International conference-cum-exhibition

Food 360°

Agribusiness and Food Processing

Feeding Opportunities through Partnerships

November 21-22, 2011
Hyderabad International Convention Center, Hyderabad

Background Paper

KNOWLEDGE PARTNERS

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ICRISAT
Science with a human face

N. KIRAN KUMAR REDDY

HYDERABAD

CHIEF MINISTER
ANDHRA PRADESH

Message

The Agriculture and allied industries across the globe continues to evolve. The same is true for Indian Agriculture and food processing sector. This industry in India had been growing constantly and significant growth IS contributed by agriculture, forestry and fishing. However global economic slowdown, higher fuel prices adversely impacted growth. With the economy now stabilizing, the Agriculture sector in India is poised for rapid expansion again as Andhra Pradesh maintains one of the highest growth rates in Indian economy

Further to enhance and stimulate the Indian Agriculture & Food processing Industries, "FOOD 360°" the first International Exhibition and Conference on Agriculture & Food Processing, which is being jointly organized by Government of Andhra Pradesh and Federation of Indian Chambers of Commerce and Industry (FICCI). The conference would provide agriculture, food processing and allied industries a great opportunity to interact and exhibit their products / services. This will also demonstrate and educate the public at large extent on latest technologies available globally.

I am immensely pleased to know that major companies, farmers, entrepreneurs, service providers, operating carriers from across Nation and the World showing their full-fledged participation in the event. I extend my best wishes to every exhibitor and visitor.

I wish "FOOD 360°" to be a grand success.

Kiran Reddy.

(N.KIRAN KUMAR REDDY)

Message from Conference General Chair

The Indian food industry is a significant part of the Indian economy with food constituting about 30% of the consumer wallet. With a vast consumerbase that is growing and with a strong base for food production, the sectorpresents a good opportunity for all players. If we look at the food sector, there are some clear opportunities for growth in the future.

Added to this momentum, the economy of Andhra Pradesh has predominantly been dependent on agriculture and its allied sectors. Around 60 percent of the total population of the state is engaged in the sector, which contributes roughly 25 percent to the GDP. The state is the largest producer of rice in the country, with production which is 14.36 percent of total production in the country and is thus aptly known as the rice bowl of India. The varied climatic conditions and resources also help in the cultivation of a variety of crops like sugarcane, cotton, chilli, mango, tobacco, groundnuts and sunflower. The eastern coastline has immense potential for fisheries sector and also for export opportunities.

In this background, I am happy that FICCI has taken a lead in Organizing this conference in Andhra Pradesh. I am sure the partcipants will be benefited out of the Conference deleberations and Exhibitions.

We hope the report will be useful and look forward to your inputs and feedback. We also hope this report will encourage a greater participation by Indian & International companies in the Agri and food processing sectors.

J A Chowdary

Conference General Chair – FOOD 360° &
Co-Chairman, FICCI AP State Council
FICCI Food 360°

Message from the Programme Chairman

The food processing industry in India is one of the largest in terms of production, consumption, export and growth prospects. It is also equally supported by a favourable policy environment and demand push impact of a young consuming class with growing disposable incomes, India offers significant investment opportunities in the food and agri-business sector and is likely to become a world player in this business.

By 2015, the Indian food industry is expected to reach USD258 billion from the current level of USD181 billion. This growth is expected to be sustained till 2020, where the industry size is expected to touch USD318 billion. India is making an important mark in the global food arena-both as a larger producer and exporter of agriculture products and as a very large and growing market for processed foods.

Considering the growth witnessed by the sector in the last decade, and further improvement in growth rates in the years to come, this sector presents varied opportunities for investment across the entire agri-value chain.

I am confident that this effort by FICCI AP State Council along with eminent Knowledge Partners like IL&FS Clusters and ICRISAT will be instrumental in further strengthening the global ties between India and Global food business, by highlighting the investment attractiveness and business potential in the Agri-business sector.

Mr. Sivakumar S

Programme Chair
FICCI Food 360°

Message from the Director General, ICRISAT

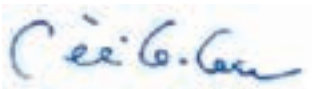
On behalf of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), allow me to extend my warmest greetings to the Federation of Indian Chambers of Commerce and Industries (FICCI), Andhra Pradesh Chapter for organizing this "Food 3600 International Conference cum Exhibition on Agribusiness and Food Processing". Through this Conference, FICCI is providing an excellent platform for networking among stakeholders from all segments of the Agri and Food Processing industry.

ICRISAT is happy to be associated with this initiative as it is consistent with ICRISAT's new strategic plan to 2020 which is based on the Inclusive Market-Oriented Development or IMOD approach. IMOD is ICRISAT's guiding framework to empower smallholder farmers to grow their way out of poverty. IMOD is a dynamic progression from subsistence towards market-oriented agriculture. It starts by increasing the production of staple food crops, and then converting deficits into surpluses that are sold into markets. This inclusive strategy will enable the poor, particularly women and the youth, to participate, rather than be sidelined, in the development process.

In line with its IMOD strategy ICRISAT has established an Agribusiness and Innovation Platform (AIP) as part of its efforts to give dryland farmers technological and marketing opportunities. AIP primarily promotes publicprivate partnerships aimed at linking farmers to the markets. ICRISAT believes that for IMOD to be sustainable in the long run, a strong convergence strategy that brings together the research bodies, civil societies and the public and private sectors through mutually beneficial partnerships is needed.

We commend FICCI for providing such a platform. We appreciate the initiative of FICCI to address food and nutritional security through this conference and in involving our Institute as a Knowledge Partner to produce this study. I am sure this document will serve as a useful resource material for stakeholders in the food and agricultural sector.

With that, I wish you all the success in this activity!



William D. Dar
Director General
ICRISAT

Introduction

Agriculture sector continues to receive attention of the policy makers at the highest level in this country due to its predominant role in the food and nutrition security, rural employment generation and in its contribution to GDP. Despite the fall in its share to the GDP, farming and allied activities contribute around 18% of the Gross Domestic Product and also employs about 55 % of the country's population. The growth rate also has been improving and it registered a growth rate of 3.8 % during 2010-11.

Area under food crops has increased from 122.78 million hectares (ha) in 2001-02 to 125.73 million ha in 2010-11 (4th advance estimate). Production of food grains has increased from 212.85 million tonne (MT) in 2001-02 to 241.56 MT during 2010-11(4th advance estimates). If the country has to maintain a GDP growth rate of above 8%, the agriculture sector should grow at the rate of 4 % annually. To sustain this growth rate agriculture has to be remunerative, which calls for focus on precision agriculture to enhance productivity, reduce post harvest losses and focus on value addition. Development of food processing industry achieves paramount importance in this context.

India is the second largest producer of food and holds the potential to be the biggest on global food and agriculture canvas, according to a Corporate Catalyst India (CCI) survey.

"The food industry in India comprises food production and food processing industry."

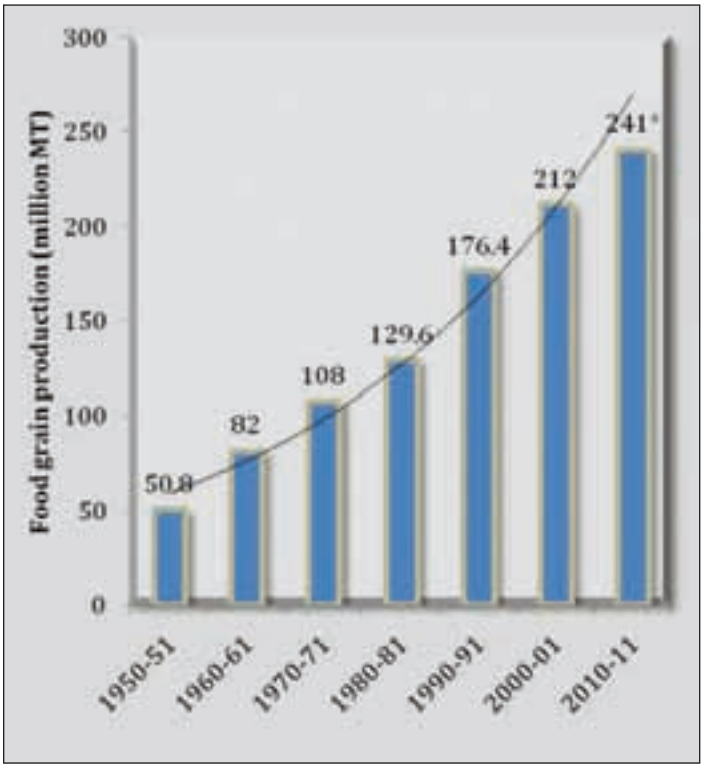
According to the Vision 2015 by the Ministry of Food Processing Industries; Government of India, Indian food industry is projected to grow three folds to US$ 300 and the value addition is envisaged to increase from 20% to 35%. Increased per capita income, growing consumerism, surging demand for convenience foods, rise in women working population etc are the key drivers for the industry today. Though the potential drivers, India still has the industry dominated by unorganized players to an extent of 90% and the organized sector constituting only 10%.

AP is one of the major producers of many agricultural and horticultural commodities in this country and the State holds huge potential for food processing. Realising the potential, the State Government has already initiated steps to prepare a Strategy and Action Plan for an accelerated development of food processing sector in the State and the initiative of the FICCI State Council for bringing all the stakeholders on to a common platform to explore newer and potential avenues for developing this sector is timely and achieves importance.

Food Production and Processing "Subsistence-Security-Sustainability"

Food Production Trends in India

Agriculture in the country has progressed a long way from an era of frequent droughts and vulnerability to food shortages to becoming a significant exporter of agricultural commodities. This has been possible due to persistent efforts at harnessing the potential of land and water resources for agricultural purposes. During the pre-green revolution period, from independence to 1964-1965, the agricultural sector grew at annual average of 2.7 per cent. This period saw a major policy thrust towards agricultural sector grew at 3.2 per cent during 1965-1966 to 1975-1976, and at 3.1 per cent during 1976-1977 to 1991-1992.



