Food & Agribusiness Sector in India: Poised for the Next Big Leap

Focus Sector: Dairy

Focus State: Maharashtra

Themes
- Rural Economy: The Transformation in the Making
- Brand India: Taking India to the World
- Innovation: The Next Big Engine of Growth
- AgTech: New Paradigms of Transformation

In Conversation With
Smt. Harsimrat Kaur Badal
Hon’ble Union Minister
Ministry of Food Processing Industries

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EDITOR’S NOTE

INDIA’S FOOD & AGRI ECOSYSTEM: UNDERGOING A PARADIGM SHIFT!

The role of agriculture sector in India’s economy cannot be understated. While it contributes only 16 per cent of GDP, it employs 49 per cent of people. The sector has a massive indirect impact on allied sectors of the rural economy, as well as a significant ripple effect on the manufacturing & services segments of the national economy. The Government too is looking at implementable recommendations and solutions from various stakeholders for doubling farmers’ incomes by 2022. The role of Food Processing & Agriculture Technologies as enablers towards this endeavor, is significant.

The inaugural international investment summit World Food India 2017, followed by a Union Budget which had a strong rural & agri focus, have reiterated the Government’s focus on the above.

This edition of CFO Insights with the theme “Food & Agribusiness Sector in India: Poised for the Next Big Leap” therefore comes at a very opportune time.

Our editorial team reached out to the Government, regulatory authorities, economists, industry, global thought leaders & the start-up ecosystem for their 360 degree views and insights on the theme.

In this edition we have covered many interesting features & articles across five key segments namely, AgTech, Innovation, Rural Economy, Brand India and Global Collaboration.

The cover story with Hon’ble Union Minister, Ministry of Food Processing Industries, Smt. Harsimrat Kaur Badal provides a glimpse into how the Ministry over the past 4 years has lent a completely new face & paradigm to the Indian Food Processing Industry.

Contributory articles from industry stalwarts & leaders highlight the stellar role being played by the corporate sector in transforming the rural economy, hand in hand with a collaborative partnership with farmers & the Government alike.

Success stories of start-ups doing some highly impactful work to revolutionize the sector have also been covered to echo the entrepreneurial optimism in this sector.

As part of the special feature, Maharashtra has been identified as the Focus Region and Dairy as a Special Sector in this edition.

In all, through this edition, we hope to present our readers a comprehensive view of interesting developments shaping up the country’s food & agribusiness ecosystem. I hope you will enjoy reading this special edition as much as we did in putting it together.
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Introduction
In recent years the Government of India has initiated a number of reforms related to agricultural marketing which are likely to have far reaching positive impact on farmers’ income. Launching of electronic National Agriculture Markets (eNAM) is one such measure. It would interlink various agri markets within the State and the country by creating a unified market through online trading platform, both, at State and National level. The eNAM is expected to promote uniformity in agriculture marketing by streamlining of procedures across the integrated markets, removing information asymmetry between buyers and sellers and promoting real time price discovery based on actual demand and supply. Similarly, the Model Agricultural Produce and Livestock Marketing (Promotion & Facilitation) Act, 2017, introduced by the Government of India, incorporates various changes to reflect the agenda of a unified national market for agriculture, besides facilitating alternate market channels, including opening up the system to private sector as well for alternate online marketing platforms. Co-ordinated development of transport and logistics infrastructure for pan-India delivery of agri produce transacted on eNAM coupled with arrangements for assaying, grading, storage, dispute settlement, amongst others will create tangible impact of progressive reforms aimed to ultimately benefit the farmers.

Meanwhile, farmers are facing problems of low price realisation as market price discovery based on actual demand and supply. Similarly, the Model Agricultural Produce and Livestock Marketing (Promotion & Facilitation) Act, 2017, introduced by the Government of India, incorporates various changes to reflect the agenda of a unified national market for agriculture, besides facilitating alternate market channels, including opening up the system to private sector as well for alternate online marketing platforms. Co-ordinated development of transport and logistics infrastructure for pan-India delivery of agri produce transacted on eNAM coupled with arrangements for assaying, grading, storage, dispute settlement, amongst others will create tangible impact of progressive reforms aimed to ultimately benefit the farmers.

Promotion of Farmers’ Collectives
Traditionally, the agricultural marketing chain in India is very long with a large number of intermediaries between producers and consumers, resulting in added costs at every level without incremental value at each level. The Dalwai Committee on Doubling Farmers’ Income (2017) has pointed out that share of farmers in consumer’s price is very low; it generally varies from 15 to 40 per cent for perishable commodities, which has been further confirmed by studies conducted by the International Food Policy Research Institute and World Bank. The multitude of middlemen, amongst others, is primarily responsible for farmers not realising a reasonable price for their produce, lowering farm income and profitability. Therefore, there is a need to reduce the length of marketing chain through aggregation of farm produce by Farmer Producer Organisations (FPOs) and taking over some of the roles of market intermediaries.

The formation of FPOs, particularly of small and marginal farmers, has been considered as effective means of enhancing farmers’ income and boost agriculture growth. Hence, it is important to promote FPOs of small & marginal landholding farmers in appropriate geographies, depending upon availability of potential clusters, commodities and market opportunities.

