton, Oilseeds | Watermelon , Toris, Cucumber & Other Vegetables |
| Features | Largely dependent on quantity of rainwater and its timings | The water that has percolated in the ground during the rains is main source of water for these crops. Rabi crops require irrigation. | They require warm dry weather for major growth period and longer day length for flowering | |

*Provisional estimates
Sources: Directorate of Economics and Statistics, Ministry of Agriculture

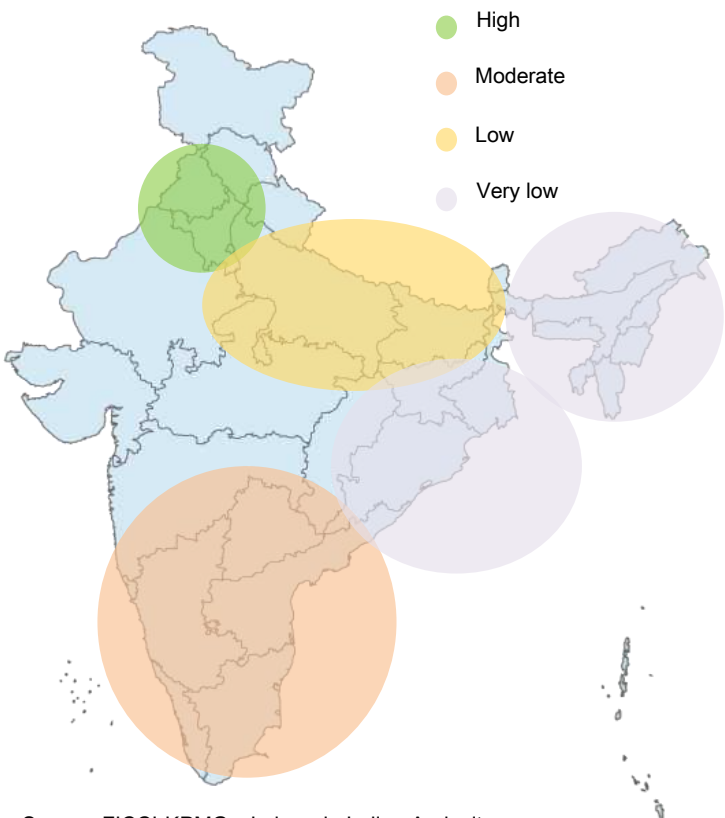
# Overview of India's Agriculture

**Mechanisation:**

The primary goal of mechanisation is to achieve greater productivity, precision, increasing capacity utilisation, profitability and reduce the time spent on a process. Indian agriculture is yet to reach maturity in terms of mechanisation of farming. Indian farming is slowly but steadily moving towards mechanisation, with recent data suggesting that nearly 90% of power in farming is driven by machines like tractors, power tillers, diesel engines and electric motors. Of the remaining 10%, half comes from human workers and half from draught animals. However, overall mechanisation in farming is only around 40%.

Farm mechanisation has been growing at the rate of less than 5% in the last two decades.

> *"40% of farm operations for major crops are done by mechanical power sources and 60% is still being done by animate power sources (human + draught animal) that generate only 10% of the total power available in farming. This shows that the timeliness and quality of farm operations with animate sources of power are poor."*
>
> *- C R Mehta, Principal Scientist, Central Institute of Agricultural Engineering, Bhopal*




Source: FICCI-KPMG – Labour in Indian Agriculture

The biggest hurdles in mechanisation in India are the small sized and fragmented land holdings. Punjab and Haryana are India's most advanced regions in terms of agriculture mechanisation, followed closely by Uttar Pradesh and Bihar. The Southern region (and also Maharashtra) are slowly turning to technology, and there is great scope for equipment market in those areas. The North Eastern part, however, needs major boost for mechanisation and the Sub-Mission on Agricultural Mechanisation (a part of the 12th five year plan) is expected to give a much required push.

Sources: Directorate of Economics and Statistics, Ministry of Agriculture; Economic Survey of India 2014-15, The Economic Times, Labour in Indian Agriculture (2015) by FICCI-KPMG

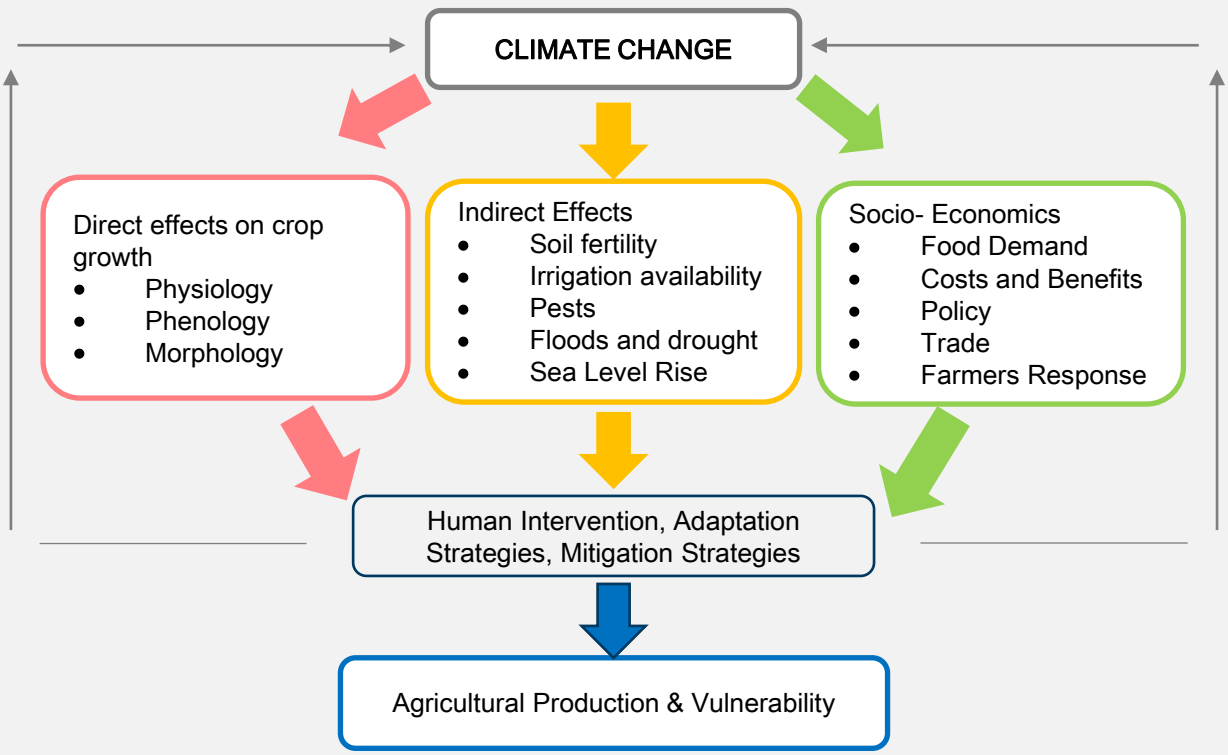
# Overview of India's Agriculture

**Climate:**

Agriculture in India is highly climate sensitive. Southwest Monsoon is the biggest driver of cropping patterns and seasons in the country. Nearly 60% of the net sown area is dependent on rains. However, in recent years there has been a significant change in the climate and the same has a lasting effect on farming pattern of India. It is imperative to understand the effect of climate change in order to eliminate the losses caused by it.

**Box 2. Climate Change Impacts on Agriculture India, The Indian Agricultural Research Institute (IARI), New Delhi**

A study by Scientists at IARI used a variety of crop growth models like INFOCROP, INFOCANE to evaluate potential climate change impacts on wheat and rice (India's primary crops), and other crops such as sorghum and maize. Specific variables used in the models included changes in temperature, $CO_2$ levels, precipitation, and solar radiation Importantly, these variables can both increase and decrease crop yields with changes in climate, and therefore the interaction of these effects was also studied (for example, while increased temperatures can reduce yields, this can be offset by increased yields due to increased solar radiation)



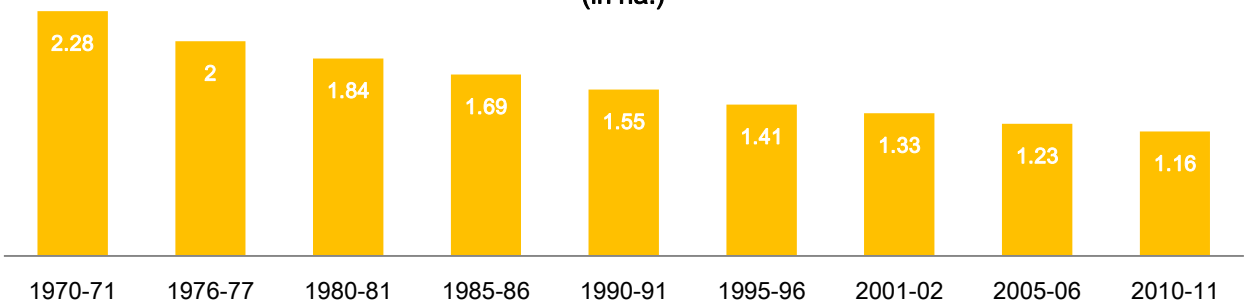

Sources: Columbia University – Earth institute (State of the Planet) ; Indian Agriculture Research Institute, New Delhi

# Overview of India's Agriculture

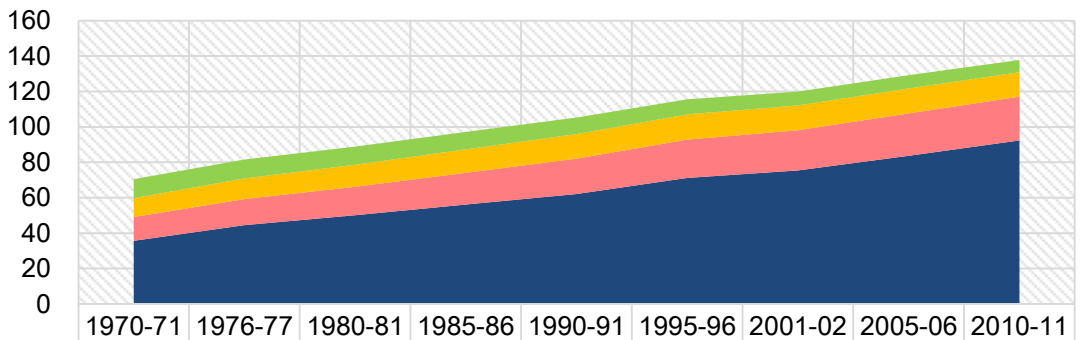
**Landholding Pattern:**

Small and fragmented land holding is one of the major hindrances in development of Indian agriculture. Average size of land holding has seen a downward trend since the past three decades. Decline in landholding reflects immense pressure on limited land resources available for cultivation. Consequently, the number of land holdings in the marginal and small categories has swelled by 57 million ha and 11 million ha respectively, during the same period. Small and marginal holdings together, constitute 85% in terms of number of operational holdings and 44% of the operated area in the country. The size of the land holdings has implications for investments in agriculture, its productivity, farm mechanization and sustaining farm incomes itself.

**Average size of Operational Holdings as per different Agriculture Census - All India (in ha.)**




**Category-wise Land Holdings in India (in million ha)**




| | 1970-71 | 1976-77 | 1980-81 | 1985-86 | 1990-91 | 1995-96 | 2001-02 | 2005-06 | 2010-11 |
|---|---|---|---|---|---|---|---|---|---|
| Med+large | 10.7 | 10.65 | 10.24 | 9.84 | 9.3 | 8.5 | 7.81 | 7.47 | 6.86 |
| Semi medium | 10.68 | 11.67 | 12.45 | 13.25 | 13.91 | 14.26 | 14.02 | 14.13 | 13.84 |
| Small | 13.43 | 14.73 | 16.07 | 17.92 | 19.97 | 21.64 | 22.7 | 23.93 | 24.71 |
| Marginal | 35.68 | 44.52 | 50.12 | 56.15 | 62.11 | 71.18 | 75.41 | 83.69 | 92.36 |



Sources: NABARD Rural Impulse, Issue - VIII, March - April 2015

# Overview of India's Agriculture

**Assessments by the Twelfth Five Year Plan (2012-2017)**

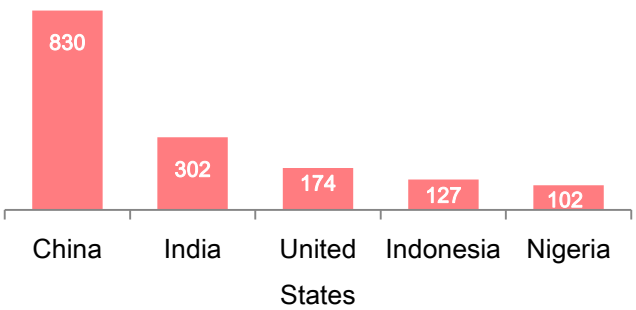
| Key Growth Drivers |
| --- |
| Viability of farm enterprises and returns to investment |
| Availability and dissemination of appropriate technologies |
| Plan expenditure on agriculture and infrastructure together with policy |
| Governance in terms of institutions that make possible better delivery of various farming related components |

| Key Challenges |
| --- |
| Policy imbalances |
| Shrinking land base, Dwindling water resources, Adverse impact of climate change |
| Shortage of farm labour |
| Increasing costs and price uncertainty caused by volatile international markets |

**Where does the world stand?**

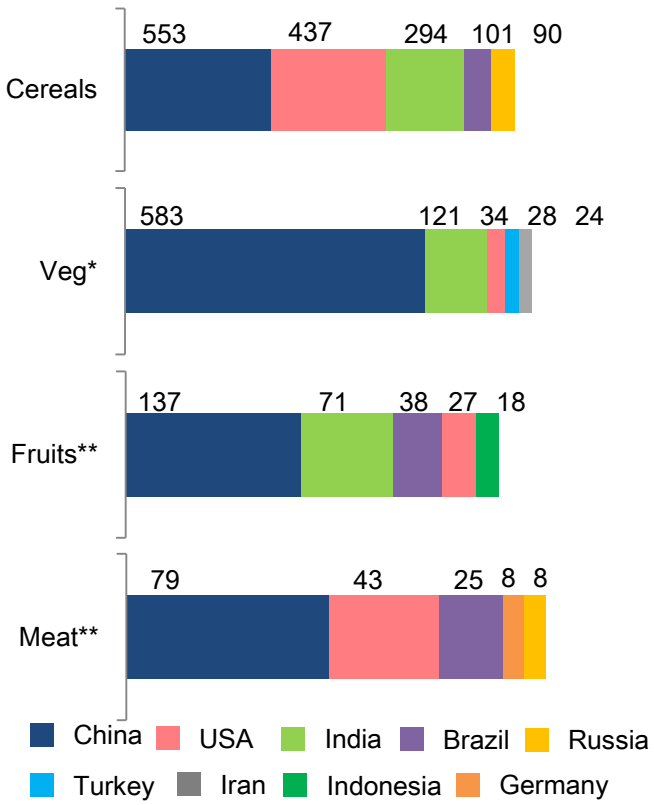
India is one of the countries with largest agricultural outputs, both in terms of value as well as volumes. The top slots have always been dominated by China, India, United States, Russia.

**Largest Agricultural Output (2012, in US$ bn)**




China dominates food production with value of output more than double of the second largest producer. India and USA are also significant contributors.

**Worldwide Production of Major Commodities (In mn Tonnes)**

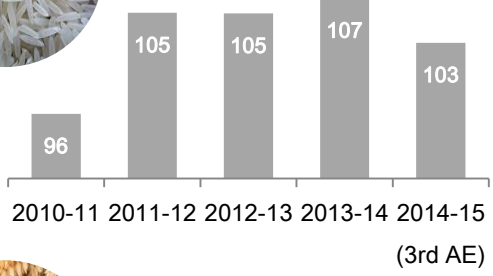



Sources: Planning Commission, Government of India 2013; The Economist Newspaper Ltd. 2015; FAOSTAT
*2013, **2012

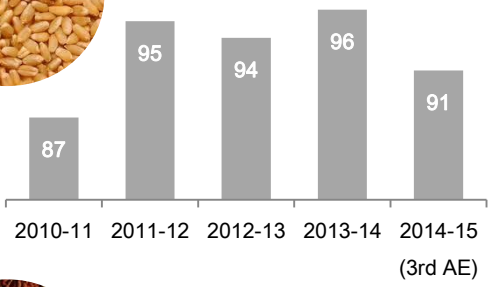
# Overview of India's Agriculture

**India's Foodgrains (in million tonnes) and Oilseeds (in lakh tonnes) Production (2010-2014)**

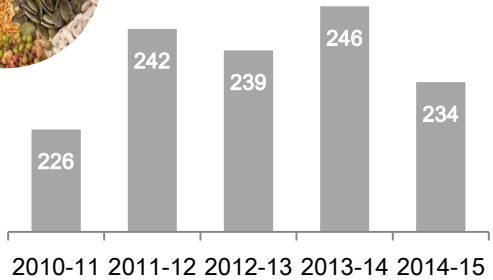
**Rice**



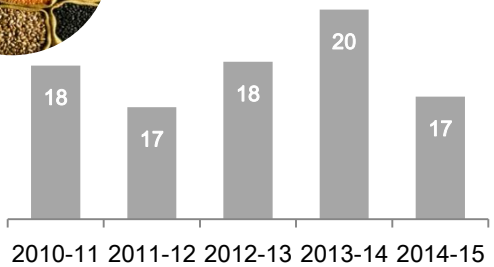

**Wheat**



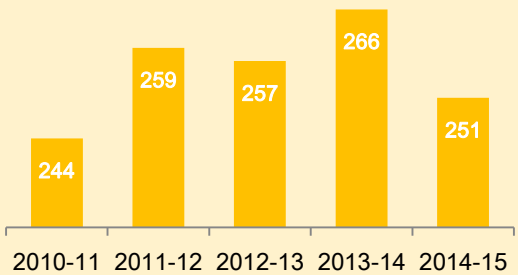

**Cereals**



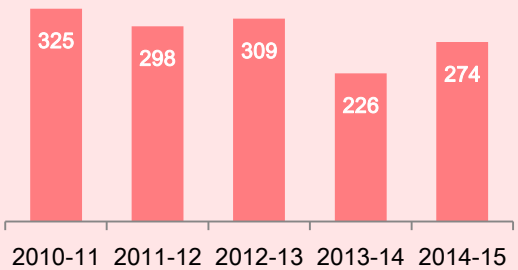

**Total Pulses**




**Total Food Grains**




**Total Nine Major Oilseeds***




A glance at the domestic production of major crops in India reveals a very unstable scenario. Moreover, in 2013, India's yield rate for rice (2.4 tonnes/hectare) and wheat (3.15 tonnes/hectare) put the country on 27th rank (out of 47) and 19th rank (out of 41) respectively. Although the yield has increased, there is still scope for improvement.

*Groundnut, Castorseed, Sesamum, Nigerseed, Rapeseed & Mustard, Linseed, Safflower, Sunflower, Soyabean

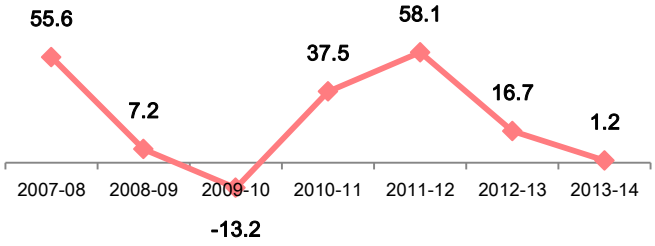
Sources: Directorate of Economics and Statistics, Department of Agriculture & Co-operation; Mint

# Overview of India's Agriculture

**Agriculture & Trade:**

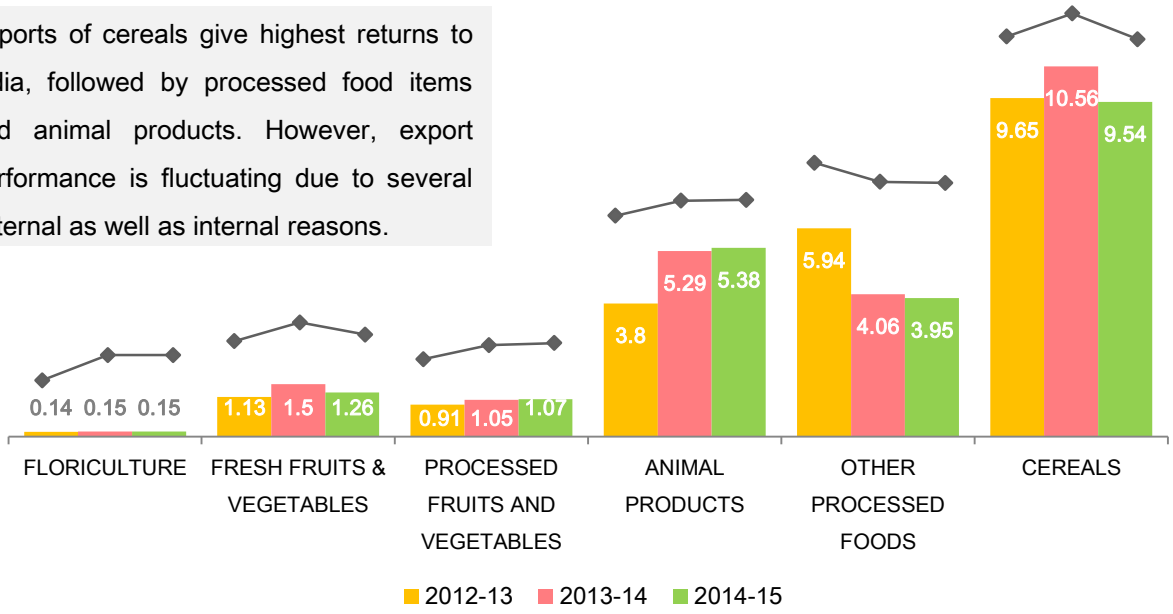
Imports and exports are an important indicator of a country's position in terms of growing demands of population. It even throws light on where lies the economy's comparative advantage. A glance at growth in exports of agricultural and allied commodities reveals a rather unstable pattern.

**Growth in Exports of Agricultural & Allied Products (%)**




**Value of India's Exports of Principal Commodities (in USD Bn)**

Exports of cereals give highest returns to India, followed by processed food items and animal products. However, export performance is fluctuating due to several external as well as internal reasons.




**Factors affecting India's agro exports**

Despite being the top exporter for a number of food items, India can face volatility when it comes to exports. Fall in currency prices of other countries results in shift towards products from those countries due to lower prices. Falling crude oil prices are also a major factor influencing demand for certain oilseeds. India also faces the challenge of meeting increasing domestic demand and the daunting task of managing stocks of various foodgrains at warehouses. All in all, exports of agro products have become an extremely volatile issue and multiple conflicting factors are involved in determination of the countries subsidies, prices and support policies.

Sources: Office of the Economic Advisor, Govt. of India; APEDA; The Financial Express

# Future Outlook

As per various government and private agencies' estimates, 2015-16 will see increase in the production of foodgrains, pulses and oilseeds on the back of record sowing in the Kharif season. The surplus rainfall in June 2015 and higher support prices (MSP) paved way for early sowing of crops; with 80% increase in the acreage of pulses. Oilseeds acreage has risen more than five-fold and coarse cereals and cotton also saw substantial growth. Even the Ministry of Agriculture anticipates rise in the total production of Kharif season in the year 2015-16 due to increase in the sown area. The only major worry is decline, of approximately 7%, in the acreage of paddy.

## Primary Concerns

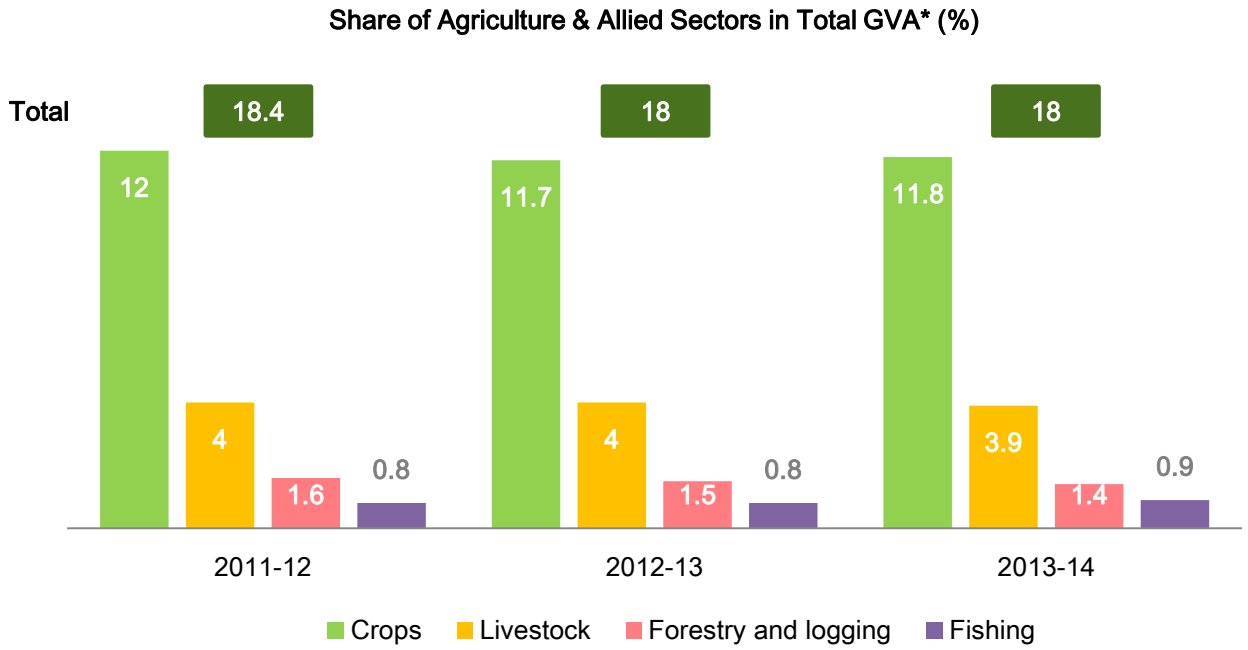
All the estimations about domestic agricultural production still carry a disclaimer that they will come true provided monsoon is sufficient and evenly distributed. India's agriculture and farmers are highly dependent on rainfall during monsoons and on other weather based factors. Slightest change in even one of these climatic conditions spells doom for the sector, and more often than not, farmers are caught unprepared. This has adverse impact on the overall farming and results in gradual collapse of every action related to it.

Agriculture yield rates are also a concerning factor and despite having more arable land than most countries in the world, India still lags behind in terms of productivity or realisation. The most important pillar of food security is a robust farming sector. Although India does produce ample amount of food currently, it has not yet realised its potential and lags behind many developed countries. Boosting productivity of farming sector is the need of the hour.

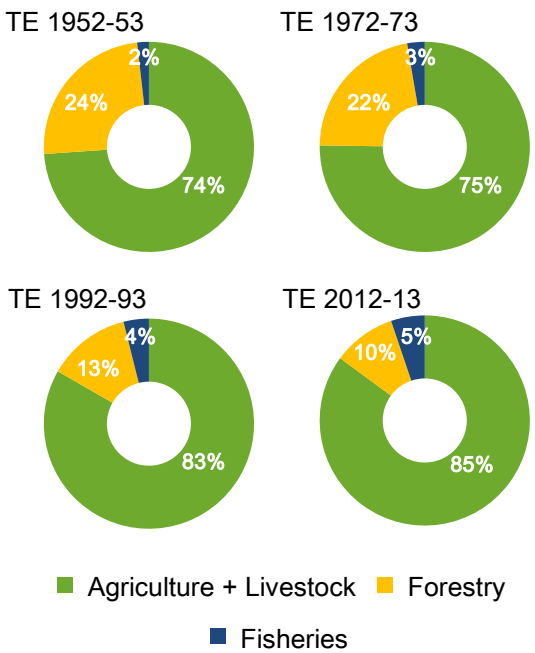
# CHAPTER TWO

## FISHERIES, ANIMAL HUSBANDRY AND DAIRY IN INDIA

# Agriculture and Allied Sectors




Allied activities like animal husbandry, fishery, forestry & logging, dairy, etc. are always considered to be supplementary to the core activity of farming. They are of great importance as they provide continuous employment and income flow supporting the seasonal nature of farming. The share of supplementary activities in India's gross value added has shown steady trend for the last three years. Animal husbandry related (Livestock) activity has the highest share followed by forestry and logging and lastly fishing. The allied sector that has lost a significant share is the forestry sector; share of which has decreased from 24 per cent in early 1950s to about a half (13 per cent) in early 1990s and to further about 10 per cent in the more recent period[1]. On the other hand, share of fisheries shows a slow but definitive increase.



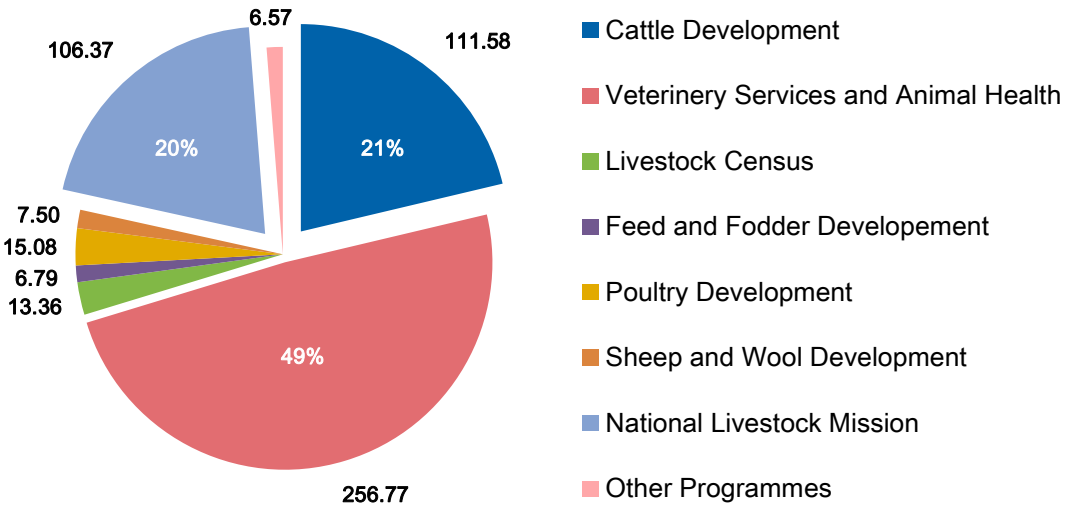

*GVA – Gross Value Added (at current prices); TE = Three Year Ending
Sources:1.National Council of Applied Economic Research, 2015

# Animal Husbandry

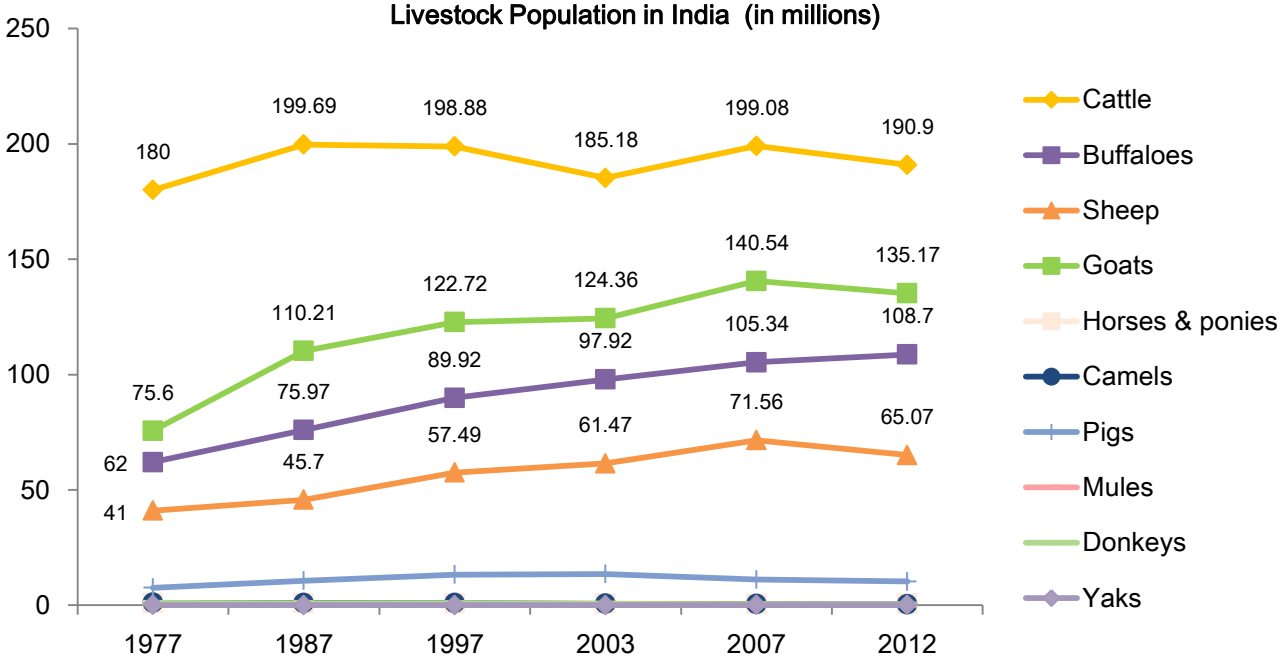
Indian agricultural system is predominantly a mixed crop-livestock farming system, with the livestock segment supplementing farm incomes by providing employment, draught animals, and manure.

The budget for 2015-16 envisages plan outlay of INR 442.92 for the sector. Moreover, the 2015-16 budget allocations revel significance of the sector to Indian economy.

**Budget Allocations for Animal Husbandry (2015-16)**



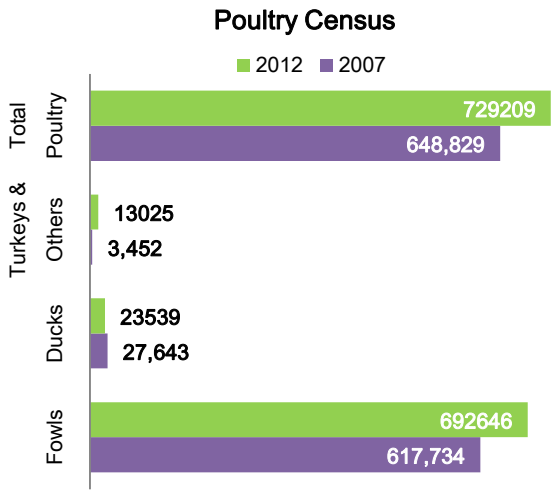

**Livestock Population in India (in millions)**




Sources: Economic Survey of India 2014-15; Basic Animal Husbandry and Fisheries Statistics, Department of Animal Husbandry, Dairying and Fisheries

# Animal Husbandry

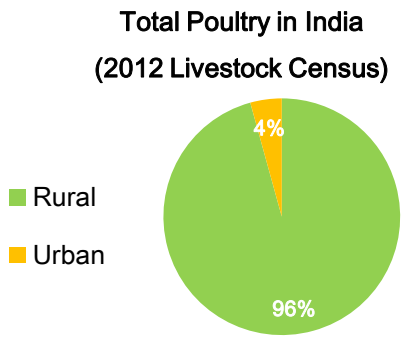
Quite obviously, cattle, goats, buffalos and sheep are the most commonly found livestock in the country. The biggest benefit of livestock is the products that can come from them, such as milk, meat, eggs, wool. Additionally, livestock also proves to be of assistance in the farm, especially where mechanisation is not possible. It is therefore necessary to view animal husbandry as a potential leveller to counter erratic agriculture outcomes.




India's Poultry market is estimated to be worth INR 90,000 Crore (2014). India is the second largest egg and third largest broiler-chicken producer in the world. The proportion of fowls is largest in total poultry population in the country. In 2012, it represented 95% of the total poultry. Population of ducks declined sharply from 2007 to 2012, by almost 15%. On the other hand, number of turkey increased by a massive 277% in the same five year period.

The number of poultry in urban areas of India has declined significantly representing a shift towards different professions. The only animals which saw a rise in numbers in the urban areas are horses, ponies and mules.