Food grain production trends *(Source: FAO study)*

Credit to the Green Revolution, the growth of food grain production over the past six decades in the country is remarkable. Substantial growth enablers during the period included;

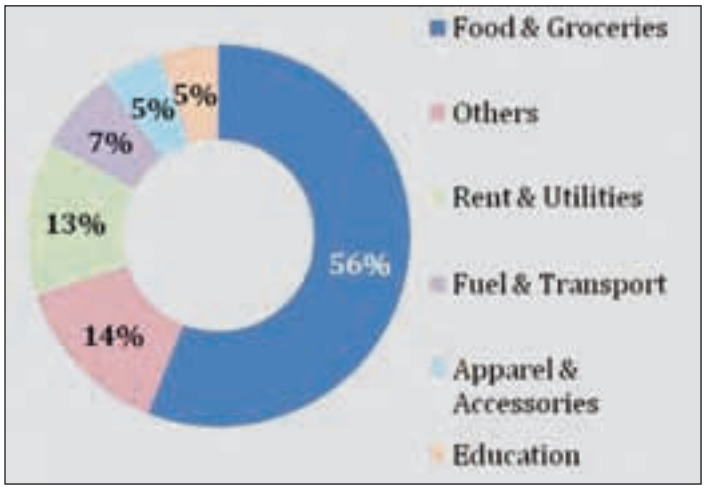
- Introduction of high-yielding varieties of wheat and rice
- Increased supply of agricultural inputs such as chemical fertilizers and pesticides
- Expansion of major and minor irrigation facilities
- Announcement of Minimum Support Prices for major crops, government procurement of cereals for building buffer stocks and to meet public distribution needs, and
- Provision of agricultural credit on a priority basis; etc.

This period also had witnessed a number of market intervention measures by the Central and State Governments. From 1991 onwards, the performance of Indian agriculture leapfrogged due to liberalization under the new economic policy. Though the agriculture contribution to the overall GDP has been declining, the country had transformed itself to a net exporter of agricultural commodities, recording an average growth of near 4%. The agriculture sector in India had seen a series of notable transformations during the past two decades beginning 1991 and had led the beginning for Sustainability. One among the catalysts is Food Processing and Value Addition that had aided and has been aiding the transformation from "Security to Sustainability".

Food processing industry in India-Outlook

Food Industry is a significant part of the Indian Economy, with food constituting about 30% of the consumer's basket. The country is one of the largest producers of cereals, fruits, vegetables, milk and meat products. With the growing consumer base and strong resource potential, the food sector presents large and exciting business opportunity for both domestic and international players. Key segments of the industry are;

In domestic market, food is the biggest consumption category in the consumer's basket and the size of food category has increased from USD 141 billion in 2004 to USD 181 billion in 2008



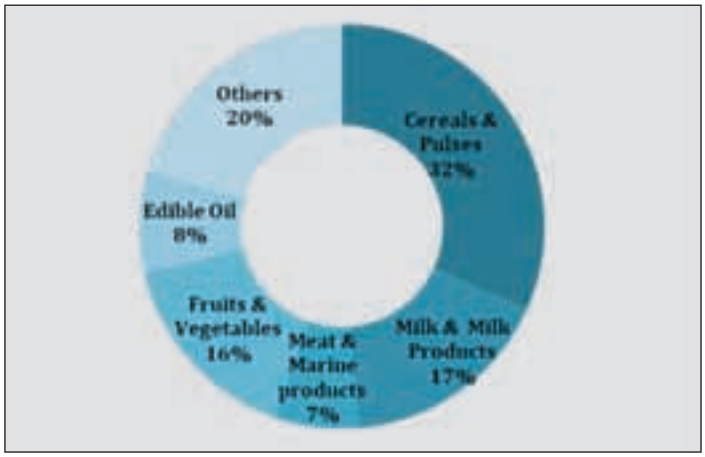
Household Expenditure *(Source: NSSO, 2008)*

The spending on food in India has grown at a steady rate, with high growth recorded between 2004 and 2008 with a CAGR of 6.4%. As the Indian economy is growing, the overall expenditure on food is increasing but, its share in consumer's wallet is decreasing, with a shift towards more discretionary categories like entertainment.

USD 181 billion spending on food accounts for 56% of the household expenditure, which is approximately, four times the next largest category (Rent and utilities)

Within the food and groceries category, agri products account for 32% followed by dairy and dairy products accounting for 17% followed by fruits and vegetables accounting for 16% of the total spend on food and groceries. It is noteworthy that both fruits and vegetables and dairy products which accounts for over one third of the total consumption are highly perishable and have long supply chain

The consumption pattern and tastes for various sub-categories within the food and groceries category



Segment wise food expenses *(Source: NSSO, 2008)*

vary from state to state and vary even within the state resulting in many marketing challenges and opportunities. Still, Andhra Pradesh has shown more or less a similar picture of consumer preferences as far as the food expenditure is concerned.

Going forward, the domestic food market is expected to grow at 40% and the export market at the rate of 23%. Below is the illustration of growth drivers of the industry. The country is at the cusp of food processing revolution and there are tremendous unexplored domestic and export market segments and opportunities ahead.

Key Drivers

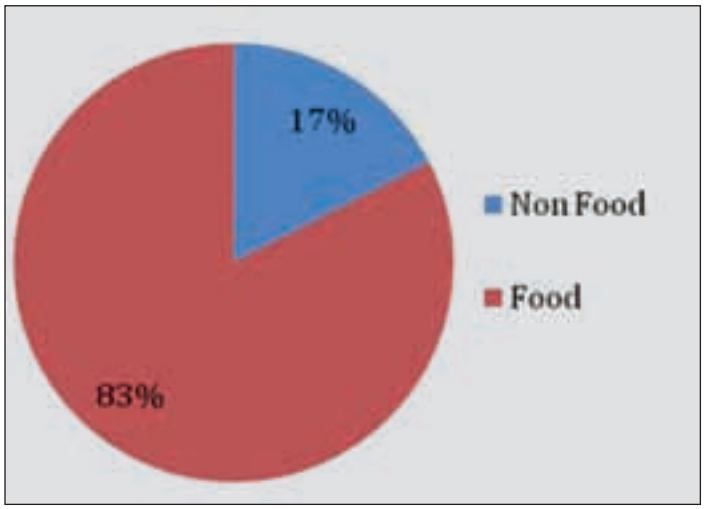
The growth of the industry is expected across all the food categories with fruits and vegetables accounting for USD $ 116 billion followed by dairy products at USD $ 61 billion. The growth is expected to be driven by the phenomenal replacement of home made products with branded offerings. The tertiary products are expected to see a rise in consumer spending. The magnitude of spending on secondary processed foods is expected to grow to USD $ 86 billion by 2020.

International Trade – Share of Agriculture Commodities, Specifically Food

On the export front, India has a very low share in the international trade accounting for 1.4% of the global trade. As regards the agriculture exports, according to DGFT, the value in 2010-11 is US $ 29.6 billion and the share is 12.5% of the total exports. Though the absolute values have been rising on a considerable scale for the past two decades, the share of agriculture exports has remained consistent in a range of 10-12%.

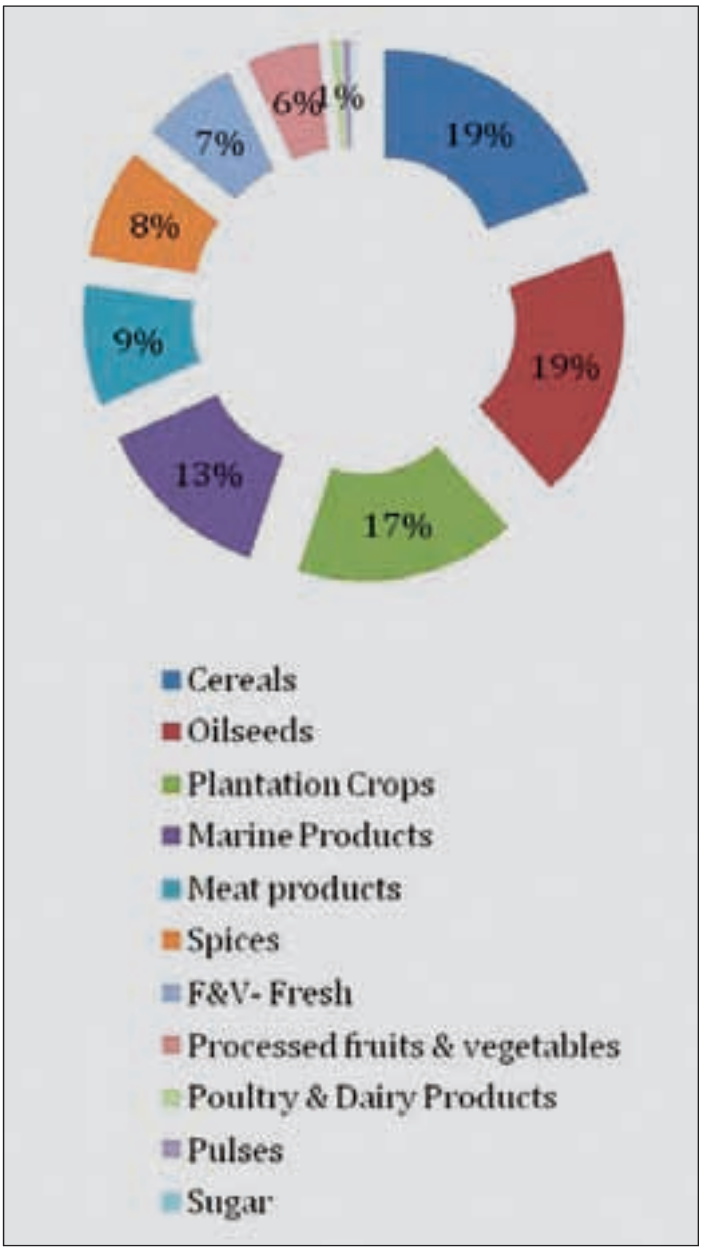
Excluding non food agriculture products such as paper, cotton, jute and shellac, food exports constitute around 83% of the total agriculture exports. A large share of exports of agri products from India is in the primary or non processed forms, with rice, fruits & vegetables and chillies as the major categories. Meat and meat products, oil meals, chicken products and marine products are exported in secondary form.

Category wise percent share to food exports are illustrated in the figure below.



Food in Agricultural Exports *(Source: DGFT)*

While a strong surge in domestic and international consumer demand for processed foods is expected, the levels of food processing in India is limited and at a nascent stage. Major reasons being non availability of adequate critical infrastructure facilities, lack of quality control and testing facilities, poor and inefficient supply chain systems, non availability of processable varieties of produce, high inventory carrying costs, high taxation, high packaging costs leading to affordability concerns and cultural preferences for fresh foods, etc.