Recognising the importance role that can be played by FPOs, the Government has announced a favourable taxation treatment for the FPOs in the Union Budget of 2018-19 aimed at helping farmers aggregate their needs of inputs, farm services, processing and sale operations. This step will give a major impetus in promoting FPOs across the country.

Adoption of Value Chain Approach
The composition of Indian agricultural production is undergoing steady changes, as farmers have started diversifying production and increasingly higher share in agriculture output is coming from dairy, fruits and vegetables, etc. There is a need to adopt value chain approach characterised by a market-
focussed collaboration of enterprises working collaboratively to produce, process and market products and services in an efficient manner. Value Chains allow businesses to respond to the marketplace by linking production, processing and marketing activities to demand. Sugar and milk are two traditional value chains that have stabilized in different parts of our country. These two value chains play a significant part in the livelihoods of many small farm households. The oilseeds sector has also developed value chains, as the processing requires aggregation. Cotton, rubber and plantation crops such as coffee and tea have organized value chains in many locations where the relationships between the producer, aggregator, processor and marketer continue over a long time. There is a need to promote similar value chains for varied location specific fruits and vegetable produce across the country.

Strengthening of Agri Marketing Infrastructure

Indian agriculture is dominated by small and marginal farmers, who constitute about 85 per cent of total landholdings, with around 40 per cent share in the total marketable surpluses. The current agriculture market system comprises a total of 2,284 APMCs which operate 2,339 principal markets and 4,276 sub-market yards. The existing agriculture marketing infrastructure in the country are old, traditional with outdated technology, thus necessitating a need to improve marketing infrastructure. The small & marginal farmers, with uneconomical sized marketable lots, find it difficult to aggregate their produce and move to these APMCs to participate in the auction system for suitable price discovery. They, therefore, use local agents and traders, who relieve the small farmer of their produce at locally determined prices, to function as aggregators and transport to transact at the APMCs. This intermediation has naturally been depriving the producers from aiming for optimal or market-linked price realization. The current market architecture does not provide farmers with a choice of markets but imposes constraints to their selling options.

In addition to APMCs, there are a large number of rural periodical markets (rural haats) that are located at village level. These small haats / shandies operate at intervals of a week or two and attract both sellers and consumers from the hinterland. An assortment of daily needs including farm produce (grains, fruits & vegetables) are traded at these places. These haats numbering about 23,000 all over the country are owned and managed by different agencies, namely, individuals, panchayats, municipalities, including State Agricultural Marketing Boards (SAMBs) / Agricultural Produce Market Committee (APMCs), etc.

To enhance farmers’ access to market and feed wholesale markets, these haats need to be upgraded into a function that enables aggregation and transport from village level to wholesale markets of choice. There is a need to build on the available infrastructure and experience of haats to provide the two following services viz. direct marketing between producers and consumers and aggregation platforms for the small lots of farmers.

The haats need to be developed as the foundation of new agri market architecture, with facilities to aggregate and organize flow of farm produce and thereby, bring primary post-production activities at village level. These haats serve dual function of serving as local retail markets as well as assembly and aggregation centres – thus deepening market structure and increasing direct participation from small and marginal farmers.

Each rural haat would suitably take up the services of a village level logistics hub, where horticultural produce would undergo pre-conditioning and other agricultural produce would be assayed and graded for onwards connectivity to next level markets. Hence, the rural haats would necessarily have facilities that will allow first stage post-production activities at the first mile, located close to the villages and farms.

The Government of India has recently announced setting up of an Agri-Marketing Infrastructure Fund with a corpus of ₹2,000 crore for developing and upgrading agriculture marketing infrastructure in 22,000 Gramene Agriculture Markets (GrAMs) and 585 APMCs in the budget for 2018-19. This move is likely to facilitate investment in augmenting infrastructure facilities in rural haats and enable small farmers to sell their produce directly to consumers or to local aggregator and thereby realize better price for their farm produce.

Conclusion

More than ever before, the country’s agricultural marketing sector is garnering attention across all corners. It is time to recognize that farm production and marketing would have to together go hand-in-hand to benefit farmers and consumers. Farmers need to be empowered to decide when, where, to whom and at what price to sell. The dependence on middlemen needs to be reduced drastically. The seasonal spike in prices of perishable commodities that pushes up the food inflation, without benefitting farmers, cannot be addressed without market reforms. Three suggestions given in this article, viz. promotion of farmers’ collectives, adoption of value chain approach for fruits and vegetables and improving rural agriculture marketing infrastructure can go a long way in improving price realisation by small and marginal farmers and making agriculture markets work for them.

Opinions expressed in the article are the author’s own
Promoting Investment in Food Processing Sector in India

Shri J. P. Meena
Secretary
Ministry of Food Processing Industries, Government of India

On Government initiatives to promote investments in India

Introduction
With a population of nearly 1.3 Bn and a rapidly growing middle class spending a high proportion of their disposable income on food, the Indian food and retail sectors are poised to witness tremendous growth in the coming years. The country today is already a US$ 2.4 trillion economy (9.44 trillion PPP in international Dollar terms) and IMF expects it to remain amongst the fastest growing large economies in the world in the coming years. Increasing per capita income, growing urbanization, changing lifestyles, rising participation of women in work force, and above all, rapid globalisation has provided fillip to the growth of this sector. As per a recent projection, total consumption of the food and beverage segment in India is expected to increase to US$1.14 trillion by 2025.