Over the past couple of years, rising prices of feedstock, such as maize and soya, had resulted in a slump in the segment; however it is slowly getting overturned. Furthermore, experts project feedstock prices to remain at the lower levels for the next couple of years at least. The poultry sector is poised to grow by 8-9% over the next year.



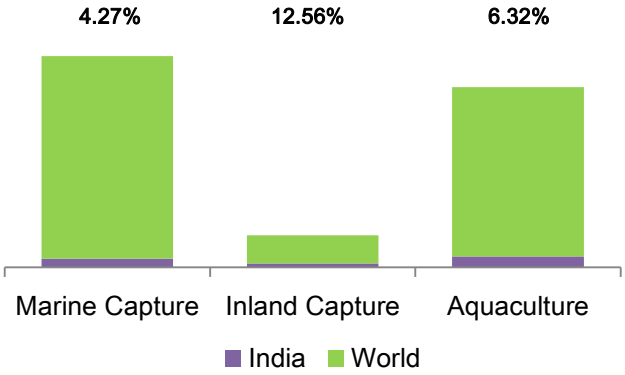

Poultry segment is crucial in two ways. Firstly, poultry when done professionally provides a valuable addition to farming. Demand for poultry products is thriving in both domestic and international markets and fetches consistent returns. Secondly, poultry items offer high nutritious value and are moderately priced, making them an affordable and accessible food choice. As a result, poultry segment is essential when talking about food security in general.

Sources: Basic Animal Husbandry and Fisheries Statistics, Department of Animal Husbandry, Dairying and Fisheries

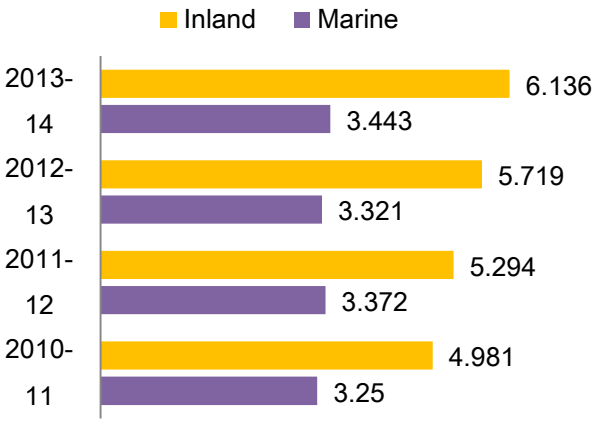
# Fisheries

In a country like India – with a coastline of more than 8,000 kilometres – Fisheries forms a highly important segment. And the fact that India is the second largest fish producer in the world bears testimony to this significance. The Indian fisheries sector is estimated to be of INR 67,800 crore (approximately USD 10 billion) in 2015. Fisheries constitute about 0.92% of the country's GDP and 5.58% of agriculture GDP in 2013-14.

**India's Share in World Fish Production (2012)**




**Total Fish Production in India (In tonnes)**




The total fish production has grown on by an average of 4.62% in the past four years. In 1990-91, share of marine production in total was 60%. This has now reversed exactly and inland production registered a share of 64% in 2013-14. The proportion of inland production is rising, and a major reason for it is increase in aquaculture and fish farming in India.

India has 13 coastal states and UTs and almost all states have inland fishing resources.

| Marine | |
|---|---|
| Length of coast line (Km) | 8,118 |
| Exclusive Economic Zone (EEZ) million Sq Km | 2.02 |
| **Inland** | |
| Total inland water bodies (lakh Ha) | 73.59 |
| Rivers & canals (Km) | 195210 |
| Reservoirs (Lakh ha) | 29.07 |
| Tanks & ponds (lakh Ha) | 24.14 |
| Flood plain lakes/derelict waters (lakh Ha) | 7.98 |
| Brackish water (lakh Ha) | 12.40 |

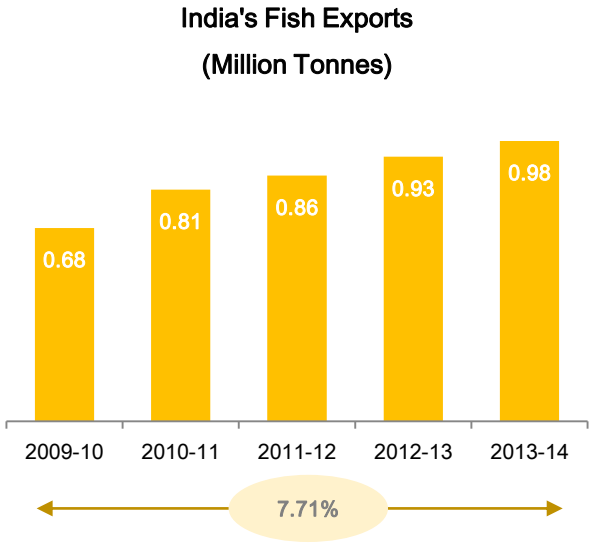
Quite obviously, top six states in fish production are coastal states.

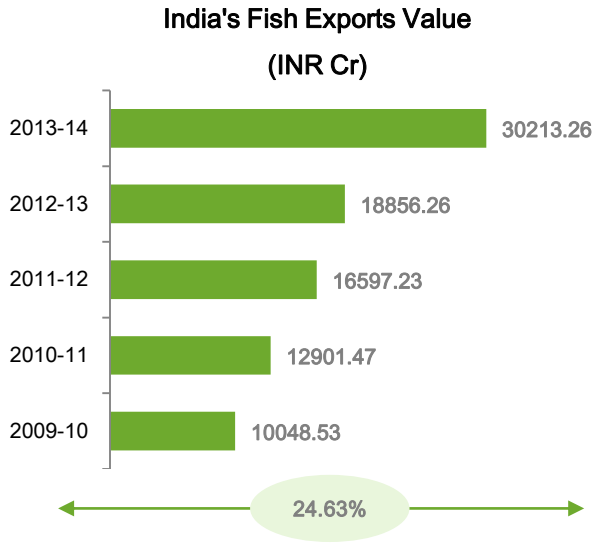
| | |
|---|---|
| Andhra Pradesh | West Bengal |
| Gujarat | Kerala |
| Tamil Nadu | Maharashtra |

Coastal states have 3432 fishing villages with 874,749 families in the business comprising of 4,056,213 fisher folk population.

Sources: The Economic Times; Department of Animal Husbandry, Dairying and Fisheries; General Knowledge Today, FAO, Handbook of Fisheries Statistics 2014

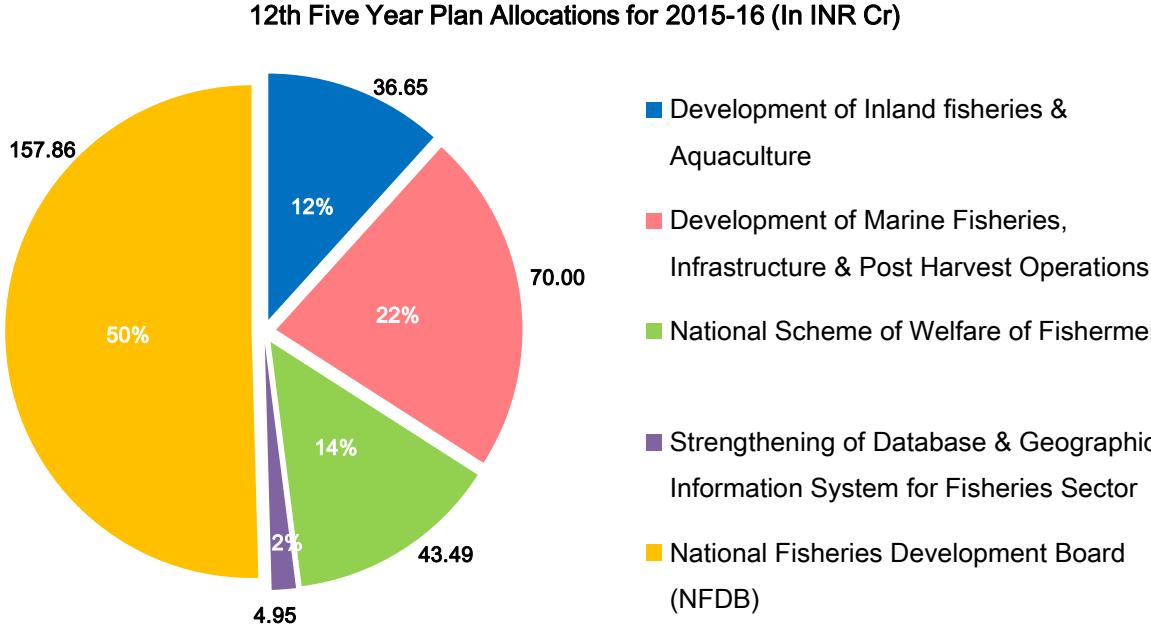
# Fisheries




64.10% of the export value comes from frozen shrimps. As far as the quantity goes shrimps make up 30.64%. Other varieties exported from India include cuttlefish, squids, live, chilled or dried items. Maximum exports go to South East Asia (Incl. China), European Union, United States and Japan.

There have been numerous schemes and initiatives taken by the government to boost fisheries sector in India over the years. INR 1033.98 crore were released during the 11th five year plan (2007-12) towards various schemes for fisheries; this figure rose to 847.81 in just the first three years of 12th five year plan (2012-2017).

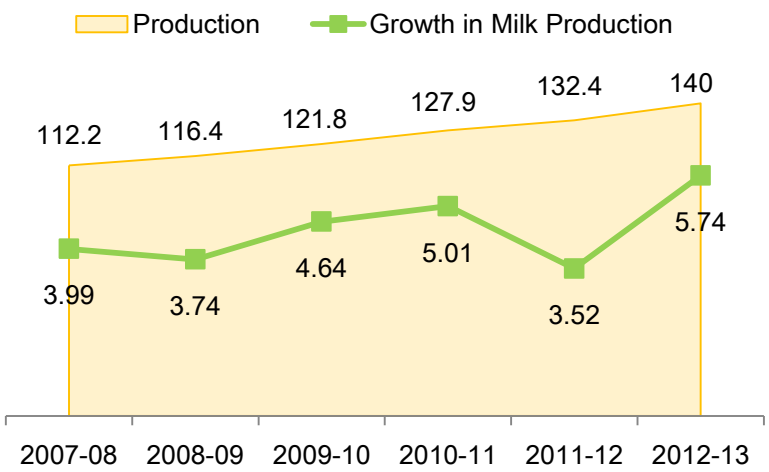



Sources: The Economic Times; Department of Animal Husbandry, dairying and Fisheries; General Knowledge Today, FAO, Handbook of Fisheries Statistics 2014

# Dairying

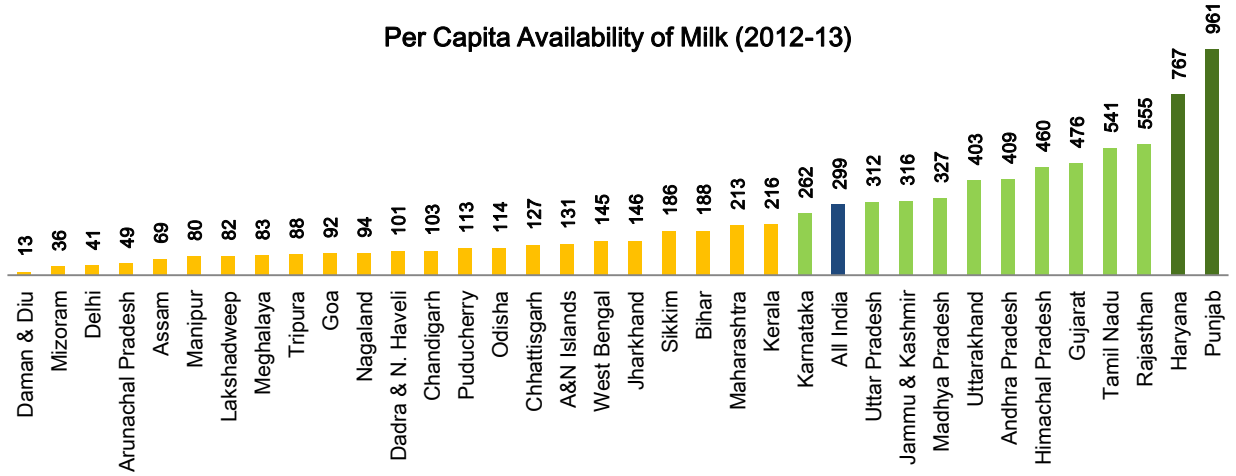
India's thumping success in the White Revolution, initiated in 1970s, was a result of one of the most well framed food-related policies of the modern era. India's milk production in 1950s and 1960s was a major concern and often dipped to negative levels. To revive the sector National Dairy Development Board launched Operation Food, bedrock of which was milk producers' cooperatives across various strata. At the end of the three phased mission, India emerged as world's largest milk producer and also milk sufficient. Almost two decades from then, India still maintains its top ranking in milk production, but the sector faces several new challenges (especially the rising milk prices) which need to be addressed to continue having a dominant global position. Milk and milk products are some of the most nutritional food items and status assessment of the dairying sector is a must when addressing food security concerns.

**India's Milk Production and Growth (Million tonnes and %)**




In 2013-14, India produced an estimated 140 million tonnes of milk, showing an increase of almost 6% over the previous year. Domestic as well as international demand for milk continues to increase and India is also the biggest consumer of the commodity. Out of the total production, about 70% is used in its raw form and the rest is used for processing.

**Per Capita Availability of Milk (2012-13)**




Sources: The Hindu, Department of Animal Husbandry, Dairying and Fisheries, BIG Analysis

# Dairying

On an average, a healthy adult needs to drink at least three to four glasses of milk everyday to fulfil calcium as well as vitamin D needs. However, there may well be other sources of calcium in the diet, which could lessen the dependence on just milk for the nutrient. As a result, minimum one glass of milk can also prove sufficient for a healthy adult. What is alarming is that only 12 out of 35 states in India have a per capita availability meeting these standards. Which essentially means almost 66% of the nation requires more amount of milk per capita.

**Import Export Scenario of Milk and Milk Products (Quantity)**

**Imports**

| Product | 2012 | 2013 | |
|---|---|---|---|
| Milk & Cream Not Concentrated Nor Containing Added Sugar or Other Sweetening Matter | 99 | 83 | ↓ |
| Milk & Cream Concentrated/Containing Sugar/Sweetening Matter | 45910 | 667 | ↓ |
| Butter Milk, Curdled Milk & Cream, Yogurt, Khir & Other Fermented Acidified Milk & Cream | 104 | 87 | ↓ |
| Whey & Products Consisting of Natural Milk Constituent Not Containing Added Sugar or Sweetening Matter. | 12351 | 4503 | ↓ |
| Butter and Other Fats & Oils Derived from Milk; Dairy Spreads | 6632 | 783 | ↓ |
| Cheese and Curd | 992 | 1294 | ↑ |

**Exports**

| Product | 2012 | 2013 | |
|---|---|---|---|
| Milk & Cream Not Concentrated Nor Containing Added Sugar or Other Sweetening Matter | 14615 | 4886 | ↓ |
| Milk & Cream Concentrated/Containing Sugar/Sweetening Matter | 519 | 72038 | ↑ |
| Butter Milk, Curdled Milk & Cream, Yogurt, Khir & Other Fermented Acidified Milk & Cream | 160 | 264 | ↑ |
| Whey & Products Consisting of Natural Milk Constituent Not Containing Added Sugar or Sweetening Matter. | 115 | 610 | ↑ |
| Butter and Other Fats & Oils Derived from Milk; Dairy Spreads | 7841 | 6500 | ↓ |
| Cheese and Curd | 2389 | 3526 | ↑ |

Trade Surplus | Trade Deficit | ⇩⇧ Change in previous year | Good change | Bad change

Sources: Department of Animal Husbandry, Dairying and Fisheries, BIG Analysis

# Key Issues

Some of the most recent events in the allied sectors have revealed serious issues troubling the sector. Rising milk prices due various factors like the demand supply forces, effect of policies and institutions, role of exports, buffer stock and productive population is an issue that requires serious attention. It was recently revealed than in the newly formed state of Telangana, Animal Husbandry department had no control over poultry farms in the State. They relied on farm owners to voluntarily approach the department to notify about any problems or alarms. In terms of fisheries, despite being the second largest in production, India is ten times smaller than the world number one, China. Industry experts believe, India is not utilising just a marginal share of its massive potential in the sector. Moreover, plan and non-plan budget outlay has shown a drop in animal husbandry, dairy as well as fisheries sector in the current fiscal.

## Primary Concerns

There is a complex relationship between poverty and agriculture & its allied activities. Supporting farming with animal husbandry or poultry and thereby dispersing occupational risks has often been considered the most desirable strategy. However, in times of extreme drought and famine, maintaining animals becomes a daunting task for farmers, leading to deterioration of animal's health which ultimately results in degradation in the animals' value. This circle beats the very purpose of animal farming and cultivators begin considering them as a burden. There is an urgent need to break this cycle and put focus on developing agriculture and allied activities simultaneously, as complementary occupations.

Sources: The New Indian Express, The Telegraph India, Mainstream Weekly, IIM Bangalore, BIG Analysis

# CHAPTER THREE

## FOOD SECURITY – UNDERSTANDING AND DEMYSTIFYING THE CONCEPT

# Food Security

Definition of food security keeps undergoing changes over time, in order to become more inclusive. Comparison of definitions given by three major global organisations reveals how broad is the idea of 'security'.

## World Health Organisation

Food security exists when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life". Commonly, the concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences.

## World Food Programme

Food must be available in sufficient quantities and on a consistent basis. It considers stock and production in a given area and the capacity to bring in food from elsewhere, through trade or aid.

People must be able to regularly acquire adequate quantities of food, through purchase, home production, barter, gifts, borrowing or food aid.

Consumed food must have a positive nutritional impact on people. It entails cooking, storage and hygiene practices, individuals' health, water and sanitations, feeding and sharing practices within the household.

## Food and Agriculture Organization

Food availability: The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid).

Food access: Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).

Utilization: Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security.

Stability: To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity). The concept of stability can therefore refer to both the availability and access dimensions of food security.

Global level stakeholders have coined their own versions of the concept; however, the crux of it all looks at food security from a deep socio-economic perspective, with equal focus on the health aspect of it. Food is fundamental to life and food insecurity is the most crucial problem staring at the world.

Sources: World Health Organization, World Food Programme, Food and Agriculture Organization

# Food Security

Food, nutrition and health are intimately connected aspects of our life. Food is fundamental to human existence. Through the centuries we have acquired a wealth of information about the use of food to ensure growth of children and youth, to maintain good health through life, to meet special needs of pregnancy and lactation and to use it to recover from illness. Nutritional contribution of food is of great value to life.

| | |
|---|---|
| Food | Nourishes the body. Food may also be defined as anything eaten or drunk, which meets the needs for energy, building, regulation and protection of the body. In short, food is the raw material from which our bodies are made. Intake of the right kinds and amounts of food can ensure good nutrition and health, which may be evident in our appearance, efficiency and emotional well-being. |
| Nutrition | Food at work in the body. Nutrition includes everything that happens to food from the time it is eaten until it is used for various functions in the body. Nutrients are components of food that are needed by the body in adequate amounts in order to grow, reproduce and lead a normal, healthy life. Nutrients include water, proteins, fats, carbohydrates, minerals and vitamins. There are over 40 essential nutrients supplied by food, which are used to produce literally thousands of substances necessary for life and physical fitness. |

**This document views food security with four basic pillars**

**Availability:**
Human beings require a particular amount of food intake in order to survive. Food security must guarantee that basic minimum food requirements of the citizens of any nation are taken care of either by ensuring enough production capabilities or provisioning adequate imports. Availability must take into account current as well as future demand.

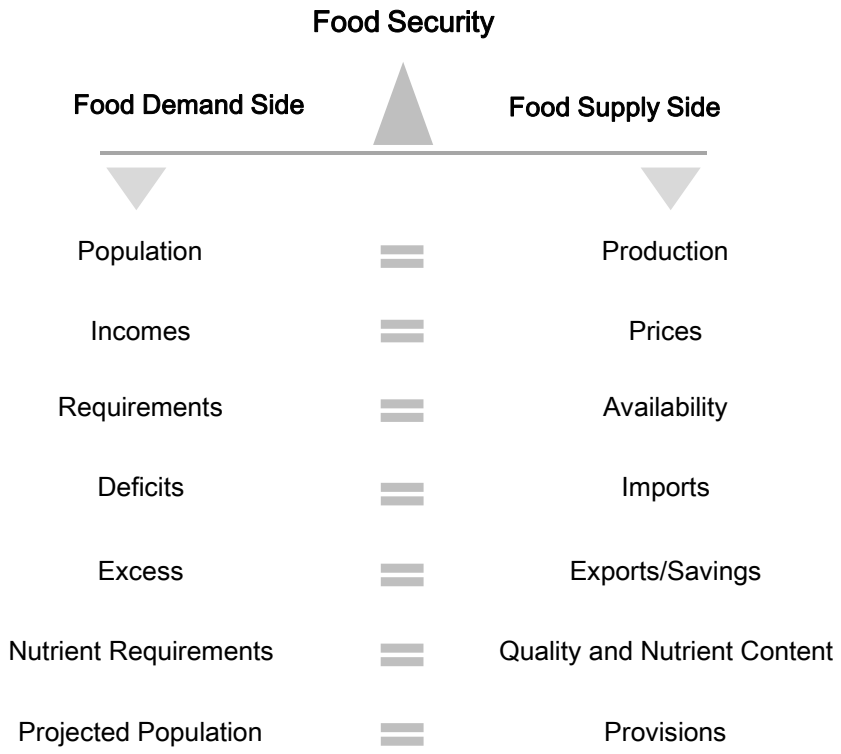
**Accessibility:**
Availability of food is necessary but not sufficient. The food available must reach all spheres of society. Food reaching all quarters of the country must also remain fit for consumption.

**Affordability:**
Provision of affordable basic food items is of utmost importance, especially to a developing nation. The greater goal of food security is unachievable if all strata of society cannot afford access to it.

**Nutritional value:**
This is the most ignored aspect of food security. Adequate nutrient supply is vital for holistic growth of every individual. Food available for consumption must provide rudimentary nourishment.

Sources: Fundamentals of Foods, Nutrition and Diet Therapy, BIG Analysis

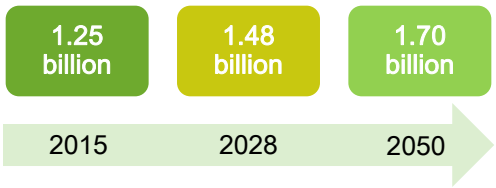
# Food Security – The Balance Model




Food security must traverse through time. It is a phenomenon that needs long term planning. Review of resource endowments, current and future demand calculations, study of income and price factors ensures accurate status assessment and set a stage for provisional measures. Equilibrium between the demand and the supply sides of food is the most fundamental determinant of food security. Food insecurity can stem from several factors – wastages, unequal distribution, distorted prices, improper resource management, imbalanced trade, unfair and incorrect policies, asymmetrical value chain, short-sightedness of leadership, lack of coordinated efforts – to name a few.

Source: BIG Analysis

# Food Insecurity




At a population of nearly 1.25 billion, India is already world's second most populous country after China. The number is estimated to only swell more and after 2028, India will surpass China to become the world's most populated country. This growth is expected to last till 2040-2050.

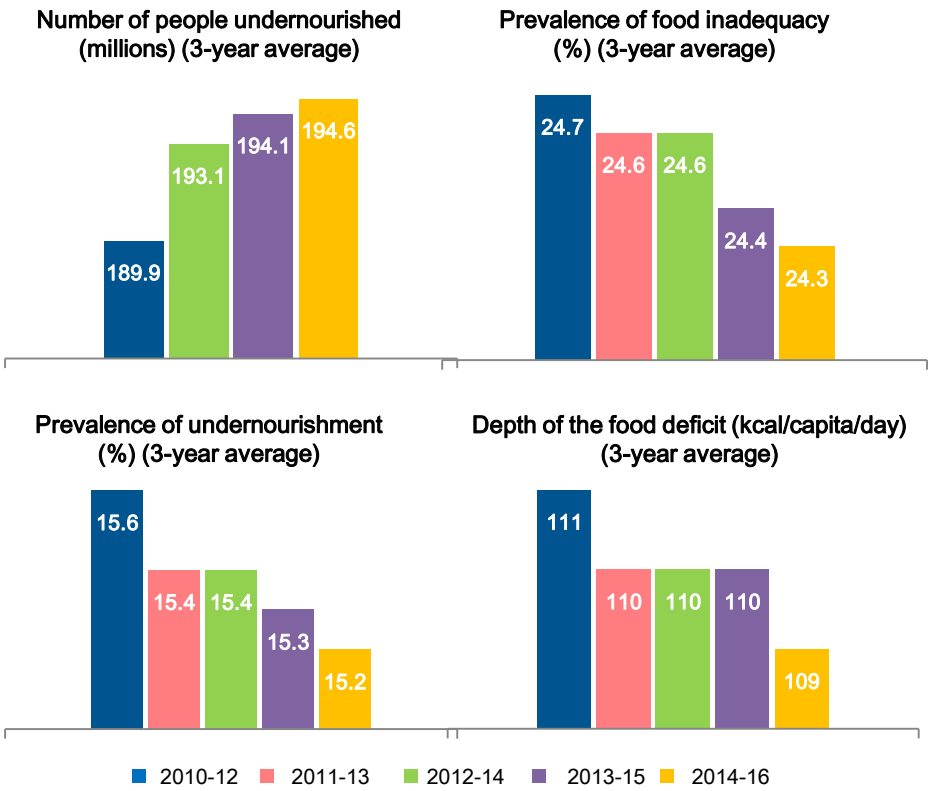
**55**
India's rank in Global Hunger Index 2014 (Out of 76 countries)

**15.2**
Proportion (%) of undernourished in India's population by 2014-2016*

**48**
Proportion (%) of women in reproductive age with anemia**

**29**
Proportion (%) of underweight children under 5 years age

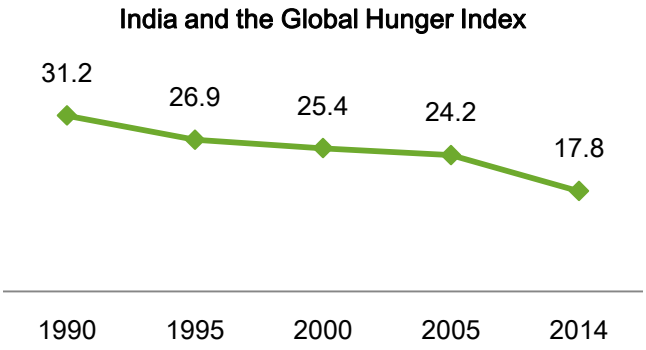
Having such high levels of population brings its own challenges. India is taking definite steps in eradication hunger and nutritional imbalances but there still is a long way to go before the country offers its citizens complete food security.




Prevalence of food inadequacy, undernourishment and depth of food deficit may well be gradually decreasing, but India still remains home to nearly 195 million undernourished people, which is 2.8% of the world's total population. **A country with 195 million inhabitants would be the sixth most populous country in the world.**

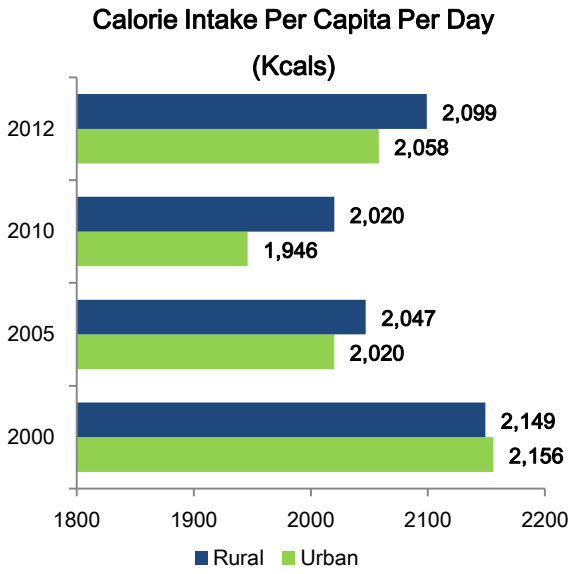
Sources:*projections; **2011
Sources: The State of Food Insecurity in the World 2015 by FAO UN , IFAD and WHP; Global Nutrition Report 2014 (India), FAO

# Food Insecurity




India's ranking in the Global Hunger Index has been improving over the past few years due to multi level efforts. However, there is substantial gap when it comes to fulfilling adequate nutrient requirements for a healthy living. India's efforts towards food security in the coming years need to focus on this aspect.

The Planning Commission has identified the ideal calorie intake to be **2,400 Kcals per day**. The Indian Council of Medical Research has detailed energy requirements based on gender and age groups, which are considered to be a standard.




Among the bottom 5% of rural population ranked by Monthly Per Capita Expenditure (MPCE), **57% of households had calorie intake below 2,160 Kcal/consumer unit/day which was only 2% for the top 5% wealth strata of the population.**

| Group | Category | Body weights | Requirement |
|---|---|---|---|
| | | | (kcal/d)a |
| Man | Sedentary Work | 60 | 2320 |
| | Moderate work | 60 | 2730 |
| | Heavy work | 60 | 3490 |
| Woman | Sedentary work | 55 | 1900 |
| | Moderate work | 55 | 2230 |
| | Heavy work | 55 | 2850 |
| | Pregnant woman | 55 + GWG | +350 |
| | Lactation | 55 + WGc | +600 |
| | | | +520 |
| Infants | 0-6m | 5.4 | 500 |
| | 6-12m | 8.4 | 670 |
| Children | 1-3y | 12.9 | 1060 |
| | 4-6y | 18.1 | 1350 |
| | 7-9y | 25.1 | 1690 |
| Boys | 10-12y | 34.3 | 2190 |
| Girls | 10-12y | 35 | 2010 |
| Boys | 13-15y | 47.6 | 2750 |
| Girls | 13-15y | 46.6 | 2330 |
| Boys | 16-17y | 55.4 | 3020 |
| Girls | 16-17y | 52.1 | 2440 |

Sources: Indian Council of Medical Research; The Hindu; Nutritional Intake in India by NSSO 68th Round, Nabard Annual Report 2014-2015

# Food Insecurity

**Undernourished (Under 5 years)**

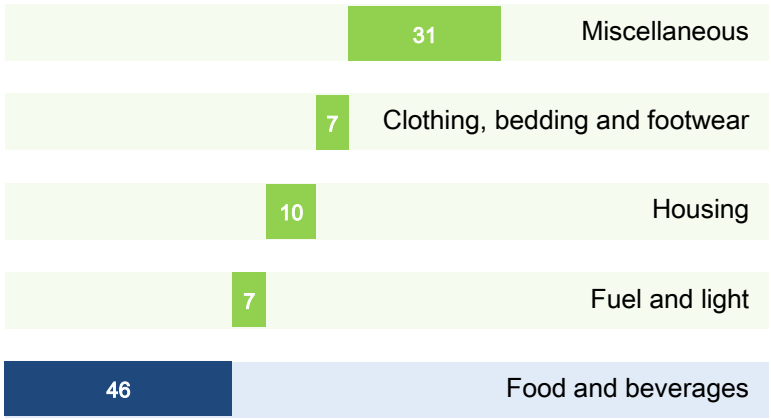

**Girls aged 15-18 with low BMI**


A glance at the proportion of geographical distribution of undernourished children and girls with Body Mass Index (BMI) lower than the standard 18.5, reveals a lot about the status of food security in India. Most states have proportion of unhealthy population in the range of 30-60%, which is substantially high. These numbers wash out all the positive findings about improving health and put the focus on how far is the road towards achieving food security.

**Consumer Price Index (CPI)**

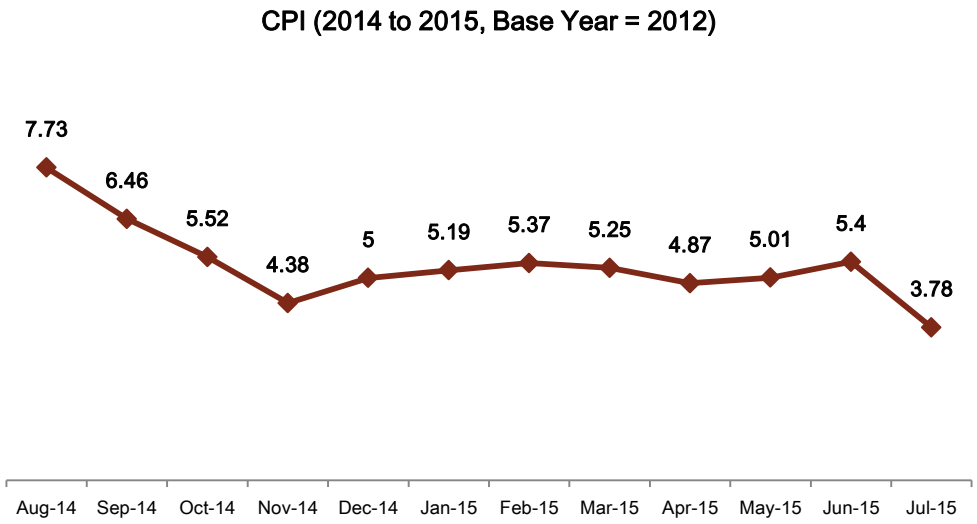
CPI is one of the most crucial measures of inflation in a country. India's CPI mix is further divided into 5 sub-components and food and beverages has the highest weightage of 50%. Hence, CPI is a fairly judicious measure of consumer's spending capacity and in the determination of food security in general.

**CPI (Rural and Urban) Components (%)**




Sources: Rapid Survey on Children, UNICEF and Government of India; The Economist; Ministry of Statistics and Programme Implementation; Mint, BIG Analysis

# Food Insecurity

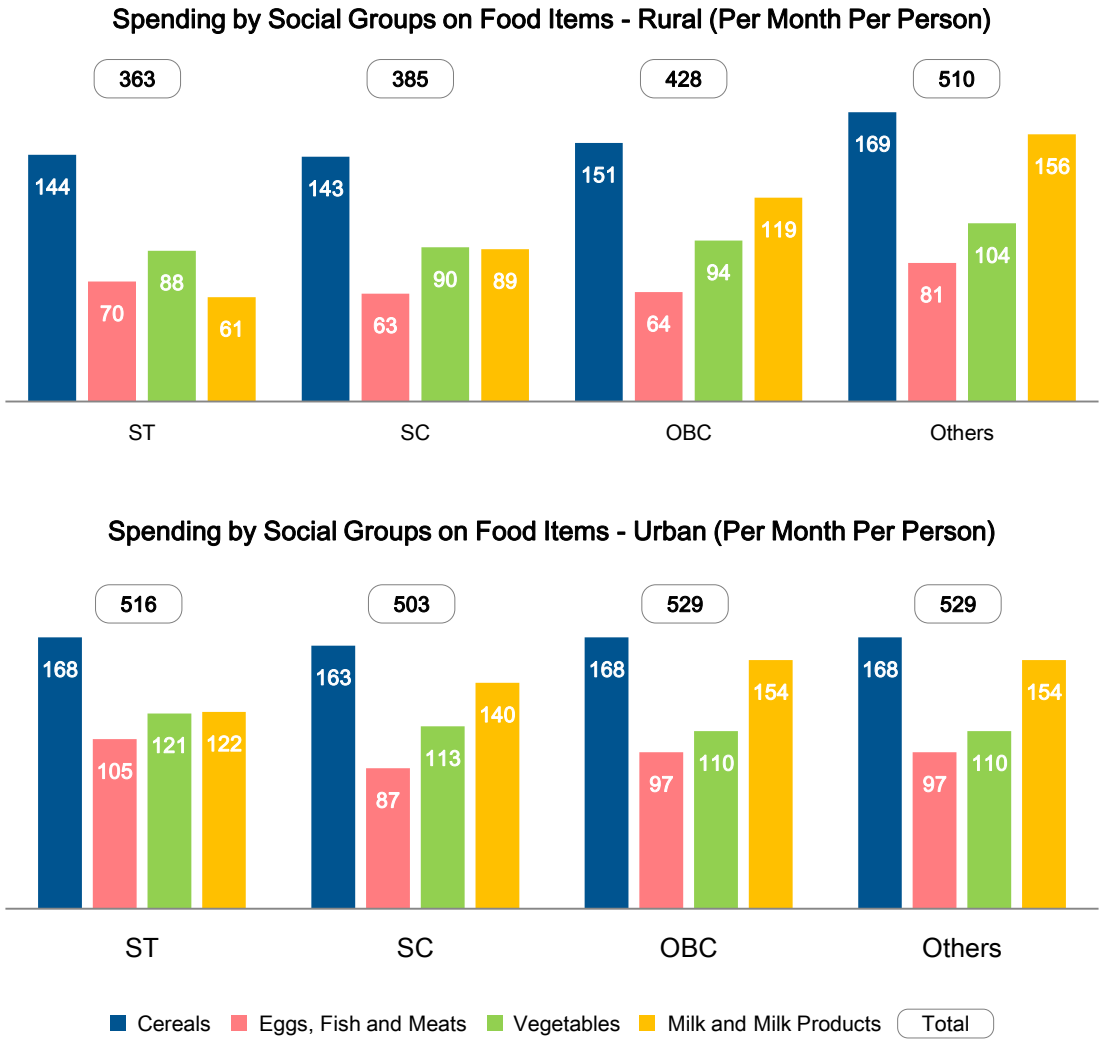



| Basic Items (Per Person Per Day) | Approximate Prices (In INR) | | | | |
|---|---|---|---|---|---|
| | Mumbai | Delhi | Kolkata | Chennai | All India |
| Milk (0.25 ltr) | 12 | 11 | 9 | 10 | 10 |
| Rice (250 g) | 15 | 15 | 10 | 10 | 12.5 |
| Eggs (2 nos) | 9 | 10 | 9 | 8 | 9 |
| Wheat (100 g) | 2 | 2 | 2 | 2 | 2 |
| Fruits (Bananas 2 nos) | 8 | 8 | 8 | 8 | 8 |
| Vegetables (Basic) | 30 | 30 | 25 | 25 | 25 |
| **Total** | **76** | **76** | **63** | **63** | **66.5** |

Average prices of basic food items in four metros and in the country reveal that a person **requires minimum INR 60/- per day if dietary requirements are to be fulfilled**. The recommended poverty line in India is INR 32 for Rural areas and INR 47 for Urban; based on which India has nearly 30% of the total population in the country is Below Poverty Line. The food grain rates for this group are highly subsidised, leaving the rest 70% population. Although National Food Security Act proposes bringing 67% under the scheme, the implementation has not happened as per the schedule and faces severe challenges.