Category wise share in food exports *(Source: www.agristat.com)*

APEDA's statistics reveal that India's export of processed food during 2008-09 was Rs.10, 066 Crores of which Jaggery and Confectionary, Guargum, Cereal preparations, Groundnuts and processed Fruits and Vegetables formed a major pie.

Processed Food Exports	
Category	**Export Value (Crores)**
Jaggery & Confectionary	2,005
Other Processed Fruits & Vegetables	1,372
Guar gum	1,339
Groundnuts	1,239
Cereal Preparations	1,101
Mango Pulp	753
Miscellaneous Preparations	592
Alcoholic & Non Alcoholic Beverages	543
Pulses	542
Dried & Preserved Vegetables	496
Cocoa Products	84
Total	**10,066**

Above table indicates the value of exports under each processed food category during 2008-09.

On the imports front, the agricultural imports in India are significantly lower and the country is a net exporter in international agriculture trade. India is a self sufficient nation in most agricultural categories except pulses and edible oil. The share of imports of agricultural commodities out of the total imports was 5.2% in 2010-11 according to the statistics of Department of Commerce. It is worthwhile noting that the dependency of the economy on agricultural imports has declined over a period of time in India. To accelerate further growth of exports and also to make agriculture a significant contributor to Indian economy, due focus shall be laid on sunrise industries such as Food Processing.

Food Policies and Regulations in India

Post liberalization, several policy measures have been taken with regard to regulation & control, fiscal policy, export & import laws, taxation, exchange & interest rate control, export promotion and incentives to high priority industries. Food processing and agro industries have been accorded high priority with a number of important reliefs and incentives.

At present, no industrial license is required for almost all of the food & agro processing industries except for some items like: beer, potable alcohol &

wines, cane sugar, hydrogenated animal fats & oils etc. and items reserved for exclusive manufacture in the Small Scale Industry (SSI). Items reserved under SSI include pickles & chutneys, bread, confectionery (excluding chocolate, toffees and chewing-gum etc.), rapeseed, mustard, sesame & groundnut oils (except solvent extracted), ground and processed spices other than spice oil and oleoresins, sweetened cashew nut products, tapioca sago and tapioca flour.

Wide ranging fiscal policy changes have been introduced progressively. Excise & Import duty rates have been reduced substantially. Many processed food items are totally exempt from excise duty. Custom duty rates have been substantially reduced on plant & equipments, as well as on raw materials and intermediates, especially for export Production. Corporate taxes have been reduced and there is a shift towards market related interest rates.

There are tax incentives for new manufacturing units for certain years, except for industries like: beer, wine, aerated water using flavouring concentrates, confectionery & chocolates etc. Indian currency (rupee) is now fully convertible on current account and convertibility on capital account with unified exchange rate mechanism is foreseen in coming years. Repatriation of profits is freely permitted in many industries except for some, where there is an additional requirement of balancing the dividend payments through export earnings.

In order to boost the food processing sector, the Centre has permitted under the Income Tax Act a deduction of 100 per cent of profit for five years and 25 per cent of profit in the next five years in case of new agro processing industries set up to package and preserve fruits and vegetables.

Food laws and standards followed in India is one of the best in the world. In order to ensure safety and standards in food, there are eight different sets of laws to govern the food processing sector in the country. They are as enlisted below:

- Prevention of Food Adulteration Act, 1954
- Fruit Products Order, 1955
- Solvent Extracted Oil, De-Oiled Meal and Edible Flour (Control) Order, 1967
- Meat Food Products Order (MFPO), 1973
- Edible Oils Packaging, 1998
- Vegetable Oil Products Order, 1998
- Milk and Milk Products Regulations, 2009
- Food Safety and Standards Act, 2006

The Food Safety and Standards Authority of India (FSSAI) has been established under Food Safety and Standards Act, 2006 which consolidates various acts & orders that have hitherto handled food related issues in various Ministries and Departments. FSSAI was established for laying down science based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption.

Recently, new food law (FSS Act) has come into force. FSSAI has taken this initiative to integrate all the existing food laws in the country so that the surveillance practices at the ground level are efficient. To ensure regular supervision for food standards, FSSAI will now appoint a Food Commissioner at the State level. In addition to institutional strengthening, FSSAI will now work to ensure hygiene and food quality of the street food also. The mechanism is now established in Uttar Pradesh and planned to go pan India very soon.

Support from the Government

Ministry of Food Processing Industries is the nodal Ministry of the Government of India for Food Processing sector in India. The ministry acts as a catalysing factor for bringing in greater investments to the sector, generate employment, encourage exports, and create a conductive environment for the healthy growth of the industry. The ministry promotes business ventures in the country through a range of schemes supporting infrastructure, technology upgradation, human resource development, institutional strengthening and food quality enhancements. Various schemes and the support extended by the Government are summarized in the table next page.

GoI Ministry	Dept./ Board	Scheme
Ministry of Food Processing Industries		Scheme for Development of Mega Food Parks
		Scheme for Development of Cold chain, value addition and preservation infrastructure
		Scheme for development/upgradation of food processing units
		Scheme for development/upgradation of abattoirs
		Scheme for setting up of training institutes
Ministry of Agriculture & Co-operation	National Horticulture Board	Schemes for Post harvest infrastructure with separate back ended subsidy scheme for each component
	National Fisheries Development Board	Schemes for Government and Quasi Government organisations for development of production, processing, etc
	Department of Marketing	Rashtriya Grameen Bhandaran Yojana – National Rural Godown Scheme
		Terminal Market Complex (TMC) Scheme
	Rashtriya Krishi Vikas Yojana	State Plan scheme to incentivize the states to increase public expenditure in agri and allied sectors
Ministry of Commerce and Industries	Agricultural Export Development Authority (APEDA)	Schemes for Development of Research & Development
		Schemes for Quality Development
		Schemes for Infrastructure Development
		Schemes for Market Development
	Marine Export Development Authority (MPEDA)	Export Production – Capture Fisheries
		Export Production – Culture Fisheries.
		Induction Of New Technology, Modernization Of Processing Facilities And Development Of Infrastructure Facilities.
		Market Promotion
	Spices Board of India	Promotion of Indian Spices brand abroad
		Schemes for Development of infrastructure
		Schemes for Research and Development
Ministry of Micro, Small and Medium Enterprises	–	Scheme for development of common facility centres

ANDHRA PRADESH AND FOOD PROCESSING INDUSTRY

Introduction

Andhra Pradesh is an agrarian state with bountiful of natural resources and forward looking farming community. The State occupies a premier position in the country's agribusiness industry with major contribution in agriculture, horticulture, dairy, poultry and fisheries. The state has a strong production base for majority of the agricultural and horticultural commodities.

Food processing industries contribute to an extent of 19.26% in total industrial production of the State. Total number of registered small scale units in food processing sector in the State is 33,965 with an investment of Rs.1376.34 Crores. The sector is dominated by Micro, Small and Medium enterprises. With the largest production of Mango, Chittoor is a well known cluster for mango processing and other tropical fruits like banana, guava and papaya. There are 65 processing units involved in processing of fruits and vegetables with an estimated turnover of Rs.450 Crores.

Major food industry segments in the state, their production trends, and industry outlook and the business climate of the state are discussed hereunder.

Agriculture Profile – A.P.

Total Land Area

275.4 lakh ha

Agro Climate

9 Agro climatic zones with moderate climate. Humid to semi humid conditions in the coastal and arid to semi arid in interior parts of the state.

Net Sown Area

109.58 lakh ha

Major Crops

Ranks 1st in production of Mango, Chillies, Turmeric, Oil Palm, Brackish Water Shrimp, Fresh water prawns, Eggs, Broiler and Sheep Meat

Second in production of Rice, Maize, Sunflower, Citrus, Coriander and Fresh water fish

AP ranks fourth in production of milk, cotton, coconut and wool

Fifth in Banana, Guava, Ginger, Grapes, Marine Fish and Marine Prawns

Production (million MT)

Food Grains	:	20.4 (08-09)
Horticulture	:	18.5, excluding flowers (10-11)
Milk	:	8.9 ('08)
Marine	:	1.29('09)
Meat & Poultry	:	0.45

Agri and Agro Industries Profile:

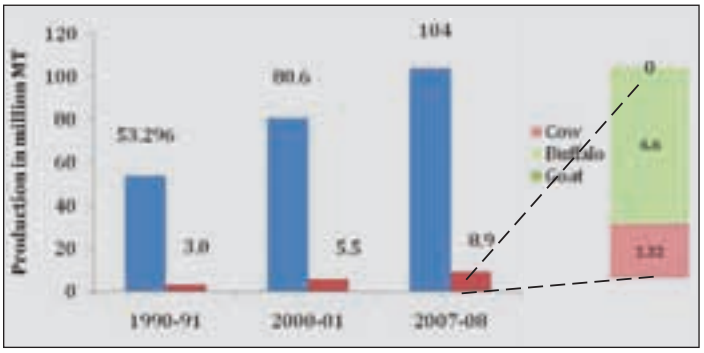
Agri: A strong agri input base is established in A.P. Most of the regional offices of agriculture input companies are located in Hyderabad. Almost all the MNCs have captured a good market in A.P due to diverse cropping patterns. The market is open, dynamic and offers space for innovation and competition.

Agro: Rice & Oil milling units are very much prevalent in the State. Among the F&V processing category, mango is wide spread followed by tomato, papaya and guava. Pickles and fruit jelly units are dominant in the value added category.

Production & Investment trends in Major Segments

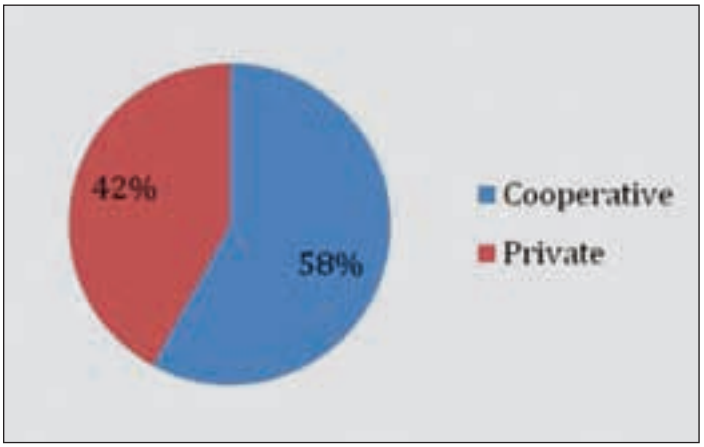
Dairy

Andhra Pradesh is the fourth largest producer of milk in India with an annual production of 8.9 million MT according to 2008 statistics. The state contributes around 8.5% to the national milk production and the share has been increasing for the past two decades. Of the total milk produced in the State, 74% is produced from buffaloes. The state possesses 10.8% of the total buffalo population in India according to 17th Livestock Census provisional statistics.