Demand & Supply Dynamics
Side by side, the composition of food production and demand is undergoing change. Increasing awareness about nutrition, affluence of working population and access to information have led to an increase in use of health supplements, nutraceuticals, organic food as well as other high value products. All these factors have led to a paradigm shift in the demand for processed foods and composition of food processing sector. This will impact not only food processing industry but also other related segments such as machinery manufacturers, cold chain, logistics operators, retailer and, most importantly, the farmers.

On the supply side, India presents abundant sources of raw material to meet the demands of food processing industry. The agro climatic advantage and diversity of climatic zones makes India a home to a variety of fruits and vegetables, spices, cereals, marine produce, plantation crops and ingredients which are relished all over the world. The production advantages are huge, however, the level of processing for perishables continues to be very miniscule at round 10 per cent and even lower for fruits and vegetables (~2 per cent). On the other hand, the level of wastage of agri produce is very high and is estimated at over US$ 15 Bn annually. These two factors pose both challenges and opportunities. Challenge to the Government in terms of creating an ecosystem and enabling environment for investors to invest in food processing sector; and, on the other hand, an opportunity for investors to benefit from what the sector has to offer.

Investment Facilitation
To facilitate investment in the food processing sector, the Government of India has undertaken several major reforms and initiatives. One of the key economic reforms was permitting 100 per cent FDI under the automatic route in food processing industries and 100 per cent FDI in trading, including e-commerce, for food products manufactured or produced in India through government approval route. A number of fiscal incentives are provided to food processing and related activities to promote food processing sector: 100 per cent Income Tax exemption is permitted on profit for new food processing, preservation and packaging units for first 5 years and 25 per cent (30 per cent in the case of companies) thereafter for next 5 years. 150 per cent investment linked deductions is permitted on capital expenditure for setting up and operating cold chain. The Government has also implemented Goods and Services Tax (GST) by merging a number of central and state taxes. Implementation of GST makes India truly one country, one tax and one market. This major reform is aimed at reducing tax cascading, adding to logistics efficiency, and making it easier to do business. Under GST regime, nearly 80 per cent of raw and processed food products are covered in lower tax slab of 0 per cent, 5 per cent and 12 per cent conveying pro-investment commitment of the government in food processing sector with overreaching objective of doubling farmers' income by 2022.

Another important initiative has been the introduction of one umbrella scheme — the Pradhan Mantri Kisan SAMPADA Yojana (PMKSY) which is being implemented with an allocation of around US$ 1 Bn. PMKSY is a comprehensive package of support which will result in creation of modern infrastructure with efficient supply chain management from farm gate to retail outlet. It will not only provide a big boost to the growth of food processing sector in the country but also help in providing better returns to farmers and is a big step towards increasing farmers income, creating huge employment opportunities especially in the rural areas, reducing wastage of agricultural produce, increasing the processing level and enhancing the export of the processed foods.

India's geographical location gives it a unique advantage, having convenient connectivity to Europe, the Middle East and Africa (amongst others) from the western coast and Japan, Singapore, Thailand, Malaysia, Korea, Australia and New Zealand (amongst
any investor can hardly ignore. The sector has emerged as a high growth and high-profit sector which any investor can hardly ignore. Today, India’s food sector has emerged as a high growth and high-profit sector which any investor can hardly ignore. In order to take the growth story forward, major announcements have been made in the Budget 2018-19. Doubling the allocation for food processing sector; over the preceding year, in the budget for 2018-19 to ₹1,400 crore marked the culmination of a series of initiatives the government has been taking over the last few years for promoting food processing sector. Apart increasing the size of allocation, the announcement highlighted a series of steps to be taken for holistic development of the sector and increasing farmers income. These included support for cluster approach for increasing agri-produce for processing and expansion of processing facilities, connecting farmers with consumers, strengthening agri-logistics & supply chain infrastructure, promoting professional management, increasing the flow of credit through establishment of agro-processing financial institutions etc. An “Operation Green” programme, with an allocation of ₹500 crore, has been envisaged for three basic vegetables, Tomato, Onion and Potato, covering all these elements to connect farmers directly to consumers.

Conclusion
Sustainable growth of food processing sector would require full participation of all stakeholders and equitable distribution of the benefit accruing to the sector. Among all the stakeholders, the farmers remain the key but most vulnerable participant. For the food processing industry to grow and prosper, it is very essential to strengthen farmer-industry connect for ensuring predictable supply of raw material of desired processable variety to the processors and relatively stable earnings for the farmers. Such collaborative efforts have been found to be very successful in some of the processing segments in dairy, banana, potato, tomato etc. These successful model of symbiotic relationship need to be further nurtured and strengthened to avoid the situation of distress sale by the farmers and inadequate availability of processable variety to the processors. It is declared policy of the government to double farmers’ income by 2022. Strengthen farmer-industry connect is the key to achieve this objective.