Sources: Trending Economics, Numbeo, BIG Analysis

# Food Insecurity




The highest amount a rural individual spends per day on basic food group comprising of cereals, eggs, fish & meat, vegetables and milk is INR 16 (belonging to the Other social group). Scheduled Tribes have an even lesser per day spend of INR 11. The same social groups in urban areas spend INR 18 and INR 17 respectively. Here, the Scheduled Tribes spend the least INR 16 on food items. This data reveals a staggering picture of reality of food security in India. These spending figures are nowhere near the amount needed to ensure a healthy, balanced diet for an average individual.

Sources: NSSO, BIG Analysis

# Food Insecurity

**"Great initiatives by the Indian government, but serious lack of awareness and implementation"**

***Mrs. Bhagyashri Mhatre***
*Food Technologist*
*Lead Auditor ISO 22000-2005 (FSMS)*

In her extensive career of over a decade, Mrs. Mhatre has seen the food industry grow leaps and bounds and with her food technology background, she works closely with government agencies as well. Mrs. Mhatre believes that there is severe lack of awareness, especially in rural areas, regarding nutritional value of food, understandably so due to the adverse living conditions and lack of integrated development. The Government has taken several initiatives through the Ministry of Women and Child Development and other entities. Campaigns such as IEC (Information, Education & Communication) Campaign against Malnutrition, Integrated Child Development Scheme (ICDS) – one of the longest running food security related programme in the country or the Take Home Ration (TRH), to name a few, have been successfully implemented and have shown great results. In recent times, there has been a substantial reduction in severe grades of under-nutrition in children and some improvement in the nutritional status of all the segments of population is achieved through national programmes for tackling anemia, iodine deficiency disorders and Vitamin-A deficiency. However, several challenges remain. The country needs to increase the production of livestock, fish and horticulture products. This has to be achieved in the face of shrinking arable land and farm size, low productivity, growing regional disparities in productivity and depletion of the natural resource base. Appropriate steps have to be taken to minimize the potential adverse consequences of globalization on domestic production. Inputs needed to achieve a sustainable increase in food grain production to meet the needs of the growing population have to be provided. Innovative local efforts can go a long way in improving nutrition security especially for the poorer segments of the population living in vulnerable areas.

## Primary Concerns

The issue of food security needs to be addressed from the lowest possible levels. Poorest of the poor must know the comprehensive meaning of food security and must be empowered to demand and create access to the same. Additionally, food security provisions for the next few years need to be thought of right from the onset and production capabilities of the country's farming sector, purchasing powers of consumers, food handling habits need to be designed in a more focussed manner.

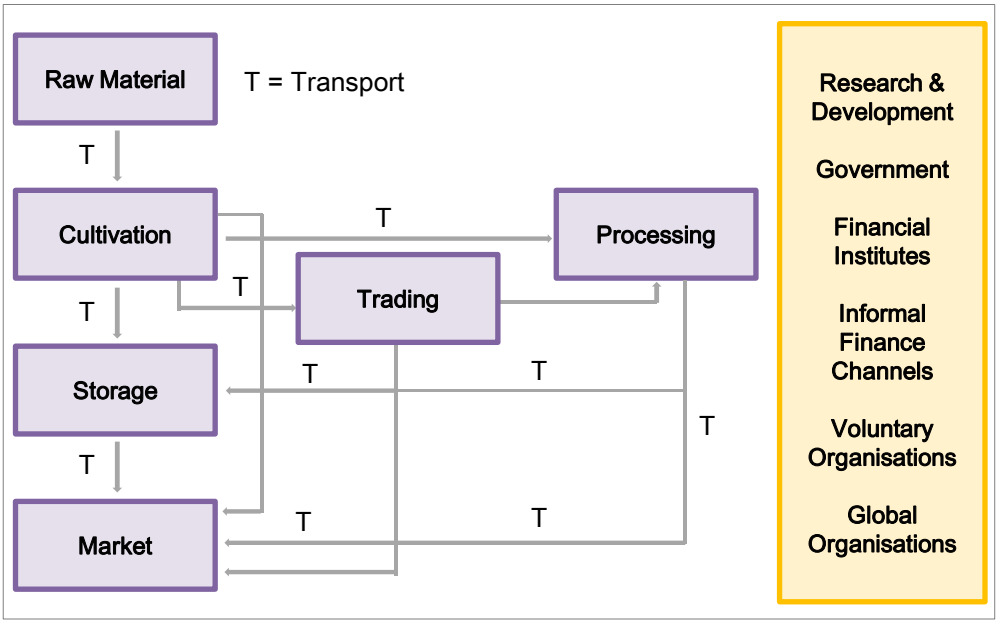
# CHAPTER FOUR

## AGRICULTURAL VALUE CHAIN AND FOOD WASTAGE

# Agricultural Value Chain

Value chain includes the route of a product or service from the primary stage (raw material) to the final stage (consumption). Multiple stakeholders are involved in turning a product fit for consumption by adding value to it at every stage. Complex value chains exist in all sectors be it manufacturing, services or agriculture. How the product is managed along this chain has an extensive effect on the quality of the product, its price, availability and accessibility. Typically, value chain for any product consists of some fundamental stages and nodes viz. Inputs, Production, Processing, Transportation, Storage, Marketing, Sales.

**Agricultural Value Chain (AVC)**




| Raw Material | Cultivation | Storage & Transport | Market | Trading | Processing |
|---|---|---|---|---|---|
| Seeds | Farmers | Warehouse | Marketing | Importers Exporters | Cleaning |
| Soil | Farm Equipment | Cold Storages | Distributors | Traders | Food Processors |
| Fertilisers | Irrigation Equipment | Transporter | Media | | Packaging |
| Pesticides | Other Machinery | | | | |
| Fodder, Livestock | | | | | |

- Agriculture Research Institutes (Private and Government)
- Agricultural Universities and Colleges (Private or Government)
- Ministries and Departments
- Government-run Storage Facilities,
- Banks and other FCs
- Commodity Exchanges
- Moneylenders
- NGOs and Farmers Communities / Associations
- Food and Agriculture Organization
- World Trade Association

Source: BIG Analysis

# Agricultural Value Chain

Stakeholders directly involved in agricultural activities have some primary roles to fulfil, and more often than not, lack of fulfilment of these roles results in deterioration of the final agro product and crumbled value chain.

**Role and responsibilities of each participant in the agricultural value chain**

| Participant | Role | Effect of inefficiency |
|---|---|---|
| Seed manufacturer | To make good quality nutritional seeds for various crops available via development methods like hybrid, traditional or modern | If the seed itself lacks quality the end product will also come out inferior |
| Soil (Land) | Owner of the land must ensure maintenance of the soil, soil health assessment | Poor quality soil would result in low yield |
| Fertilisers manufacturer | To provide necessary nutrients to the crop, based on the type and yield expected. Proportion of nutrients should be balanced. | Inferior quality fertiliser results in damage to the crop, soil and the entire crop cycle. |
| Pesticides manufacturer | To prevent crop damages and wastages from pest attacks, pesticides makers must be up to date with kinds of pests attacking particular crops, their severity, etc. | Ineffective pesticide will not mitigate losses due to pest attacks |
| Farmers | To ensure all inputs are balanced and used in an efficient manner, to manage crops, crop health, farm equipment, labour, irrigation, finances effectively. | Lack of knowledge about single aspect of farming results in inept utilisation of resources. |
| Equipment manufacturer | Farm, irrigation and other machinery must be up to date, farmer friendly, energy and cost efficient. | Outdated, poor quality equipment has a direct impact on farm productivity. |
| Storage Facilities | Warehouses / cold storage must provide the right temperature, right space, effective prevention from spoilage and pest attack, security. | Final output may get completely wasted if not stored properly resulting in massive monetary and intangible losses. |
| Transporters | Transporter is involved at all stages of the AVC. The transit system must be fast, safe, modern, sufficient. | Faulty transport systems lead to delay, decay, spoilage, wastage of farm components. |

Sources: BIG Analysis

# Agricultural Value Chain in India

Other indirect stakeholders such as agricultural product marketing corporations, government and allied agencies, food processors, traders, distributors, importers and exporters, agricultural research and education institutes also provide great support, mainly to the core functionaries to ensure efficacy. Unless the government or voluntary organisations don't run awareness programmes regarding plantation techniques, soil health, modern technologies, etc. farmers will not be able to perform effectively. If there are too many middlemen in the value chain, right price will not be fetched by either farmers or consumers. Lack of accessibility to institutional finance will hamper the efforts of agricultural community to fulfil their needs.

India has a plethora of institutes (government-allied or non governmental) dealing with agriculture and allied activities. A glance at even a few of them revels the complexity involved in the agricultural value chain in India

**Ministry of Agriculture and Farmers' Welfare**

Department of Agriculture and Cooperation

DAC is further divided into 27 divisions

| | | | | | |
|---|---|---|---|---|---|
| Agriculture Marketing | Cooperation | Finance, Budget and Accounts | Information Technology | | |
| Integrated Nutrients Management | Mechanisation and Technology | Seeds | Technology Mission on Oil Seeds & Pulses | | |
| Crops | Economic Administration | Extension | Natural Resources Management | Oilseeds | Plant Protection |

Agmarknet – Directorate of Agriculture Marketing and Inspection

Food Corporation of India

NABARD

Department of Agricultural Research and Education

Central Warehousing Corporation

Indian Agricultural Research Institute

Department of Animal Husbandry, Dairying & Fisheries

National Centre of Organic Farming

Agricultural Finance Corporation Limited

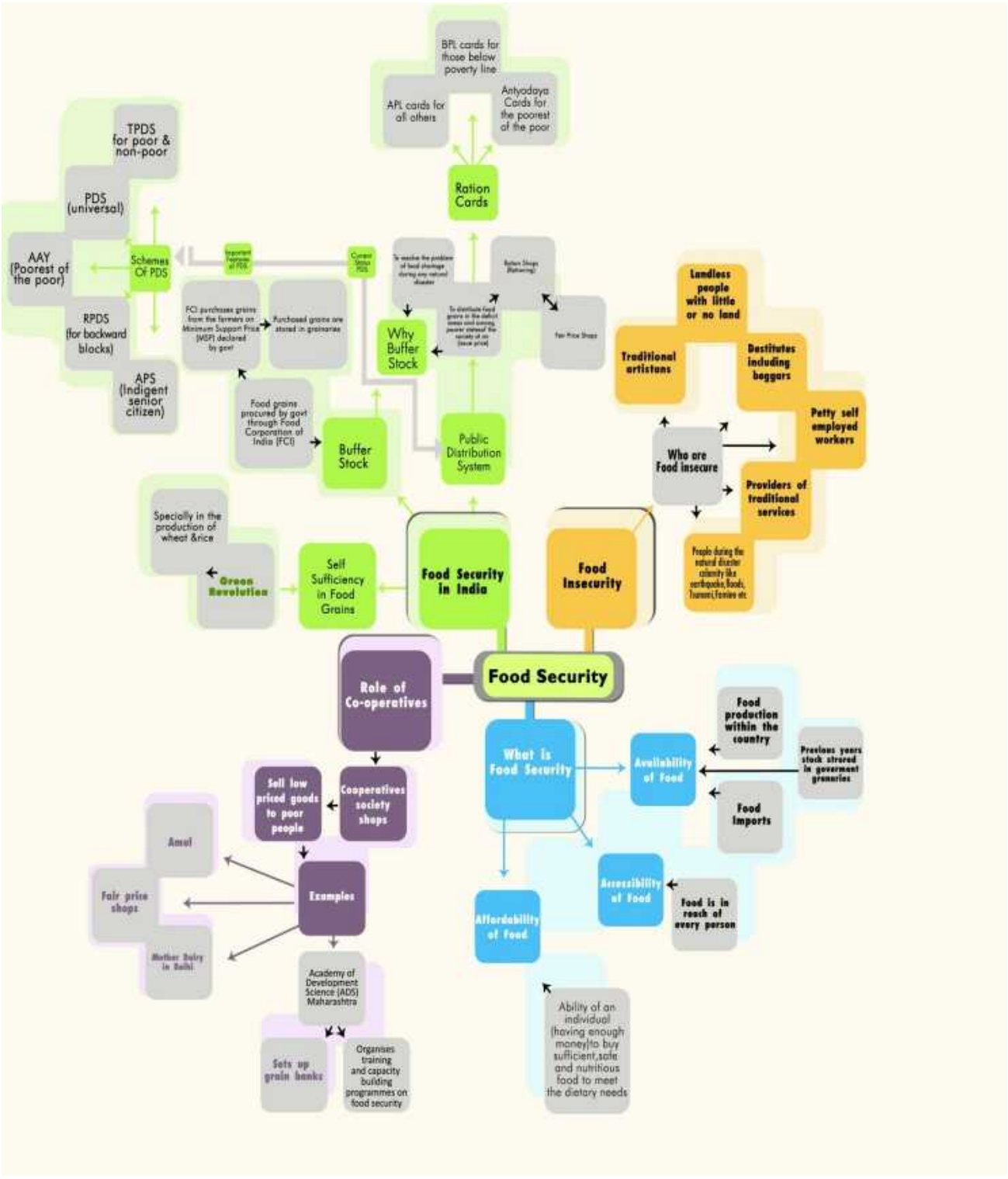
Agricultural Technology Information Centre

Krishi Vigyan Kendra

Total number of govt. affiliated agricultural entities (Centre + States) go well beyond 500 in number. This reflects the enormity of value chain participants in the country.

Sources: BIG Analysis

# Value Chain and Food Security




Sources: Wikipedia; BIG Analysis

# Finance-related Components of AVC

Finance is an integral aspect of any business and agriculture is no exception. Financing-related institutes and mechanisms are a vital component of agricultural value chain and they directly or indirectly determine the returns to farmers and prices to consumers alike. Farming credit, agricultural insurance, subsidies and price ensuring and discovery mechanisms, agro-product exchanges, trade promotion zones, the banking network are all a part of the umbrella term – finance. Modern times have brought in modern instruments which are gradually being introduced in agriculture sector as well. The biggest hurdle faced by Indian agriculture is that it is never looked at as a downright business activity. The primary approach of any agro-financial instrument or mechanism should be to ensure farming is considered as and becomes a cost-effective venture. Every such mechanism must be a stepping stone in achieving the ultimate goal of 'profitable farming'. Whether or not current instruments are successful in achieving this goal needs to be assessed but before that it is necessary to first understand which options are available and what is their current role.

### NABARD (National Bank for Agriculture and Rural Development)

One of the foremost and the apex development bank in the country, Nabard was established in 1982, primarily to ensure effective credit support and related services, institutional development and other innovations for agricultural and rural development. Today, Nabard has a net utilisation of nearly INR 31,000 with a reach in all nooks and corners of the country.

**RRB (Regional Rural Banks)** – Established in 1975, RRBs have come to the fore as one of the most widespread banking network for the rural areas in the country. Presently there are 56 operational RRBs, with approximately 19,000 branches. All RRBs made profits in 2013-14 and their combined net profit was INR 2,833 Crore.

**Banks** – The Indian banking sector includes 26 public sector banks, 20 private sector banks, 43 foreign banks, 56 regional rural banks, 1,589 urban cooperative banks and 93,550 rural cooperative banks. Barring a few exceptions from the commercial banking group, all banks have dedicated agri-business units and continuously introduce and offer a range of schemes and facilities for the farming sector.

Apart from these three fundamental categories, there are commodity exchanges (6 national and 22 regional commodity exchanges in India), agri-insurance companies, such as National Insurance Company Limited, AIC of India, etc., Agriculture Export Zones (AEZs). The government also provides Minimum Support Prices (MSPs) for farm outputs. We take a look at the working patterns of exchanges and export zones and understand their role in agricultural value chain.

Sources: NABARD; Forward Markets Commission; Farmers' Portal; Indian Brand Equity Foundation; BIG Analysis

# Commodity Exchanges

Commodity exchanges have assumed quite an important role in the agriculture value chain over the last decade. Although marred by different controversies at regular intervals, it is imperative to review the commodity exchange industry to see how it helps farmers in two important segments: Price discovery and being the fix buyer for their produce. The exchanges also bring with them sophisticated storage facilities. Industry experts believe in the following initiatives in order to bring the ideal synergy between farming and exchanges.

A strong need to make the commodity exchanges part of the national minimum price assessment program. There have been numerous research studies conducted to assess the price pertaining to export and consumption of commodities; whose prices are not controlled by any regime versus the commodities whose prices are controlled. Certain commodity exchanges have taken initiative to share prices with the farmers; placed tickers electronic and hard board at village levels through post office infrastructure displaying spot prices achieved through exchange mechanisms. Impact assessment of such efforts must be done and if found useful, they should be replicated wherever needed.

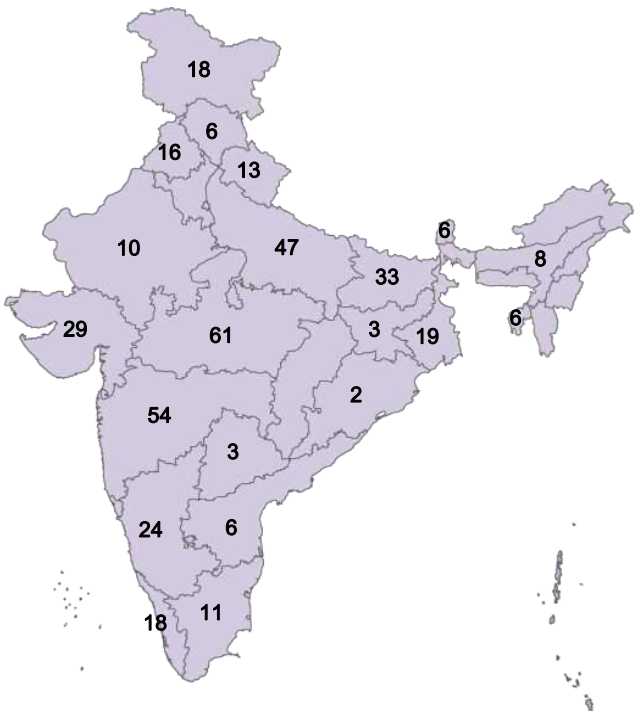
### Box 3. National Commodities and Derivatives Exchange

NCDEX has been doing extensive work in putting in place infrastructure to support farmers to enable the farmer to get the right price for their produce. A project of state importance has been initiated by NCDEX with the Government of Karnataka in the ambit of the APMC infrastructure. The farmer gets his produce assayed through an electronic device and the quality of the same is defined. The farmer inputs a price for the determined quality through an e-portal . Matching of prices is done at the e-portal and a deal is struck. The farmer can also station his produce at the attached warehouse at the APMC market and get a warehouse receipt for the same. The NCDEX has also designed a forwards platform to facilitate trade of commodities with quality not registered with the exchange. Also at this kind of APMC outlet in Karnataka there is no restriction on license to be issued, a trader can hold multiple licenses of APMCs. This has been possible due to amendment of the APMC act at the state level enabling traders to hold multiple licenses thus ending monopoly . E-pledge system implementation has allowed users to have a e warehouse account.

Sources: BIG Analysis

# Role of AEZs in the Value Chain

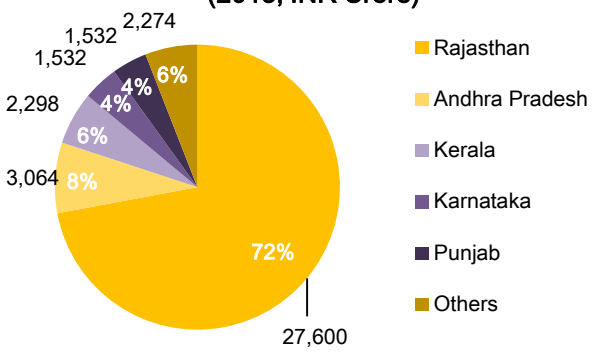
In March 2001, the Government of India announced establishing Agri Export Zones (AEZs) across the country. The main motive behind AEZs was to coordinate and enhance all the efforts taken by various Central and State level agencies in order to improve Indian farming's export performance. The Zones take a comprehensive view of products and geographical proximity to raw material sourcing, cultivation, processing and facilitate exports. At present, India has 60 AEZs spread across 21 states. These 60 are further divided into 393 geographical areas.



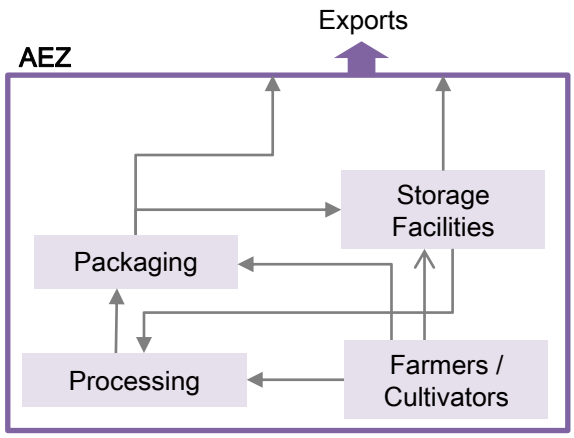

The originally anticipated benefits of AEZs were strengthening of backward linkages in the value chain, accruing fair market price for products, value addition.

In terms of actual exports to actual investments from AEZs, Kerala is the top performer in the country, as per a recent assessment. It is followed by Rajasthan and Jammu and Kashmir. In terms of value of total actual net exports, Rajasthan emerges the clear leader with 72% of the total country's share of INR 38,300 Crore.

**Total Net Exports from AEZs (2013, INR Crore)**




**AEZs Ideal Role in the Agricultural Value Chain**




AEZs are intended to provide a comprehensive export base for pre-identified products to avoid wastages, time losses, introduce value additions and market.

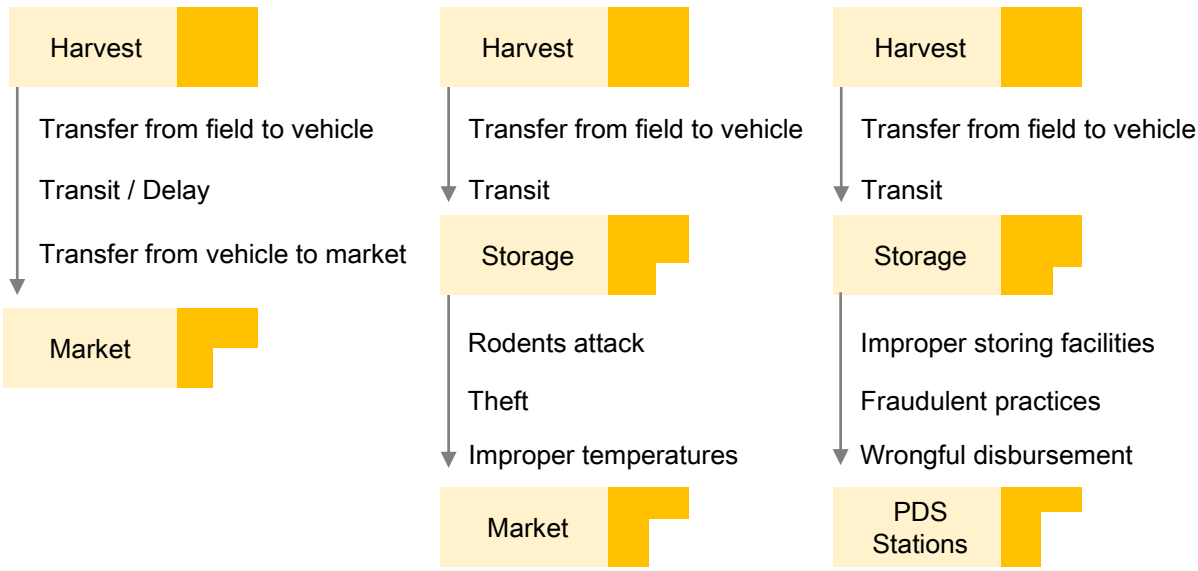
Sources: Farmers' Portal; Agricultural and Processed Food Products Export Development Authority (APEDA); Assocham; BIG Analysis

# Value Chain and Food Wastage

Post harvest losses (PHL) are the biggest contributors to food wastage in India. Food travels along the value chain from harvesting to consumption. Losses occur at each stage in this chain and contribute to the total PHL. Generally, if a commodity is going through multiple nodes and transactions or if the geographical travel of the produce is extensive then chances of losses get higher.

The most common reasons for losses are ineffective value chain components, in the form of lack of or inefficient cold storages, faulty warehouses, absence of proper monitoring at storage facilities, loss during transportation. Value chain wastages are even higher in the case of perishable food items. The following diagram illustrates what kinds of losses can occur in a value chain

**Possible Wastage Nodes and Reasons in the Agricultural Value Chain**




## Primary Concerns

Producing enough quantities of food is not really the problem faced by India at the moment. The actual issue is ensuring how does all the domestically produced food reach the last mile with minimum wastages and diversions. Curbing food wastage is the next most important step in the pursuit of food security; after development of the agricultural sector and capacity building of the consumers. Wastage in the value chain affects availability, accessibility as well as affordability, which form three of the four defining pillars of food security.

Sources: BIG Analysis

# CHAPTER FIVE

## AGRICULTURAL VALUE CHAIN - GAP ASSESSMENT

# Crumbling Institutions

**Food Corporation of India (FCI)**

In January 2015, a High Level Committee submitted its comprehensive review of the Food Corporation of India (FCI) recommending a total reorientation of the entity. FCI is the country's apex food body and set up to provide remunerative prices to farmers, to make food grains available at reasonable prices, to intervene for price stabilisation and most importantly to maintain buffer stocks as a measure of food security. The 50 year old institute is however finding it difficult to sustain and recent events have put a question mark on the overall performance of the Corporation; in the light of which the HLC was appointed.

On the foremost objectives of ensuring remunerative prices for farmers and acting as a procurement agency, FCI has not been of any significant help. Out of the nearly 90.2 million agricultural households in India, only 37.13 million reported a sale of paddy and wheat and only 5.21 million of them sold it to any procurement agency. Alarmingly, merely 32.2% were aware that there exists a mechanism called MSP and 25.1% were aware of any procurement agency.

In 2015-16, FCI managed to procure 27.8 million tonnes of wheat, marginally lower than previous year. However more than 80% of this was procured only after the government relaxed quality norms for purchase. The overall procurement fell in almost all states due to unseasonal rains.

In FY 2015, FCI faced a shortfall of INR 50,000 Crore owing to less allocations made by the government due to budgetary constraints. The government, in turn, is considering raising deficit funds through issuance of bonds. These are clear indications of an overall ineffective system.

As far as the recommendations for an overhaul are concerned, experts believe that the restructuring strategies may pull apart the institution in the long run. The first recommendation suggests bringing the scope of the Food Security Act 2013 to benefit just 40% of the total population. And second states that the Public Distribution System be replaced by a cash transfer system, which essentially implies that there would not be any need to physically procure food grains, putting a question mark on the very existence of FCI.

The basic critique on these recommendations stems from the fact that the Committee assumes a very positive scenario of food production, export and consumption patterns by comparing it to the one during the crisis hit 1960s. However true it may be, the recommendations seem to ignore that food security and hunger related issues are still prevalent in the countr The basic critique on these recommendations stems from the fact that the Committee assumes a very positive scenario of food production, export and consumption patterns by comparing it to the one during the crisis hit 1960s . However true it may

Sources: Food Corporation of India; 70th Round of NSSO on The Key Indicators of Situation of Agricultural Households in India (July 2012 to June 2013); The Hindu; The Economic Times; Mint; BIG Analysis

# Crumbling Institutions

be, the recommendations seem to ignore that food security and hunger related issues are still prevalent in India. Hence reorganising FCI to ultimately dilute its significance may not be a feasible idea and is debatable. The role of PDS in lowering the incidence of malnutrition and hunger is well documented and what is needed is redefining of the implementation of the scheme by keeping its core focus intact.

### Agri Export Zones (AEZs)

In May 2015, government announced that there have been no new fund allocations for the AEZs in the past 3 years, other than APEDA's assistance to exporters under their plan scheme. All 60 AEZs completed a span of five years in 2012, and as a result no State government has published any data regarding their exports performance, employment generation ever since. The Government has not even notified any new AEZ in this last year period. On the back of these disappointing conditions, the Government is planning to completely revamp the AEZ policy, with a focus on value added exports. Multiple factors contributed to the dismal performance of India's exports ranging from type of Indian exports not being in the value added segment and being price sensitive, volatility in international markets and socio-political conditions, to name a few. The most significant factors leading to under performance of AEZs, as identified by a government appointed Peer Review Group, are

i) Lack of ownership by Government authority and their agencies,

ii) Lack of awareness

iii) Lack of project orientation in the concept design

iv) Lack of coordination and monitoring

v) Non materialisation of adequate public investment

vi) Indiscrete proliferation

### Cold Storages and Warehouses

India has 6,156 cold storage facilities across various states. Only about 30 players belong to the organised segment while more than 3,500 are unorganised.

Insufficient: India's total cold storage capacity is nearly 30 million tonnes, which is highly insufficient.

Nearly 20% of the country's vegetable and fruit production, worth about INR 40-50,000, is wasted due to lack of proper cold storage facilities and lack of refrigerated transport. 5.8 to 18% of fruits and vegetables, worth INR 13,000 Crore are wastage annually. 7% of grains are lost in field and open grounds. For horticulture and non-horticulture produce, less than 10% of the total production has adequate storage facilities.

Uneven distribution: 70% of the cold storages are located in 5 to 6 states of India

Ineffective: Majority of the network only supports potatoes.

Sources: Press Information Bureau, Govt. of India; Assocham; Ministry of Commerce and Industry, Govt. of India; BIG Analysis; Research and Markets; Ministry of Food Processing Industries, Govt. of India

# Issues Plaguing AVC Components

**"Misdirected policies leading to inefficient utilisation of the country's capacities"**

***Mr. Madan Sabnavis***
*General Manager, Chief Economist*
*CARE Ratings*

Mr. Madan Sabnavis gives an economist's perspective to the issue of food security. He believes that if population of the country is growing at a certain rate then food production must also grow proportionally. According to him, it's a wrong notion that MGNREGA has had an adverse effect on food security by enabling its beneficiaries to increase their food consumption and thereby distort estimated balance of food availability. He further adds that India enjoys top position in the world when it comes to most commodities, especially in the case of cereals, pulses. Consequently, any demand for imports of these commodities by India sends wrong signals in the international market resulting in reactive shoot up in the market prices of those commodities. Shortage of pulses and subsequent import requirement occurs at regular intervals because unlike rice and wheat, FCI does not procure pulses from domestic producers. Rise in price reflects in the CPI giving inaccurate reading and measurement. Additionally, due to the provision of MSP and procurement of rice and wheat at those prices, production patterns are highly skewed and this is certainly not the ideal scenario. Moreover, farmers stick to growing fair value crops and refrain from taking any risks such as adapting to changing environmental conditions. This results in spoilage of soil, degradation of crop and ultimately decrease in incomes.

To turn the tide around, certain measures are imperative. MSP and procurement system should be revisited. Direct cash transfers to farmers must be considered. FCI should increase infrastructure in the Southern region as their presence there is not optimum. FCI should also device a policy to release food stocks at regular pre-determined intervals and not just during adverse climatic calamities.

Sources: BIG Analysis

# The Problem of Middlemen

Possibly the biggest contributor to price rise in the farm to fork chain is the presence of multiple traders and middlemen inflating the costs. For instance, The Agriculture Produce Market Committees (APMCs) were originally established for regulating the marketing of different kinds of agriculture and pisciculture produce for the same market area or any part thereof. However, the provision has often been criticised as being anti-market as it virtually results in farmers becoming insignificant at the hands of multi-layered chain involving the middlemen. Agents indulge in unfair hoardings, charge exorbitant commissions to the cultivators, practically control the entry in various APMCs. All these lead to substantial rises in the prices which have to be borne by the consumer, inviting severe agitation. However, these high prices benefit farmers the least and thus spoil efficacy of agricultural value chain. Various experts have time and again demanded abolishment of such corrupt practices but the demand hasn't met with great success yet. Some of the most common issues discussed below are not faced only by these marketplaces, but represent the overall problems caused due to the presence of middlemen like brokers, commission agents, etc.

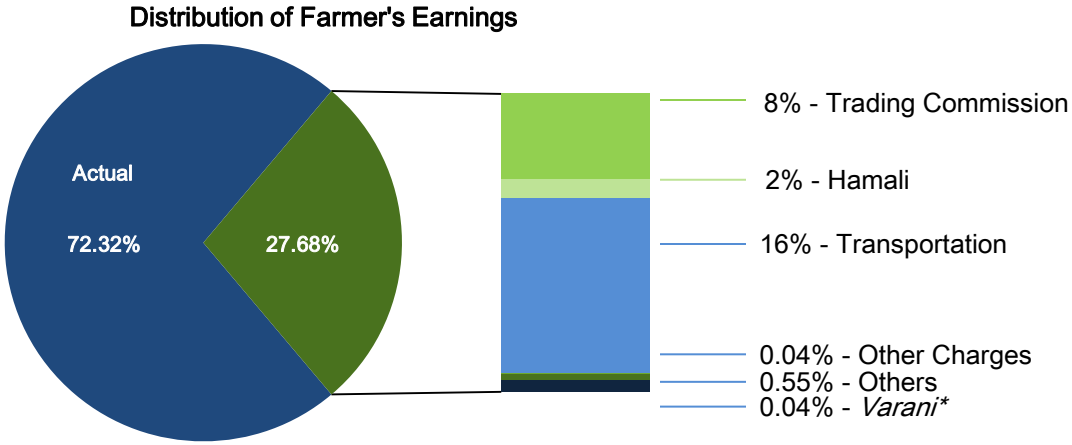
- License is mandatory for farmers to set up their selling shops in APMC markets. But due to demand and supply imbalances and discriminatory entry barriers created by middlemen lobbies, the license seeker is always at the receiving end and is left with no choice but to get a backdoor entry in the market.
- Brokers often delay payments to farmers on the account of various artificial excuses such as non-payment from other parties or other arbitrary practices.
- In order to avoid tax or other such levies, middlemen evade provision of a receipt to the farmer. This lack of documentation makes it difficult to the farmer to avail any assistance from organised financial institutes as there is no formal proof of income with him.
- Brokers have no facilities for grading and sorting. Moreover, it is observed that they resist any attempt made to bring in transparency or to reduce transaction costs.
- MSP is not offered by the Government on perishable farm produce such as vegetables and fruits. This is taken advantage of by the intermediaries and farmers are denied fix support prices.
- Monetary support extended to ensure quality of infrastructure at these marketplaces is frequently misused and never reaches the desired end.