Milk production in Andhra Pradesh

While A.P accounts for 8.5% of the nation's milk production, the state has only 6% of the installed milk processing capacity of the country. The value chain for milk in the State is relatively established compared to other segments of food industry. Though the case, there are prevailing issues and challenges such as low productivity of the cattle, rising cost of feed inputs, inadequate cold chain infrastructure, lack of trained manpower for research on value addition, higher taxation and regulations.



Ownership

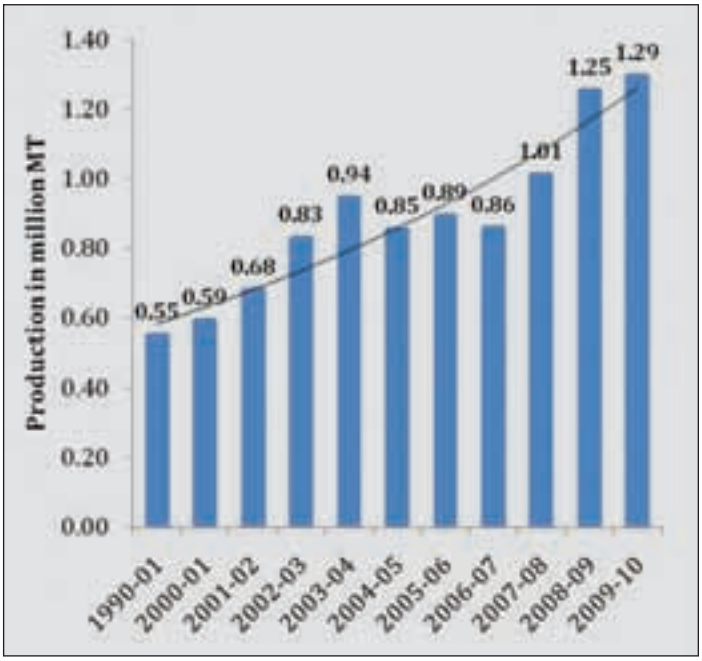
with a capacity of 0.52 million LPD. The average milk production per day in the State is 24.3 million LPD. The present processing capacity in the organized sector is sufficient to handle 22% of the milk produced in the state compared to 13% in the country.

Apart from the National players like Nestle, Britannia, Amul and Danone, there is quite a good presence of local players in the industry in A.P. The consumer markets in A.P, especially Hyderabad are very dynamic and open for newer products. There has been series of launches/introductions in segments such as Yoghurts and Probiotic Curd during the past few months and the products are reported to be performing well. Innovation being the key, there is a lot of unexplored space in the dairy industry in the State. This unmet demand could be eyed by start ups and entrepreneurs and the industry shall be taken to the next level of excellence.

Fisheries

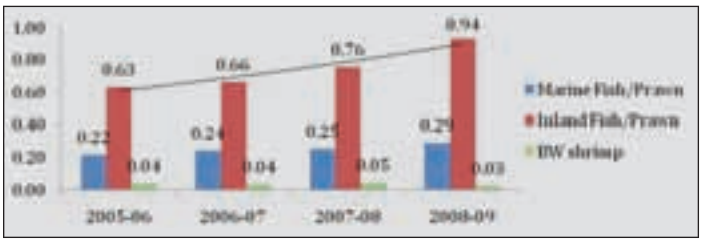
Fisheries sector occupies a top position in the State, contributing to 2.39% of the State's GDP. It is a source of livelihood to over 3 million people. The state's 1000 km coastline, 8577 km of river length and 102 reservoirs over an area of 2.34 lakh ha are boons for the fisheries sector.

The state is the leading producer of cultured shrimp and scampi in the country, second top producer of fish (both marine and inland) in the country after West Bengal, Fifth top most producers of marine fish after Gujarat, Kerala, Maharashtra and Tamil Nadu.



Category wise marine production in the state for the past few years is as shown below:

Fish production in A.P has increased from 0.59 million MT during 2000-01 to 1.29 million MT in 2009-10. The growth is majorly because of the inland fisheries that contribute to around 76% of the production. Remaining 24% comes from marine production. Major pockets of cultivation include Vishakhapatnam, East Godavari, West Godavari, Krishna and Nellore.



Category wise fisheries production
(Source: www.apfisheries.com)

Fish processing infrastructure is fairly well developed in the State. Total number of processing plants located in Andhra Pradesh is 58 of which 39 are of world class facilities, approved for export to European Union. The state has excellent export record of processed fish and shrimps. However, larger chunk of the export pie is primary processed products and there is a limited focus on value added/ready to cook fish and shrimp products. Marine supply chain in the state; both marine and fresh water have considerable issues and challenges to be addressed on a priority basis for the development of the industry. Interventions such as modernized fish processing for value added products; technological upgrade, integrated cold chain and modern marketing complexes would lead to the overall development of marine processing sector.

ASSOCHAM has recommended Andhra Pradesh as one of the states for boosting marine processing and thereby exports in the country. The State Government of Andhra Pradesh also has identified fisheries as one of the 6 growth engines in Agriculture sector under Vision 2020.

Horticulture

Horticulture production in A.P has been consistently on a surge over the past decade as there is growing awareness among the farmers for cultivation of high value crops. Adjacent is the table from Indian Horticulture Database, 2010 indicating the production statistics of different categories of horticulture crops in the State.

Category	Production (million MT)
Fruits	11.40
Vegetables	5.26
Flowers	6.33
Plantation Crops	0.66
Spices	1.15
Total	**24.80**

Mango, Citrus fruits followed by Banana contribute the most to the fruit basket of the State. In the vegetables category, Tomato, Okra, Onion and Brinjal is the order from largest to smallest. Chilli is the near total contributor to the spices category. Below is the matrix indicating the major districts/production pockets for horticulture crops in the State.

Crop	Major districts
Banana	East Godavari, West Godavari, Kurnool, Cudappah
Lemon	Nellore, Prakasam, West Godavari, Guntur, Cudappah, Anantapur, Nalgonda, Karimnagar
Mosambi	Vijayawada, Anantapur, Nalgonda, Rangareddy
Grapes	Rangareddy, Medak, Anantapur
Guava	East Godavari, West Godavari, Krishna, Guntur, Anantapur, Khammam, Medak
Mango	Krishna, East & West Godavari, Khamman, Vijayanagaram
Papaya	Cudappah, Medak, Kurnool, Rangareddy
Pomegranate	Anantapur, Mehboobnagar, Medak
Sapota	East & West Godavari, Krishna, Guntur, Kurnool, Medak
Brinjal	East and West Godavari, Krishna, Nellore, Guntur, Kurnool, Anantapur, Srikakulam,Vishakapatnam
Okra	Guntur, Prakasam, Kurnool and Rangareddy
Onion	Kurnool, Cuddappah, Rangareddy
Tomato	RR, Mehboobnagar,Prakasam, Vizag and Chittoor

Andhra Pradesh is one of the progressive states when it comes to fruit and vegetable processing. The state possesses F&V processing infrastructure to an extent of 296 FPO (Fruit Product Order) licensed units as in 2009. The state ranks first in terms of volumes processed followed by Tamil Nadu and Maharashtra, the total production being 2.35 lakh MT. However, in terms of value, the state ranks second next to Maharashtra.

Major fruit and vegetable processing cluster in the State is in Chittoor district which primarily consist of mango pulping units. There are about 65 units operating in the cluster with about 50-55 units involved in canning of mango pulp and about 15 units having aseptic packaging facilities. Apart from the pulp, East Godavari and Vijayanagaram have mango jelly units. There are about 58 major registered units in processing and production of chilli powder in Guntur and 40 units for turmeric processing in Nizamabad and Medak districts of the State. Inadequate post harvest infrastructure and cold chain is the major issue in the F&V processing industry. Absence of scientific ripening facilities is one another cause of concern.

The state possesses the highest cold storage infrastructure in the country. National Horticulture Mission statistics shows that Andhra Pradesh has a total of 290 cold storages set up across the state, with an installed capacity of 9 lakh MT. Most of the existing cold storages are multipurpose units, some of them are specifically meant for fish, milk products, fruits and vegetables, ice creams, hotels and meat products.

Geographical spread of existing cold storages in A.P shows that there is a high concentration in coastal region with domination by Guntur district possessing around 25% of the units. Other prominent districts in the state include Hyderabad, Ranga Reddy, Prakasham, Nellore, Cuddapah, Khammam, Warangal and West Godavari.

Proper utilization of existing infrastructure and establishment of an integrated cold chain shall accelerate the development of food processing industry in general and F&V processing in particular.

Macro Environment in the State

Food processing as a sector has been gaining impetus in the country for the past two decades. The Ministry of Food Processing Industries, GOI is proactive in promoting the industry through investor friendly schemes and policies. Though there are centrally run and sponsored schemes, Andhra Pradesh is one of the few states that has developed an exclusive policy for food processing that was announced in 2005. The State Department of Industries and Commerce, Government of Andhra Pradesh has been continuously supporting the state agro and food processing sector with proactive policy measures. The policy covers a wide range of sub sectors including horticulture, agriculture, animal husbandry, fisheries, agro food processing industries and allied industries. Below is the chart indicating the areas of support under each sub sector.