Opinions expressed in the article are the author’s own
Catalyzing Rural Prosperity: The Five Pronged Approach

Rana Kapoor
Managing Director & CEO
Chairman YES Bank

The five pillars of rural prosperity - Effective and Efficient Markets, Cluster Approach, Sustainability, Agritech and Food Processing

The Union Budget FY19 is defined by Prudency, Expediency and Inclusiveness - where an integrated 5-pronged approach to rural prosperity has been focused on, through market development, a cluster approach to value chains, sustainability principles, promotion of Agritech and focus on food processing. This integrated approach will help actualize rapid socio-economic development of the rural economy.

Efficient Markets

The Government has demonstrated a bold intent to offer a State-administered price support mechanism to farmers for a larger basket of commodities. Continuing in the true spirit of cooperative federalism, the move to offer the difference between the market prices and MSPs, through a consultative approach with States, will ensure that the farmer benefits from the deal and the industry does not face vagaries of market distortions. A liberalized export regime will further help Indian farmers realize the full potential of integration with global opportunities. The farm value chain will also be a prime beneficiary of an all time high allocation to road and rail infrastructure, especially in the high value perishables space.

Setting up an institutionalized mechanism for deployment of scientific demand forecasting techniques, popularizing warehouse financing mechanisms and an enhanced thrust on spot futures integration through a larger eNAM network, are measures which will definitely pave the way for a comprehensive price discovery, transaction enablement and price risk management mechanism for farmers. For eNAM, the move to integrate 22,000 rural haats as well as to set up a dedicated ₹2,000 crore Agri Market infrastructure Fund will rightfully integrate - both physically and institutionally - the last mile to this larger marketing architecture. Dovetailing of various existing Government infrastructure schemes will further boost investments for eNAM.

Cluster Approach

Through a coordinated mechanism of well integrated production and processing clusters, duly supported by respective Ministries, processing levels in the perishables space are poised to increase from the current 10 per cent to over 20 per cent levels. This will not only help us transcend from a supply-side to a demand-side driven value chain, but will also boost efficient infrastructure utilization in designated clusters.

The role of a new specialized financial institution, which is being proposed for promoting the processing sector, will help the industry and in turn significantly benefit farmers through backend outreach interventions of FPOs, Corporate players and Cooperatives anchoring these value chain-based clusters. Agri logistics focused allocation and tax incentives or support to FPOs and MSMEs will create the perfect recipe for a self-sustaining ecosystem to support these clusters. Fully leveraging Jan Dhan Accounts for offering an entire bouquet of granular financial services, enhanced target of lending ₹3 Lakh crore through the MUDRA Yojana, farm credit target of over ₹11 Lakh crore, capital support and interest subsidy for MSMEs and unique refinancing avenues will provide the much needed safety net for manufacturing and services players supporting the farm sector.

The Government, in the FY18-19 Union Budget, has identified following focus clusters for nurturing:

- **Horticulture**: Allocation of ₹500 crore for ‘Operation Green’ is the right step towards efficiently manage demand-supply gaps, as well as building a scalable business model integrating the best of aggregation, logistics, storage, processing and market linkages.

- **Organic**: Large scale organic farm clusters have been envisaged through promotion of FPOs. Women SHGs will also be encouraged to take up farming under the National Rural Livelihood Program and ₹75,000 crore...
has been allocated for SHGs. An agri inputs development program has been framed to promote conversion of cattle waste to compost, bio-gas and fertilizer.

**Fisheries and Animal husbandry:** Allocation of ₹10,000 crore to fisheries and animal husbandry is a transformational move. It is increasingly becoming clear that farm income must be diversified from within, as well as complemented by non-farm income sources. This is vital, both to supplement incomes, as well as mitigate risks.

**Bamboo:** Allocation of ₹1,290 crore towards cluster-based bamboo value chain development is an excellent move, particularly for the North East Region.

**Aromatic & Medicinal Crops:** Allocation of ₹200 crore will help promote commercialization of high value herbs and plants.

**Sustainability**

The move to catalyze diversification of more sustainable, climate smart and remunerative agricultural systems in the farm sector has been given prime importance. This has been suitably enabled through significant focus and budgetary allocations on medicinal & aromatic plants, organic food, bamboo and green and sustainable value chains. Organic inputs have been given well-deserved support through allocations for solid waste and cattle-based agri inputs initiatives. The crop residue subsidy will give a fillip to sustainable resource management, as well as catalyze better residue management economics for farmers. The dedicated Animal Husbandry & Fishery program will ensure larger non-field crop based income diversification, as well as risk mitigation mechanism for farmers and further the dual cause of substantially higher incomes as well as a sustainable rural economy. Extension of the Kisan Credit Card scheme to this segment will also be a big boon.

**Agritech**

The Agritech sector is the most deserving and best poised to reap benefits of AI, IoT, Machine Learning, Big Data and Blockchain technologies. The time is ripe for collaboration amongst academia, innovators, start-ups, industry and the Government to create unique and innovative solutions to address challenges and bottlenecks, through applications across the three domains of FinTech, FoodTech and FarmTech. The allocation of ₹3,000 crore to support the Digital India initiative can be aptly leveraged for this. Nurturing the start-up investment ecosystem will provide a much needed boost to worthy and deserving innovators coming up with solutions for challenges across the farm value chain.