Many state governments attempted to eliminate issues caused by faulty practices in APMCs, but there is still a long way to go before the farmer is free from the ordeal of middlemen.

Sources: Surajit Dasgupta for Niti Central; APMC Maharashtra; BIG Analysis;

# Typical Value Chain Components

We reviewed the typical value chain a Tomato farmer in Belagavi (Belgaum) has to go through. Tomato cultivation roughly represents 0.57% of the total net sown area in the region. The data analysed is for May 2015. Total amount of tomato sold to a local trader, by a group of farmers, in this single month amounted to 15,006 i.e. approximately 15 tonnes. Rate fetched by the produce depended on the quality of the output. On an average, tomatoes were sold to the trader for INR 9.68 for one kilogram. However, this amount represents the gross price. The farmers had to shell out additional expenses for logistics and commissions. As a result their net earnings were 28% lesser. Maximum of the deductions were due to transportation charges.




It was observed that Commission of the trader was fixed at the rate of 8% of the total gross price of the produce. The farmers also had to shell out for multiple components such as carrying the produce from one place to the other. The transportation cost ate up the maximum share and was variable, changing with different quantities of output.

Typically, traders charge the farmer for the following components#. Higher the number of stakeholders involved, higher are their shares. Excessive amount of components is the biggest factor hampering Indian agricultural value chain..

| | | | |
|---|---|---|---|
| Commission | *Hamali* (Porter Charges) | Filing | Weighing |
| Measuring | Transportation | Packaging | Miscellaneous |

**All components may not be charged by everybody, the list is representative*
Source: BIG Analysis

# Value Chain and Farmers

**Box 4. "Cultivation of perishable products getting more and more difficult"**

Mr. Krishnaji Suryavanshi belongs to a traditionally farmer family and has been a farmer himself for the last 5 decades near Satara district in Maharashtra. This belt is one of the more developed and relatively stable agricultural regions of the state. Drought or related issues have never been a severe concern here. Originally Mr. Suryavanshi would produce vegetables and fruits such as tomatoes, French beans, cucumber, etc. and make decent profits. However, lately he has changed his cultivation pattern and has put more focus on the region's favourite - Sugarcane. Ponder him further about reasons for this shift – especially when Sugarcane requires large amounts of water and climate change and the possibility of Maharashtra farming sector's failure in realising its severity, may well hit the otherwise water abundant regions sooner or later – he says he is left with no choice. He is ageing, family's next generations have moved away from agriculture and have migrated to urban areas in the search of better earning prospects. All these coupled with lack of easy availability of labour makes it very difficult for him to manage effort-intensive vegetable cultivation. Moreover the vicious cycle of traders, commission agents and other middlemen proves to be a strenuous affair for the veteran to handle. Sugarcane cultivation assures him of buyers and he even gets the benefit of buying refined sugar from the same factory that he sells his produce to, at subsidised rates. Great incentives on one side and inefficient value chain on the other has made the choice of shifting cropping pattern seem very easy and the highly feasible for many farmers like Mr. Suryavanshi.

Source: BIG Analysis

# Other Reasons of Crop Wastage

**Box 5. 'Timely prevention and monitoring are keys to mitigating crop losses due to diseases'**

Another issue troubling farmers to a large extent is the attack of pests. More often than not, such attacks are not anticipated and end up destroying the entire harvest with farmer left with no option but to suffer a massive loss. Ignorance, lack of assistance and awareness turns this preventable menace into a detriment.

The Indian Agricultural Research Institute (IARI) is one of the foremost research bodies in the country, with a legacy of over a century. IARI currently has 20 divisions and 5 multi-disciplinary centres, 8 regional stations, 2 off-season nurseries, 3 all-India coordinated research projects and 10 national centres working under these projects. We interacted with a senior scientist from the institute to talk about their experience of working with farmers on various levels.

IARI primarily deals with viral disease management and policy making. The institute believes that one size doesn't fit all and it is imperative to innovate and find solutions for different problems through continuous research and ground level interaction with farmers. Their experience with farmers suggests that most are extremely enterprising and adaptive. The Institute is flooded with inquiries and questions on a plethora of topics and all are eager to learn. However there needs to be a greater level of awareness among cultivators about naturally occurring crop diseases. Diseases are as detrimental as natural calamities but are rarely given similar attention. In fact, with proper planning and preventive measures, crop diseases can certainly be reduced to a large extent. This will automatically bring down crop losses due to pests and diseases, which are in the tune of INR 50,000 Crore per year in the country. Natural calamities destroy farms immediately, but diseases have a more lingering effect resulting in ultimate death of the crop as well as adverse impact on the quality of soil. Training about how to assess the health of a crop must be coupled with regular monitoring and feedback. Ground level workers must be equipped with thorough knowledge and proper mechanisms must be adapted to ensure ground level accountability.

Source: BIG Analysis

# Value Chain and Farmers

## Primary Concerns

Loopholes in the agricultural value chain are causing serious problems, especially for the farmers. Inability to market the produce effectively is becoming one of the most common issues grappling farmers. Major reason behind this could be information asymmetry. Farmers have no access to information about consumer preferences or price distortions. Central and state governments are coming up with many initiatives but their reach is limited. Lobbies and cartels of middlemen are getting stronger by the day and driving genuine farmers away from the profession. If this continues then sustainable food security will remain a distant dream as the backbone of the concept – the farmer community – is crumbling. There are already many other issues like climate change, reduction in the size and deterioration of the quality of arable land, etc. affecting agriculture. It is therefore necessary to iron out discrepancies in the man-made aspects of farming.

Source: BIG Analysis

# CHAPTER SIX

## CAN FOOD PROCESSING SECTOR HELP ACHIEVE FOOD SECURITY?

# Food Processing in India

A well developed Food Processing sector can be a strong link between agriculture and the consumers. Government's high priority to the sector coupled with growing consumption-led demand is leading to a fast pace growth in the sector. Food processing is the set of methods and techniques used to transform raw ingredients into food or to transform food into other forms for consumption by humans or animals either at home or by the food processing industry. Food processing is a large sector that covers activities such as agriculture, horticulture, plantation, animal husbandry and fisheries. It also includes other industries that use agriculture inputs for manufacturing of edible products. The food processing industry is made up of primary, secondary and tertiary food processors.

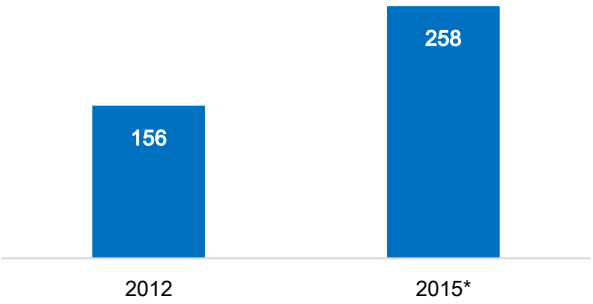
A developed Food Processing sector will help overcome the biggest challenges in front of India viz:

- Low farmer income and high subsidies
- High wastage along the value chain
- Poor hygiene and safety standards

India's food processing industry is one of the largest industries in India and ranks fifth in terms of production, consumption and exports.

Food processing sector is expected to reach **USD258 billion in FY15. Food processing is one of the fastest growing sectors of the economy and the sector is growing at 8.4 per cent.** According to the Ministry of Food Processing Industries, **contributes 1.5% of India's GDP, 9% of GDP in manufacturing and 11% in that of agriculture.** It provides **direct employment to 16 million people.** Registered food processing units are growing at 11%

**India's food processing industry size (in USD bn)**

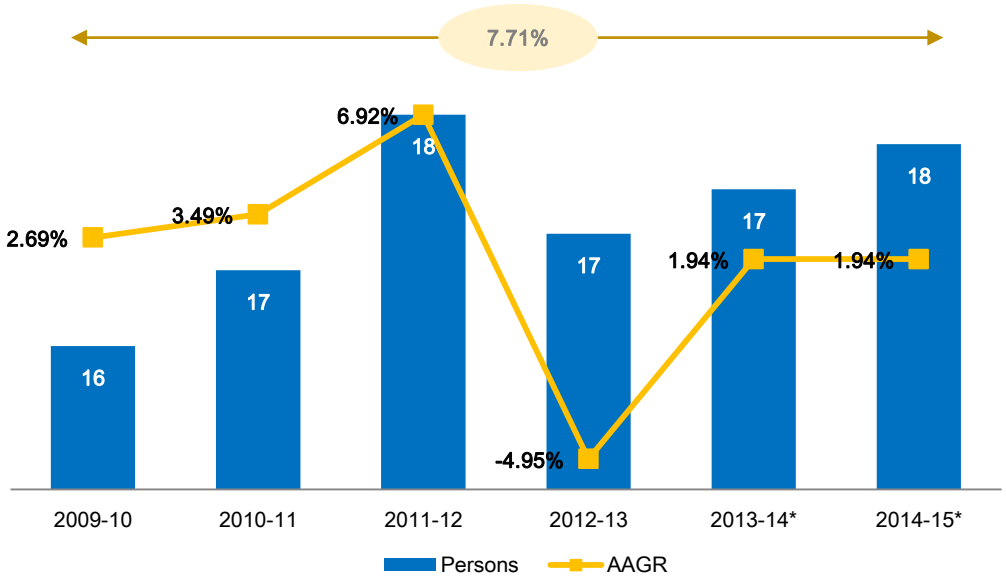



**Key Growth Drivers**


Sources: BIG Analysis

# Food Processing in India

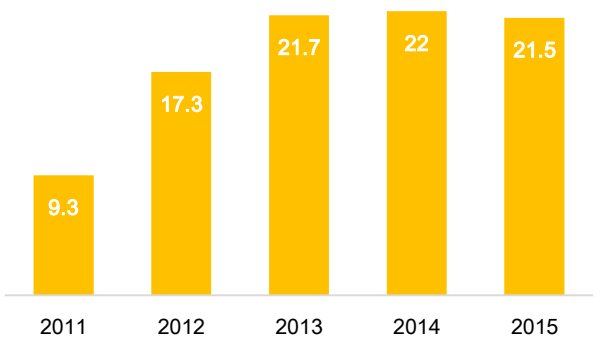
**Employment in Registered Food Processing Units**
**(In Lakh Persons and Average Annual Growth Rate)**




The share of food processing sector in the country's total employment has been growing and the sector engaged an estimated 17.55 lakh persons in 2014-15. However, this number represents people employed only by the registered food processing units. The proportion of organised food processing units in India is only 25%. As per the latest formal data, unorganised food processing units employ nearly 47.9 lakh people, almost three times more than their organised counterparts. This means overall employment by the segment is over 65 lakh.

During FY11–15, India's Exports of processed food and related products (inclusive of animal products) increased at a CAGR of 23.3 per cent to USD 21.5 billion. The major markets for Indian processed food are Europe, the Middle East, Japan, Singapore, Thailand, Malaysia and Korea. The food processing industry, which was primarily driven by exports in the past, is now witnessing rapid growth in the domestic market as well.

**India's Exports of Processed Food**
**(In USD Billion)**



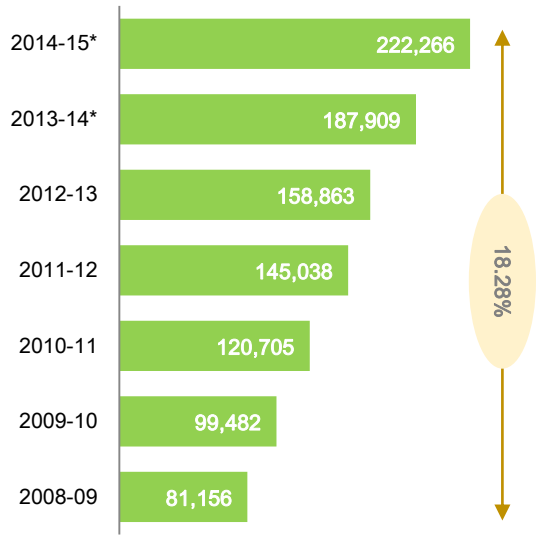

Source: MoFPI Annual Report 2014-15;

# Food Processing Industry in India

The Indian food and grocery market is projected to grow at the rate of 104% to touch USD 482 billion by 2020.

Fixed capital in registered food processing units grew at a CAGR of 18.28% from 2008 to 2012. The capital formation is estimated to be in the tune of INR 222,266 Crore in 2014-15. Empirical evidence suggests that the highest investment is in the beverages segment followed by grain mills and starch products. Vegetable and animal oils, fats related units come in third. Yet, Grain mill and allied units remain the largest in number, employ highest proportion and produce the highest output in terms of value.

**Fixed Capital in Registered Food Processing Units (INR Crore)**




| Year | FDI (In INR Crore) |
|---|---|
| 2009-10 | 1,314.23 |
| 2010-11 | 858.03 |
| 2011-12 | 826.16 |
| 2012-13 | 2,193.65 |
| **2013-14** | **25,106.78** |
| 2014-15 (April to November) | 1,919.43 |

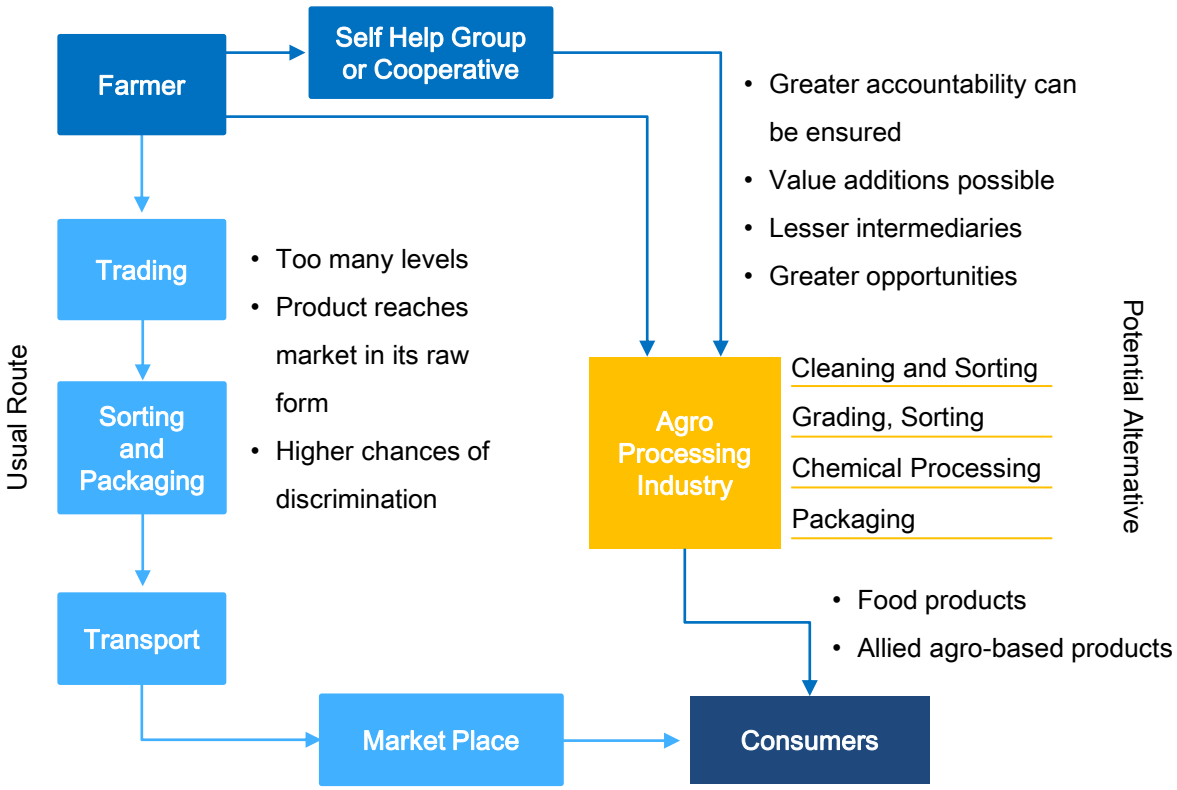
Food processing sector may well be one of the most lucrative in the country, but it was never so for foreign investors. Moreover, recent controversial events such as regulatory burdens and lack of quality infrastructure have put a cautious cloud over entry of foreign entities. Inconsistent FDI flows in the sector over the years bear testimony to this phenomenon.

FDI in 2013-14 was highest in 2013-14 due to two back to back investments announced by Coca Cola and PepsiCo

Sources: Indian Brand Equity Foundation; MoFPI; Mint; BIG Analysis

# Strengthening the Linkages

A robust and active food processing sector can work as the much needed link between agriculture and the market. Biggest problem faced by Indian farmers in recent times is their inability to fetch fair market price for their outputs and sometimes even the inability to reach markets. These failures, especially in the case of perishable commodities, often drive farmers towards distress sale or drives them completely away from cultivation of such vulnerable commodities resulting in inequities in the overall production patterns. Lack of resources, mechanisms and awareness, multi-layered value chain and barriers to entry are some of the commonest issues faced farmers face in terms of market penetration. Food processing can bridge this wide gap effectively.




It must be noted that food processing is not the only possible rescuer of the distressed farming sector. But it does prove to be one of the better alternatives available. Proper integration of farmers with the processing industry can be a feasible option for both stakeholders. It would help boost the already thriving industry.

Source: BIG Analysis

# Benefits of Farmer-Processor Integration

| Benefits to Farmers | Benefits to Food Processors |
|---|---|
| Assured buyer | Potential of single point and direct sourcing |
| No room for price discrimination by middlemen | Relatively cheaper raw material cost |
| Elimination of uncertainty possible if contracts are entered | No need to rely on imports and price volatility due to currency norms |
| Lowered risk of losses in the case of perishable commodities | Local sourcing can lower transportation and logistics costs |
| Produce will not remain confined to its raw form, value additions possible | Contribution to region's socio-economic development |
| Exposure to better handling and packaging practices | Customisation of raw material possible to match quality requirements |

| Benefits to Consumers |
|---|
| Substantially lower prices due to absence of long value chains |
| Reduction in wastage along the value chain will increase availability of food |
| Rise in local employment opportunities and industries |
| Strengthening of the Agriculture sector will have an indirect but substantial, positive economic effect |

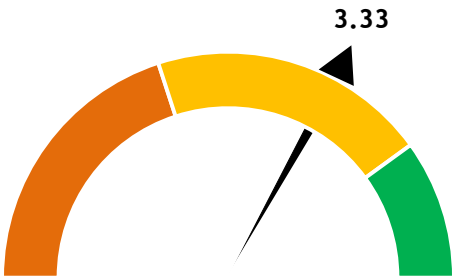
Food processing sector can play a defining role in realising all the four objectives of food security – availability by contributing towards minimising post harvest wastage, affordability by utilising economies of scale, accessibility by reaching the last possible mile with sophisticated marketing and distribution channels and nutritional value by manufacturing healthier food products.

Sources: BIG Analysis

# Competitive Advantage Index

The Competitive Advantage Index (CAI) attempts to capture potential of Indian Food Processing Units, especially the ones belonging to Small and Medium business categories, to withstand global as well as local competition. It is a measure of the general pulse of the segment. These units may or may not be undertaking any international activities currently. But the Index attempts to capture whether their products are at par with the highest standards. The CAI measures overall performance of companies on the 16 key parameters.

| | |
|---|---|
| Marketing Costs | Focus on R & D |
| Procuring Raw Materials | Use of IT and ITES in the Business |
| Capacity Utilisation | Expansion Plans |
| Availability of Credit Facilities | Diversification Plans |
| Availability of Skilled Labour | Profitability of the Business |
| Availability of Utilities | Ease of Obtaining Licenses and Clearances |
| Significance of International Certification | Awareness and Impact of Government Schemes |
| Implementation of Technology | Succession Planning |




**Competitive Advantage of Food Processing Units in India**

At 3.33 out of a possible 5, Competitiveness of Indian food processing industries can be termed as fairly good. However, there are several grounds on which the sector can improve.

India's food processing industries rank very high in terms of implementation of latest technology at their factories and even in terms of efficient procurement of raw materials. Their overall profitability, diversification and marketing strategies and penetration of IT-ITES are also at decent levels. The worrying factors are difficulty in procuring licences and clearances, unavailability of labour and credit facilities, lack of awareness and impact of government policies. Industries' approach to obtaining international certification is also very bad and reflects their approach towards being internationally accepted and competitive.

Source: BIG Analysis

# Problems Faced by the Sector

**"More and more concentrated efforts are needed from all stakeholders"**

***Mr. Prasad P***
*Group Executive Vice President*
*Food and Agribusiness Research Management (FARM) - YES Bank*

Mr. Prasad P has widespread expertise in the agribusiness segment and its several components. We discussed with him the common issues faced by Indian food processing industry. Following are his insights.

According to him the main issues for poor growth in the agro processing sector are:-

- Poor infrastructure for collection and storage of raw material
- At some places infrastructure is developed but no auxiliary infrastructure like electricity to support the same is available, e.g. Jharkhand

A lot of government as well as private players are indeed taking various initiatives to boost the sector. For instance, SREI (Srei Infrastructure Finance Limited) in Chennai and Andhra Pradesh have taken lead in setting up food parks which house food processing units; Varun Agro has a Farmer Producer Organisation and many more. But the efforts seem too little and scattered and must be given a greater impetus.

There could even be dedicated 'Kisan Melas' set up at *taluka* levels bringing all the stakeholders under one roof. These could be primarily used for networking, exhibition of modern technologies, dissemination of information and creation of awareness.

Sources: BIG Analysis

# Problems Faced by the Sector

## Primary Concerns

Although massive in size, food processing sector in India can still be termed as an underdeveloped sector. Primarily because the sector fails to strike a feasible and mutually cooperative deal with the country's mammoth agriculture. And whenever any such attempts are made they are downed by forces terming them capitalism-driven activities. This accusation is partially true and possibly the biggest factor working against the sector. A healthy relationship between domestic agriculture and food processing should be one which uplifts the latter and provides better economic avenues for the distressed lot. Food processing is also embroiled in the controversial claims of being unhealthy and there is an urgent need to resolve it. Lack of support infrastructure and regulatory framework also diminishes the sector's potential. Food processing can not develop independent of agriculture.

Source: BIG Analysis

# CHAPTER SEVEN

## LABOUR IN INDIAN AGRICULTURE

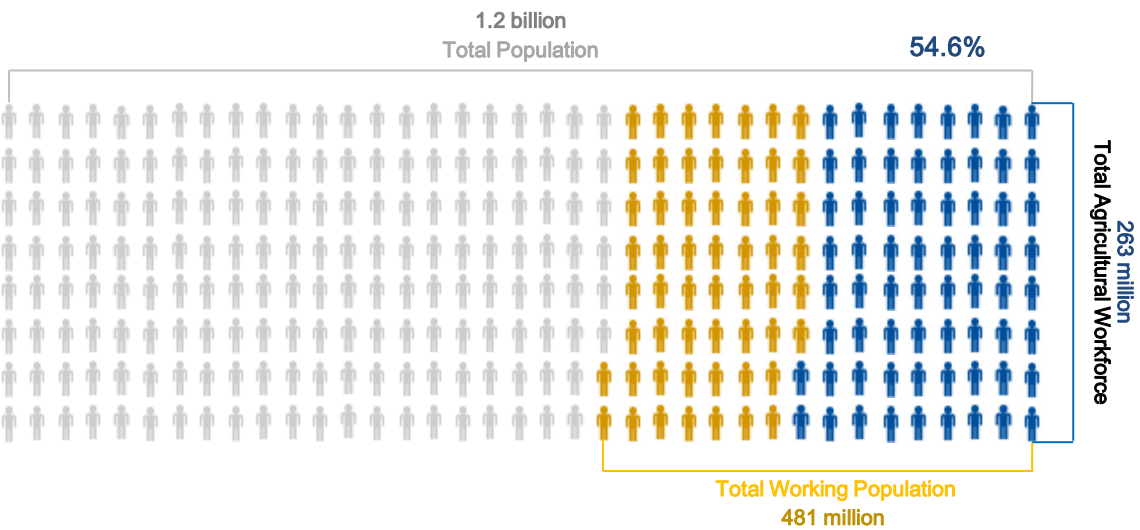
# Labour in Indian Agriculture

All those persons who derive a major part of their income as payment for work performed on the farms of others can be designated as agricultural workers. For a major part of the year they should work on the land of the others on wages.[1]

When talking about bringing profitability to farming, it is imperative to consider the degree and condition of workforce involvement in the sector, more so in the case of a labour-abundant country like India. Indian agriculture encounters the unique paradox of having massive number of people working in farming and at the same time facing acute labour shortages which restrict growth. More often than not it is the improper management and adverse working conditions that contribute to the problems of the sector. A look at the sheer number of persons involved in agriculture and allied activities justifies the significance attached to labour issues in agriculture and also explains the difficulty in reaching a comprehensive resolution. In order to achieve the larger goal of food security, two aims must be set:

- Making agriculture a feasible profession for those already in it
- Making agriculture a lucrative option for potential workforce

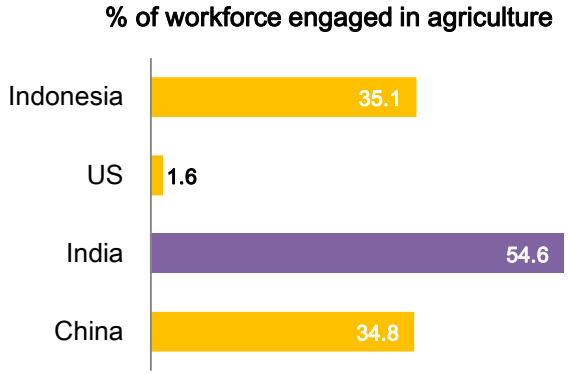
Successful achievement of these goals will provide a massive boost to the supply side involved in the food sector. Another factor which can not be overlooked is the fact that agriculture labour must themselves have access to healthy, affordable food. This will happen only when there is equal and adequate income distribution.

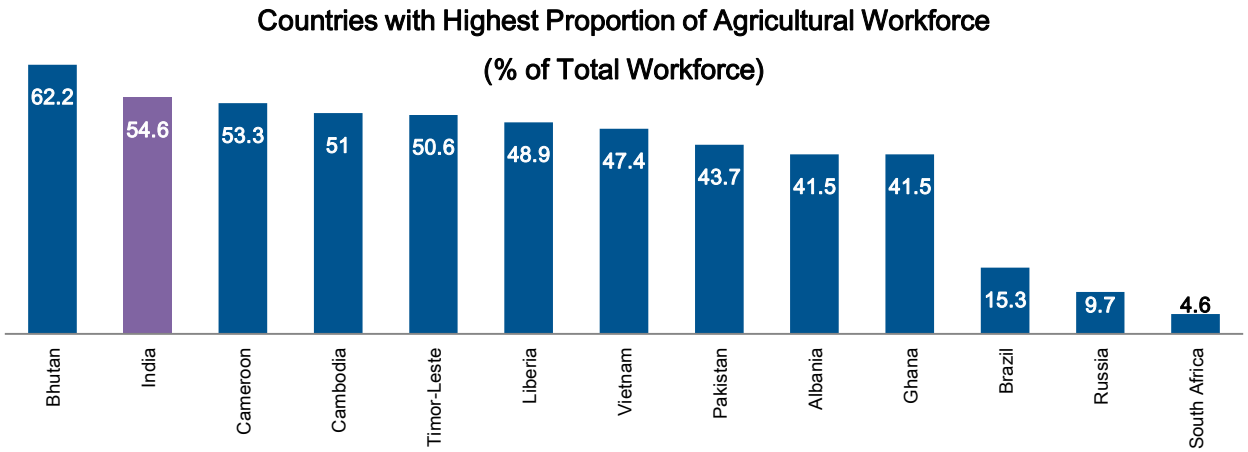



Sources:1. Mishra and Puri, Census of India 2011, Hindustan Times

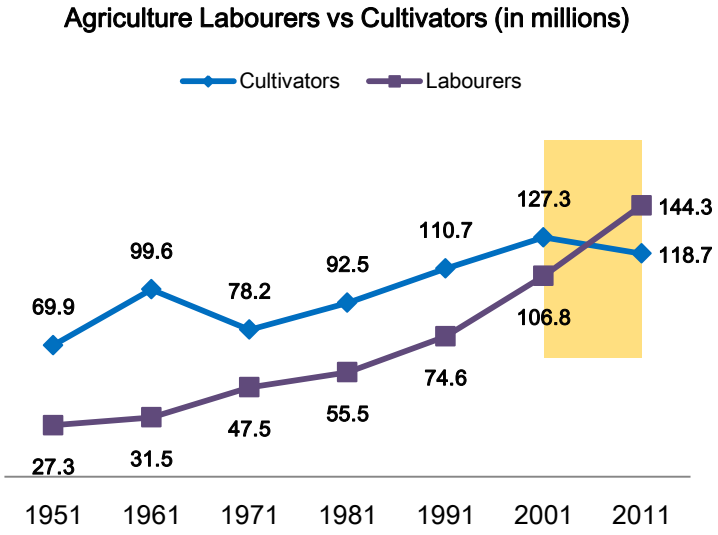
# Labour in Indian Agriculture

As per Census 2011, more than half of India's total workforce is engaged in agriculture and allied activities. This proportion is way higher than that observed in developed countries. Moreover, China, US and Indonesia are among the top four countries with highest agriculture output, and yet a maximum of 35.1% of the total workforce belongs to farming sector.



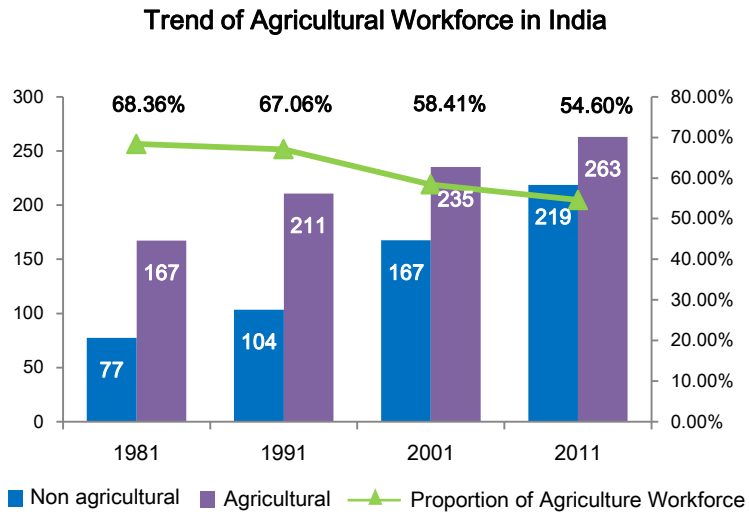




With 54.6% of the total workforce, India's agriculture sector is in the same league as those from Bhutan, Cameroon, Cambodia, to name a few. Even amongst the BRIC nations, India is the only agro-based economy. What is alarming is that in the past decade, the number of cultivators is showing a declining trend whereas agricultural labourers are increasing. Being an agriculture driven economy is not an undesirable feature but efficacy must be achieved in workforce management.




Sources: The Economist, Census of India 2011, Hindustan Times, in News by InSerbia Network Foundation

# Labour in Indian Agriculture




It has been observed that as economies move towards development, workforce also tends to shift from primary sectors to the rest. This well-proven fact can be seen in India as well with the share of employment declining by more than 10% in two decades. However, it remains to be seen whether this shift is proving beneficial for the economy or weakening agriculture.

Why is agricultural labour moving away?

**1. Availability of better wages outside agriculture**

| Agricultural activities | Men | Women |
|---|---|---|
| Ploughing/Tilling | 258.96 | 175.89 |
| Sowing | 218.62 | 181.43 |
| Harvesting/Winnowing/Threshing | 217.41 | 181.55 |
| Picking | 190.55 | 156.7 |
| Horticulture Workers | 223.5 | 154.72 |
| Fishermen (Inland) | 282.99 | 150 |
| Fishermen (Coastal) | 281.67 | NA |
| Loggers and Woodcutters | 302.56 | 147.35 |
| Animal Husbandry | 176.66 | 133.27 |
| Packaging | 218.36 | 168.36 |
| General Agricultural | 215.7 | 164.57 |
| Plant Protection | 276.85 | 162.08 |
| Mean Wages | 238.65 | 161.45 |

| Non-agricultural activities | Men | Women |
|---|---|---|
| Carpenter | 327.73 | NA |
| Blacksmith | 262.91 | NA |
| Mason | 360.97 | 268 |
| Weavers | 231.68 | 184.74 |
| Beedi Makers | 161.78 | 108.37 |
| Bamboo/Cane Basket Weavers | 210.97 | 150.14 |
| Handicraft | 287.7 | 146.43 |
| Plumbers | 385.63 | NA |
| Construction Workers | 266.31 | 191.44 |
| LMV and Tractor Drivers | 281.02 | NA |
| Non-agri labourers | 232.69 | 172.22 |
| Sweeping / cleaning workers | 178.36 | 163.41 |
| Mean Wages | 265.65 | 173.09 |

A simple scrutiny of the average daily wages earned by rural population in agriculture and non-agricultural activities reveals that the latter offers slightly higher remuneration to the workforce. Some studies even suggest that the gap between agriculture and non-agriculture per worker earning is as wide as 1:6.

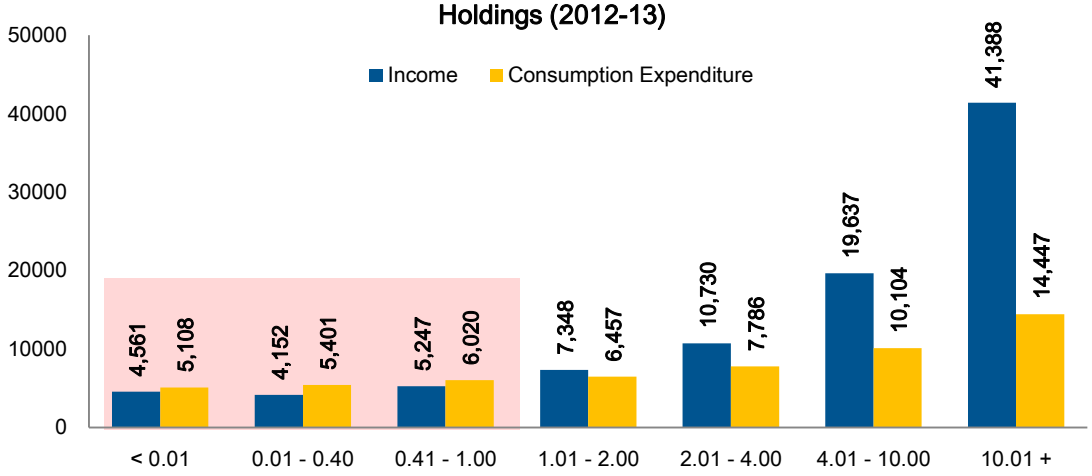
Sources: Growth and Structure of Workforce in India – Venkatanarayana and Suresh Naik; Labour in Indian Agriculture (2015) by FICCI-KPMG; Indian Labour Journal Vol 55 – June 2015, India Labour and Employment Report – June 2014 by Institute for Human Development

# Labour in Indian Agriculture

## 2. Unsustainability

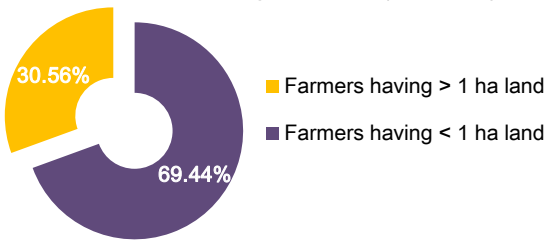
According to NSSO's 70th round of the Situation of Agricultural Households in India Survey, the average farm household makes INR 6,426 per month. Out of this total income, 47.9% comes from cultivation while the rest is earned through a mix of other jobs. However, a comparison between income and consumption expenditure based on size of land holding reveals a clearer, and more worrying picture.