Figure 4: Coverage of State Food Processing Policy

Horticulture	Fruit & Vegetable Processing
	Fruit based ready to serve beverages
	Tissue culture laboratories
	Green houses
	Green house nurseries
	Mushroom laboratories
	Seed production units
	Wine making
Agriculture	Food Grain Milling/ Processing
	Alcohol for blending with fuels
	Using modern technology and equipment (Except rice mills)
Animal Husbandry & Fisheries	Dairy products
	Processing of poultry, eggs, meat and meat products
	Fish processing including shrimps
Agro Food Processing	Bread
	Oilseed meals(edible)
	Breakfast foods
	Biscuits
	Confectionary including cocoa processing and chocolate
	Oil expellers and refining
	Malt extract
	Protein isolates
	High protein foods
	Weaning foods
	Extruded /other ready to eat products
Allied	Cold Storage
	Refrigerated Transport Vehicles containers (Excluding second hand refurbished vehicles/contains)
	Units manufacturing food grade packaging materials for food processing industry
	Units engaged in packaging, canning and bottling of processed foods
	Units manufacturing additives/preservatives/colours/ fragrances for food processing industry
	Biotechnology industries
	Source: Andhra Pradesh Industries Portal

For entrepreneurship development, the State has continuously been engaged in conducting stakeholder consultations and workshops through industry associations and federations. Andhra Pradesh has excellent investment climate for setting up of food processing industries, other key macro environmental factors are listed below:

- **Food Processing Department:**
  The State has proactively formed a Food Processing Department to provide the much needed impetus to the food processing industry.
- **APMC Act:**
  Under the Model APMC act that has been enacted in the state direct buying from farmers, contract farming, single licence for operating in the entire state are few of the highlights among several other progressive guidelines.
- **Power surplus state:**
  Andhra Pradesh is a power surplus state with an installed power generation of 11134 MW. AP has uninterrupted supply of power to the industry for more than 14 hours per day. Additional power will be available in the near future when the gas reserves of Krishna Godavari basin will be available for power production.
- **Multiple Sea ports:**
  Andhra Pradesh has 14 major and minor ports with cargo handling capacity of over 50 million MT.
- **Well developed road and rail network:**
  The state has well developed road and rail network. All the district head quarters are connected by all-season motor able roads to

Vishakhapatnam. The state government is planning to make all these roads into 4 lane roads in the next five years. The work has already been started on major connecting networks like Vijayawada-Hyderabad.

- **Andhra Pradesh – The knowledge Hub:** Availability of skilled manpower is not a constraint. The state has several institutes of national and international repute to provide the much needed human resources and knowledge to the industry. ICRISAT, NAARM, NIRD, MANAGE, IIIT, ISB, NIN, ANGRAU are few of the many such institutes.
- **Well developed social Infrastructure:** All other social infrastructure such as educational institutes, vocational and skill training institutes, hospitals, banks are present in sufficient numbers and spread in the state that will provide the required social infrastructure for any new or existing ventures.

Concluding Remarks

Andhra Pradesh is a leader in production of various agriculture commodities along with dairy, fisheries and horticulture. The state is resource rich and possesses favourable agro climate for food production as well as processing. The state also has an exclusive Department for promotion of food processing investments in the state and provides conducive macro environment for the industry. To augment the efforts by the State and the Central Governments, it is recommended that a National Food Processing Mission shall be constituted under the 12th five year plan. The National Mission shall function with the support from the state and the district level missions. The mission mode shall encourage project development, mobilization, appraisals, approvals and monitoring by a more decentralized approach.

The state has already worked on a strategy and a time bound action plan for development of the food processing industries. Key interventions and respective outlays are being finalized as the next course of action. Sector specific thrust areas for overall development of food processing industry in the State are as below:

Dairy

The key interventions in dairy include; Promotion of integrated and mechanized dairy farms, Promotion and development of integrated cold chain facilities dedicated to milk and dairy products, Establishment of dairy technology related schools both for production and processing related skills and Reduction of VAT on value added dairy products; etc.

Fisheries

Fisheries shall be supported for Establishment of processing facilities for value added products, Establishment of integrated cold chain, Development of modern fish marketing complexes in major consumption centres in the State. Apart from this, policy initiatives such as Assistance for market development and promotion of processed fish products both in domestic and export markets and Exemption from VAT for sealed and frozen sea foods shall be focused upon.

Horticulture

Promotion of integrated value chains such as Mega Food Parks across the state, Modern pack houses with sorting, grading, pre-cooling and packing facilities shall be established and Reduction of VAT on processed F&V are essential for horticulture processing.

FOOD AND NUTRITIONAL SECURITY

Dr William Dar, Director General of ICRISAT says, "The world is facing a perfect storm, with a number of huge problems converging around us. At the centre of this storm are the poor people, who depend on agriculture for survival. Warming temperatures, droughts, floods, increasing land degradation, loss of biodiversity, rising food prices, zooming energy demand and population explosion are creating extreme challenges to feed the world".

With this background of a brewing "perfect storm" and in the context of the Food 360 conference it is important to take stock of the food and nutritional security status of the country. Further this paper attempts to provide a direction to the new age food industry in order to understand the existing challenges and leverage on the emerging opportunities.

The urban population in India is expected to increase to more than 550 million by 2030[1]. Currently, a sizable proportion of the population in most Indian cities lives in slum areas. The increasing slum population in Indian cities is seen an indication of worsening living conditions and increasing poverty in cities in India. The increasing concentration of population in slums and urban poverty has elicited a strong interest in urban health conditions in general and the health of slum dwellers and the urban poor in particular.

The last National Family Health Survey of India (NFHS-3, 2005-06)[2] provides clear evidence of the poor state of nutrition among young children, women, and men in India and the lack of progress over time, based on measurements of height and weight, anaemia testing, testing for the iodization of household cooking salt, utilization of nutrition programmes, and information on child feeding practices and vitamin A supplementation. Young children in India suffer from some of the highest levels of stunting, underweight, and wasting observed in any country in the world, and 7 out of every 10 young children are anaemic. The percentage of children under age five years who are underweight is almost 20 times as high in India as would be expected in a healthy, well-nourished population and is almost twice as high as the average percentage of underweight children in sub-Saharan African countries. Although poverty is an important factor in the poor nutrition situation, nutritional deficiencies are widespread even in households that are economically well off. Inadequate feeding practices for children make it difficult to achieve the needed improvements in children's nutritional status, and nutrition programmes have been unable to make much headway in dealing with these serious nutritional problems. Adults in India suffer from a dual burden of malnutrition (abnormal thinness and overweight or obesity). Although the percentage of women and men who are overweight or obese is not nearly as high as it is in many developed countries, this is an emerging problem in India that especially affects women and men in urban areas, those with higher educational attainment, and those living in households in the highest wealth quintile.

The government's inability to containing the spiraling food prices despite the recent monetary and other measures is reflected in the surging food inflation figure. Food inflation surged further to 12.21 per cent for the week ended October 22, 2011 from 11.43 per cent in the previous week owing to soaring prices of various edibles such as vegetables, fruits, pulses, milk and all other protein-rich items. Despite aggressive monetary tightening by the Reserve Bank of India, with fuel price hike already in place and increase in electricity tariffs expected, the inflationary situation is likely to aggravate and persist for long. With this background the one alternative in order to address this critical issue of food inflation is to increase farm productivity and decrease post-harvest losses. The role of the agro food processing industry in this area will be critical and in this context agribusiness and entrepreneurship shall play a major role.

[1] Ministry of Health and Family Welfare Government of India. Report: Health and Living Conditions in Eight Indian Cities

[2] National Family Health Survey (NFHS-3) India 2005-06: Nutrition in India (URL: http://www.measuredhs.com/pubs/pdf/OD56/OD56.pdf, Lastaccessed on 14th November 2011)

However in spite of the looming cloud around health, nutrition, food inflation etc. plaguing India there is a silver lining in the cloud. This is attributed to:

- Changes in Life Expectancy at Birth[3]
  Life expectancy in India has more than doubled in the last sixty years. It increased from around 30 years at the time of independence to over 63.5 years in 2002-06. Globally India's life expectancy is lower than the global average of 67.5 years and the average of most countries that won their independence from colonial rule at about the same time–China, Vietnam, Silence, and so on.

- Improved Child Survival[3]
  India's infant mortality rate (IMR) too has shown a steady decline, from 129 deaths per 1,000 live births in 1971 to 53 in 2008. The rate of decline has been slowing, from 19 points in the 1970s to 16 points in the current decade. Currently the urban IMR is 36 as compared to the rural IMR of 58.

- Decreasing Maternal Mortality[3]
  Data suggests that India had a MMR of 460 in 1984, declining to 254 deaths per 100,000 live births in 2004-2006.

These positive indicators show that there will be future demand for more processed and healthy food for both the increasing ageing as well as the young population. The food and agribusiness sector shall play a major role in fulfilling this demand of food and nutritional security.

2. Role of food processing industry in food and nutritional security

2.1. Food and nutritional security challenges and solutions

Food Industry has a major role to play in ensuring the food and nutritional security. Minimising post harvest losses, by identifying the potential areas of intervention, should be the foremost agenda across all segments of the food industry. This is important to ensure that all the produce of our farmers find way into the food value chain, thus making enough food available to feed the growing population. In order to further improve the food security scenario a thorough analysis of the food value chain is essential. As there is also considerable loss of processed commodities at several stages of the supply chain, it is essential that these losses are minimised and ultimately eliminated, in order to improve the food security scenario. The food industry needs to first develop innovative ways to quantify these losses and then quickly evolve innovative value addition options to ensure that these losses are translated to food security solutions. This of course cannot be achieved in isolation and a consortium model linking the food industry to the farmers, growers and the producers, is very crucial to achieve this goal. In addressing food security, the food industry also needs to understand its role with respect to capacity building capacity, both in terms of infrastructure and human resources.

Food processing and the food industry have a crucial role to play in addressing nutritional security across all sections of the population. Already schemes of the government such as the Integrated Child Development Services (ICDS) scheme[4] which address nutritional security along with other aspects of health and education are directly benefiting from the inputs of the food processing industry. The successful implementation of the supplementary nutritional services under the ICDS scheme in the state of Andhra Pradesh has been led by the technological inputs provided by its leading initiative Andhra Pradesh Foods (AP Foods, http://apfoods.ap.nic.in/html/cont.htm). The success of AP foods in raw-material pre processing leading to the manufacture and supply nutritious food to school and pre school children, expectant & lactating mothers for improving the nutritional status is a model that needs to be replicated across the country. As the demand for food for human consumption increases, the demand for quality and value added food products is also increasing. But most importantly, the need is to ensure that these food products meet the nutritional requirements addressing nutritional security.

ICRISAT's approach to address food and nutritional security involves targeted productivity increases coupled with work on biofortification and bioavailability leading to better quality grain.