**Food Processing**

Doubling fund allocation for the Ministry of Food Processing Industries to ₹1,500 crore will significantly promote investments into the sector. This will help reduce losses, enhance value addition and enable better price realization for farmers. Inter-Ministerial collaboration among Ministries of Food Processing, Agriculture and Commerce as well as Center-State coordination will be critical in facilitating these investments. As Agriculture and land are primarily State subjects, they require increased, seamless Center-State coordination for execution and speedy resolution of issues, including clearances and certification. Food safety is another area where close coordination amongst multiple Ministries is vital.

**Conclusion**

The Government has very aptly recognized the need for a balanced approach, incorporating the best of sustainability enablers as well as enterprise approaches, in order to ensure doubling of farmers’ incomes in India by 2022. The integrated five pronged approach highlighted above will indeed help actualize rapid socio-economic development of the rural economy in India, on a sustainable basis.
Introduction

A recent NITI Aayog paper pointed out a startling anomaly: Non-farming activities provide 2.67 times more productive employment than agriculture in rural areas. Yet, majority of India's rural workforce (64 per cent) is engaged in farming - thereby contributing only 39 per cent to the rural net domestic product. The significance of agricultural sustainability to the nation's progress cannot be overstated. It is, however, replete with challenges ranging from low farm productivity and fragmented landholdings to poor post-harvest infrastructure and weak market linkages.

Still, India's inimitable resilience has witnessed its transformation from a food-deficit nation to a net exporter of agricultural produce. The country exported an average US$ 30 Bn worth of agricultural produce in the last three years, registering more than 9 per cent export growth in the previous decade. With increasing globalization of agricultural value chains, India's farm progress is also critical to the smooth functioning of international trade and tweaks in its farm policies often have far-reaching universal implications.

India must therefore establish a stable, predictable and transparent agricultural trade policy to signal reliability to the global market while weaning domestic farmers from the low-growth and low-value cereal-dominated agricultural ecosystem. While allocations to major schemes (Irrigation and Fasal Bima Yojna) should rightly continue, the budget of 2018-19 has acted as a policy enabler to nudge farmers, traders and industry into high-value and sustainable agriculture - aimed at both domestic and export markets.

Agri Export: A Potential Game Changer

After assuming office, Shri Suresh Prabhu, Minister for Commerce & Industry and Civil Aviation has been emphasizing on a comprehensive agricultural export policy which will require reforms at farm, infrastructure and trade level. This would involve intervention in research and development; importing seed varieties; farmer extension blitz; farm cluster & FPO formation; land leasing reforms; crop re plantation; increasing hinterland connectivity and improving exit point infrastructure; aligning states with trade priorities; establishing sea protocols and quality standards; marketing & communications branding; and resolving market access issues. This will require both policy action and public investments for which required resources will have to be identified.

Farm Income Diversification

It is increasingly clear that farm income must be diversified from within and also complemented by non-farm income. This is vital in two respects: firstly, to supplement (and potentially double) farmer income; and secondly, to safeguard and buffer traditional income from farming. Accordingly, government allocations must nudge farmers towards export-oriented non-cereal, high-value and organic production. Nonetheless, it is imperative to plan such production nudges after mapping global and domestic market ability to absorb additional production of high-value crops. Some farm-level crop/product wise suggestions follow:

- **Marine Export** – Oriented shrimp farming provides an excellent opportunity to boost non-cropping farm income. There is potential for augmenting production in the states of Gujarat, Maharashtra and Karnataka in the areas of aquaculture. Development of countless tracts of brackish water and providing seawater irrigation system for aquaculture will be critical to boosting shrimp production and exports.

- **Horticulture** – Latest estimates suggest India’s horticultural production touched a record 305 Mn MT. Perishables have received a huge production boost with rising investments in cold chain infrastructure and better market linkages. This will prove particularly beneficial to fruits & vegetables where India has traditionally suffered from abysmally low farm yields and limited surplus of good-quality varieties amenable to the export market. Investment in export-oriented cluster development for augmenting production, boosting post-harvest infrastructure and an orchard replantation blitz are the need of the hour. The Finance Minister’s announcement for development of clusters during the budget speech on February, 2018 was a timely intervention for this initiative. Equally, one must nudge and enable private players to import seed germplasm and seed varieties...
of identified exportable crops from breeders across the world. After all, it was on the back of high-density orchard plantation, timely replantation and processing investments that China, in the early to mid-1990s, took over India as the leading producer of horticultural produce.

Cocoa, on the other hand, requires a production boost. Exports are increasing as is India’s own consumption of cocoa beans, chocolate and chocolate based products. The latter is growing at a much higher rate than its production. Still, cocoa is grown in less than 30 per cent of its potential area in southern states of Andhra Pradesh, Karnataka and Tamil Nadu. Imports from Indonesia and other nations such as Malaysia and Singapore fulfil India’s demands. Cocoa is not an essential commodity integral to consumer price inflation. It does, however, offer an excellent opportunity to boost farmer income and exports of cocoa based products.