**Comparison between Incomes, Consumption Expenditure and Land Holdings (2012-13)**




Only those having land holdings larger than 1 hectare earn more than what they spend. And nearly 69.44% of agricultural households of the country possess less than a hectare of land holding.

**Size of Land Holdings in India (2012-13)**




## 3. MGNREGA

Studies suggest MGNREGS has resulted in rise in minimum wages which makes it unaffordable for the farmers to employ more labour. So the scheme affects availability and also productivity of labour. Other perspectives claim that since the scheme assures and provides a minimum wage, it results in rise in rural incomes which is reflected in higher consumption, especially that of food helps a larger section of the populace to avail healthy meals. However the scheme also makes other jobs seem more lucrative than farming and hence drives workforce away from the sector. Overall, agricultural labour market is certainly affected by MGNREGA, in some or the other way.

Sources: The Hindu / Rukmini S.; National Sample Survey Office, MoSPI, Govt. of India

# Labour in Indian Agriculture

**Other significant factors leading to labour movement away from agriculture**

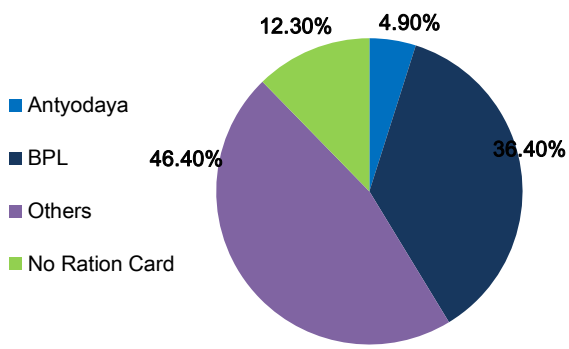
- Shift to a regular / permanent job
- Presumption of agriculture as a low esteemed job
- Migration to urban areas

The size of the workforce in this sector is expected to shrink by another 23 million in the next eight years till 2019-20 and form only 41% of the total workforce

### Food Security of the Food Providers

The Antyodaya Anna Yojana and BPL ration cards cater to the poorest of the poor strata and provide rice and wheat at highly subsidised prices. 41.3% of the total agricultural households hold these ration cards revealing their economic conditions. The National Food Security Act 2013 is anticipated to cater to a large proportion of agricultural households and thus, speedy implementation of the same will uplift the condition of India's food providers to a great extent.

**Distribution of Agriculture Households Based on Type of Ration Cards**




## Primary Concerns

Indian agriculture remains to be highly labour intensive and mechanisation efforts are still at a nascent stage. The biggest risk in these efforts is abandoning human resources and such occurrence will prove catastrophic to the sector. But labour force involved in agriculture is highly distraught. Low and unstable returns, exploitation, ignorance, low quality of life, absence of profitability, etc. remain causes of concern. All cries for food security and achieving food for all are futile if the workforce is not getting their due. Farmers are slowly turning away from agriculture and the involvement of new generation is alarmingly low.

Sources:

# CHAPTER EIGHT

## FINANCE IN INDIAN AGRICULTURE – BEYOND THE OBVIOUS...

# Finance in Indian Agriculture

Agricultural loans are available for a multitude of farming purposes. Farmers may apply for loans to buy inputs for the cultivation of food grain crops as well as for horticulture, aquaculture, animal husbandry, floriculture and sericulture businesses. There are also special loans to finance the purchase of agricultural machinery such as tractors, harvesters and trucks. Construction of biogas plants and irrigation systems as well as the purchase of agricultural land may also be financed through special types of agricultural finance. All nationalised and cooperative banks offer extensive support to farmers.

**FDI in agriculture**

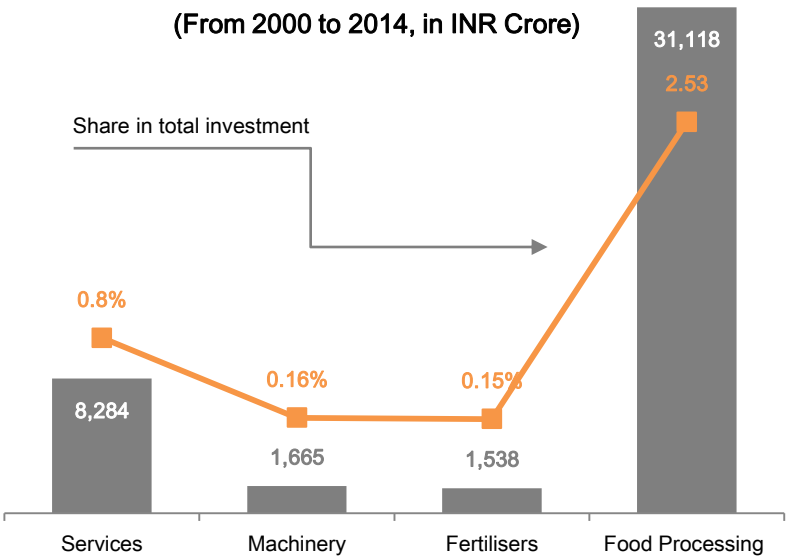
**Intent and Objective**

It is the intent and objective of the Government of India to attract and promote foreign direct investment in order to supplement domestic capital, technology and skills, for accelerated economic growth. Foreign Direct Investment, as distinguished from portfolio investment, has the connotation of establishing a 'lasting interest' in an enterprise that is resident in an economy other than that of the investor.

**Up to 100%**
(under the automatic route)

| | | |
|---|---|---|
| Development of seeds | Animal husbandry | Pisciculture |
| Cultivation of vegetables and mushrooms etc. under controlled conditions | | Food processing (Except alcohol) |
| Machinery, services related to agro and allied sectors and fertilisers | | |

**Total FDI Inflows in Agriculture**
**(From 2000 to 2014, in INR Crore)**




FDI plays a significant role in increasing productivity by offsetting the investment and technological gap. Presently, substantial FDI presence is in the food processing, representing 2.53% of the total investments in that sector.

Sources: Department of Industrial Policy & Promotion, Ministry of Commerce & Industry, Govt. of India

# Economics of Food Inflation

*"We are living in a world today where lemonade is made from artificial flavours and furniture polish is made from real lemons." ~ Alfred E. Neuman.*

The price mechanics involved in the pricing of agricultural commodities is dependent on various factors related to international trade, domestic market price and the price fixed by the government authorities as MSP. While understanding the price mechanics of agricultural products, the variables such as extremities of weather and soil conditions have not been considered as the sole objective of this chapter to highlight the impact of economically derived factors such as MSP, spot price and futures price on the pricing of the food commodity leading to inflationary trends. The resulting price is the one paid by the consumer. In event of distraught the Government buys the agricultural produce from the farmer at a MSP so to at least provide relief and cover to the input cost of the farmer in event of falling domestic selling price. This can be termed as a subsidy which can be called as the risk premium paid by the government to the farmer. MSP is used as a tool by the government to provide the farmer cushion and encourage mechanized technology and improved use of high yielding seeds. However, it is observed in a situation such as this that prices of agricultural commodities in the international market have plunged with the domestic market still standing strong at the higher price thus not bringing any relief to the consumer. The government provides subsidy to the farmer but the value for the subsidy is provided by the consumers who pay a price for the same. This results in food inflation which is difficult for the consumer to cope with if the same is an urban resident living below the poverty line. This has been evident from risking firing food price inflation even higher in 2012-13 when the Cabinet Committee on Economic Affairs on Thursday approved sharp increases of 15-53% in the minimum support price (MSP) of Kharif or summer crops for 2012-13 (October-September) to encourage farmers to plant more .The flipside to this is higher prices improve rural consumption, benefiting fast-moving consumer goods companies. Also, farmer's preference is always bent towards planting crops under the MSP scheme in spite of the non support of the weather conditions leading to crop failure and non realization of the input cost even to be covered under the MSP. When MSPs were raised by as much as 40% in major crops such as paddy, sunflower seeds and rahar in 2009-10, rural consumption boomed and consumer goods companies experienced handsome volume growth. Analysts said volume growth for many consumer categories had improved over 2008-09 as a result of higher MSPs.

Source: WTC Mumbai

# Economics of Food Inflation

An increase of 22% in MSP was recommended in the fiscal 2011-12 by the Commission for Agricultural Costs and Prices (CACP) which did act as a precursor to the rise in food inflation in 12-13. MSPs higher than input costs benefits farmers however when inflation is high and growth weak, rising MSPs add to the structural uptrend in food price inflation, raise the floor on inflation and complicate matters for monetary policy. In the last six years prior to 2012 MSPs have risen at a compounded annual growth rate of more than 15% per annum compared with the cost of production, which is rising at a much more muted 6-10%. A 5% over the actual input cost can be addressed to the increase in consumer price for the same.

The sharp increase in paddy support price in MSP in 2012 without the necessity for the same in accordance with the objective led to amid burgeoning food grain stockpiles leading to wastage of the same. Though the sharp increases come amid growing concerns over monsoon in the year 2012, which has had a weak start due to the El Nino effect a sharp increase was not a needed one. The flipside to these higher prices to improve rural consumption are observed to benefit only the fast-moving consumer goods companies. The chart shows that hikes in MSPs were muted in 2013, but they've been reduced even further this year. In contrast, the huge hikes in 2009 led to rampant food inflation and, since MGNREGS wages are linked to the consumer price inflation, they went up too, leading to a wage-price spiral. The low hikes will be a comfort to the Reserve Bank of India (RBI) in its fight against inflation. A Kotak report sums it up: "The government's decision of moderate increase in minimum support price of kharif crop for FY2015 is a significant positive for India's policy framework."

**Historical Trends Showing Changes in MSPs**

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|
| Paddy (Common) | 20.80% | 11.10% | no hike | 8% | 15.70% | 4.00% | 3.80% |
| Paddy (Grade A) | 20% | 10.80% | no hike | 7.80% | 15.30% | 5.10% | 4.10% |
| Jawar | 40% | no hike | 4.80% | 11.40% | 53.10% | no hike | 2% |
| Maize | 35.50% | no hike | 4.80% | 11.40% | 19.90% | 11.50% | no hike |
| Udad | 44.80% | no hike | 15.10% | 13.80% | 30.30% | no hike | 1.20% |
| Moong | 44.80% | 9.50% | 14.90% | 10.40% | 25.70% | 2.30% | 2.20% |
| Cotton (Medium Staple) | 38.90% | no hike | no hike | 12% | 28.60% | 2.80% | 1.40% |
| Groundnut in shell | 35.50% | no hike | 9.50% | 17.40% | 37.00% | 8.10% | no hike |
| Soyabean (Black) | 48.40% | no hike | 3.70% | 17.90% | 33.30% | 13.60% | no hike |
| Soyabean (Yellow) | 32.40% | no hike | 3.60% | 17.40% | 32.50% | 14.30% | no hike |

Source: WTC Mumbai

# Economics of Food Inflation

Unlike other commodities, the sensitivity of the demand for food to an increase in income is much greater for low-income earners. In economists' parlance, the highest income elasticity of the demand for food is in the low-income bracket. As countries become richer, the income elasticity drops quickly, and in rich countries food demand is dictated more by population growth than income growth, since well-off (and well-fed) consumers spend extra discretionary income on durable goods and services (including weight-loss programs!) rather than food. For example, in low-income countries (defined by the World Bank as those with an average Gross National Income (GNI) per capita of below USD1,000), demand for grains rises quickly as income increases – a 10% increase in incomes is associated with a 6% increase in demand for grain but as GNI per capita reaches about USD3,000, the income elasticity starts to decline, falling close to zero in high-income countries, where GNI per capita is above USD12,000 .It is noted that in spite of enormous increases in prices, developing countries increased their cereal production by less than 1% in 2008 and production actually decreased in the vast majority of them, leading the FAO to conclude that "the hoped-for supply response simply failed to materialize".

**Box .6 Some successful initiatives**

International Finance Corporation (IFC) mainly has fixed criteria to extend loans to any agribusiness sector on strict compliance basis. It usually lends to large banks to benefit their agri business clients and in turn these banks comply with the IFC. Seeking loans from IFC helps increase the reputation of the agri business to seek debt from other sources with minimum scrutiny.

Edelweiss Securities

90% of the crops are having surplus production however in spite of the surplus deficits have been occurring in the food supply and the current economy is thriving on deficits at the cost of the farmer. Actually we are facing a capitalistic situation which does not address food security in spite of surpluses. Traders and farmers are at conflicting positions .Organic farming is the best for the human beings, but as far as the farmer is concerned it becomes somewhat unrealistic as research states that with small farmers having small land size the yield is already very low and if he uses organic farming it further decreases the yield. Small farmer supports his family through the small piece of land which provides him with the ration of food supply for the entire year with some cash in hand if things go well and his expectations are realized. Hence, though organic farming sounds very healthy as far as the small farmer is concerned it does him no good income wise.

Source: BIG Analysis

# Economics of Food Inflation

If the loss of cash in the value chain due to various interests are curbed may be the farmer can get a price reflected at the end of the value chain . However this is not the case . Intervention at the government level needs to happen extensively and aggressively but nothing of that sought is happening leaving the small farmer helpless. Price awareness is a serious issue for the farmer who is subject loss of income. Price volatilies of various exchange traded commodities that are being observed are also due to the price information asymmetry. Farmers need training in farming techniques extensively to curb information asymmetry.

Initiative: Edelweiss has implemented an innovative concept for the farmers , however, the same is being tested for its efficacy at the trader and the stockiest level. Edelweiss proposes to implement the same at the farmer level in the long run. A warehouse has been put up at the micro taluka level which is used by the stockists and the traders to store their purchase against which a warehouse receipt is produced mentioning the quality and other assaying parameters . The trader or stockiest has to keep aside a margin money against this purchase in case of price fluctuations the trader or stockiest is at free will to change his sell commitments at the loss of the margin money. If this infrastructure reaches the farmer he will be able to get pre harvest financing against his post harvest produce and need not end up pledging his house or other property as collateral for pre harvest financing.

Source: BIG Analysis

# Efficacy of New Instruments

**"Strengthening of Spot Markets should be done on a priority basis"**

***Ms. Nidhi Nath Srinivas***
*Chief Marketing Officer*
*NCDEX*

Ms. Srinivas has in-depth understanding of modern day agriculture-based financial instruments and their implications on the sector on a much larger level. She puts forth her views on how can these new mechanisms be utilised effectively.

According to Ms. Srinivas, food inflation is nothing but visibility of prices which display high volatility. The spot markets are an important tool for price discovery. However such discoveries should be highly sophisticated and should happen at a farmer-trader interface, such as the APMC market or any other meeting point.

She adds that there is no reliability of data for true and accurate measurement of prices. The prices are based on old survey records which are not updated to consider the effects of climatic and economic changes over recent years. This results in a faulty price discovery scenario.

She adds that MSP is a critical parameter for price and the government's intentions and completely instrumental efforts in achieving its desired objectives are creditworthy. However, due to inefficiency in the data collection technique it has been a failure. At a time when private companies are spending huge sums of money for obtaining or retrieving data through satellite sources, government is lagging way behind in that department. This needs to be addressed and solved on an urgent basis if effectiveness of MSP or other such government policies is to be retained.

Sugarcane pricing is very unique and only crop in which farmer is given outright 70% of the FRP, this structure needs to implemented in case of other crops too. Government should incorporate prices reflected on commodity exchanges while deciding on the commodity prices.

## Primary Concerns

Several industry experts believe that MSP should be reviewed objectively and practical parameters should be added to refine it. Many believe that commodity exchanges must also be made a part of the national minimum price assessment programme. Certain voices even claim that scope of MSP should be widened to include more number of crops in order to avoid imbalance in production pattern.

Source: BIG Analysis

# CHAPTER NINE

## POLICY ENVIRONMENT CONDUCIVENESS

# National Food Security Act

The National Food Security Act, also known as the Right to Food Act, was signed into law in September 2013. The Act brought different food-related schemes of the government under one roof (such as Mid Day Meal Scheme, Public Distribution Scheme and Integrated Child Development Services, etc.).

Primary aim of the act was to give subsidised food grains to a large proportion of the population. The National Food Security Act was widely debated, domestically as well as on international levels, but remains to be at the core of India's efforts towards bringing food security.

### The Act – Highlights

- Seeks to offer rice at Rs 3 per kg, wheat at Rs 2 per kg and coarse cereals at Rs 1 per kg to the intended beneficiaries
- Benefits nearly 800 million people – up to 75% of rural population and 50% of urban population under the Targeted Public Distribution System
- States are given the responsibility to decide on eligibility criteria based on socio-economic and caste census (SECC) data
- Pregnant women and lactating mothers would receive a maternity benefit of at least Rs 6,000
- Children aged six months to 14 years will get take-home rations or hot cooked food
- The central government will also provide money to states and union territories if it runs low on grain as well as providing them with assistance towards the cost of intra-state transportation and handling of grains
- The oldest adult woman in each house would be considered the head of that household for the issuing of ration cards
- **Total estimated annual foodgrains requirement is 612.3 lakh tons and the corresponding estimated food subsidy for implementation of NFSB, at 2013-14 costs, is about Rs 1,24,747 crore** The beneficiaries can get a total of five subsidized rice, wheat, coarse grains a month at a price of 1 to 3 rupees a kilogram

The food security bill has met with vehement support and criticism alike, from all quarters. A look at the most commonly expressed concerns as well as merits presents a better picture of the scenario. In January 2015, a high level committee set up to review the Act proposed that the coverage be brought down to 40% from the originally recommended 67%. The committee also recommends revision of the role of Food Corporation of India.

Sources The National Food Security Act 2013, Firstpost

# National Food Security Act

| | |
|---|---|
| Merits | • Proper implementation will lower spending on foodgrains which will prove very beneficial to extremely poor families<br>• Saved household expenditure can be diverted towards obtaining better quality and nutritional food options such as fruits and vegetables<br>• Eldest woman is considered the head of the household, pregnant women and lactating mothers and children are entitled to 'take home ration'. This gives more power to the vulnerable group of society |
| Demerits | • Method of identification of beneficiaries has to be well framed and comprehensive. There is a serious threat of misdirecting the benefits<br>• Unless distribution system and channels are fool-proof, implementation will not be effective as substantial amount of food may get wasted or taken up by corrupt entities<br>• Heavily subsidised pricing may have a conflicting effect. Since large quantities would be required to fulfil demands, production will skew towards these items, but at the same time low prices will dishearten the producers. Hence it is imperative to ensure the burden of subsidies does not fall on farmers<br>• The bill puts a severe fiscal burden on the country's resources<br>• There is lack of proper storage facilities for subsidised foodgrains which may result in wastage and spoilage; defeating the very purpose of food security |

**Cause of Concern:**

The delay in implementation of the Act has been a serious concern for many. The original deadline for execution of the Act was July 2014. However, till September 2015, the Centre extended it as many as thrice, citing States' lack of preparedness and the inability to identify the exact number of beneficiaries. The Act is already under criticism over the monetary burden it is expected to put on the country's resources. The current confusion over its scope and the consequent delay is stifling the very purpose of its introduction. The biggest concern surrounding the initiative is the lack of political consensus and the uncertainty stemming from it.

Sources: The National Food Security Act 2013, Firstpost, The Hindu, Down To Earth; BIG Analysis

# National Food Security Act

### Box 7. The Trade Facilitation Agreement (TFA)

**The Agreement:**

- The TFA aims to fast track any movement of goods among countries by cutting down bureaucratic obligations.
- TFA lists a clause that says farm subsidies cannot be more than 10 percent of the value of agricultural production. If the cap is breached, other members can challenge it and also go on to impose trade sanctions on the country.

**India's Opposition to TFA:**

- The 10% cap on subsidies will not be possible for India to achieve. Adding to the woes is the fact that the 10% cap is calculated based on 1986-88 prices when the prices of food grains were much lower. So the cap has to be updated taking into account the present prices of foodgrains.
- For providing subsidised food, India will have to open up its own stockpiling to international monitoring. It will not be able to add protein heavy grains like say, lentils, if it wants to, due to riders in the peace clause.

**WTOs Problem with high Subsidies:**

- WTO argues that if the developing countries continue to give prices to farmers which are higher than the market prices, it might harm the poor farmers in other parts of the world. It also says the deal could add $1 trillion to global gross domestic product and 21 million jobs, by cutting down red tapes.

**Current Status:**

- The deadline to ratify TFA is December 2015. India is unlikely to ratify the agreement this time as well.

Sources The National Food Security Act 2013; Firstpost; Business Standard; Centre for Strategic and International Studies; BBC News

# National Food Security Mission

The main objective of **The National Food Security Mission (NFSM)** scheme is to increase production and productivity of wheat, rice and pulses on a sustainable basis. According to NFSM report, the total financial implications for the NFSM were estimated to be INR 4,882.48 crore during the 11th Five Year Plan (2007-08 2011-12). The implementation of the NFSM would result in increasing the production of rice by 10 million ton, wheat by 8 million ton and pulses by 2 million ton by 2011-12.

**Success:**

The production of wheat has increased from 75.81 million tonnes in pre-NFSM year of 2006-07 to 94.88 million tonnes during 2011-12 i.e. an increase of 19.07 million tonnes against the envisaged target of 8 million tonnes at the end of 11th Plan. Similarly, the total production of rice has increased from 93.36 million tonnes in pre NFSM year of 2006-07 to 105.30 million tonnes in 2011-12 with an increase of 11.94 million tonnes against the target of 10 million tonnes. The total production of pulses has also increased from 14.20 million tonnes during 2006-07 to 17.09 million tonnes during 2011-12 with an increase of 2.89 million tonnes against the envisaged target of 2 million tonnes. Thus, 33.90 million tonnes of additional production of total foodgrains against the target of 20 million tonnes. The various interventions of the mission have been instrumental in bringing about significant yield gain to the farmers resulting into increase in their income level.

The Mission is being continued during 12th Five Year Plan with new targets of additional production of food grains of 25 million tons of food grains comprising of 10 million tons rice, 8 million tons of wheat, 4 million tons of pulses and 3 million tons of coarse cereals by the end of 12th Five Year Plan.

The following table takes a look at the progress made by Maharashtra State in the Mission:

Participating Districts: Nashik, Pune, Bhandara, Gondia, Chandrapur and Gadchiroli

| | |
|---|---|
| Union and State Govt. Investment (cumulative) | **Rs. 26 crore** |
| Target Land to be covered | **13,500 hectares** |
| Subsidies | **100%** |
| **1. 7500 hectares of land to farmers**<br>**2. Seeds: Hybrid – 576 quintals; Improved - 10,000 quintals**<br>**3. (Gondia 6.11 crore; Bhandara - 6 crores; Gadchiroli - 5.17 crore)** | |
| Projects to be undertaken | **423 (99 in Gondia, 34 in Pune)** |

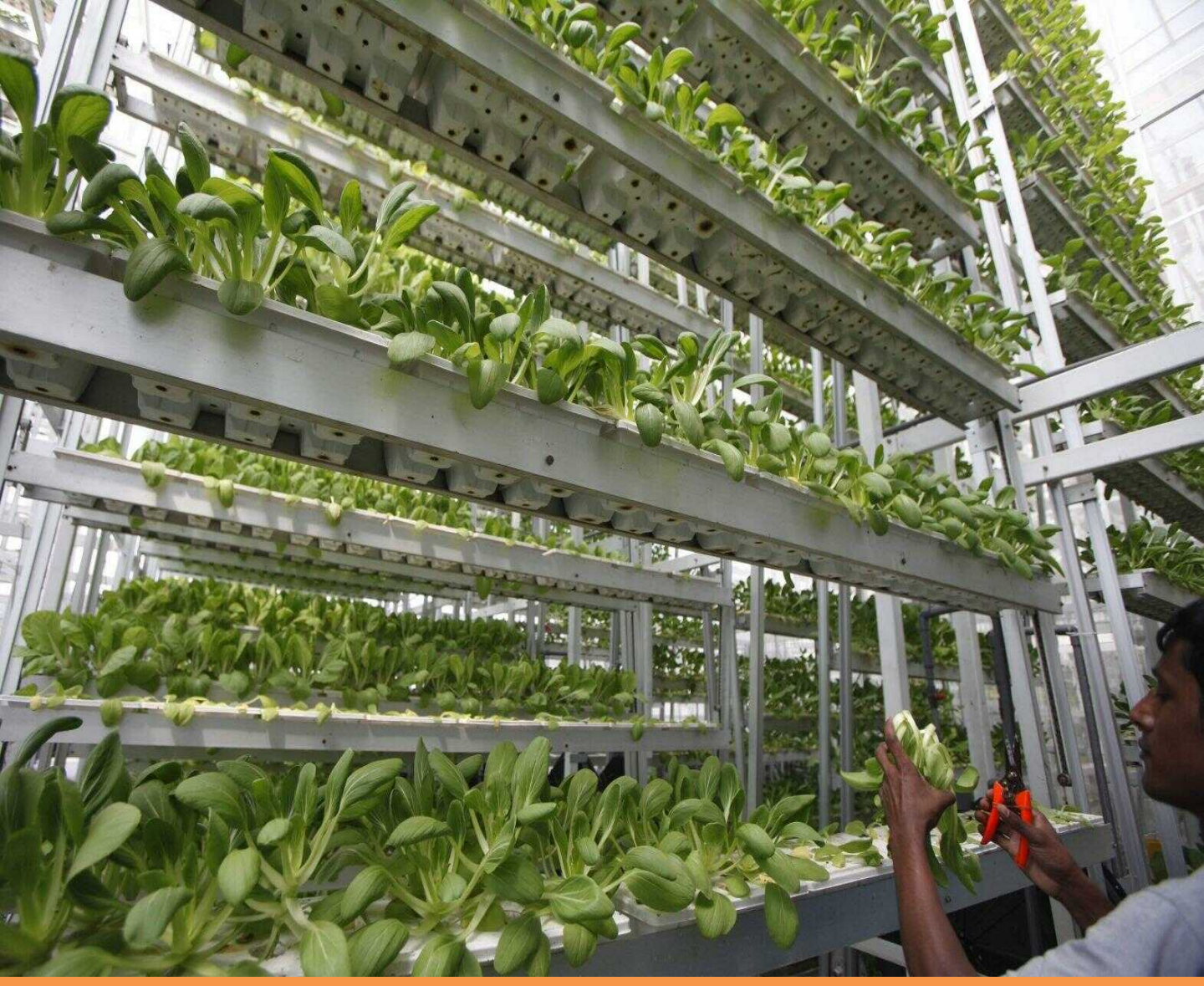
Sources: The National Food Security Act 2013, Firstpost, The Hindu

# National Food Security Mission

## Primary Concerns

The National Food Security Act and the National Food Security Mission are two giant initiatives taken towards ensuring food security. However, there must be great level of coordination between the two, as the former deals with guaranteeing distribution while the latter deals with safeguarding availability. Unless the implementation of the two work in tandem, the purpose behind their introduction will not be fully realised.

Sources: BIG Analysis



# CHAPTER TEN

## STRATEGIES TO MITIGATE CONSTRAINTS

# Contract Farming

Agriculture production is carried out on the basis of an agreement between the buyer and farmers/producers. Contract farming implies that producers cultivate only those products which are required by the client. Sometimes the contract also specifies price and quality of the produce, which the farmer has to deliver at the pre-decided date.

"**Karivane**" in Roha Taluka of Raigad district, is situated about 11 kms. from Roha in forest area. The tribal people the village had no work for their livelihood hence these people were engaged in illegal country liquor production. This liquor was supplied in nearby villages.

In the year 2011-12, a youth named Anil Tukaram Wargude, who had a diploma education in Agriculture, formed a group of 20 people from his community. With the advice of the Department of Agriculture in Maharashtra, these people took 18-20 acres of land on contract basis in Killa village premises. Mini kits of various vegetables were provided to these people through ATMA by Taluka Agriculture Officer, Roha. Details about cultivating practices of various vegetables were taught to this group. During the first year they got encouraging results and earned a net profit of INR 10,000/- per acre.

Inspired by the results and active support by the Department, the group's strength increased to 27 in the year 2014-15; and they began cultivating various vegetables such as Bitter Gourd, Ridge Gourd in 125 acres in and around Killa village.

Regular field visit of the District Collector, District Superintending Agriculture Officer Raigad and various other officers have boosted the morale of the group. During the year 2014-15 this group could harvest about 65-70 tons of vegetable. They fetched an average rate of INR 40 per kg, which is almost at par with market prices The total amount received by the group was to the tune of Rs.25 to 28 lakhs. Next year the group intends to purchase a transport vehicle for the group to transport their produce to the market.

*Demonstration of Vegetable Plantation at Killa- Roha (Area 0.40 Ha)*

*Interculturing in Demonstration Plot*

Source: BIG Analysis

# Contract Farming

*Successful farmers from the Roha district*

*Grading of ridge gourd by the farmers*

*Transportation of Vegetables to Vashi APMC market.*

### Box 8. Food Processing and Contract Farming

Varun Agro specializes in contract farming and is the intermediary of one of India's leading FMCG companies . It is in touch with about 5,000 (out of which there are 200 to 300 woman farmers in groups) farmers surrounding Umrale village and also outsources from other places in Hyderabad and other parts of Maharashtra. Varun Agro enters into an agreement with the farmer for 90% of his produce and has 3 price levels referenced to the market price. Thus ensuring the farmer is at no loss due to the agreement when market prices are up or down .The farmer is at liberty to sell remaining 10% of the produce to the higher price market if the same exists. It has ensured collection centers at every village corner at convenient places decreasing the transport cost for the farmer. The farmers are earning at least INR1 to 5 lakhs after overcoming the input cost.

Varun Agro ensures providing the farmers with adequate trainings and atleast 80 trainings for a period of six months. They have also made as compulsory as possible urging the farmers to open bank accounts in the name of their wives ensuring the money reaches the woman farmer thus promoting women empowerment. Training for the farmers has not only decreased the input cost but also has increased yield due to perfect combination of usage of seeds , pesticides and fertilizers.

Source: BIG Analysis

# Contract Farming

The mandate to the farmer is to use a mixed variety of permissible seeds to mitigate risk in the time of any plant disease pertaining to a specific seed. This practice is ensured by providing the farmer with a passport which carries all the information of the used seeds (bio crop and yara milap) , fertilizers and pesticides with dates and other specific information thus overruling any risk of untimely and unprecedented use of especially the pesticide. The farmer and the company is well aware of the input schedule till the harvest period. Usage of mask is made compulsory while spray of pesticide. Cash payment is immediately made to the woman farmer if she does not hold a bank account on supply of her produce. Wastage management has been also taken care of in two ways

- The byproduct i.e. the seeds and the skin left over after paste making is dried and crushed and mixed with the earth which has high nutrient value and is very much sought after by the farmers and gets over in record one hour the moment it is ready.
- The spoilt raw material is treated and made available to be used as a fertilizer. As a social initiative Varun Agro urges its farmers to inculcate hygienic practices such as using filtered drinking water and educate their children for higher education.

**MD and CEO of Varun Agro, Ms. Manisha Dhatrak,** expressed her concerns about obstacles in the development of the food processing industry. She highlighted that corruption in the system is the biggest challenge today. It leads to a loss of nearly 10-12% which could otherwise be directed to the farmers.

Source: BIG Analysis

# Cooperative Farming

In cooperative farming, farmers come together to form a group or 'cooperative' wherein they can pool their resources and mitigate risks which they would have otherwise had to bear independently.

The Gambhira Collective Farming Society was formed in 1953 at Anand, Gujarat. There are more than 291 farmers in the cooperative who have been continuously cultivating an area of 526 acres. The collective consists of 30 groups with 8 to 14 members in each group. 13 to 24 acres (average 17 acres). Land and other assets belong to the collective society and the Managing Committee of the collective decides the crop plan to be implemented by each group. The society undertakes the following main activities:

- Primary tillage
- Purchase of inputs
- Irrigation
- Marketing of the produce

The proceeds obtained from crop production from the land allotted to groups, after meeting all the expenses and contribution towards reserve and development fund, is passed on to the respective group leaders who, in turn, share it with group members in proportion to their labour contribution.

The cooperative has boosted income for its member farmers and improved their socioeconomic condition to a great extent. Sales of crops rose gigantically, from INR 90,660 in 1953-54 to INR 3.26 Crore in 2010-11. Factors leading to success: The social mobilisation work undertaken by the collective was successful can be measured through the fact that the farmers felt the need for the setting up of a participatory organisation, in other words a co-operative society that would look after the collective benefit of all of them. Social Mobilisation involves first understanding the needs of the stakeholders and then addressing them in a professional manner. The Collective foresaw the benefits of a co-operative system of farming, realised the potential it had for alleviation of poverty in the area. The farmers were able to see the benefit of engaging in collective action. Hence participation was voluntary and complete, with more farmers wanting to join in at later stages. Thus, the mobilisation in the villages of Gambhira, Bilpad, Nanisherdi and Kathiakhad achieved near-perfect results in terms of the setting up of a sustainable institutional structure that would look out for the collective benefit of its members.

Sources DNA India; Managing Co-operative Farming: A Case of Gambhira Collective Farming Society by N. T. Sudarshan Naidu; UK Essays

# Cooperative Farming

### Box 9. Collective strength can overcome any hurdle

When my husband and I decided to venture into full-time farming, little did we know that it will not be as easy as planned. Firstly, our small sized holding wasn't making farming profitable and secondly, it was very difficult to get the produce to the 'Market Yard' (the local term for market) for sale. Furthermore, upon reaching the market, vegetables were not obtaining fair price. We decided to shift away but our attempts at selling milk weren't successful either. The milk business was marred mostly by the attitude of the consumers, who did not mind low quality packaged and branded milk but hesitated paying even 75% of the price to high quality but amateur milk providers like us. We tried supplementing the milk business with making processed cottage cheese but the consumer apathy continued. Moreover, since the processing cost was quite cheap, competition multiplied, giving rise to unfair practices and throwing genuine but small players like us out of the race.

Days went by and we continued dabbling into different agro-products sale, but with limited or no success. During an exhibition, we saw that consumers had blatantly refused buying whole wheat (of a very good quality) from a reputed company, stating that they simply go and buy wheat flour. Buying readymade flour is less time consuming and easy. And this is when the idea of entering into consumer friendly, agro-processed products, especially wheat flour market, entered into our minds.

However, we did not want to do this alone. We mobilized a group of fellow farmers, performed a thorough quality check of their farming practices and produce, and discussed with them the benefits of coming together to form a cooperative. Since all of them were marginal land holders and small farmlands offered no benefits, they decided to join our movement. Those who knew us from before readily agreed to source all their produce to our entity. But we did not want to be just another contract farmer. We understood that the cooperative will grow only when each participant in it will be treated with utmost care and consideration. We wanted to come up with a profitable and financially feasible alternative and that's how Naisargik Agro Products was born. Our model is completely farmer-centric. We prepared a detailed schedule of money requirement timelines of all the participating farmers and made sure we buy their produce according to that time-table. This ensured participants got steady, pre-defined income flow. Once this model was activated and settled, we shifted our energies towards aggressive marketing and diversification. Today we supply flours of wheat, rice, millet and many more. We have also widened our scope and involved various self-help groups in this endeavour. Instead of being isolated, marginal farmers, we chose to come together to form a strong collective and reach new levels in our traditional occupation.