[3] Ministry of Health and Family welfare, GOI, Annual Report, 2010 September

[4] Integrated Child Development Services (ICDS) Scheme. (URL: http://wcd.nic.in/icds.htm, Last accessed on 14th November 2011)

For example in most dryland cereals production systems, where ICRISAT works; malnutrition, especially among young children and their mothers, is dramatic. ICRISAT is focusing on increasing Fe and Zn concentration in these dryland cereals through biofortification and establish the benefits of biofortification through related bioavailability studies. Simultaneously, by adopting the gender-focused approach for variety testing, ICRISAT is working towards identifying pathways for improving productivity and access to better quality grain for women and their children in the semi arid tropics. These biofortified crops shall be new tools in the hands of food industry to further value added and address nutritional security. The role of transgenic research, using modern biotechnological tools, in ensuring food and nutritional security is already known. Hence, ICRISAT along with the Department of Biotechnology (DBT), Government of India has established the Platform for Translational Research on Transgenic Crops (PTTC). The aim of establishing PTTC is to facilitate a coordinated approach for the translation of existing genetic engineering technologies in developing transgenic crop varieties for product development and commercialization. Similar approaches need to be incorporated as part of the overall strategy to be adopted across all segments of the agri-food industry in order to ensure nutritional security.

2.2. Food Safety and Nutritional security

Ensuring food safety and its cost effectiveness is another agenda directly related to food and nutritional security. The SME (Small & Medium Enterprise) entrepreneurs in food processing industry mostly serve the domestic markets and are often deprived of the exportable market opportunities for their products and services. This is basically due to a lack of infrastructure facilities for food quality testing services that are not available with them. In order to be a successful food exporter, a country must produce food that is acceptable to consumers in other countries that complies with the statutory requirements of the importing countries. Compliance with the statutory or mandatory requirements of importing countries is an unavoidable and essential prerequisite to successful and profitable food export. However, compliance is becoming increasingly demanding because of the preoccupation of the world community with food safety. In addition, an increasing number of importing countries are demanding agreed inspection and examination procedures, as well as certification by the governments of exporting countries that products are in compliance with the quality and safety requirements.

For example, of late, the Indian chilli exporters are facing new challenges as importing nations tighten their food safety standards. As part of its food safety laws, the US has started prescribing zero tolerance levels for food contaminants like aflatoxin and pesticide residues. The stringent norms have led to the rejection of a few consignments of chilli and chilli products from such developed countries. Similar requirements and standards are in place for other food produce as well. Foods needs to be tested and certified free of microbiological contamination, heavy metals and pesticides, mycotoxins and also for genetically modified (GMO)/ non-GMO certification in current scenario..

Given that the International food trade is a highly complex, technical and administrative operation involving the global movement of a very large quantum and variety of food and food production is scientifically-based intervention in this era. It is possible and also essential to transport food over long distances to arrive at its destination in a wholesome condition, without an appreciable loss of quality. Consumers worldwide now have access to a wider variety of high quality food in greater quantities than ever before. Two other developments have also contributed significantly to the increase in both the quantity and variety of food moving in international trade. The first has been the dramatic increase in the number of countries, especially developing countries, involved in the production of food for export. The second has been the internationalization of food tastes and habits. While the former is associated with economic development, commercial strategy and the acquisition of valuable foreign exchange, the latter is associated with the people of different countries developing a liking for each other's food. However, the most important requirement is to provide food which is safe to the consumer.

Food safety issues are also focused on toxicity levels of various possible contaminants. Therefore, food safety is not just concerned with heavy metals, pathogens, chemical contaminants and residues, but also many other ingredients which may have either an allergic reaction or may not be compatible with a group of the population or an individual. In this regard branch of "Nutrigenomics" will play a role in future food safety. However, to deliver a safe food in commerce with zero contamination of pesticides or heavy metals, absence of toxins and no pathogens is not an easy task, which requires high levels of science and technology with the requirement for in-depth basic and applied research to solve these problems. Thus, food safety should be an integral part of food and nutritional security strategies and the agri food industry.

3. Meeting consumer demands through value addition

In recent years, consumers have become more health conscious. This has led to demand for food crops and food products that can be consumed as a part of their daily diet. There is also the need in India, to address malnutrition and other deficiency diseases. In addition, very high rates of mortality occur due to coronary heart diseases (CHDs) cancer and diabetes – all related to diet. Nutritional security is thus a key issue which encompasses agriculture as well as the food processing industry. Health concerns are attributed to poor nutrition in low income segments of the population, whereas the affluent strata of the society need to address health issues that emerge from changing lifestyles and food habits. The neutraceutical industry is also growing as consumers demand for more healthy food products, which can take care of their health needs and prevent severe health conditions. It is clearly evident that the changing demands and habits of the consumers will be driving the growth of a new age food industry in India. The Food 360 approach needs to ensure that the farmers be part of the new age food industry. In addition to designer neutraceutical food products, the trend is also to obtain nourishment as well as prevention of chronic diseases through staple diet. Thus, keeping this in mind, the food industry needs to work closely with the agricultural sector in order to develop and identify crop varieties that are sources of micronutrients, antioxidants, bioactives etc., thereby having the potential to deliver "health beyond basic nutrition" to the consumers. Farmers growing these crops will be an integral part of the value chain of the emerging neutraceutical industry, and hence also reap the economic benefits associated with the neutraceutical industry.

According to the Vision 2015[5], for the food processing India, of the Ministry of Food Processing (MOFPI) Government of India plans to treble the size of the food processing industry. The basis of this vision is the vast potential of the Indian agriculture. The growth in the food industry can result in demand for more agricultural produce, both for fresh consumption as well as for conversion into different value-added food products.

This Vision 2015 of MOFPI for the food processing industry can only be achieved by establishing a seamless linkage of the farming community with various stakeholders in the food processing industry. Thus the value chain approach resulting in establishment and strengthening of value chains, in fact can be the backbone of a successful new generation food industry. In order to leverage on the opportunity to benefit the farmers by linking to the new age food industry, the farmers need to explore ways of value addition at the farm level by minimising post-harvest losses, equip themselves with improved post-harvest management technologies and practices, beside inculcating the entrepreneurial spirit in order to explore new business opportunities based on developing niche value-added products from their farm produce.

3.1. The new age food industry demand safe produce

The demand for safe food needs to be implemented right from the farm level. Adoption of integrated food safety management systems is an important aspect that should be considered when framing the policies that will form the basis of the new age food industry. With the objective of providing safe food to the consumers efforts need to be made to

[5] "VISION 2015: Vision, Strategy and Action Plan for Food Processing Industries in India" Volume I. Ministry of Food Processing Government of India, 2005. (URL of the document: http://mofpi.nic.in/images/volume1.pdf. Last accessed on 26th May 2011)

implementing ways of producing crops without indiscriminate use of pesticides. Implementing systems and management practices to ensure produce free of contaminants (pesticides, toxins and heavy metals) will go a long way in providing a new dimension to the concept of value addition in the food industry. To achieve these goals, the farmers will need support from the private sector food industry first to understand and then to implement the industry requirements in order to deliver safe produce. India has already consolidated the laws relating to food safety under The Food Safety and Standards Act, 2006, whereby the Food Safety and Standards Authority of India (FSSAI) has already been established, that is responsible for formulating science based food standards and regulates the manufacture, import, processing, distribution, and sale of food[6].

3.2. Consumer demands "health beyond basic nutrition"

The consumer demand for "health beyond basic nutrition" has shifted the focus to new crops and food ingredients. There is also renewed interest for millets and sorghum in the present context of climate change, as they have the ability to grow under high temperature and drought conditions. The demand for dryland grains, such as sorghum and millet, is growing as a number of major global issues continue to impact the world's food security. Trends include: the increasing global demand for livestock feed; the growing use of nutritious foods with high levels of iron, fiber and calcium for weaning children and the nursing mothers, and the gluten free food for the gluten intolerant; rising fertilizer prices forcing a shift to crops that require limited fertilizer; an increasing global population requiring more food; and the diversion of crops such as corn into the bioethanol market. Recently, the Government of India has announced an allocation of 300 crores in 2011-12 under Rashtriya Krishi Vikas Yojana for the promotion of millets as Nutri-cereals. A scheme on "Initiative for Nutrition Security through Intensive Millets Promotion (INSIMP) has been formulated to operationalize the announcement. The scheme aims to demonstrate the improved production and post-harvest technologies in an integrated manner with visible impact to catalyze increased production of millets in the country. Besides increasing production of millets, the Scheme through processing and value addition techniques is expected to generate consumer demand for millet based food products. The Scheme is being implemented from *Kharif* 2011[7]. Similar policies and schemes that promote both basic agricultural research as well as entrepreneurship in the food industry around these coarse cereals and other similar crops should also be considered as part of the next five year plan. The food industry has also a major challenge to develop the value chain for these crops.

3.3. Key support mechanisms to value addition

Value-addition coupled with entrepreneurial development activities must be an integral part of the new age food industry. To integrate value-addition and entrepreneurship with the core agricultural sector, it is essential to identify the intervention points at each stage of the value chain and suggest suitable interventions to promote appropriate value addition develop infrastructure and identify appropriate market opportunities through agro enterprise development. The following key areas need to be addressed:

- Post-harvest and supply chain management
  One of the major problems that the Indian farmers are facing is the poor returns on their produce, owing to the highly inefficient supply chain, presence of intermediaries, low level of processing (2-15%) and huge post-harvest losses (20-30% in perishables). Storage and warehousing facilities is one of the key requirements that need to be addressed as part of the Food 360 approach. With government incentive allowing 100 percent deduction for tax purposes[8] on the investment in warehousing for storing agricultural produce, efforts need to be made in engaging the private sector to invest in warehousing facilities,

[6] Food Safety and Standards Authority of India (FSSAI), (URL: http://fssai.gov.in/)

[7] Initiative for Nutritional Security through Intensive Millets Promotion(INSIMP)

[8] An Appetite for Growth: Opportunities in the Indian Food Industry, Ernest & Young, 2009.

Operational Guidelines, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, 2011 (URL of the document: http://agricoop.nic.in/INSIMP.pdf. Last accessed on 26th May 2011)

especially for promoting the coarse cereals and perishable produce.

Another important area which can initiate forward engagement of the farmers and buyers for production and supply of farm produce, thereby resulting in assured returns to the farmers and quality produce to the buyer is contract farming. Presently contract farming has been adopted by private sector for crops of commercial value. However, efforts need to be made to initiate contract farming into other crops such as sorghum and millets, demands for which are already growing in the food industry, and for which there is no organised market at present. The fruits and vegetable sector, which account for higher wastages in the traditional value chain can tremendously benefit from contract farming. While the Government of India has been actively encouraging contract farming endeavours, the National Agricultural Policy envisages that 'private sector participation will be encouraged through contract farming and land leasing arrangements to allow accelerated technology transfer capital inflow and assured market for crop production'.