Organic Ethnic and Novel Products – There is great potential to boost production and export of organic spices (turmeric, ginger, cardamom) and medicinal herbs (neem & its byproducts) from the North Eastern region. This requires greater farm extension activities along with investments in aggregation, marketing and processing infrastructure. India must also invest in R&D which leverages its 5000 year old traditional Ayurvedic knowledge to extract suitable phyto-constituents and promote nutraceuticals benefits of many of its traditionally grown crops such as Senna and Psyllium Husk (Isabgol).

Conclusion

It is worth reiterating that any move to boost non-cereal production must be in consonance with market demand. The recent glut in the pulses market is a case in point. Promoting diversification will require providing suitable price and procurement cushion to cover farmer risks, arising from both market and natural phenomena. Recently, attempts have been made to provide a price deficiency payment as a safety net (“Bhavantar Bhaarpai scheme”). While this is reassuring in the short-term, long term policy must be based on market led export opportunities. A buoyant agricultural ecosystem where any surplus which cannot be absorbed by the domestic market must be of such quality and variety that it may be channeled through exports. Agricultural trade may indeed play a key role in this direction.

Projects and programs which are the result of a public good are expected to pay off eventually. This can be set in motion by encouraging employment in agriculture and related activities.

Opinions expressed in the article are the author’s own
The food processing industry plays a significant role in the economic growth of any nation, primarily because of its impact on agriculture, food security and industry. It can transform lives and create social advancement. A strong and dynamic food processing industry helps in the reduction of food loss, reduces price volatility, empowers the farmers through better employment generation, promotes trade across nations and drives national prosperity.

The role of processed food products in India’s total food market is growing. It includes sub-sectors or business categories such as grain, pulses, dairy, meat, poultry, fisheries, dairy, confectionary, non-alcoholic and alcoholic beverages. It is estimated that currently in India there is a colossal waste of 30 per cent of food that is produced.

Considered as one of the largest and fastest growing Industry, India has attracted foreign investments worth US$ 7.81Bn from April 2000 to June 2017 in the food processing industry, making it the 13th largest sector receiving FDI in the country. Believed to be a sunrise sector, countries like France, Germany, Netherlands, United Arab Emirates and United States have made commitments during the World Food India (WFI) that was held in November 2017 to invest in the food processing sector in India.

The Indian Government has taken some decisive steps to further boost the industry. One such aspect is the introduction of 100 per cent FDI through the automatic route. The Government is also playing an important role in strengthening infrastructure of the supply chain, establishing food parks, promoting skill development and introducing new food processing technologies. It is believed that the food-processing sector has the potential to attract investment worth US$ 33 Bn and generate employment to approximately 9 million persons by 2024.
The correlation between agriculture and the food processing industry cannot be undermined. Both these sectors need to co-exist and build on its strength. Together, they can form a formidable force that can bring about transformative change by improving food supply, combatting food wastage, increasing farm incomes that would build resilient rural communities and display enormous economic potential.

Agriculture is fundamental to India's prosperity. The power of rural India in contributing to the food processing industry is immense. Approximately 2/3rd of our population resides in rural India. Despite rapid urbanisation nearly 50 per cent of our population are still directly and indirectly dependent on agriculture.

India has the second largest arable land in the world and is a key producer of wheat, rice, vegetables and fruits. It is the largest global producer of milk and world's third largest producer of eggs and fifth largest producer of meat. Our diverse agro-climatic conditions promote diverse crop cultivation. The total food production in India is expected to double in the next decade, which will make India the world’s largest food processing market by 2025.

The agricultural sector in India has been touched by periodic waves of reforms - land reforms, the green revolution and the cooperative movement, yet a lot more needs to be done. And perhaps the food processing industry is the sunrise sector that will drive new energy and dynamism, that will bolster this change. The industry and the policymakers have to provide further direction on how we invest in agriculture. Do we create a public-private partnership and build networks with civil society and development agencies that will make the sector efficient, sustainable and prosperous?

**Investing In Rural Communities**

Nestlé India has invested in rural communities by providing livelihood and overall welfare for farmers and their family members. By stepping up technical and agricultural production, creating sustainable water resource management and bridging skill gaps, we attempted to illustrate how profit and social impact can co-exist and complement each other in developing rural communities. It was in our own simple humble way, by taking small but steady steps towards rural development, the company charted out a strategy that was driven with purpose and commitment.

Our Moga factory has been instrumental in transforming the lives of the rural community in Punjab. Set up in 1961, the Moga factory has been working with milk farmers and ancillary suppliers to develop and strengthen the milk economy in the region. Approximately 90,000 milk farmers collect about 300 Mn kilograms of high quality milk across the states of Punjab, Haryana and Rajasthan. We have also trained over 68,000 women dairy farmers and harnessed their entrepreneurial spirit.

As part of the NESCAFÉ Plan, we enable coffee farmers to develop their agricultural practices in terms of quality, productivity and sustainability while supporting them in obtaining Common Code for the Coffee Community certification for better coffee prices.

The agricultural sector is one of the largest user of fresh water. Nestlé India took a conscious decision to enable the farmers about water efficiency and sustainability. We are collaborating with AgSri in Karnataka’s Kabini river basin to promote System of Rice Intensification (SRI) and Sustainable Sugarcane Initiative (SSI), by setting up demonstration farms and training farmers in ecologically sustainable practices to reduce water withdrawal from the catchment area while improving agricultural productivity. This helps the farmers to get more yield by using less seeds, less water and fewer fertilizers and over all cutting down the expenditure of the farmers.