Source: BIG Analysis

# Cooperative Farming

India's Dairy Cooperative Movement is the biggest example of collective efforts. There are 16 major dairy cooperatives in the country, governed by the apex body National Cooperative Dairy Federation of India Limited. Today, milk is the largest agricultural crop in India with market value exceeding Rs 4 lakh crore (USD 65 billion) per annum and the milk group contributes the highest to the total output of the country's agricultural sector, surpassing the output value of wheat, rice and oilseeds. Milk directly affects livelihood of more than 150 million Indian farmers; a vast majority of whom are small and marginal farmers.

| |
|---|
| Andhra Pradesh Dairy Development Cooperative Federation Ltd (APDDCF) |
| Bihar State Cooperative Milk Producers' Federation Ltd (COMPFED) |
| Gujarat Cooperative Milk Marketing Federation Ltd (GCMMF) |
| Haryana Dairy Development Cooperative Federation Ltd. (HDDCF) |
| Himachal Pradesh State Cooperative Milk Producers' Federation Ltd (HPSCMPF) |
| Jammu & Kashmir Milk Producer's Co-operative Limited |
| Karnataka Cooperative Milk Producers' Federation Ltd (KMF) |
| Kerala State Cooperative Milk Marketing Federation Ltd (KCMMF) |
| Madhya Pradesh State Cooperative Dairy Federation Ltd (MPCDF) |
| Maharashtra Rajya Sahakari Maryadit Dugdh Mahasangh (Mahasangh) |
| Orissa State Cooperative Milk Producers' Federation Ltd (OMFED) |
| Pradeshik Cooperative Dairy Federation Ltd (UP) (PCDF) |
| Punjab State Cooperative Milk Producers' Federation Ltd (MILKFED) |
| Rajasthan Cooperative Dairy Federation Ltd (RCDF) |
| Tamilnadu Cooperative Milk Producers' Federation Ltd (TCMPF) |
| West Bengal Cooperative Milk Producers' Federation Ltd. (WBCMPF) |

Sources: Amul; National Cooperative Dairy Federation of India Limited; BIG Analysis

# The Role of Food Processing Sector

### Box 10. Food processing to have a greater role in the years to come

Schreiber Dynamix Dairies Ltd. is one of India's leading dairy products company, with a set up in Baramati in Pune, Maharashtra. They have been successfully exporting their products to nearly 22 countries across the globe. We discussed with them their views on the role of food processing sector in general in India's drive towards attaining sustainable food security.

*What are your thoughts on contract farming?*

Contract farming would become a necessity rather than a choice. As need for food security and food safety grows with rising population – food productivity and traceability will become a predominant requirement of the food processors, consumers and government alike. However, contract farming may bring its own challenges that will need to be closely monitored,

- Reduction in biodiversity resulting in increased risks of pest and weed contamination; disturbance of natural ecology of a specific area
- Increased risk of cartel formation between seed, fertilizer and contract farming companies
- Ensuring proper protection net for consumer and farmers; also maintain biodiversity

*Usually from where do food processing industries in India source their raw material? Local sourcing is most desirable but does it happen (or is it feasible) in the current scheme of things in India?*

Raw material for food processing could be manifold –

- perishable commodities like milk, fruits, vegetables etc.
- extended life commodities like cereal grains, sugar, coffee beans etc.
- functional ingredients like hydrocolloids, high intensity sweeteners, acidulants, starter culture and number of other high end functional ingredients;
- packaging materials;
- food processing & packaging equipment etc.
- chemicals, hygiene supplies, safety gears etc.

Local sourcing of commodities, food ingredients, packaging material and equipment still happens and is feasible as well. However, given that our food supply chain (sourcing, storage, logistics etc.) is still in nascent stage. Our input commodity ingredients still aren't perceived as robust to meet international standards for export.

*Contd.*

Source: BIG Analysis

# The Role of Food Processing Sector

However, our internal demand itself is strong to drive current growth of processed food industry. Absence of value added differentiated items though creates commoditization of food products. Additionally, functional food ingredients still require significant imports (primary source of innovation). Given low volumes for these items and concern about protection of IP in India, foreign companies aren't thrilled to set up manufacturing facility for high value added ingredients in India. There is also significant hurdles with clearance of these ingredients at Indian ports due to incompatibility of food additive definition between Indian regulatory agencies vs. International food safety standards for food additives. This stifles innovation and potential job growth.

Food packaging & process equipment companies are being set up in India as the food processing industry grows. However, this sector will evolve and more localized manufacturing may happen.

*How do you address / tackle the perception about processed food being unhealthy?*

Food processing industry, hospitality and restaurants could be one of the biggest employment generating business sector in India over the next few years. However, for this to materialize, general perception of the processed food in consumer's mind should improve tremendously. Consumer education on food safety, nutrition and hygiene should be a prime focus for government, food industry and academics. Food processors need to embrace self-regulation and government should focus on optimum regulation and enforcement.

*What can food processors do to improve the nutritional value of their products?*

Government and food processors need to partner to tackle nutrient deficiency and food security issues in the issue. With appropriate consumer education on food, nutrition and health, food processors will be motivated to deliver what consumers are looking for. Government needs to roll out comprehensive nutrition policy based on scientific evidence to guide and regulate the food industry to promote food as a medium to fight malnutrition.

Source:, BIG Analysis

# Boosting Allied Sectors

Co-existence of agriculture with allied activities has always proven to be a win-win situation. Innovations in allied sectors such as aquaculture, crab farming, poultry farming, integration of renewable energy into supplementary activities can go a long way in minimising risks associated with agriculture.

The Marine Products Export Development Authority (MPEDA)'s successful 'Crab Farming' pilot project in Sindhudurg district, Maharashtra

The project was started in October 2014 after a successful trial with the involvement of six farmer help groups from three places that include Malvan, Vengurle and Devgad situated along the Konkan coast in Maharashtra. These farmers were trained by MPEDA scientists on crab farming and were later provided with a one acre line to cultivate Mangrove crabs, also known as mud crabs (Scylla serrata). The crabs are grown at a farm that is located in the mangroves and covered by high density polythine nets (HDPN), which were also provided by MPEDA. Since the crab is grown in natural areas, requirement of capital is nearly zero.

Structure of the pilot project:

- Each self-help group has been given two lines of 1 acre each. For an acre, 2000 seeds have been used, meaning a total of 4000 for the farm they operate.
- The project is funded by the Maharashtra State Forest Department that has pumped over $240,000 (Rs 1.5 crore) into the project.
- The crab seeds are provided to farmers for a mere INR 2 per piece and will fetch farmers INR 1000 per crab after nine months of harvesting.
- Seeds are given to farmers from MPEDA's hatchery in Tamil Nadu on a subsidised rate. Mud crab seed production is by the Rajiv Gandhi Centre for Aquaculture (RGCA), MPEDA in Tamil Nadu.

Upon successful implementation of this pilot project the authorities are planning to introduce 15 new farms, starting from September 2015. Additionally, Rajiv Gandhi Centre for Aquaculture (RGCA), the research & development (R&D) arm of the MPEDA, located at Thoduvai, Sirkali in Nagapattinam District, Tamil Nadu has taken up R&D work on the production of mud crab seeds in the hatchery and has established a hatchery at Thoduvai Village, Sirkali, Nagapattinam, Tamil Nadu. This hatchery is one among very few mud crab hatcheries in the world. The Philippines, Vietnam and China being the other countries having them.

This hatchery has been regularly producing mud crab seeds reared to crablet sizes at its demonstration farm and supplying to farmers in the area.

Sources: MPEDA, BIG Analysis

# Strengthening the Infrastructure

There are various government and non-government organisations working in the agricultural field in India. There organisations are formed with sincere intentions and mandates. If coupled with active financial and operational support, these can do wonders and bring comprehensive change to farming and farmers.

Krishi Vigyan Kendras (KVKs) are the biggest examples of organisations with notable intentions and reach. The Indian Council of Agricultural Research (ICAR) introduced KVKs as district level farm science centres which can help in assimilation of the latest knowledge and resources, especially about technological aspect of farming. These centres are the link between research institutes and farmers. KVKs' foundational mandate includes technology assessment, refinement and demonstration. Additionally, the centres also undertake intensive vocational trainings for local farming community and act as the catalyst of regional agricultural transformation. The main objective of KVKs is to ensure rise in agricultural production and betterment of the socio-economic conditions of farmers thereby.

India currently has more than 642 KVKs and plans to establish another 109 new in during the twelfth five year plan period between 2012 and 2017. the Central government kept a budget of INR 3,900 Crore for betterment of initiative. KVKs can be highly effective agents of change in enriching the status of farming in their region of operation. Several KVKs are already doing a great job in this regard.

Source: BIG Analysis

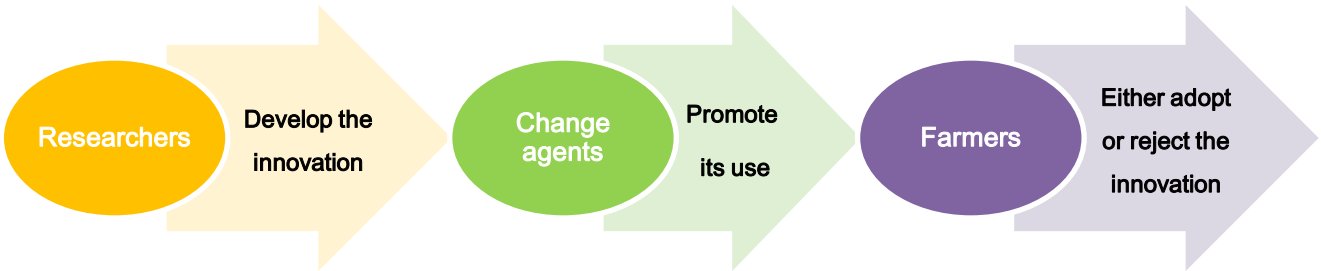
# Bringing Innovation in Agriculture

Small sized holdings, decreasing yield, excessive use of fertilisers and pesticides, shortage of skilled and consistently available labour are the main reasons for overall reduction in the quality of farm output in India. However, all these obstacles can be mitigated by changing the approach towards farming and incorporating ingenious, inventive solutions. There are numerous research and innovation drivers in the country, doing ground-breaking work at various levels. The only problem is that these are fragmented. Innovations must be far reaching, adaptive and affordable. Activating the framework facilitating healthy interaction between researchers, government and farmers is the need of the hour.

Technological change has been the basis for increasing agricultural productivity and promoting agricultural development. Research impacts the productivity of farming systems by generating new technologies which, if appropriate to farmers' circumstances, will be rapidly adopted.

Historically, researchers and change agents have been primarily responsible for identifying and incorporating economic and environmental factors in the process of developing and introducing an agricultural innovation.

This research/change agent centered process, usually referred to as a Transfer of Technology approach, is typically characterized as a top-down process where




**The most popular innovative farming techniques:**

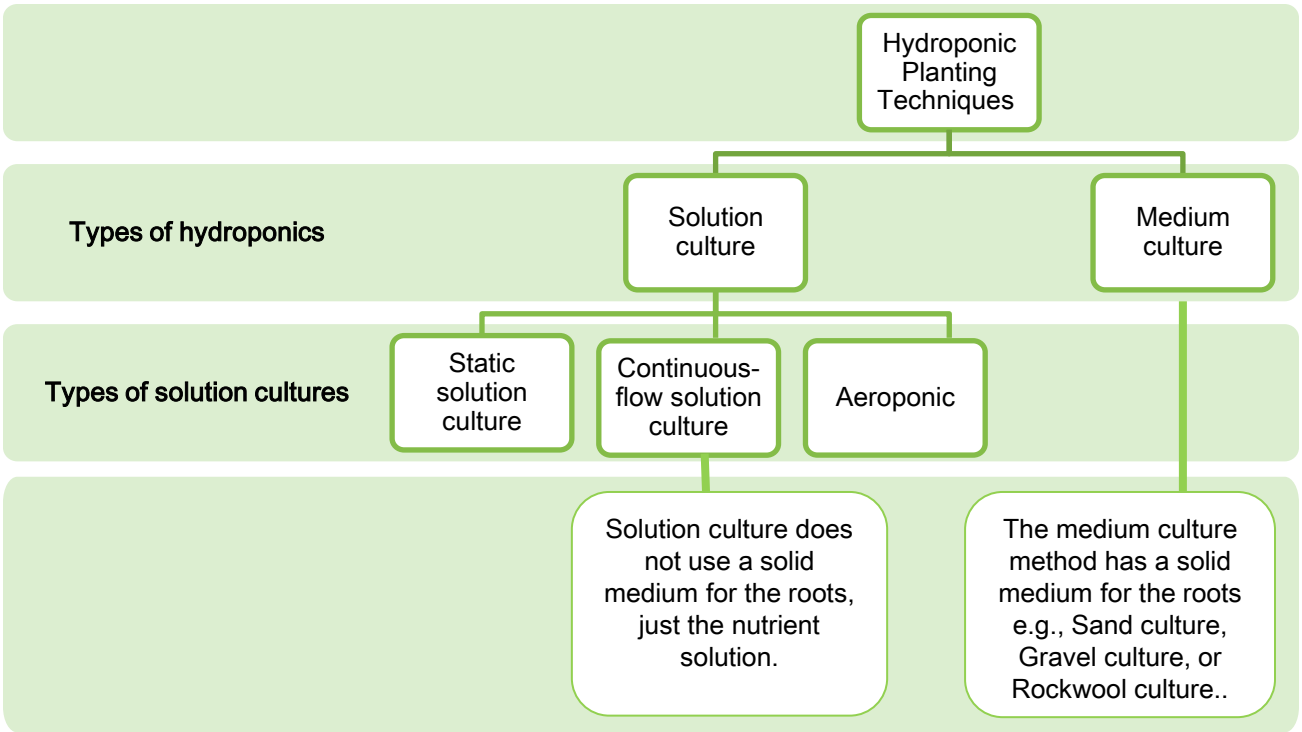
| | | | |
|---|---|---|---|
| Hydroponic | Aquaponic | Vertical Farming | Organic Agriculture |
| Integrated Farming | Integrated Soil Fertility Management | Dry Land Farming | Nitrogen-use Efficiency |
| | Post Harvesting Technology | | |

Sources: Journal of Extension; BIG Analysis

# Agents of Change

### 1. Hydroponic

The term Hydroponic comes from words 'hydro' meaning water and 'ponos' meaning labour in Greek. The name itself suggests that the technique is water-based. Hydroponic cultivation technology uses water, nutrients and oxygen. **It is used to grow vegetables and fruit, e.g. peppers, mini cucumbers, tomatoes, and green vegetables.**




I. **Static solution culture** : Plants are grown in containers of nutrient solution, such as glass, plastic buckets, tubs, or tanks. The solution is usually gently aerated but may be un-aerated. If un-aerated, the solution level is kept low enough that enough roots are above the solution so they get adequate oxygen. A hole is cut in the lid of the reservoir for each plant. There can be one to many plants per reservoir. Reservoir size can be increased as plant size increases. Clear containers are covered with aluminum foil, butcher paper, black plastic, or other material to exclude light, thus helping to eliminate the formation of algae.

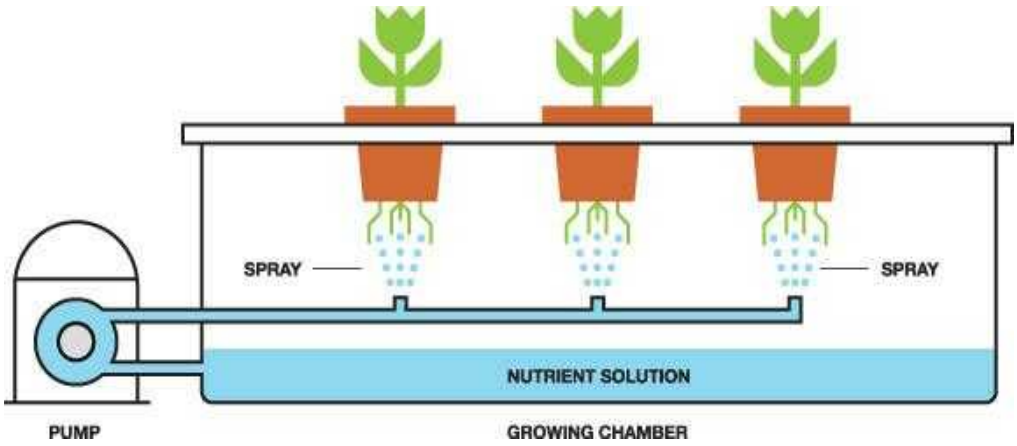
II. **Continuous-flow solution culture** : In continuous-flow solution culture, the nutrient solution constantly flows past the roots. It is much easier to automate than the static solution culture because sampling and adjustments to the temperature and nutrient concentrations can be made in a large storage tank that has potential to serve thousands of plants.

Sources: Hydroponic Plant Systems; BIG Analysis

# Agents of Change

**III. Aeroponic :** Aeroponic grows plants with their roots suspended in the air in a grow chamber, with no medium, in a closed-loop system. Nutrient-rich water is sprayed on the roots of the plants as they dangle in the air. The microbes on the plant are in an oxygen-rich environment, which allows the microbes time to digest the nutrients and to make them immediately available to the plant's circulatory system. Well-circulating CO2 in the room allows further enhanced growth.

**How Aeroponic Works**




**Pros and cons of Aeroponics**

- Receives 100% of the available oxygen and carbon dioxide to the roots zone, stems, and leaves, thus accelerating biomass growth and reducing rooting times.
- 80% increases in dry weight biomass (essential minerals) compared to hydroponically grown plants.
- Uses 65% less water than hydroponics.
- Requires ¼ the nutrient input compared to hydroponics.

- Uses a lot more electricity than hydroponic gardens because the pump that provides the plant's roots with food and water runs constantly.

Sources: BIG Analysis; Aeroponics

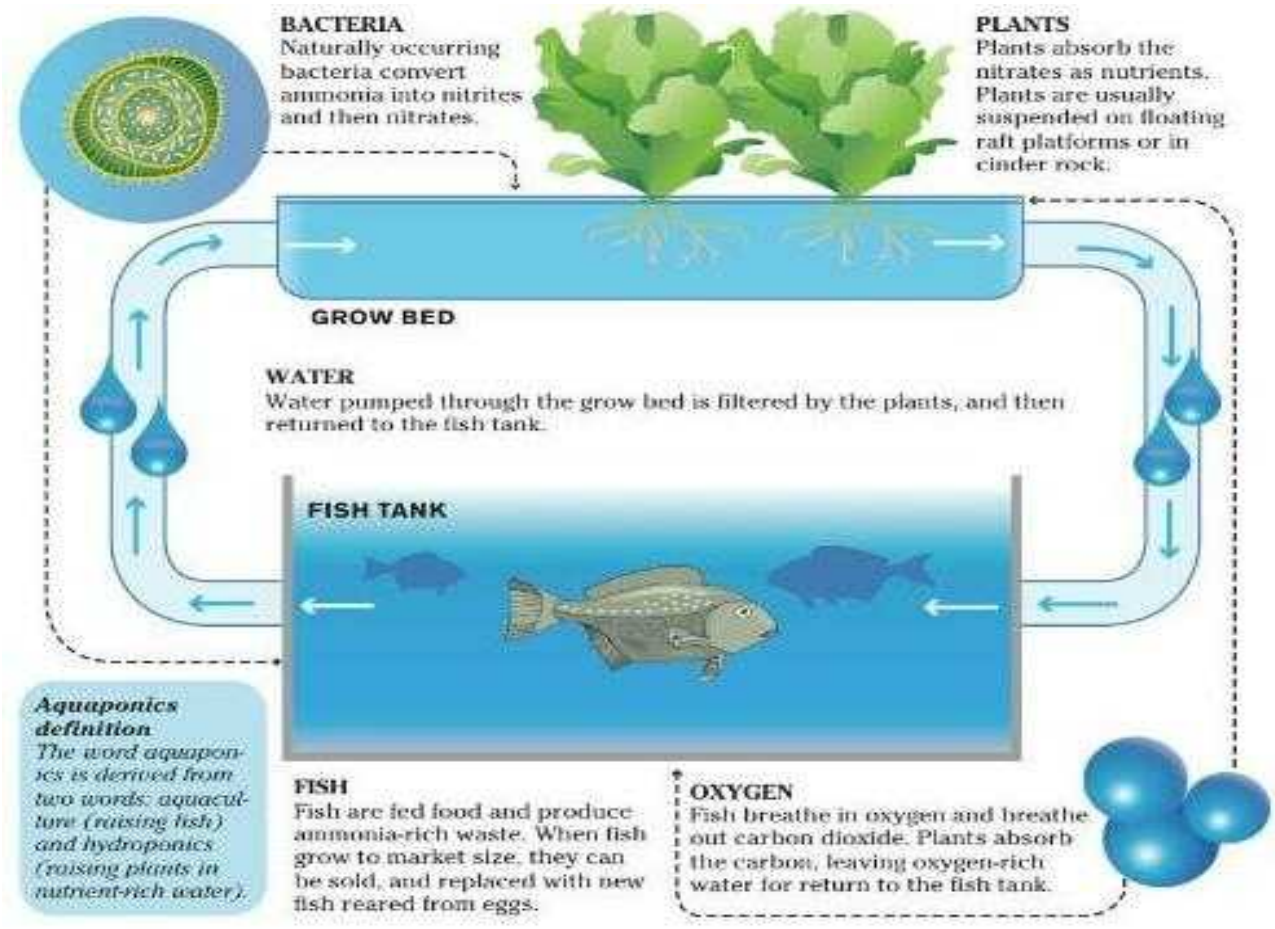
### 2. Aquaponic

The word Aquaponic is derived from two words: aquaculture (raising fish) and hydroponic (raising plants in nutrient – rich water)

**Process :**

Unique feature of this method is that it grows fish and plants together in one integrated system. The fish waste provides an organic food source for the growing plants and the plants provide a natural filter for the water the fish live in. The third participants are the microbes (nitrifying bacteria) and composting red worms that thrive in the growing media. They do the job of converting the ammonia from the fish waste first into nitrites, then into nitrates and the solids into vermicomposting that are food for the plants.

**How Aquaponics Works**




Sources: Massachusetts Institute of Technology – Mission 2014: Feeding the World; BIG Analysis

# Agents of Change

**Types of Plants & Fish can be grown in Aquaponics**

Most varieties of lettuce — Most varieties of herbs

Watercress — Tomatoes — Cucumber — Squash — Zucchini

Peppers — Broccoli — Melons — Strawberries

Perch — Talapia — Catfish — Peruvian Pacu

Oscars — Koi — Goldfish and some varieties of aquarium fish

Freshwater prawns

**Low Technology Application**

- Involves simultaneous cultivation of an aquatic species and plants in a system.
- Reduced need for fertilizer because the waste of the aquatic organisms are used by the plants as nutrients.
- Has been historically implemented for thousands of years in China and other places that have large swampy tracts of land.
- The most commonly implemented one is a Tilapia-Azolla-Rice culture. Tilapia are one of the most efficient species of fish and can put on close to one pound of fish flesh per pound of fish food they eat; the Azolla is a floating aquatic macrophyte that acts as supplemental food to the fish. The rice can be harvested directly for human consumption.

**Pros and cons of Aquaponic**

- Water Use Reduction
- Clean Gardening
- Reduced Space Use
- Plants Glow Better
- Less Maintenance

- Costly to setup
- Technical Knowledge Required
- Higher chance of failure

Source: BIG Analysis

# Agents of Change

### 3. Vertical farming

Vertical farming as a component of urban agriculture is the practice of cultivating plant life within a skyscraper greenhouse or on vertically inclined surfaces. The modern idea of vertical farming uses techniques similar to glass houses, where natural sunlight can be augmented with artificial lighting and metal reflectors.

### Pros and cons of Vertical Farming

- No weather-related crop failures. No droughts, floods or pests could find their way into a vertical greenhouse that easily.
- All food is organically grown, when pests and weather aren't an issue it's easy to avoid herbicides, pesticides and fertilizers.
- Allows farmland to be returned to nature, restoring ecosystems.
- Converts black/grey water into usable water by using evapotranspiration.
- Reduces the need for transportation of produce

- Cost intensive, setting up a vertical farm takes lots of time and money.
- Variety of plants grown, the types of vegetables that are able to grow in a green house is limited compared to traditional farming.
- If the greenhouse is to be insect free, pollination will have to be done by hand.
- Energy costs, the cost of heating and lighting a greenhouse.

Source: BIG Analysis

# Agents of Change

**4. Organic Agriculture**

It is a method of farming system which primarily aimed at cultivating the land and raising crops in such a way, as to keep the soil alive and in good health by use of organic wastes (crop, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (biofertilizers) to release nutrients to crops for increased sustainable production in an eco friendly pollution free environment.


**Pros and cons of Organic Agriculture**

- Organic farming is more economical than the other farming techniques
- Organic farming results in less nutrient contamination
- It is capable of producing the same crop variants
- The issue of soil management is effectively addressed by organic farming.
- This type of farming helps the farmers clear the weeds, without using any mechanical and chemical applications.
- It is environment-friendly and non-toxic

- Organic methods gives small yields compared to conventional farming methods.
- Organic agriculture is hardly contributing to addressing the issue of global climate change. It does reduce CO2 emissions to a certain extent, but there is no dramatic contribution.
- In organic farming total output produced by conventional farming, in the same area

Source: BIG Analysis

# Agents of Change

## 'Time to go back to the basics"

***Dr. Jayant Desai***
*Chief Coordinator – Maharashtra Organic Farming Federation (MOFF)*

Dr. Jayant B Desai is a veteran agriculturalist, horticulturalist, agriculture engineer and farm manager. His expertise in the field of sustainable and organic farming is unparalleled and he has extensive domestic as well as international experience of working in the sector. We discussed with him the role of organic and natural farming from the perspective of food security.

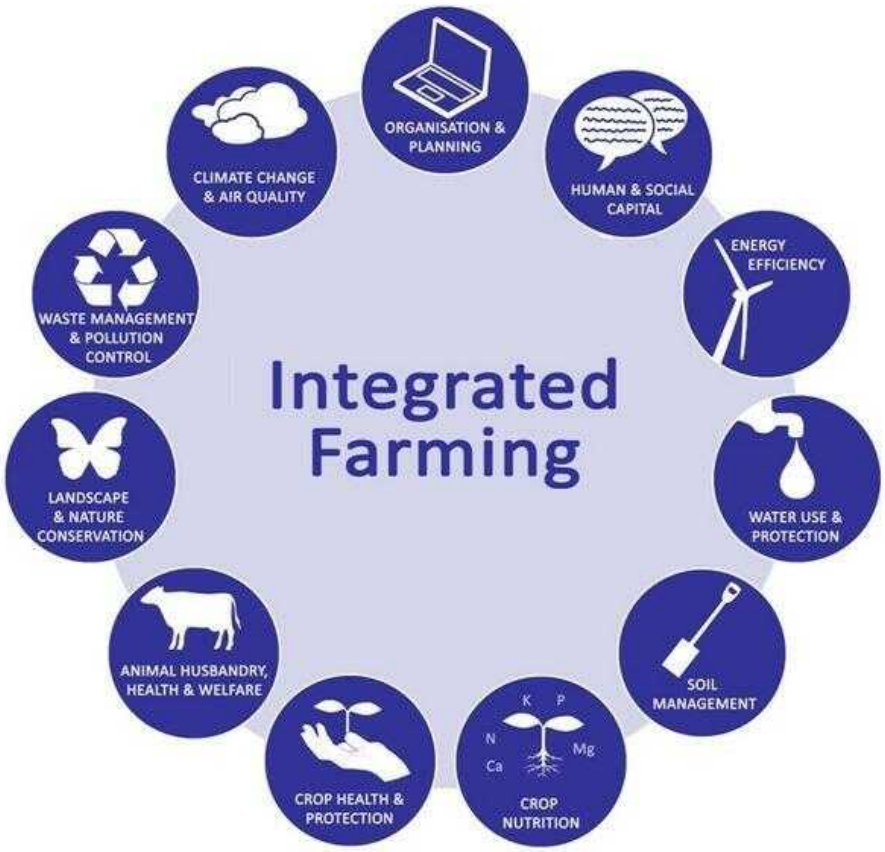
Dr. Desai believes that Indian farming techniques in their purest form are highly sophisticated and cogent. However the sector is now stuck in a vicious circle involving low yields, excessive usage of pesticides and chemicals, erosion of soil. According to him, it is high time we went back to the basics and developed more environmentally sustainable practices and nature-friendly agriculture. Food security, as discussed elsewhere in the document, is incomplete without nutritious food. Excessive chemical usage is slowly and steadily degrading the quality of food that the nation consumes. There must be active awareness campaigns among not only producers but also the consumers about benefits of organic farming methods. 'Organic farming' has unfortunately become an elitist phenomenon and high prices of organically produced food items deter larger populace from embracing its advantages. This needs to be changed and green farming needs to be made more inclusive. Farmers should be incentivised to shift towards environmentally friendly cultivation techniques and at the same time, consumers must also press for better quality food. After all, demand will drive change in the way food industry works. Along with organic, farmers must also be encouraged and empowered to take up integrated farming. There is also an urgent need of initiating research and development in eco-friendly farming techniques, in collaboration with the farming community.

Source: BIG Analysis

# Agents of Change

**5. Integrated Farming**

Integrated Farming as a farming system where high quality food, feed, fibre and renewable energy are produced by using resources such as soil, water, air and nature as well as regulating factors to farm sustainably and with as little polluting inputs as possible.




**Components Of Integrated Farming System**

- Crops, livestock, birds and trees are the major components
- Crop may have subsystem like monocrop, mixed / intercrop, multi-tier crops of cereals, legumes (pulses), oilseeds, forage etc.
- Livestock components may be milch cow, goat, sheep, poultry, and bees.
- Tree components may include timer, fuel, fodder and fruit trees.

Source: BIG Analysis

# Agents of Change

### 6. Integrated Soil Fertility Management (ISFM)

Integrated soil fertility management (ISFM) is a set of agricultural practices adapted to local conditions to maximize the efficiency of nutrient and water use and improve agricultural productivity.

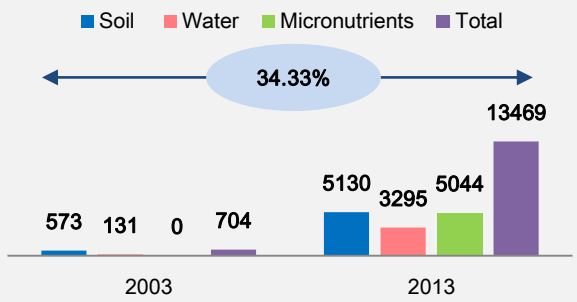
ISFM strategies centre on the combined use of mineral fertilizers and locally available soil amendments (such as lime and phosphate rock) and organic matter (crop residues, compost and green manure) to replenish lost soil nutrients.

This improves both soil quality and the efficiency of fertilizers and other agro-inputs. In addition, ISFM promotes improved germplasm, agroforestry and the use of crop rotation and/or intercropping with legumes (a crop which also improves soil fertility). Farmers who have adopted ISFM technologies have more than doubled their agricultural productivity and increased their farm-level incomes by 20 to 50 percent. The value-cost ratios of adopted ISFM options are well above two.

**Box.11 Krishi Vigyan Kendra at Baramati, Pune**

IN 2002, Krishi Vigyan Kendra at Baramati established soil and water testing laboratory The lab has now extended its scope of activities to include Atomic Absorption Spectrophotometer, Ion Chromatography, Kjaldals distillation and digestion for nitrogen ditection, Ultraviolet Double Beam Spectrophotometer. These are used for computarised micronutrient, fertiliser and petiole testing. Initially soil and water testing facility was available only at district levels which would restrict participation of farmers. KVK Baramati now benefits to 6 districts and 25 *tehsils.* Substantial increase has been observed in the number of farmers opting for soil, water and micronutrient testing from 2003 to 2013. This jump indicates rise in awareness levels of farmers and also shows that availability of proper infrastructure and facilities is met with great enthusiasm from the cultivators. They have even introduced a **mobile soil and water testing lab** which goes to the doorstep of the farmers making it even more convenient and inclusive.

**Growth in Testing by Farmers**




The institute has undertaken several other initiatives as well – Production and supply of bio-fertilisers and plant protection material, a museum of agricultural implements, crop diagnostic centre, seed processing & community fruits and vegetable processing unit, to name a few.

Source: BIG Analysis

# Agents of Change

### 7. Dry Land Farming

Cultivation of crops in areas where annual rainfall is more than 750 mm but less than 1150mm is called Dry land farming.Dry spells may occur,but crop failures are less frequent .Higher Evapotranpiration (ET) than the total precipitation is the main reason for moisture deficit in these areas .The soil and moisture conservation measures is the key for dryland farming practices in semi-arid .regions. Drainage facility may be required especially in black soils.

### Practices adopted in dry land areas

| Increase Water Absorption | Reducing the Loss of Soil Moisture |
|---|---|
| ▪ Prevent a Crust at the Soil Surface. Probably the greatest deterrent to a high rate of water absorption is the tendency for soils to puddle at the surface and form a seal or crust against water intake. The beating action of raindrops tends to break down clods and disperse the soil.<br>▪ By tillage, create a rough, cloddy surface which lengthens the time necessary for the rain to break down the clods and seal the surface. For seed bed preparation in general, small seeds should have a finer, mellower bed than large seeds.<br>▪ After harvest, create a stubble mulch on the surface. Such material not only prevents raindrops from impinging directly on the soil, but impedes the flow of water down the slope, increasing absorption time. | ▪ Reducing Soil Evaporation. Water in the soil exists as a continuous film surrounding each grain. As water near the surface evaporates, water is drawn up from below to replace it, thinning the film. When it becomes too thin for plant roots to absorb, wilting occurs.<br>▪ Shelter belts of trees or shrubs reduce wind speeds and cast shadows which can reduce evaporation 10 to 30 percent by itself and also reduce wind erosion.<br>▪ Mulching reduces the surface speeds of wind and reduces soil temperatures.<br>▪ Shallow tilling can create a dirt mulch 2 to 3 inches deep which dries out easily but is discontinuous from the subsurface water, preventing further loss. Tillage must be repeated after each rain to restore the discontinuity. This is most workable where rainfall occurs in a few major rainfalls with relatively long intervals in between. |

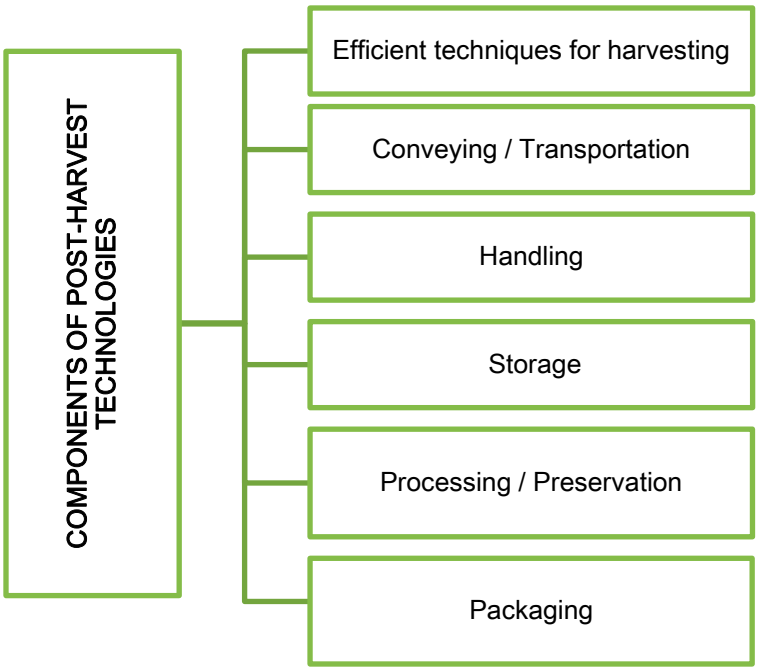
| Reduce the Runoff of Water |
|---|
| To the extent that waterlogging is not a problem, the runoff of water and its attendant erosion must be stopped.<br>▪ Cropland should be as level as possible.<br>▪ All tillage and plantings must run across (or perpendicular to) the slope of the land. Such ridges will impede the downward movement of water.<br>▪ For every two feet of vertical drop or 250 feet of horizontal run, the field should either have bunds or contour strips |

Sources: Dry Land Farming: Crops and Techniques for Arid Regions by Randy Creswell & Dr. Franklin W. Martin; BIG Analysis

# Agents of Change

### 9. Post-Harvest Technologies

Post-harvest technology involves all treatments or processes that occur from time of harvesting until the foodstuff reaches the final consumer.




How produce is harvested has a large bearing on its post-harvest life. Even in some cases, pre-harvest factors that affect post-harvest life (in terms of quality and losses) of the produce are considered as can be inferred from above, preservation is a part of the post-harvest chain. In fact, preservation of the taste, smell, look and feel of food and preventing spoilage is also an important function of food processing.