- Development of terminal markets

  Terminal markets where the farmers can assemble and sell their produce to the end consumer, or to the processor, or the produce can be packed for export, or even stored for disposal at a future date needs to be developed. Again this approach needs to include all crops, and not just wheat and rice. The farmers and farmer associations need to be integrated into a model where the terminal markets are linked to the collection centres that can be developed close to the farms. It is worth mentioning here that the Government of India is looking to promote terminal markets, as a means of integrating domestic produce with retail chains. There are plans to set up such markets in eight cities across five states, at a cost of US$ 131 million.[9]

3.4. Research and Development and related Infrastructure for value addition

In the previous sections, it has been highlighted that the market value of farm produce can be enhanced through the development and promotion of value-added products based on proper scientific research and development. Presently, the private sector companies are leading this effort. Government research institutes and universities are more focused on developing basic technologies, but there is a need to develop technologies that are market-oriented and address specific needs of the farmers and entrepreneurs. The latest initiative of the Government of India in setting up the "National Institute of Food Technology Entrepreneurship & Management (NIFTEM)"[10] is a step in the right direction to address this important issue.

The NutriPlus Knowledge Program, an initiative of the Agribusiness and Innovation Platform (AIP) of ICRISAT is another such initiative which provides access to research and development infrastructure and facilities for entrepreneurs and farmers, especially to promote value-addition and food safety for entrepreneurship development based on the crops of the semi-arid tropics.

An important initiative taken by the Government of India to promote the food processing industry are the Food parks[11].The government is considering investing US$ 22.97 million in at least 10 mega food parks in the country, besides working towards offering 100 percent foreign direct investment and income tax benefits in the sector. The new age food industry needs to leverage on such initiatives and also work towards identifying ways to promote these initiatives among the farmers and entrepreneurs.

[9] "High-tech agri markets coming soon". Agriculture & Industry Survey. February 1 2006. (URL of the article: http://www.agricultureinformation.com/mag/2006/02/high-tech-agri-markets-coming-soon/. Last accessed on 26th May 2011)

[10] National Institute of Food Technology Entrepreneurship & Management (NIFTEM). Ministry of Food Processing, Government of India. (URL of the article: http://mofpi.nic.in/content_printpage.aspx?categoryid=795. Last accessed on 26th May 2011)

[11] Food Processing. India Brand Equity Foundation, March 28th 2011. (URL of the article:http://www.ibef.org/artdisplay.aspx?art_id=28463&cat_id=114&page=2)

4. Promoting entrepreneurship in food sector through agribusiness & business incubation

The growth of the new age food industry needs to be inclusive. It needs to address the changing consumer aspirations, the emerging needs of the society, empower the farmers, and leverage upon the strengths of the available pool of talented young population, especially women, with entrepreneurial drive to bring in a self-sustaining economy linking agriculture with the food and agribusiness industry. This calls for an innovative self-sustaining model.

The foundation of such a self-sustaining model has already been laid by the former President of India, Dr. APJ Abdul Kalam who proposed the revolutionary concept of PURA (Provision of Urban Amenities in Rural Areas). Indeed, this visionary concept has already chartered the path for the successful evolution and implementation of a self sustaining economy in India. In the words of Dr. Kalam "During the last few decades, we have achieved success in many areas. One of the primary accomplishments was the first green revolution. In parallel, India has made significant progress in many areas like space, IT, biotechnology, food processing, and banking. We have the challenge to bring out the second green revolution by doubling our food output, with the constraints of less land, less water and less manpower. The PURA Mission should focus on increasing agricultural productivity and value addition to agro-products and nurturing and promoting horticulture.

The new strategic plan to 2020 of the International Crops Research Institute for the Semi Arid Tropics (ICRISAT) reiterates its commitment to harnessing complementary and purposeful partnerships, through Inclusive Market-Oriented Development or IMOD. IMOD serves as a dynamic progression from subsistence towards market-oriented agriculture. This pathway reduces poverty, since the markets create demand for a wider diversity of high-value foodstuffs and agro-industrial products. This stimulates agro-enterprises that raise rural incomes and create opportunities beyond agriculture. Smallholder farm families and entrepreneurs have to be empowered and assisted along this development pathway to lead them from pessimism to prosperity.

The Indian Food Industry consists of many players, domestic and international. Under the domestic sector, we have large public and private agro companies along with smaller players who are Medium Sector Enterprises (MSE), Small Scale Enterprises (SSE) and enterprises in the Un-Organised Sectors (UOS). The bigger and larger multi-national agro companies in the external (foreign) markets provide another set of buyers in the food industry (Fig 1).

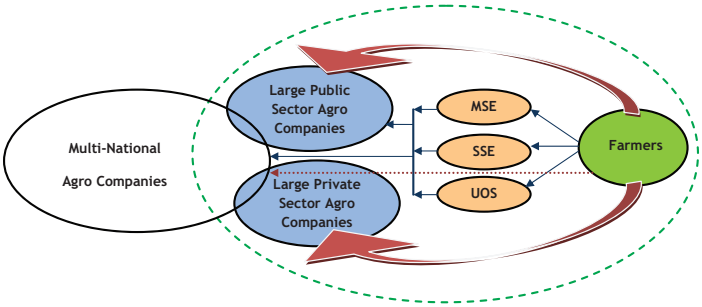


Figure 1: The model of the Indian Food Industry and channels of linking farmers

Under the current scenario, the produce from the farm gate is bought and moves up through the value chain through any of the partners in the middle tier and then to the larger companies. If the farmer can be linked to the bigger players directly, the returns from the produce will be much higher. This has been successfully indicated by direct marketing of ITC's e-choupal. However, the system is plagued by lack of trust among farmers and buyers and information asymmetry related to prices for the produce that deters the farmers from pursuing the direct approach. Favourable policies enabling farmers participation in the food industry is the need of the hour.

Policies that promote networking of farmers and farmer groups with different stakeholders in the value-chain, especially the private sector food

[12] "Abdul Kalam stresses on PURA mission". Daily News And Analysis (DNA), 6th February 2010
(URL of the article: http://www.dnaindia.com/india/report_abdul-kalam-stresses-on-pura-mission_1344075-all. Last accessed on 26th May 2011)

[13] "Strategic Plan to 2020 Inclusive Market Oriented Development for Smallhoder Farmers in Tropical Drylands", International Crops Research Institute for the Semi Arid Tropics (ICRISAT), 2011 (URL of the article: http://www.icrisat.org/newsroom/latest-news/one-pager/sp2020/sp-2020.htm. Last accessed on 26th May 2011)

processing industry, entrepreneurs and organisations that promote entrepreneurship development are the need of the hour. Important role of the food processing industry and value addition, entrepreneurs and entrepreneurship development activities and key infrastructure and policies will be required.

Indian agricultural and food sector is full of challenges and opportunities. Agribusiness is one of the solutions to meet the challenges of the sector especially that of falling returns and lack of interest in the rural youth to take up farming as a vocation. Farming needs to be integrated to the entire value chain, so that the youth have a 360° overview of the entire value chain rather than looking at farming in isolation. This holistic approach shall definitely open up new employment opportunities for the youth of India. The food industries close should work closely with the agriculture and its allied sectors in order to promote new business opportunity; one that will be provide attractive remuneration to the farmer producer which will be supported by certain programs/entities to meet the risks involved. According to Joseph A. Schumpeter, entrepreneurship employs "the gale of creative destruction" that will replace in whole or in part, inferior innovations across the market space and industries while creating new business models at the same time. The dynamism generated through innovations and new combinations of existing means of production leads to changes in the status quo. This fosters conditions that will result in increasing employment opportunities (predominantly for skilled labour), creation of more wealth, application of new technology, changes in lifestyle, and thereby support growth of the economy. Agribusiness will also enable a climate of innovations in the sector that can help in not only refining the agro-technologies in the research stations but also evaluating new local processing technologies that can be scaled-up. There are lot of avenues in the agricultural and allied sectors for agribusiness start-ups and private sector players to operate like seed business, farm ventures like contract farming, organic farming, bio-parks, food processing sectors, agro-biotechnology, supply chain management etc. In this section, we look at how these concepts can be applied in the Indian agricultural system and way to overcome the challenges.

4.1. Food and Agribusiness Opportunities

Food and Agribusiness provides an opportunity for thousands of agricultural graduates and food industry ready professionals, who pass out from the Universities and related institutions in the country, with an opportunity to start their own venture. The success of these new ventures shall be driven by the entrepreneurship culture, which shall enable creation of wealth from knowledge. However, most importantly successful innovations by these new ventures would result in new markets being discovered. Thus, innovation promotes entrepreneurship. In summary, a dynamic entrepreneurial environment supported by a vibrant and supporting academia linked to innovation will definitely help in making agribusiness a livelihood option for many (Figure 2).

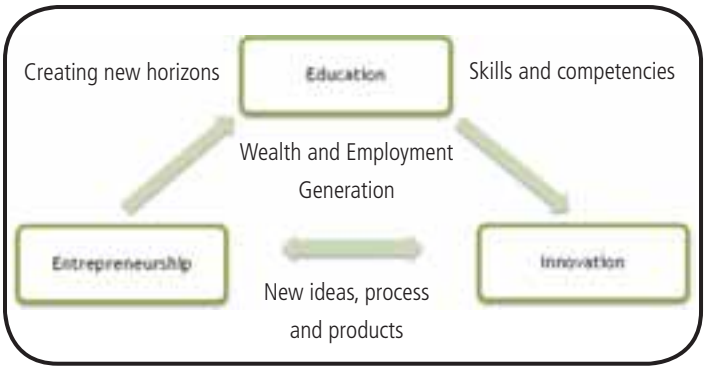


Figure 2: Dynamic entrepreneurial environment
(Source: Entrepreneurship, National Knowledge Commission, Government. of India)

In this regard, the universities and training institutes need to understand the requirements on the ground and then modified the curriculum in order to include appropriate managerial and vocational training modules leading to skill development. The curriculum and the training provided should expose the students into the world of food and agribusiness and thus motivate such graduates to become entrepreneurs, with the ability and skills to organise and run small and medium scale food and agro-processing industries, farm cooperatives, agri clinics, food and agro-parks etc. and help in improving the efficiency and economics of farming and processing. Earn while you learn and Catch them Young programs help in inculcating the spirit of entrepreneurship in students. Through such

initiatives the campuses can become the breeding grounds for innovations and innovators. Grants to promote such innovations, such as the Youth-to-Youth Fund provided by Youth Entrepreneurship Facility of Africa, can be provided to the selected food and agripreneurs to help them in starting their venture. Lectures on the importance of ethics, transparency and governance should be imparted along with regular courses to inculcate the right environment for doing business. Linkages with the food and agricultural industry, incubation centres, business chambers etc. would tremendously help the students in believing in their start-up and it's potential. It will also inculcate thinking out of the box and ultimately enable them to come up with innovative ideas for meeting the industry requirements.