**The Road Ahead**

Rural prosperity can only thrive when we empower rural communities, encourage their creative spirit, remove barriers, weave economic prosperity and combine it with making sure that rural communities have access to education, health and economic opportunities.

Opinions expressed in the article are the author's own
WE AIM AT MAKING INDIA THE FOOD PROCESSING HUB OF THE WORLD
FOOD PROCESSING:
A Key Enabler for Enhancing Farmers’ Income

Ministry of Food Processing Industries over the past 4 years has lent a completely new face and paradigm to the Indian Food Processing industry. Smt. Harsimrat Kaur Badal, Hon’ble Union Minister, Ministry of Food Processing Industries, has ably led the ministry in shaping key policy and regulatory framework for furthering the cause of this sector. Her role has been widely lauded by the domestic as well global food processing sector alike.

CFO Insights editorial team interacted with the Hon’ble Union Minister for a candid discussion on the food processing sector, World Food India, SAMPADA Scheme & many more.

Below is an excerpt from the conversation.

How has the Indian food Industry transformed in the last few years?

The food industry has seen a progressive transformation, both in terms of food consumption as well as processing. Changing food habits driven by convenience, growing concerns on health and awareness on food safety have led to technology upgradation, new and innovative product development and stricter adherence to food safety norms. However, the opportunities are still immense and we are yet to tap many of them. The last few years have set the right platform for growth of this industry and I am sure that the coming years will witness revolutionary outcomes. More interestingly this growth will be inclusive, i.e., growth will not only be driven by the urban populace but equally well by the rural masses and our farmers will play a very critical role in this growth story.

How is the Kisan SAMPADA scheme shaping up? What impact do you envisage 5 years down the line?

We have received an overwhelming response for the Kisan SAMPADA Scheme. This is a unique initiative by the Govt. of India for infrastructure development at such a large scale for food processing. We are also adopting a cluster based approach to establish the food processing industry near the existing production hubs. Most of this infrastructure is focused on perishables. The infrastructure created and the investment leveraged through this scheme will go a long way in enhancing food processing levels, reducing wastages and most importantly enhancing farmers’ income. With such measures put into place, wastages will come down by a minimum 50 per cent and processing level will reach around 20 per cent, 5 years hence.

Currently, just 10 per cent of food produced in India is processed and you are targeting to take it to 20 per cent. Your plans to scale up this industry?

The food processing levels in India are very low (~10 per cent) and even lower in our very strong fruits and vegetables segment (~2 per cent). The Ministry of Food Processing Industries (MoFPI) is working towards creating an overall amiable ecosystem for the sector right from providing access to agri information (up to district level) through our portal ‘Nivesh Bandhu’ to supporting infrastructure creation and also helping out investors to reach out to the right partners and facilitators.

Under our flagship program-Pradhan Mantri Kisan Sampada Yojana we will spend ₹6,000 crore over the next three years to create requisite infrastructure which will leverage investments worth ₹31,000 crore, handling of 33 Mn MT agro-produce valuing ₹1,04 lakh crore, benefitting 2 Mn farmers and generating half million direct and indirect employment in the country by 2019-20.

Mega Food parks are a critical element of this scheme and the Parks that have been created offer a great opportunity for
investors and entrepreneurs. They can use multiple facilities under the plug and play model, thus reducing heavy investment on processing infrastructure.

The entire infrastructure created under the Pradhan Mantri Kisan Sampada Yojana will bring in the best international technology to India. We aim at making India the food processing hub of the world.

We have also signed MoUs worth ~US$ 14 Bn with various food companies and the projects will be grounded in next 2-3 years. These projects and the units created under the SAMPADA scheme will together help achieve the objective of taking food processing levels to 20 per cent.

The allocation for food processing sector has been doubled to ₹1,400 crore in the recent budget. How will doubling allocation help in actualizing growth of this sector?

I am grateful to the finance ministry for favorably considering our proposal of doubling budget allocation. The fund would be utilized to create infrastructure at farm-gate level besides being used for preservation and processing of perishable fruits and vegetables; this will help in reducing wastages. Also a part of this budget would be spent towards creation of cold chain grid for seamless transfer of agricultural items from producing centres to consumption points.

Food processing as a sector has a deep rural connect. But how much will the farmer benefit through this transformational journey of the food processing sector?

As an industry the food processing industry is closest to farmers. Farmer connect is required for procuring raw material. Further, establishment of food processing enterprises in the vicinity of production center opens up additional marketing avenue for the farmer. We are also promoting backward linkages of these industries so that infrastructure development takes place at farm level and the farmer has option to store or process his/her own produce and avoid selling at distressed prices. Food processing is gradually emerging as a key enabler for doubling farm incomes and employment generation. Under our SAMPADA Yojana alone, we are envisaging an outreach of around 2 Mn farmers and significant job creation.

What has been the impact of World Food India? Your plans for the next edition?