**Preservation is accomplished by inactivating basic natural processes in food:**

**Enzyme action -** all food contains natural enzymes that break down proteins, fats and carbohydrates to facilitate animal and plant growth. Once an animal has been killed or a plant harvested, these enzymes, if left uncontrolled, continue to work, breaking down the food itself and resulting in spoilage.

**Microbial action** - all food can be attacked by bacteria and fungi that cause food to rot or become mouldy. If permitted to multiply, these microbes can cause spoilage.

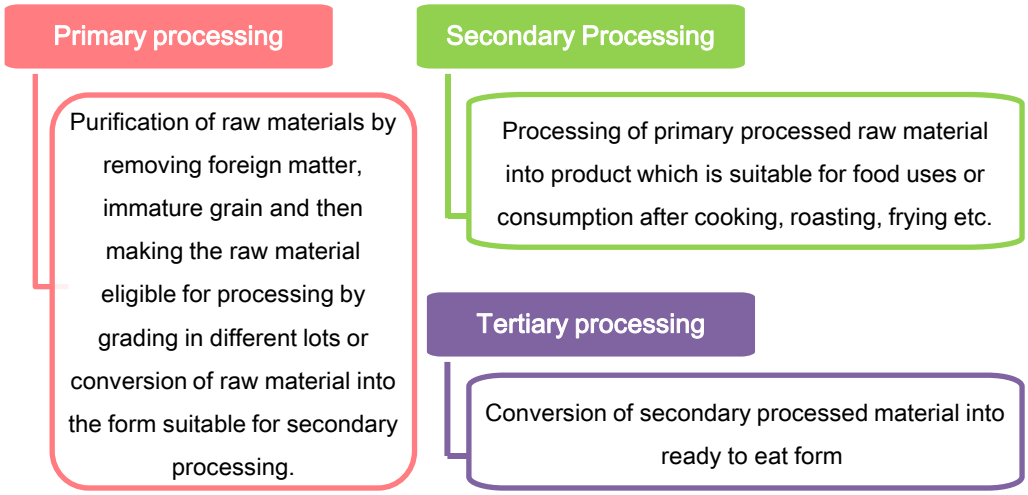
**Oxidation -** many food components can be attacked by oxygen in the air, making them go rancid or resulting in an unpleasant taste. This, too, must be controlled.

Source: BIG Analysis

# Agents of Change

**Storage of food material** in perfect consumable condition for a longer time without undergoing any spoilage is an important necessity. Due to heavy glut in the market fruits and vegetables get spoiled due to lack of storage facilities. India is an ideal country that all the important fruits and vegetables can be produced due to varied soils of climatic conditions. However, fruits and vegetables are cheap in the season and wasted due to spoilage at greater extent. By growing fruit and vegetables being they are cash crops farmers get more income from the field. Therefore, to avoid the spoilage processing units are to be installed.

**Agricultural processing** may be defined as an activity, which is performed to maintain or improve the quality or to change the form or characteristics of the agricultural product. Processing operations are undertaken to add value to agricultural materials after their production. The main purpose of agricultural processing is to minimize the qualitative and quantitative deterioration of the material after harvest.




There is tremendous production of fruits and vegetables in a shorter period. Therefore, to avoid the post-harvest loss and to increase substantial returns to processors for off season consumption. Availability of cheap labour, Government Subsidy for cold storage and processing units, convenience of roads in case for marketing and transport. Availability of cans, bottles, and other equipment's at cheap rate, there is tremendous for export of processed products like Jam, jelly, marmalade, pickles, etc. dehydrated and dried vegetables in addition to domestic demand in India.

Sources: Agri Info; BIG Analysis

# The Defining Role of NABARD

**"More and more organisations should join hands in the quest for 'Food for All'"**

***Mr. M V Ashok***
*Chief General Manager*
*Department of Economic Analysis & Research – NABARD*

The National Bank for Agricultural and Rural Development (NABARD) is one of the pioneers in the upliftment of India's agro sector. The entity is one of the most widespread in its reach. Mr. M V Ashok shed light on the efforts of India's apex agriculture bank and their views on the underlined theme of food for all.

According to him, despite being present in the remotest corners of the country, NABARD's reach can still be termed as limited. This bears testimony to the enormity of India's agricultural sector and market. NABARD constantly engages with farmers and other stakeholders alike, to understand their grievances and insights, especially from the financial perspective. Mr. Ashok suggests that the efforts of NABARD must now be met with supplementary assistance from private sector players. There is a need to start preparing strategy models which can eventually be taken up by commercial banks. He echoes that the biggest hurdle in the progress of India's farming is small farmers and their small, fragmented holding. This restricts creation of blanket policies and divides efforts. Encouragement to aggregate farming methods will go a long way in reducing the impact of this hurdle. He gives the example of NABARD's latest initiative, 'PRODUCE Fund' (introduced by the Central government). The programme has garnered great success, to the tune of 40-50%, in its initial stages itself. The biggest reason for this is their focus on capacity building of the farmers. NABARD, along with other stakeholders involved in the programme ensure thorough training on identification of good farmers, strategies to effectively mobilise them, instigating entrepreneurial qualities in them.

Indian agriculture needs more examples like NABARD if its real potential is to be realised. In fact, following the path set by NABARD will also ensure substantial change. Mr. Ashok believes that Indian agriculture is highly capable and it simply needs an active push from the country's able segments to bring it on the road to growth and success.

Source: BIG Analysis

# PRODUCE Fund

**Box 12. 'PRODUCE' to give a boost to emerging farmers**

Union Budget of 2014-15 allocated INR 200 Crore to NABARD to set up Producers Organisation Development and Upliftment Corpus - 'PRODUCE'. This fund is to be utilised for the building and promotion of 2000 **Farmer Producer Organisations (FPOs)** in the next two years. This initiative is anticipated to address initial requirements of emerging FPOs, which in turn, will provide business opportunities for financing institutions, to support them with credit.

The 'PRODUCE Fund' will build, promote and nurture FPOs by way of extending financial as well as non-financial support during nascent stages. This support will be critical and will concern awareness creation, capacity building, technical support, professional management, market access, regulatory requirements, etc. Handholding support is provided for a period of three years

What is a Farmer Producer Organisation?

- Group of primary producers
- Registered body and legal entity
- Producers are primary shareholders in the organisation
- Deals with business activities related to primary produce or related inputs
- Works for the benefit of the members
- Portions of profits are shared amongst the producers and balance goes to share capital or reserves
- Minimum 50 shareholding members at the time of registration

Usually, the executing agency takes support from non-profit organisations or NGOs, Banks, Govt. line Departments, Cooperatives, Federations, Commodity Boards, Corporations, Corporates, Functional Universities, Trade Bodies, etc. in implementation of the programme.

NABARD's Maharashtra regional office has identified and extended its support to 65 FPOs.

The PRODUCE Fund undertakes the following activities to achieve its objectives:

- Development of best practices, pilot projects and success stories for wider publicity
- Adoption of mission mode with periodic qualitative and quantitative milestones with timelines
- Launching of action research projects, experimental projects, field trials, etc.

The process involves:

- Identification of Resource Support Agencies,
- Identification of Producer Organisation Promoting Institutions
- Mobilisation of Farmers
- Capacity Building, Training and Exposure to Farmers
- Formation of FPOs and assistance with execution

Source: BIG Analysis

# PRODUCE Fund – Some Successes

**The Kadava Green Future APC** has a membership of around 500 farmers. Despite being a village surrounded by rich soil and abundant water (Vaghad Dam being in the neighborhood), this village of Khadak Sukane practices drip irrigation. The **CEO of this APC, Mr. Yogesh Palkhede**, proudly says that most of the young generation in this region is into farming and have been educated in agriculture at the graduate levels. The main scope of business is fruiticulture and horticulture. The farmers are very well aware of the standards of the 5 European and US countries and are into 95% export of fruits. Monsoon Foods being the major export partner. The farmers are well connected to internet and practice group farming of a particular variety of fruit crop. They are already aware of pesticide and fertilizer practices. Being connected on modern messenger app groups, climatic conditions are transmitted on a regular basis and pesticide management is done accordingly. Accuracy in perfect practice of fertilizers and pesticides has helped the group to overcome wastage in input cost earn effective returns up to 25% on their investment. However there still exists scope for this FPO to increase their returns up to 35% if the input material is available at 10% lower cost. It has been studied that the input companies are making a 10% margin more from the farmers without any benefit to the famer due to inadequate competition. Farmers are earning at least INR 5 lakhs per annum and the minimum land holding is 2 acres. Mechanised agriculture is common with the usage of tractors for soil tillage with presently only 5 bulls present in this village. There is only a 5% chance of rejection of exported produce which gets easily absorbed in the local markets. The average export is 75 containers at12 tonnes per month during peak season. Overall, the picture is bright for this FPO as it has realized the importance of coming together and maintaining quality of produce. The village has been hailed by many eminent personalities as one of the most ideal enterprises in the country.

**Devnadi Valley Agricultural Producer Company Ltd** is another successful FPO, specialising in water management. The FPO majorly cultivates perishable commodities, red onions being the top-most. Onions are highly price sensitive and prone to damage. Moreover, unlike white onion, red onions can not be dried and powdered, restricting its usage and shelf life. Proper management of this crop is very crucial because it is rain dependent and can be cultivated only on the onset of minimum rains. This FPO is thus thoroughly into farmer education going into back ward integration promoting their objective " More Crop per Drop". They have even revived the old-age, British methods of water management and have been successful in getting 5600 hectares under cultivation.

Source: BIG Analysis

# PRODUCE Fund – Some Successes

It has about 1000 shareholder members who have paid INR 500 to become life members of the group The uniqueness of this FPO is that it is totally self reliant and gets no assistance from any government authority for knowledge or funding. They have built a concept called as the Agri-Mall which caters to all the farmers needs like best seeds, fertilizers, pesticides and other farm equipment available at competitive prices. This Agri-Mall also provides the farmers with agronomy services which is the major advantage. This Agri-Mall also provides banking services. The other uniqueness of this FPO is that due to its success in spite of hard agricultural conditions they have been awarded with direct finance from NABARD thus saving the farmer a financial liability up to 10 %, had it been routed through various intermediaries brining relief to about 1000 farmers. This FPO has now decentralized its applications as per the cultivated crop i.e. a separate FPO has been registered for a specific crop such as onion, vegetables etc. Active tie ups have been initiated in and around Nashik residential areas for supply of fresh farm vegetables via small vans.

Primary Concerns of the FPOs working in the vegetable market are

1. Government has been not doing anything substantial to remove the trader interface which is the main cause of worry to the vegetable farmer.
2. Absence of price stability and uniformity which leads to farmer becoming over alert checking for different prices at different markets and booking for the market giving him maximum return leading to increase in price at the consumer level due to non availability of steady supply leading to economic asymmetry.
3. Wastage on return on investment at the time of excessive yield.

Thus resulting in an unregulated and unorganized vegetable market.

*Plantations at the Kadava Green Future APC*

Source: BIG Analysis

# CHAPTER ELEVEN

## CONCLUSIONS

# Conclusions

Something as fundamental as food may often come with the risk of being taken for granted. Topics such as food security, food for all seldom find a mention in mainstream discussions, especially in a seemingly well-off country like India. This is because technically, India produces enough amount of food to feed its growing population, at times even exporting some of it. However, this is a very myopic and juvenile notion, to say the least. Long term policies never rely on such unidimensional considerations. The recent uproar over the National Food Security Act, its reach and its implementation coupled with recently released data – **stating that nearly 194 million people in India go hungry everyday** – has once again put the focus on the issue of how much is really needed to guarantee one of the basic necessities of life in India. A holistic view of India's food production and food demand dynamics and whether the country realises the meaning of 'Food Security' in its entirety reveals a worrying picture. Worrying because internationally, food insecure nations are taking drastically bold and visionary steps to safeguard their inhabitants' right to food. The United Arab Emirates (UAE) is a fitting example. UAE is characteristically unsuitable for agriculture due to having dry and hot climate, limited water resources and barren desert soil. To mitigate these constraints, UAE along with other measures has undertaken massive international agricultural investment. This strategy secures import sources by engaging in offshore agricultural contracts. Investment in overseas agriculture by the way of buying thousands of acres of cheap farmlands in other countries has given UAE a guaranteed and direct access to massive food production bases. Australian government has formed several partnerships with other countries which facilitate improvements in productivity, sustainability and competitiveness in the food sector. Singapore, world's second most food secure country imports 90% of its food requirements. But its food security roadmap boasts of diversified sources of food and optimisation of local production. The common factor in all the above examples is the active involvement of their governments in taking definitive and robust measures for achieving lasting results.

India is also getting closer to realising its food security constraints but the country still has a long way to go. Assessment of India's agriculture and food demand exposes two major gaps – decreasing agriculture and increasing wastage. And both are detrimental to India's efforts for achieving self sustenance in terms of food.

Source: BIG Analysis

# Conclusions

## Indian agriculture needs a massive transformation

Indian agriculture is plagued by unpredictability of climate, incompetence of authorities, notion of being unattractive as a potential source of income and so on. Agriculture's contribution in the country's overall output is steadily declining, mechanisation levels remain very low. But the biggest problems are

a) small and fragmented land holdings

b) over dependence on climate

c) relatively low yields.

The first problem restricts implementation of any modern solutions. Average size of operational holdings has decreased and is just 1.08 ha. Farmers are unable to benefit from economies of scale, level of efforts put for cultivation are not matched by the final output, simply because of the inadequacy of its size.

The second problem is probably the severest. Almost 60% of Indian agriculture is dependent on rain. There is enough proof to conclude that globally, rainfall and climatic patterns are gradually undergoing a paradigm shift and India is already lagging behind in identifying the pattern. Unless addressed immediately, this will have a catastrophic effect on farming, sooner or later. There is an urgent need to modify farming practices to suit changing climate, rather than going for a curative overdrive year after year.

Third problem is probably the closest that exposes the actual situation of food production in India. The country may have ample amounts of foodgrains at the moment, and even in near future; but low yields suggest that the potential is certainly not being optimally realised. Low yields also mean lower output and failure of correcting this might lead to long term damage to production capabilities.

All in all, India's agriculture is seriously distressed to withhold the ever increasing burden of feeding a billion mouths. A robust agriculture is the backbone of food security and India's backbone currently looks shaky.

## Agriculture-allied sectors are improving, but need more attention

India scores high in terms of growth in animal husbandry, poultry and fisheries segment. Milk production always has been and continues to be the stronghold. It is imperative to realise the significance of these sectors to agriculture. Depending singularly on agriculture for sustenance should not be the attitude and allied sectors must be developed in order to seem lucrative for the agrarian population. The government is taking many monetary and policy level initiatives to boost these activities.

Source: BIG Analysis

# Conclusions

However there are a few niggling issues, such as rising infeasibility to nurture animals, conflicts in milk pricing policies, lack of authority and reach of government departments, etc. which need to be ironed out at the earliest.

### Food security is viewed with a very narrow perspective

Calorie intake of Indians is falling day by day. Distribution of food is not uniform and does not cover the entire population. This is evident from the fact that 15.2% of India's population is undernourished, 48% of women in reproductive age are anaemic, 57% of the country's households had a calorie intake below the stipulated levels. There is a grave need to educate the masses about the true meaning of food security. And more importantly, food-related policies still lack the ability to bring in an all inclusive change. Availability has never been the problem, but accessibility, affordability and quality remain unachieved. The country's subsidised food distribution schemes continue to be filled with loopholes. Corruption, malpractices, unaccountability on various levels restricts free access to all stakeholders in the society. Harmful cultivation practices result in severe deterioration of the nutritional value of food that everyone consumes. Food security, in its purest form, still remains a distant dream.

### Complete failure of the Agricultural Value Chain

AVC failure causes two major problems – food wastage and crumbling of the farming sector. Majority of the food wastage in India is caused due to post harvest losses. Around 30-35% of the perishable commodities produced are considered unfit for consumption due to spoilage after harvesting. These losses occur mainly because of lack of on-farm processing facilities, ill-developed storage infrastructure, fraudulent practices and inefficient transportation system. West Bengal ranks first in terms of fruits and vegetable losses, followed by Gujarat, Bihar, Uttar Pradesh and Maharashtra. Collectively, these five states account for nearly INR 56,100 Crore worth of food wastage. And wastage is not confined to only perishable commodities. Foodgrains are also subject to various forms of losses, due to improper handling, rodents and other such attacks, etc.

Other result of failed AVC is that food doesn't reach consumers equitably. The quantity of food delivered at the first node in the value chain and the quantity received at the final node can have massive discrepancies. Food seeps through the chain and diminishes at each level because of man made reasons such as manipulative and unfair distribution. The larger and more layered the chain, greater is

Source: BIG Analysis

# Conclusions

the amount lost.

Inept value chain also results in extensive price rises. Each stakeholder in the chain tries to extract as much benefit as possible, passing the monetary burden to next levels. Interestingly, farmers and consumers are at the two extreme ends of AVC. This means that the farmer, who is supposed to get maximum returns for undertaking cultivation, settles at the least price, whereas consumers end up paying the highest. Neither is satisfied with this outcome. Farmers ultimately prefer moving away to other professions or end up accepting and becoming a part of the wrongdoings. Consumers, on the other hand, feel agitated, get diverted to more competitively priced alternatives. Both these reactions are paving way for a complete crumble of agriculture and food security.

Inefficiency in the AVC perturbs farmers deeply. Many feel trapped in the hands of the mighty traders' and commission agents' lobbies and middlemen. This turns farming into an extremely difficult and unattractive profession.

India has plenty of institutional and physical infrastructure for the betterment of the farmers. However, it is too spread out and there is absolutely no lucidity in it. And then there is serious lack of support infrastructure; like availability of basic utilities which brings the sector further down. Gaps in agricultural value chain are therefore the biggest obstacle in India's quest of developing its agriculture and attaining long-term food security.

### Food processing – A ray of hope

Although in the nascent stages when compared to global counterparts, food processing in India is slowly but assuredly finding its feet in the local markets. Agriculture can benefit greatly from processing, and make value added agro-based or any food items. This will help agriculture in two chief ways – Firstly, marketing of agricultural products could get more organised and sophisticated. Secondly, farmers can minimise post harvest losses as they won't have to depend on single, conventional method of selling.

Food processing can bring additional nutritional value to food, by using modern, scientifically proven techniques.

Food processing also increases overall shelf life of the produce, making possible for it to reach the last customer in the value chain.

### Resource management is underdeveloped and is a cause of concern

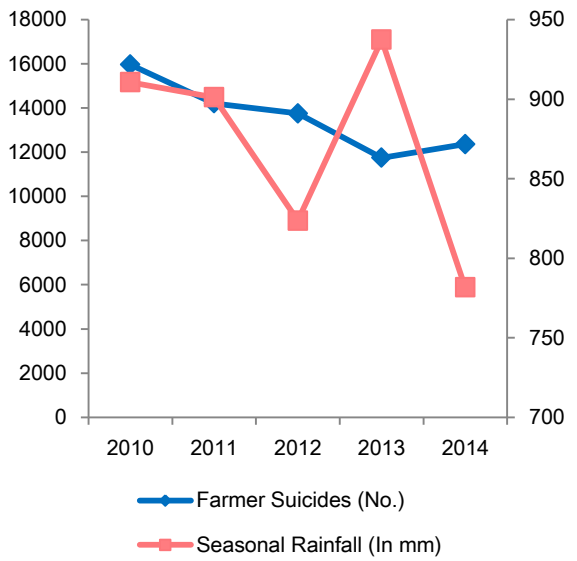
Labour force is perhaps the most neglected aspect of Indian agriculture. Despite contributing less than 1/5$^{th}$ of the country's GDP, agriculture employs 55% of the total workforce. Even then, agriculture is not considered a feasible and

Source: BIG Analysis

# Conclusions

Lucrative profession in the country. Over the past few years, number of cultivators has declined drastically, whereas amount of agricultural labourers is slowly increasing. This doesn't reflect a very healthy trend. More and more people are turning away to better paying jobs. And those who are still practicing farming are living in very poor conditions. 41.3% of agricultural households are below poverty line. The labourers have no social security, very limited to no access to formal credit facilities, absolute lack of awareness regarding government policies and agriculture in general.

**Comparitive Review of Farmer Suicides and Seasonal Rainfall in India**




Farmer suicides in India needs no special mention. If any industry's workforce is so unhappy, what are the chances of that industry's success and sustainable development is a matter of concern.

**Agriculture is still not considered as a business**

The blame for this rests with everybody involved. Agriculture has always been looked at with a social, welfare perspective and this has contributed to its current status. The notions of profitability, risk assessment, strategic thinking are still not completely assimilated in the fabric of the sector. This often results in over estimation, impractical decisions and ultimate losses. The biggest change needed is to start looking at agriculture as any other business activity.

Source: BIG Analysis

# CHAPTER TWELVE

## RECOMMENDATIONS

# Recommendations

Efforts to ensure food for all must be based on two backdrops – increasing agriculture and reducing wastage.

## Increasing resources

Land is a finite resource. But cropping should not be confined to such limits. Innovations and technology, coupled with thorough understanding of soil, crops and cultivation can multiply cropping to a large extent. A balanced mix of innovation, mobilisation and capacity building can yield desired results. Judicious use of fertilisers and pesticides needs to be promoted more vigorously and effectively. Focus should be on sustainable agricultural practices rather than short term windfall gains. Newer techniques like soil-less farming, vertical farming, integrated cultivation, high density farming, hydroponics and the likes should be studied and adapted astutely.

Financial viability of farming should be thoroughly understood and applied as any regular business activity. Integration of government level efforts in terms of pricing and financial assistance is a must.

## Farmers are entrepreneurs

Socio-economic status of farmers should be uplifted to being entrepreneurs. Once farming is proved to be a financially feasible occupation, more and more people should be incentivised to take up farming. There are a lot of hurdles if a person today tries to become a farmer with no cultivation background. This entry barrier is futile. Maximum people should be encouraged to join the sector. Regulatory support must be extended to curb discriminatory situations arising out of new entries. But farming should be a more accessible choice.

## Incentives for technology

Greater number of government subsidies should be extended introduction of innovative technological solutions to farming. Especially in order to cover initial capital expenses, which is always the biggest deterrent. Farmers should be encouraged to come together and pool their resources to implement technology-intensive

Source: BIG Analysis

# Recommendations

but revolutionary farming methods. Film based farming, for instance, is a globally proven mechanism, that uses no soil and minimum water for cultivation and yields results that are ten times better. However, the technology requires substantial one-time investment for building infrastructure. If climate affected farmers are provided with the initial monetary support (under fair conditions) then they can transform their cultivation practices. But to make them take the jump, active government support is crucial.

### Farmer incubation centres

Just like there are for business and technology start-ups, incubation centers and venture capital should be made available exclusively for the farming sector. This will allow the newer generation to set their foothold without having any unnecessary pressures. Accountability at the highest level can be ensured to attract benefactors. Preparation of working model of such incubators should be initiated at the earliest.

### Processing at Source

Farm level and post harvest wastage of perishable goods can be curbed to a great extent if processing at source is introduced. Tomatoes, for instance, get damaged in a very short span. If the farmer does not get desired demand for his output, there is massive monetary and physical loss. If the farmer has access to a basic equipment at the farm level, he can direct unsold output immediately to be converted into a value added product that can fetch new kind of demand. If not independently, farmers collectives should be provided with such options. Linkage to food processors and preservative manufacturers will lead to further betterment of the strategy.

### Role of private players

Benefits should be extended to corporates who direct their CSR activities towards farming. Krishi Vigyan Kendras, for example are an excellent idea but are often unable to fulfil their mandate due to non-availability of

Source: BIG Analysis

# Recommendations

funds. If each interested corporate entity is given the responsibility of providing financial assistance to at least one KVK of their choice, for a stipulated timespan, there could be great results. This arrangement can be replicated for any other agriculture related government institute. Activating the support infrastructure created by governments can be a massive boost to Indian agriculture.

### Other suggestions

A branded retail chain for marketing quality vegetable produce by farmers ensuring price stability.

There are about 112 government warehouses in Maharashtra alone which are being rented out to traders. If the same was made available to the FPOs at a subsidized rate it would add to the farmer's financial health leading to his prosperity.

International export is essential and is in demand too. The value chain consist of packager, transporter and trader, however this has only benefitted a few traders. Instead if FPOs were again directly involved in this value chain, the benefit would reach the farmers directly.

Source: BIG Analysis

# ANNEXURES

## A GLANCE AT FOOD SECURITY STATUS OF SOME IMPORTANT COUNTRIES

# Global Food Security Scenario

It is important to see what other countries are doing to ensure food security. A peer review is carried out in this section, to check

- If there are any similarities between the agro-economic, food security conditions in India and the world
- What have different countries done to tackle the problem of food security, under what circumstances
- What can be learned from their efforts

The section takes help of *Global Food Security Index* computed by the The Economist Group's 'The Economist Intelligent Unit'. The Index primarily provides a global perspective on food security by viewing it in three angles – affordability, availability, quality and safety.

Affordability is measured across six indicators

1. Food consumption as a share of household expenditure
2. Proportion of population under global poverty line
3. Gross domestic product (GDP) per capita (at purchasing power parity, or PPP, exchange rates)
4. Agricultural import tariffs
5. Presence of food safety-net programmes
6. Access to financing for farmers

The Affordability category explores the capacity of a country's people to pay for food, and the costs that they may face both under normal circumstances and at times of food-related shocks.

Availability is measured across eight indicators

1. Sufficiency of supply
2. Public expenditure on agricultural research and development (R&D)
3. Agricultural infrastructure
4. Volatility of agricultural production
5. Political stability risk
6. Corruption
7. Urban absorption capacity
8. Food loss

This category assesses factors that influence the supply of food and the ease of access to food. It examines how structural aspects determine a country's capacity to produce and distribute food, and explores elements that might create bottlenecks or risks to robust availability

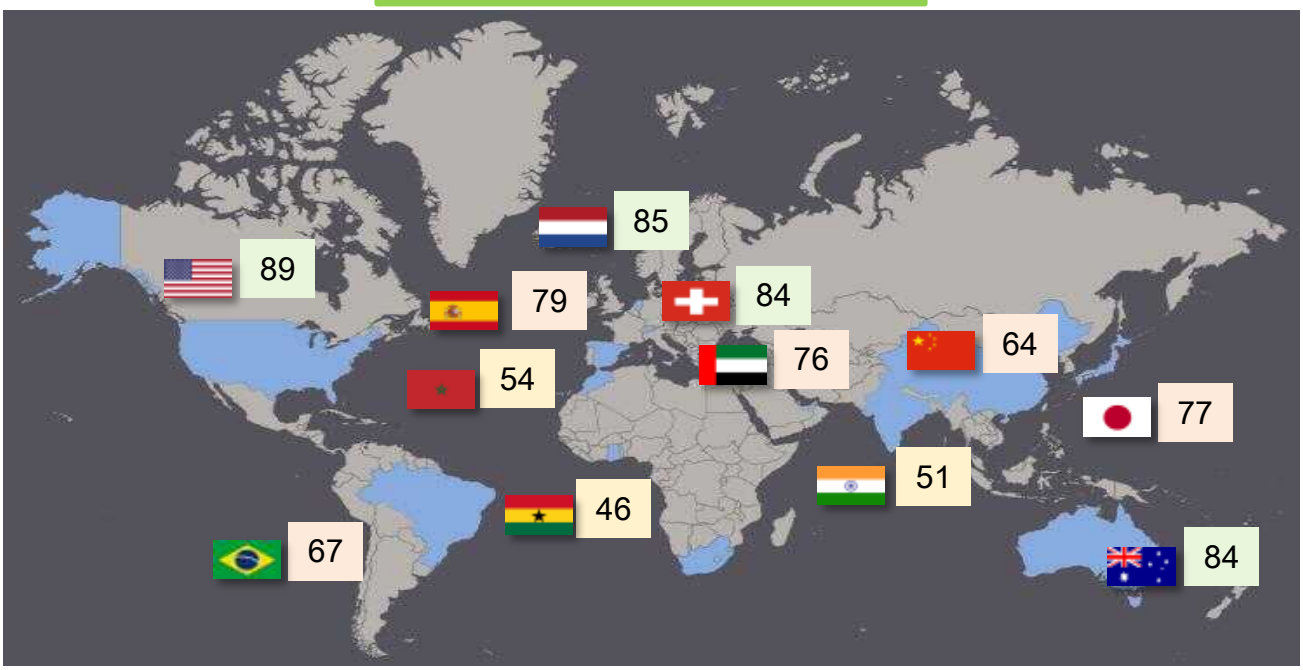
Food quality & safety is measured across five indicators

1. Diet diversification
2. Nutritional standards
3. Micronutrient availability
4. Protein quality
5. Food safety

It explores the nutritional quality of average diets and the food safety environment in each country. This category is sometimes referred to by other commentators as "utilisation" because it explores the energy and nutrient intake by individuals, safe food preparation and diversity of the diet.

Source: The Economist Intelligence Unit Limited

# Global Food Security Index

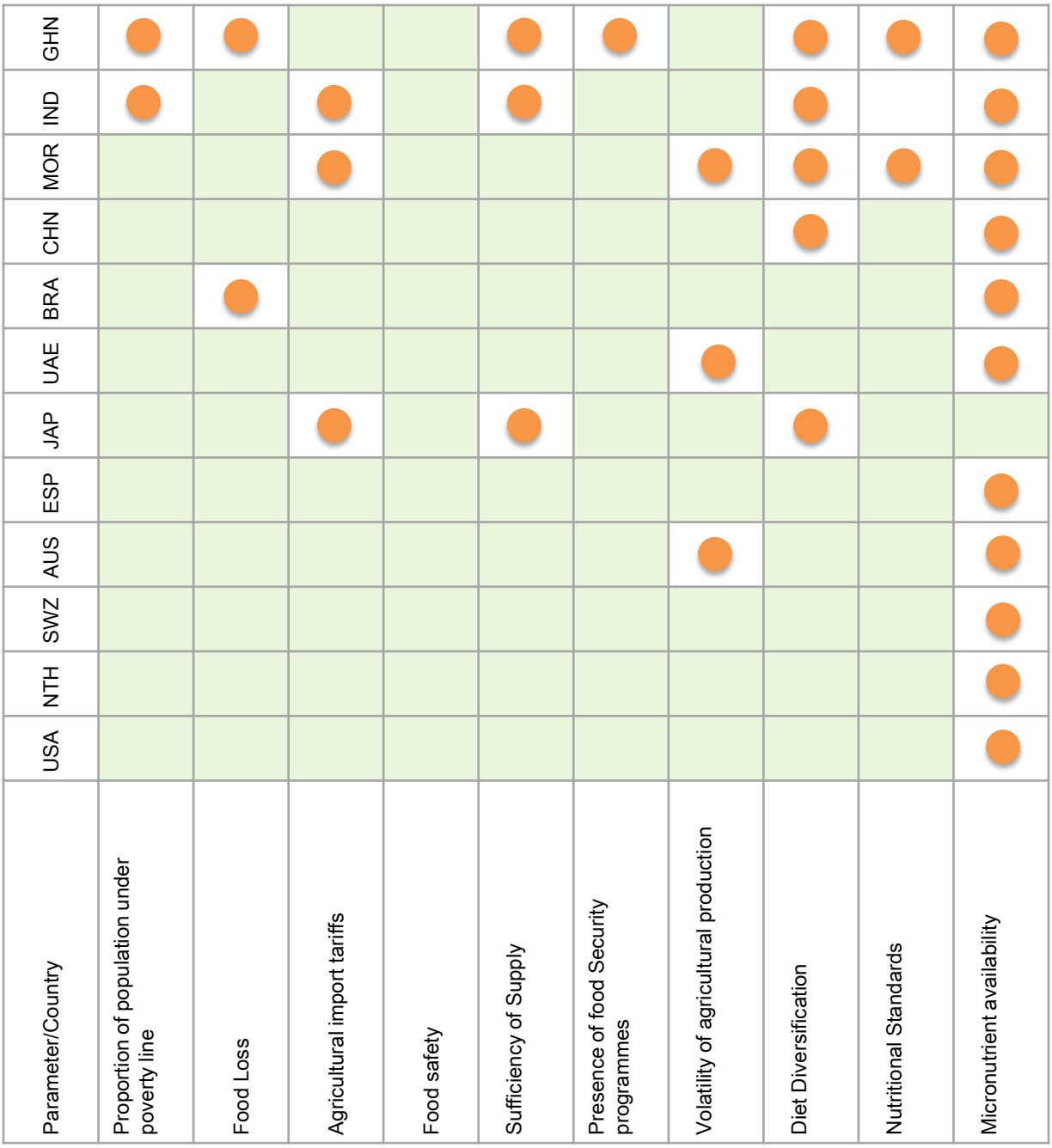



We have selected twelve countries (incl. India) for the comparative analysis. These ten represent a mixture of developed, developing and countries relatively similar to India. The scores are out of 100.

| Country | Overall Rank (Out of 109) | Affordability | Availability | Quality & safety |
|---|---|---|---|---|
| United States of America | 1 | 2 | 1 | 3 |
| Netherlands | 5 | 9 | 5 | 5 |
| Switzerland | 6 | 7 | 4 | 24 |
| Australia | 9 | 3 | 14 | 4 |
| Spain | 19 | 22 | 18 | 5 |
| Japan | 21 | 21 | 23 | 19 |
| United Arab Emirates | 23 | 3 | 43 | 25 |
| Brazil | 36 | 33 | 47 | 30 |
| China | 42 | 50 | 39 | 38 |
| Morocco | 62 | 67 | 53 | 63 |
| India | 68 | 72 | 58 | 79 |
| Ghana | 75 | 84 | 56 | 74 |

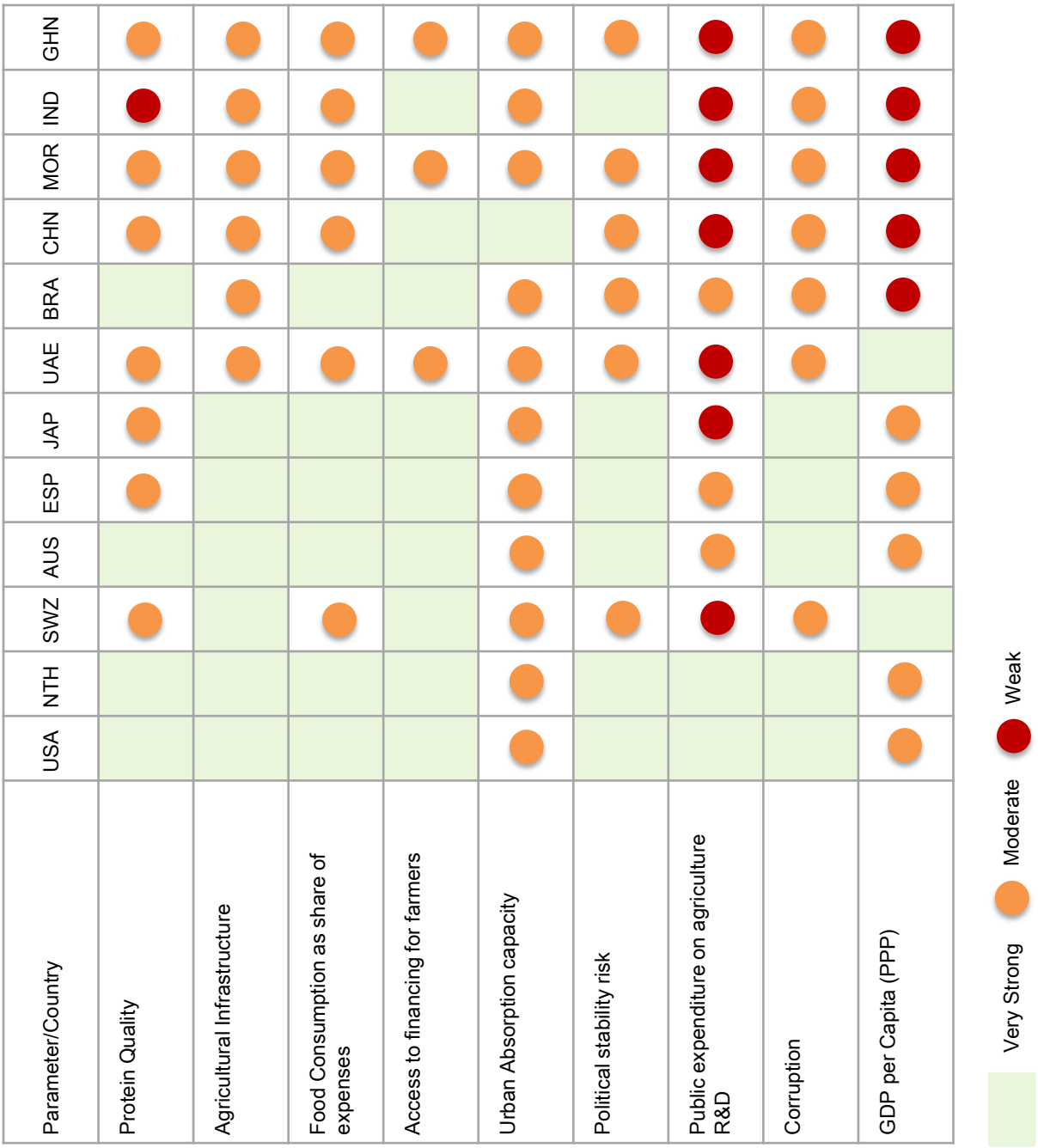
Source: The Economist Intelligence Unit Limited