However, agribusiness ventures face many difficulties due to the complexities involved in dealing with live systems apart from understanding the knowledge of running an agribusiness venture, motivational and knowledge issues to Government regulations, financial assistance, market development etc. Non-availability of scientific support and skill sets can further derail the venture. To mitigate the problems some steps have already been initiated while some need to be developed.

4.2. Funding

To support the entrepreneurs, the Government has provided lot of support on developing the SME sector, besides directing the financial agencies to provide credit to the sector. However, this has not yet fully benefited the start-ups, partly due to the risk-averse nature of the banking industry and the lack of a proper business plan from the part of the client. Even VCs and similar investors, who have larger funds, have not been funding food and agribusiness start-ups since their ROI are not as attractive as that of technology-related start-ups and the risks associated with agriculture is very high.

The Ministry of Food Processing has a number of schemes to promote entrepreneurship in this area. In addition, this problem can now be addressed with business incubators standing as collateral. The Ministry of micro, small and medium enterprises has already been offering such support to technology and industrial start-ups through an incubator that has now started offering assistance to agribusiness start-ups as well. Others like DST, TDB and TePP has also started mobilizing funds through this channel. However, a multilateral funding approach involving Government funding agencies and private firms needs to be adopted for supporting the start-ups and innovators and scaling-up successful ventures. The Government may adopt a professionally managed VC program to help the agripreneurs as is done by the Governments of Singapore and Israel that can be directly targeted to the agri start-ups in the rural sector.

4.3. Developing skill competency

The National Skills Authority can help in ensuring that the skill set of the entrepreneur especially the farmers and the next generation entrepreneurs is competent to meet the requirements of the business domain. Since Indian agriculture is primarily in its rural areas, investments should be made to ensure that infrastructure for imparting skills and vocational training are made available at the last mile. This can be adopted at the Block level and can be devised based on the nature of the locality. The skill set imparted should be relevant and in line with the resources and raw materials that are available in that territory. Special focus should be given to imparting required skills to women so as to empower them to take up agriculture based entrepreneurial activities in their locality and to support their livelihood means.

4.4. Improved support systems

Clearances and mandatory licensing that are required for setting up of the ventures should be cleared through as quickly as possible, preferably through a single window system. e-Governance and simplified regulatory policies will be a major fillip. Tax sops and other incentives should be extended to the agribusiness sector also. The Government should increase its investment in setting up infrastructure related to the agricultural sector and help in realising a better profit to the farming community.

4.5. Support of Chambers of Commerce/ Industrial Associations/Other Networks

- Chambers need to take active steps to give prominence to regular entrepreneurial meetings, discussions and networking.
- Chambers need to go beyond mid-size and large companies to reach out to young entrepreneurs.
- Scale up current initiatives on Entrepreneurship; coordinate across associations and networks, and beyond metropolitan cities and top educational institutions.
- Create networks of Entrepreneurship initiatives that are being undertaken across the country.
- Strengthen mentoring programs for upcoming entrepreneurs and actively leverage networks with successful entrepreneurs.
- Provide platforms for discussing entrepreneurial best practices and experiences by holding nationwide workshops.
- Create forums for partnerships with and mentoring by financial institutions.

4.6. Food and Agri-business Incubators

Young start-up companies are particularly vulnerable in their early stages. The business environment is generally prone to risks, since there are not many options for testing one's idea due to lack of funds and support. Studies show that worldwide close to 66 percent of new start-ups survives after two years of starting while it is 44 percent after four years. OECD study shows that over 70 percent of the start-ups windup their operations by the seventh year.

Business Incubators like the Agri-Business Incubation (ABI) program at ICRISAT provide an attractive framework to entrepreneurs (referred to as incubatee/client in incubator terminology) for dealing with the difficulties faced during start-up stages. Incubators provide the backup that small and new firms encounter by providing numerous business support services that are useful in fostering technological innovation and industrial renewal.[15]

They can be viewed as a mechanism to:

- support regional development through job creation,[16]
- create new high tech ventures, technological entrepreneurship, commercialization, and transfer of technology;[17]
- deal with market failures relating to knowledge and other inputs of innovative process.[18]

Business incubators provide the following support for a fledging start-up:

- Scientific and technical backstopping
- Technology transfer from University and Research Institutes
- Business plan and marketing consultancy
- Infrastructural facilities like office space, conference rooms, and communications
- R&D lab space
- Mentoring assistance
- Access to funding agencies
- Training to incubates
- Promotional support through exhibitions, conventions, workshops etc.
- Reduction of operational costs
- Networking with Industry, Research bodies, Commerce chambers etc.
- Assistance in getting clearances from Government regulatory bodies and Licensing bodies
- IPR management

In general, with incubation support, the closure rate of new star-ups has come down to 15-20 percent among incubator tenants.[19] Although, there are over 3500 business incubators across the world, most relate with the ICT and ITES sectors. In fact, there only about 60 incubators in the world that are in the agricultural sector, of which India has 11, making it the country to have the most number of agribusiness incubators.

[14] Entrepreneurship, National Knowledge Commission, Govt. of India (2008), pg.92

[15] Allen and Rahman 1985; Similar and Gill 1986; Allen and McCluskey 1990; Mian 1996a

[16] Allen and Levine 1986; Mian 1997; Thierstein and Wilhelm 2001; Roper 1999

[17] Mian 1994, 1997; Phillips 2002; McAdam and McAdam 2008

[18] Colombo and Delmastro 2002

[19] Bruton 1998; Adegbite 2001; Lalkaka 2002;Abetti 2004

Business incubators also help in generating benefits for the society and its parent institutions, if associated with it. Incubators have evolved over the years since the inception of the first incubator in 1957. The stages in business incubation mirror that of the agri start-up and can be described as given below:[20]

Agri start-up ventures can be incubated at any of the stages mentioned earlier. Pre-incubation stage can be offered for helping individuals who have an innovative idea. These incubators are usually attached to Universities and Research Institutes and have easy access to scientific and technical support. The risk factor will be high at this stage and can be mitigated by the incubator.

Incubation stage is where the idea transforms into a plan that can be operationalized. Incubators can help in refining the plan, provide resources and even invest in the company, thereby, financially supporting the start-up. This is the stage where incubation actually happens. The stage will help the incubate in moving to a more mature stage in the business cycle which is usually for a period of five years.

Post-incubation stage can be utilized by those agribusiness ventures that are looking for specific support facility. This will also help the incubator in supporting their other incubates and programs. The risk factor is very low at this stage.

Business incubator networks are spread across the world. Some of the prominent incubator networks are NBIA, AABI, APIN, and infoDev (that has a program specifically for agribusiness). India also has its own agribusiness network by way of NIABI (http://niabi.in/) that was setup in 2009. The mission of NIABI is "To enhance agri-business development and impacts on agriculture through co-business incubation".

This provides yet another opportunity for agribusiness entrepreneurs in connecting with other incubates, research bodies and industries that will help in its success. Through co-business incubation, technology transfer and scientific support can be made within the network that is spread across the country. It can also be used for linking with potential customers that can lead to commercialization of the venture.

5. Conclusion

The Indian Food industry needs to take a 360° approach in order to meet the challenges of ensuring food and nutritional security. These challenges have been enumerated in this paper in detail. These challenges need to be looked at positively and further analyzed critically in order to come up with strategies that promote an inclusive growth of the Indian food industry benefiting all stakeholders of the value chain. Small holder farmers and small scale entrepreneurs need the right environment to enable them to develop and carry out their businesses, through appropriate capacity building as well as infrastructure for supporting innovation. It's time that the India food industry takes the right steps to promote food and agribusiness as part of its efforts in addressing the challenges facing the country.

[20] Mixed use incubator handbook, infoDev, 2009

about IL&FS

IL&FS Cluster Development Initiative Limited (IL&FS Clusters) is an initiative of Infrastructure Leasing and Financial Services Limited (IL&FS), a leading institution in the field of infrastructure development promoted by UTI, Central Bank of India and HDFC. IL&FS Clusters has been set up to leverage on the experience gained from design and execution of several programs for development of SMEs on cluster-based PPP approach. Set up as a strategic business unit in IL&FS in June 2005, IL&FS Clusters as a separate entity initiated operations in April 2007. In a short span of coming into operation, IL&FS Clusters has developed a high degree of expertise in the development, implementation, financing and management of Cluster Development Initiatives across a wide range of sectors such as textiles, leather, agriculture, rural business, livelihoods etc.

The Vision is to provide commercially sustainable, integrated business and institutional framework and solutions for development of Micro, Small and Medium Enterprise (MSME) clusters on Public Private Partnership (PPP) basis that would enable them to become globally competitive.

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about ICRISAT

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world. Covering 6.5 million square kilometers of land in 55 countries, the semi-arid or dry land tropics has over 2 billion people, and 644 million of these are the poorest of the poor. ICRISAT and its partners help empower these poor people to overcome poverty, hunger and a degraded environment through better agriculture.

ICRISAT is headquartered in Hyderabad, Andhra Pradesh, India, with two regional hubs and four country offices in sub-Saharan Africa. It belongs to the Consortium of Centers supported by the Consultative Group on International Agricultural Research (CGIAR). ICRISAT conducts research on five highly nutritious, drought-tolerant crops – chickpea, pigeonpea, pearl millet, sorghum and groundnut.

It also develops sustainable management of semi-arid tropic (SAT) systems through efficient and sustainable management of natural resources, and enables policies and institutions for improving livelihoods and achieving food, nutrition and health security while protecting the environment.

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Established in 1927, FICCI is the largest and oldest apex business organisation in India. Its history is closely interwoven with India's struggle for independence and its subsequent emergence as one of the most rapidly growing economies globally. FICCI plays a leading role in policy debates that are at the forefront of social, economic and political change. Through its 400 professionals, FICCI is active in 39 sectors of the economy. FICCI's stand on policy issues is sought out by think tanks, governments and academia. Its publications are widely read for their in-depth research and policy prescriptions. FICCI has joint business with 79 countries around the world.

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