# Global Food Security Index




Source: The Economist Intelligence Unit Limited

# Global Food Security Index




Source: The Economist Intelligence Unit Limited

# Global Food Security Provisions

Following are the food security provisions made by all twelve countries under review.

| Country | Provisions |
|---|---|
| United States of America | • Invest in country-led plans<br>• Increase the food production to 70%<br>• The Bill Emerson Humanitarian Trust (BEHT): BEHT is a special authority in Agricultural Act of 2014 that allows the U.S. Agency for International Development's (USAID) Office of Food for Peace (FFP) to respond to unanticipated food crises abroad, when other Title II resources are not available.<br>• Emergency Food Security Program (EFSP): EFSP provides grants for local and regional procurement of food commodities, or the use of cash or vouchers for the purchase of food in response to an emergency. EFSP is deployed to respond to the highest priority emergency food security needs as a complement to Title II in-kind food aid. |
| Netherlands | • All dimensions Approach (people, profit, planet) |
| Switzerland | • Agro biodiversity Initiative by SDC<br>• Creating value in supporting trade through various credit and better storage options, including private ones.<br>• Investing in agricultural aids across the world |
| Australia | • Open Trade<br>• Maintaining a strong economy that generates ongoing employment growth and by providing effective schemes to help people enter employment. Helping people into a rewarding job is one of the best ways to ensure they can afford the food that they need.<br>• Improving the management of grocery stores. |
| Spain | • Forming a financing facility trust fund with IFAD |

Sources: USAID; Knowledge4Food; SDCMEKONG; Swiss Info; Maintaining Food Security in Australia, Government of Australia; IFAD

# Global Food Security Provisions

| | |
|---|---|
| Japan | • National Grains Strategy/ Security Strategy<br>• Increasing New entrants in Agriculture, accelerating the expansion of farming size<br>• Constructing earthquake resistant infra for Agriculture, Forestry and fisheries<br>• Using the right combination of imports and reserves<br>• Working on the three components: Agri produce, Marketing and consumption and International factors |
| United Arab Emirates | • Al Dahra Agriculture, a private-sector partner of the UAE Government is targeting investments in coffee and sugar plantations in Latin America. It follows the company buying stakes in recent weeks in Kohinoor Foods, one of India's biggest basmati rice producers, and Loulis Mills, the largest flour producer in Greece.<br>• Abu Dhabi plans to develop over 70,000 acres of farmland in Africa's largest country |
| Brazil | • Fome Zero (Zero Hunger) Policy Framework - integrate programs promoting agriculture, nutrition, health and education<br>• Belo Horizonte Food Security programme<br>• National Food and Nutritional Security Policy (PNSAN) |
| China | • Maintenance of agricultural productivity, limited imports, and innovation in science and technology<br>• Encouraging grain production<br>• Eliminating the purchase of grains from the market. |

Sources: Agritrade, FFTC; The National; Government of Australia; Science Mag, Government of China

# Global Food Security Provisions

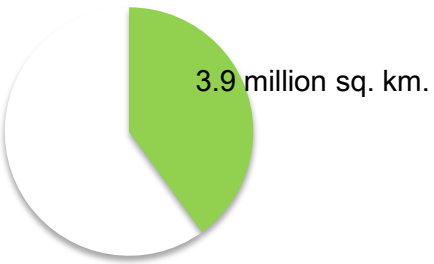
| | |
|---|---|
| Morocco | • Green Morocco Plan - agriculture at the forefront of its strategies on economic growth, poverty reduction and trade liberalization.<br>• Short to medium term : Meeting domestic demands for staple food by easing the import tariffs<br>• Long term: Encouragement of productivity gains through investment in sustainable farming methods and improve farmers income and yields using the same resources |
| India | • National Food Security Mission and National Food Security Act<br>• Public Distribution Schemes |
| Ghana | • Block Farm Programme - improved seeds, fertilizer, weedicide and tractor services are provided to farmers who pay the total amount involved in kind after harvesting. There are organized groups who have their farms in one location (block)<br>• Institutionalizing Agriculture Mechanization Services Centres (AMSEC) in the northern region<br>• National Food Buffer Stock Company (NAFCO) to ensure food security and to insulate farmers against losses resulting from anticipated increases in production. |

Sources: IISD; BIG Analysis; MOFA Ghana

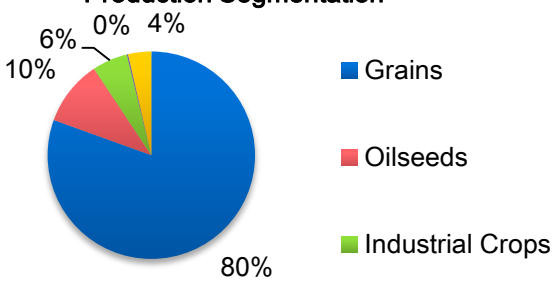
# Country Profile: USA

| | |
|---|---|
| Name of the Country | USA |
| Population | 318.9 million (2013 est.) |
| GDP (Agriculture \| Industry \| Services) | $ 16.72 trillion (1.1 % \|19.5 % \|79.4 %) |
| Total Land | 9.6 million sq. km. |
| USP | Largest exporter of agro products |

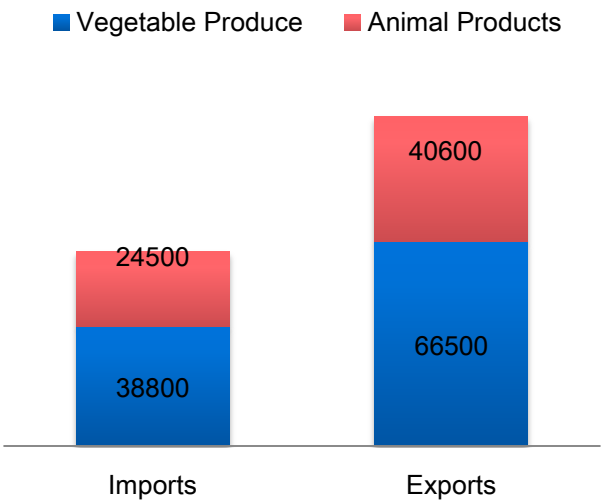
**Agricultural Land (sq. km)**




**Production Segmentation**



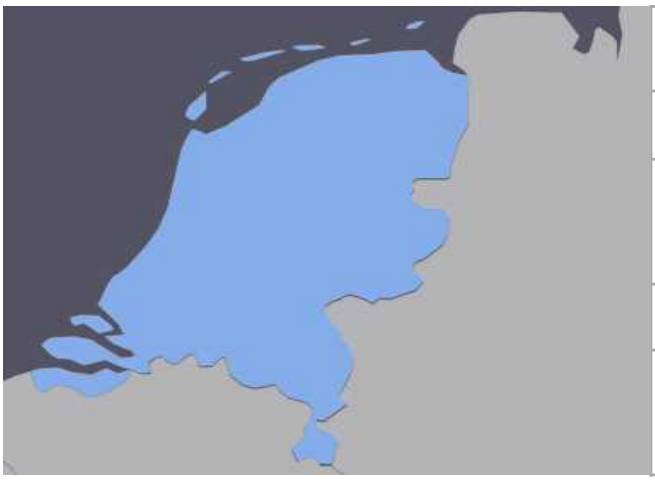

**Imports and Exports (in USD million)**




**Food Processing**

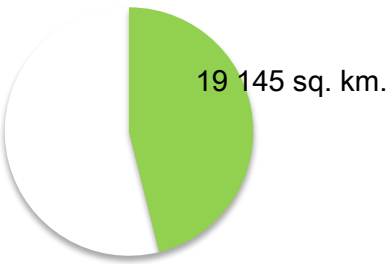

Sources: World Stat; Annual Crop Report 2015, Government of USA; Index Mundi; MIT

# Country Profile: Netherlands

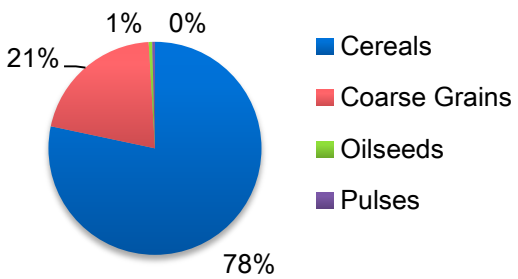


| | |
|---|---|
| Name of the Country | Netherlands |
| Population | 16.8 million (2013 est.) |
| GDP (Agriculture \| Industry \| Services) | $ 722.3 billion (2.6 % \|25.4 % \|72.1 %) |
| Total Land | 41 530 sq. km. |
| USP | Advanced agricultural techniques |

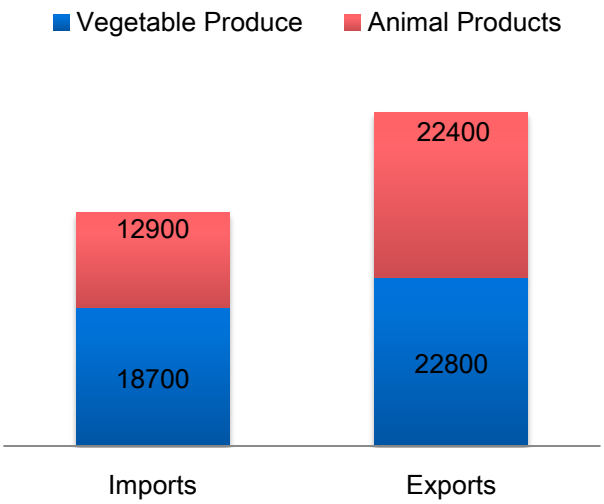
**Agricultural Land (sq. km)**




**Production Segmentation**



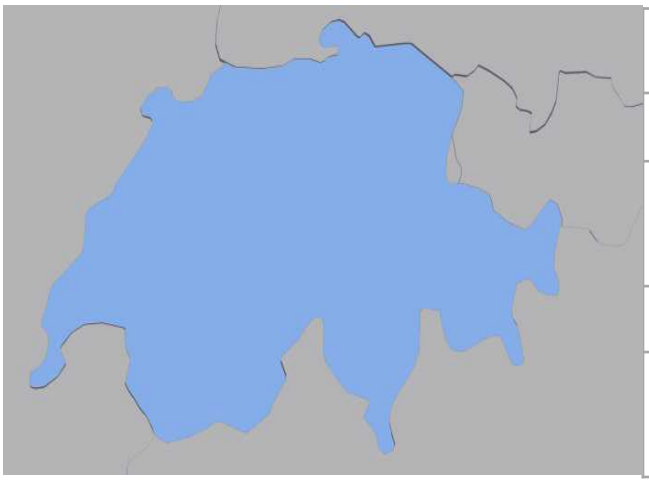

**Imports and Exports (in USD million)**




**Food Processing**

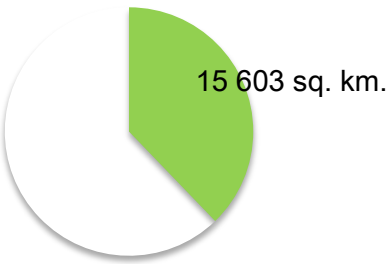

Sources: World Stat; FAO; Index Mundi; MIT; Holland Trade

# Country Profile: Switzerland

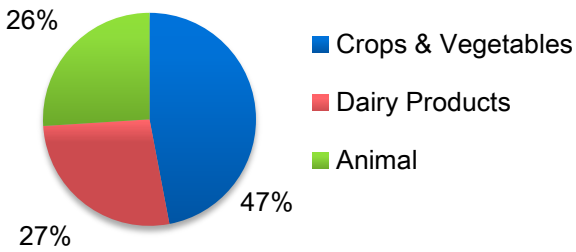


| | |
|---|---|
| Name of the Country | Switzerland |
| Population | 8.081 million (2013 est.) |
| GDP (Agriculture \| Industry \| Services) | $ 646.2 billion (0.7 % \|26.8 % \|72.5 %) |
| Total Land | 41 280 sq. km. |
| USP | Organic Agriculture |

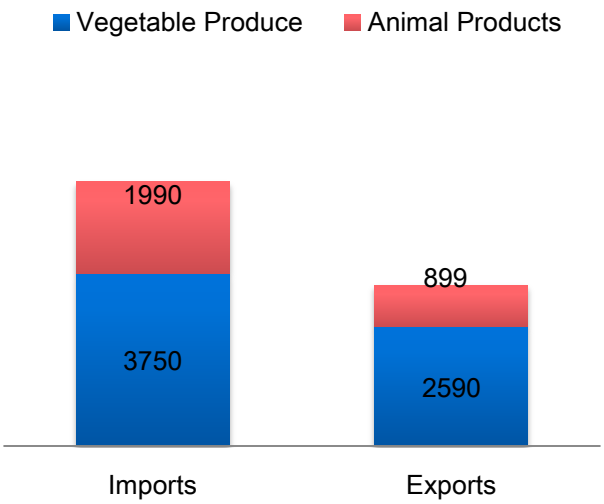
**Agricultural Land (sq. km)**




**Production Segmentation**




**Imports and Exports (in USD million)**



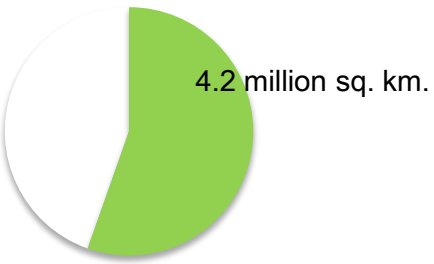

**Food Processing**


Sources: World Stat; Climate Adaptation; Index Mundi; MIT

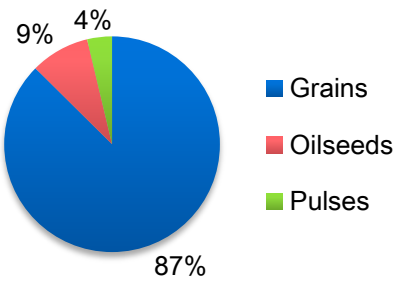
# Country Profile: Australia

| | |
|---|---|
| Name of the Country | Australia |
| Population | 23.13 million |
| GDP (Agriculture \| Industry \| Services) | $ 1.488 trillion (3.8% \| 27.4% \| 68.7%) |
| Total Land | 7.71 million sq. km. |
| USP | Dry land Farming \| Natural Resource Management \| Sustainable Agriculture |

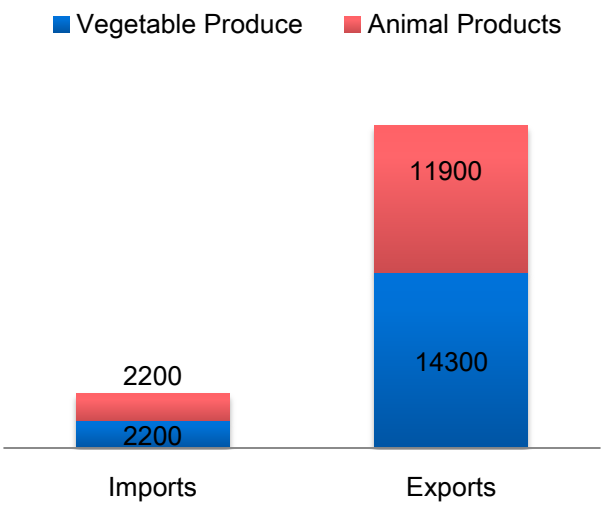
**Agricultural Land (sq. km)**




**Production Segmentation**



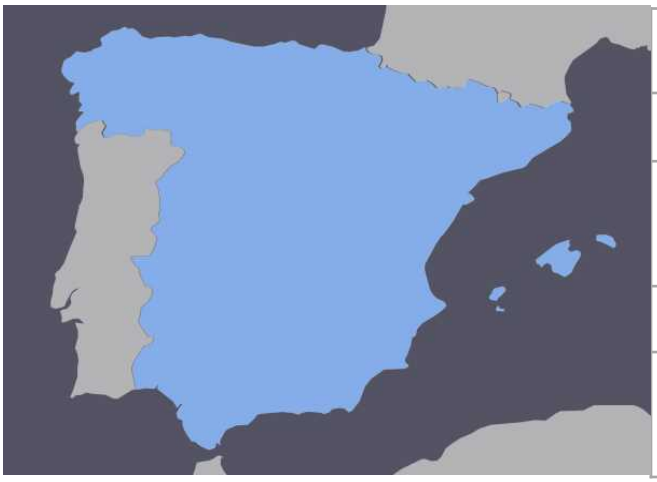

**Imports and Exports (in USD million)**




**Food Processing**

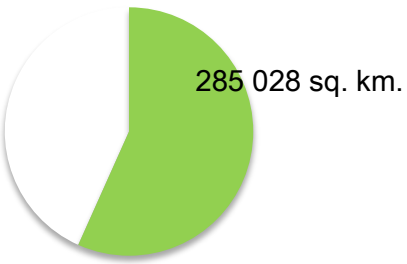

Sources: World Stat; Australia Crop Report - 2015; Index Mundi; MIT; AFGC

# Country Profile: Spain

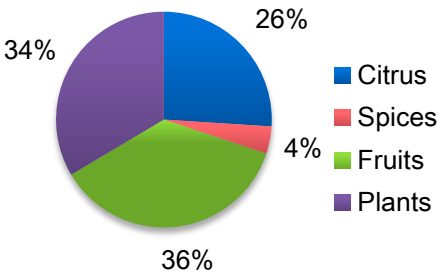


| | |
|---|---|
| Name of the Country | Spain |
| Population | 46.77 million (2013 est.) |
| GDP (Agriculture \| Industry \| Services) | $ 1.356 trillion (3.1 % \|26 % \|70.8 %) |
| Total Land | 505 370 sq. km. |
| USP | Leading exporter of Oranges and Mandarins |

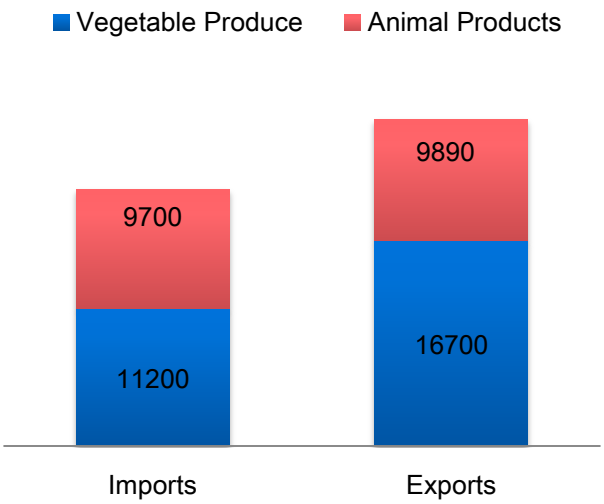
**Agricultural Land (sq. km)**




**Production Segmentation**




**Imports and Exports (in USD million)**



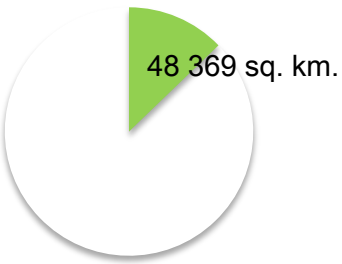

**Food Processing**


Sources: World Stat; Fresh Plaza, AGR; Index Mundi; MIT

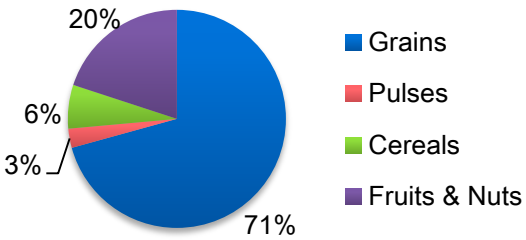
# Country Profile: Japan

| | |
|---|---|
| Name of the Country | Japan |
| Population | 127.3 million (2013 est.) |
| GDP (Agriculture \| Industry \| Services) | $ 5.007 trillion ( 1.1% \|25.6 % \|73.2 %) |
| Total Land | 377 930 sq. km. |
| USP | World's largest market for fresh, frozen and processed seafood |

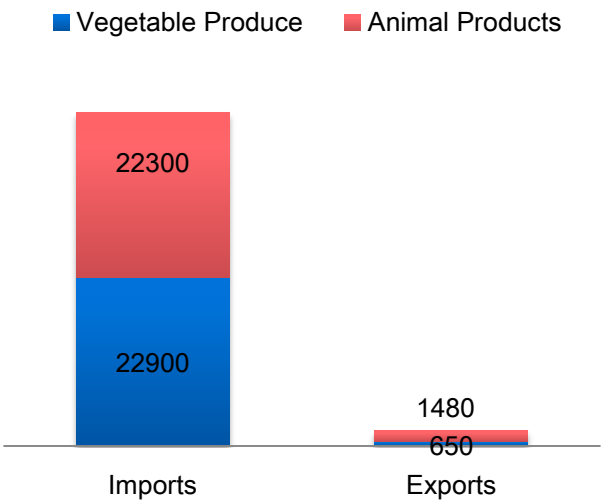
**Agricultural Land (sq. km)**




**Production Segmentation**



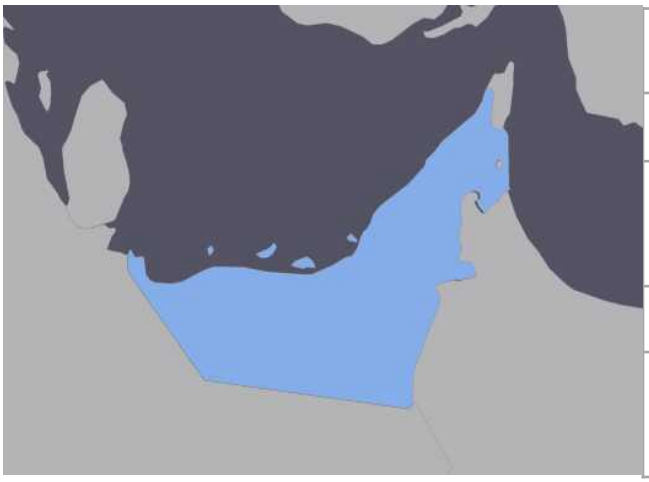

**Imports and Exports (in USD million)**




**Food Processing**

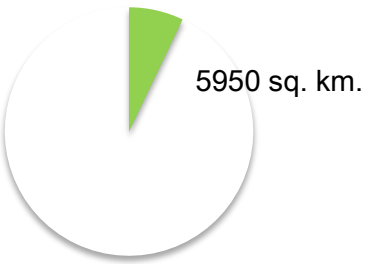

Sources: World Stat; Knoema; Index Mundi; MIT; USDA

# Country Profile: UAE

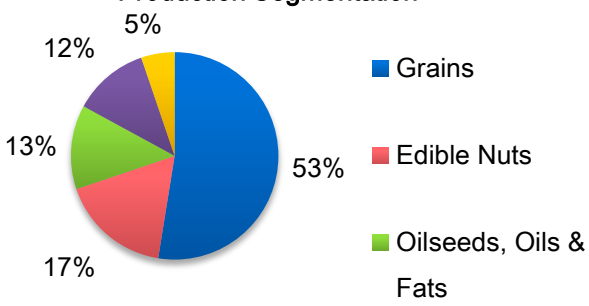


| | |
|---|---|
| Name of the Country | UAE |
| Population | 9.346 million (2013 est.) |
| GDP (Agriculture \| Industry \| Services) | $ 390 billion ( 0.6 % \|61.1 % \|38.2 %) |
| Total Land | 83 600 sq. km. |
| USP | |

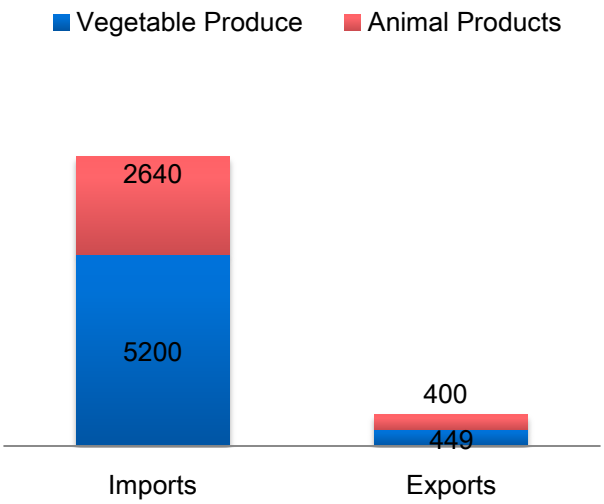
**Agricultural Land (sq. km)**




**Production Segmentation**




**Imports and Exports (in USD million)**



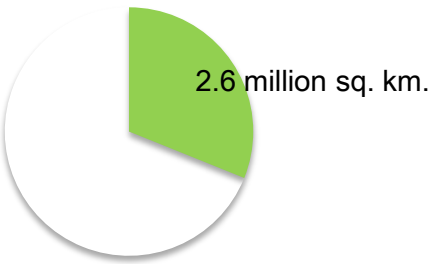

**Food Processing**


Sources: World Stat; Agro Pulse Issue 1.1 DMCC Report; Index Mundi; MIT

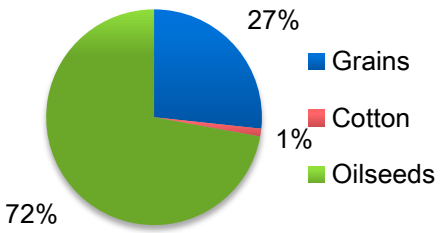
# Country Profile: Brazil

| | |
|---|---|
| Name of the Country | Brazil |
| Population | 200.4 million (2013 est.) |
| GDP (Agriculture \| Industry \| Services) | $ 2.19 trillion (5.5 % \| 26.% \| %) |
| Total Land | 8.5 million sq. km. |
| USP | Produces 1/3rd of World's Coffee |

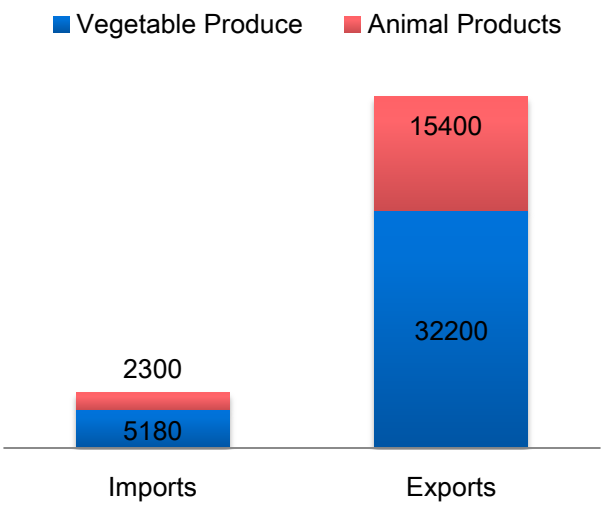
**Agricultural Land (sq. km)**




**Production Segmentation**




**Imports and Exports (in USD million)**



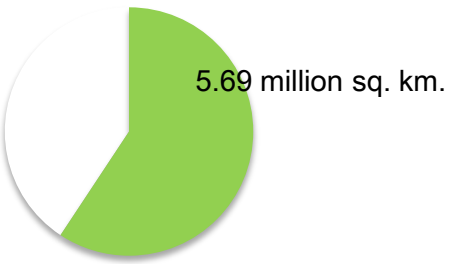

**Food Processing**


Sources: World Stat; Crop Site; Index Mundi; MIT; Euromonitor

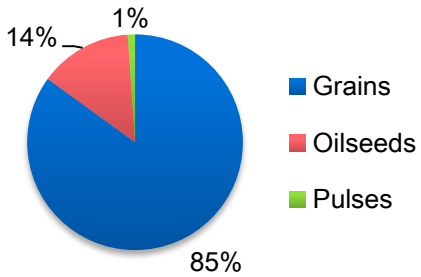
# Country Profile: China

| | |
|---|---|
| Name of the Country | China |
| Population | 1.357 billion (2013 est.) |
| GDP (Agriculture \| Industry \| Services) | $ 9.33 trillion ( 10% \| 43.9 % \| 46.1 %) |
| Total Land | 9.598 million sq. km. |
| USP | Ranks 1st in worldwide farm output |

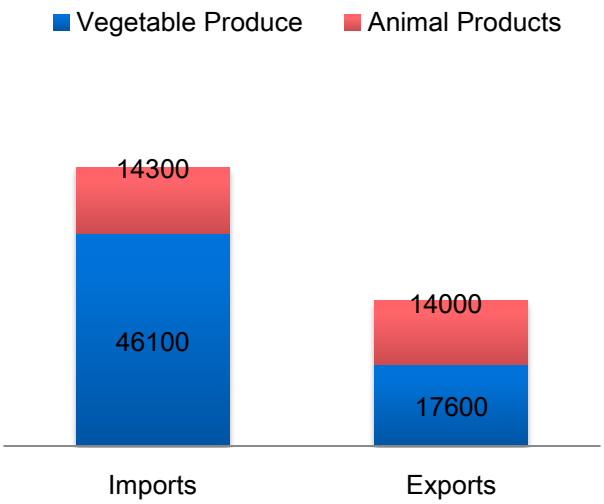
**Agricultural Land (sq. km)**




**Production Segmentation**



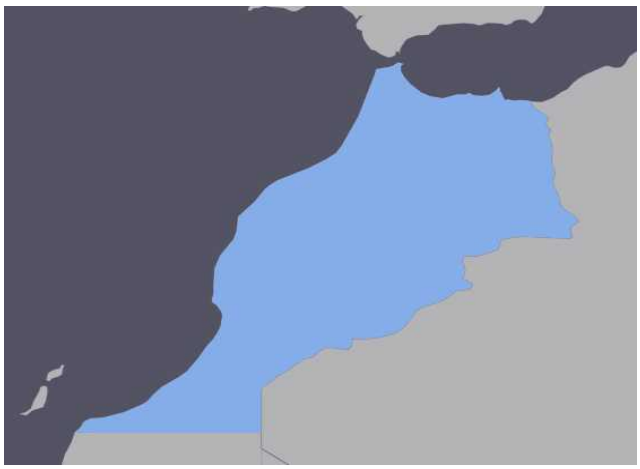

**Imports and Exports (in USD million)**




**Food Processing***

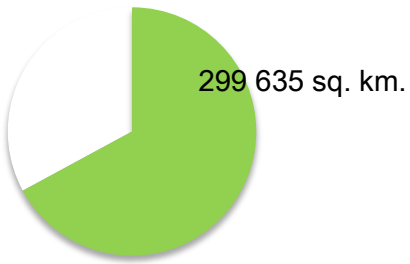

** Estimated*
Sources: World Stat; World Grain, USDA, FactFish; Index Mundi; MIT; Economists Pick Research

# Country Profile: Morocco

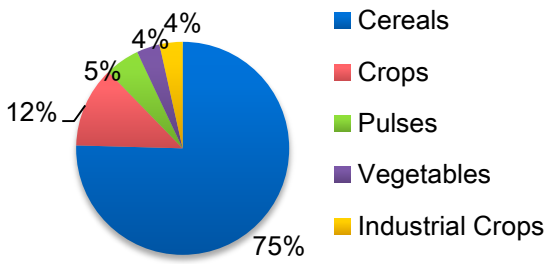


| | |
|---|---|
| Name of the Country | Morocco |
| Population | 33.01 million (2013 est.) |
| GDP (Agriculture \| Industry \| Services) | $ 104.8 billion ( 15.1% \|31.7 %\| 53.2 %) |
| Total Land | 446 550 sq. km. |
| USP | Complete tax exemption for Agro based industry. |

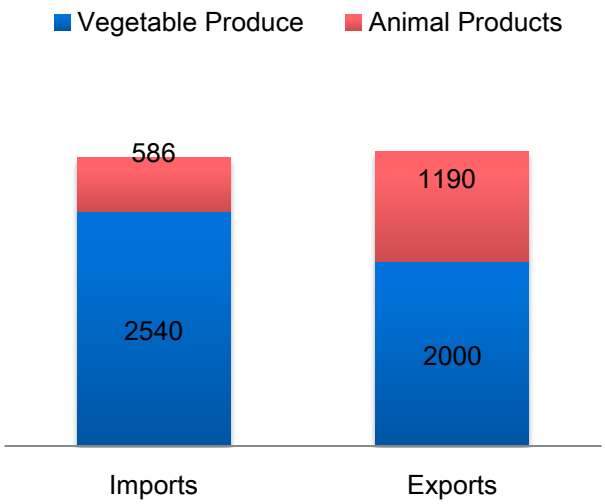
**Agricultural Land (sq. km)**




**Production Segmentation**




**Imports and Exports (in USD million)**



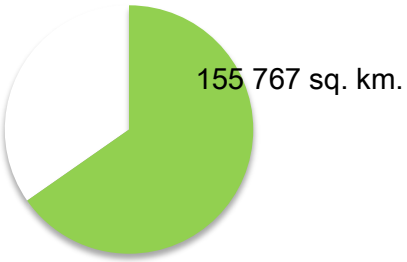

**Food Processing**


Sources: World Stat; Morocco World News; Index Mundi; MIT; Market Access Secretariat - Global Analysis Report

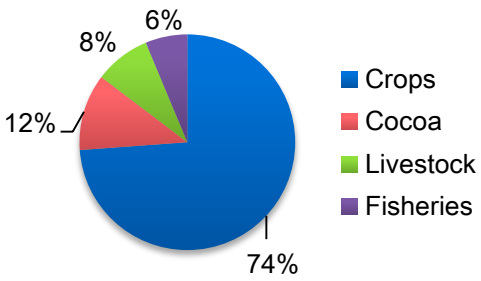
# Country Profile: Ghana

| | |
|---|---|
| Name of the Country | Ghana |
| Population | 25.9 million (2013 est.) |
| GDP (Agriculture \| Industry \| Services) | $ 45.55 billion (21.5 % \|28.7 % \| 49.8 %) |
| Total Land | 238 540 sq. km. |
| USP | Climatic zones – Dry Savanna to wet forests |

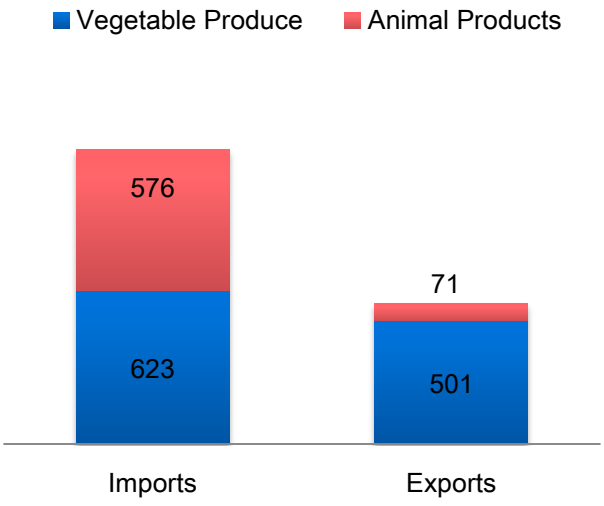
**Agricultural Land (sq. km)**




**Production Segmentation**




**Imports and Exports (in USD million)**




**Food Processing**


Sources: World Stat; Ministry of Food and Agriculture; Index Mundi; MIT