WORLD FOOD INDIA 2017 was the first international standard investment summit in the food processing industry by the Government and has been successful in creating a positive impression across the globe. It has drawn tremendous response from Indian as well as the global food fraternity. All key players were present at the Summit and many have shown interest in establishing or diversifying or increasing their business in India. MoFPI and various State Governments, together have signed MoUs worth ~ US$ 14 Bn of investment and we are closely monitoring project-wise developments for each of our partners. We are also trying to resolve any bottlenecks and challenges towards grounding of these projects in the country. Such a huge amount of investment in the food processing sector will definitely be a turning point for the industry and have a direct impact on the farming community. On the consumption front the availability and accessibility of processed products will impact the demand of processed food positively.

We are definitely looking at the second edition of WORLD FOOD INDIA in 2019 which will not only show the developments of the projects committed & initiated in the inaugural edition but also address corrective measures to challenges faced during execution. We are certain that the second edition of the World Food India will be an important ‘block your calendar’ for industry captains across time-zones.
Traditionally Indian households prefer fresh to processed food. Do you think this is a major challenge for the industry?

In India, people are used to cooking & consuming fresh food. However, the new generation, millennials in particular, prefer ready-to-cook and ready-to-eat food, owing to convenience driven preferences, nuclear families, working women and fast changing consumption habits. There are many processed products like ghee, butter, curd, pickles, jams that have been an integral part of our daily diet. The only difference now is that instead of processing these at home, we buy them from the market. So, the demand is growing and so is the potential and opportunity. We have brought in a lot of infrastructure because we realize that processing is the way in future. Moreover, the Food regulator FSSAI has been taking very proactive steps towards food safety and standards, which has helped build a trust towards processed food in consumer mind.

What do you think of StartUps and Innovations in the food processing space?

Over the last 3-4 years we have seen a huge wave of innovation which is fast transforming the landscape of food processing value chain in India. In this context, I would like to mention the Food Processing Start-Up Awards (FPSUA)- a unique and first of its kind initiative, anchored jointly by MoFPI and YES BANK, which received an overwhelming response from start-ups. The Awards identified some really interesting start-ups which are addressing critical challenges in the processed food sector through interventions on shelf life improvement, innovative packaging & food products, supply chain solutions, renewable energy based last mile storage solutions and indigenous processing technologies. We are planning to continue the Awards this year also. India is poised to emerge as the food factory and food tech incubator of the world.

Food wastage off and on the plate is huge in India? What can we do to reduce this wastage?

Yes, I agree… the food wastage statistics in India is alarming! We waste agri produce worth around ₹92,000 crore. This wastage takes place across the food value chain. At individual level we can at least avoid food wastage on our plates. The wastages off the plate can only be curtailed through adequate infrastructure development and efficient supply chain management which is our priority now. During the World Food India 2017, the visitors pledged to reduce food wastage – this was an initiative to spur consciousness amongst individuals at personal level.
Warehousing & Logistics: Key Enabler of Growth for India’s Food & Agri-economy

Sanjay Kaul
MD & CEO
National Collateral Management Services Ltd. (NCML)

On how efficient agri logistics infrastructure is a prerequisite for ensuring healthy farm income and food security

Background

Logistics comprising transportation, warehousing, packaging and cold storage is the lifeline of any economy for facilitating flow of goods across the country’s geography and time horizons. Agricultural activities in India are seasonal as well location-specific. Storage infrastructure is required to carry over the agricultural produce from the production period to the rest of the year, while agri logistics is critical for carrying the agricultural produce from few centres of production to multiple centres of consumption.

Ironically despite being a major contributor to the nation’s GDP and a sector employing more than half of the nation’s workforce, the agriculture supply chain in India suffers from multiple inefficiencies leading to heavy losses of commodities due to lack of proper storage and transportation facilities. There is a significant gap between the quantity of agricultural produce which needs storage for its consumption round the year and its available scientific management, due to the unorganised nature of the market.

Demand-Supply Mismatch

Warehousing capacity in India has not kept pace with production and procurement increase. The Government buys grains from farmers but does not have space to store them. With procurement exceeding 63.68 Mn MT, adequate storage actually falls short. Importance of proper storage and preservation can be understood by the recent study carried out by CIPHET (Central Institute of Post-Harvest Engineering & Technology) which showed that the extent of annual post-harvest wastage of major agricultural produce at national level in the wake of improper logistics in the country amounts to be of the order of ₹92,651 crore, which can be avoided by putting modern scientific storage infrastructure in place. The other private sector studies show that the losses are even higher than numbers pegged by this study.

Annual wastage of agricultural produce as assessed by CIPHET (2016)

<table>
<thead>
<tr>
<th>Commodity/ Crop</th>
<th>Losses during Transportation ( per cent)</th>
<th>Losses during Farm Operations (including transportation loss) ( per cent)</th>
<th>Losses during Storage ( per cent)</th>
<th>Overall Total Loss ( per cent)</th>
<th>Monetary value of the loss (₹ Crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>0.02</td>
<td>0.71</td>
<td>0.21</td>
<td>0.92</td>
<td>4,409</td>
</tr>
<tr>
<td>Meat</td>
<td>0</td>
<td>1.99</td>
<td>0.72</td>
<td>2.71</td>
<td>1,235</td>
</tr>
<tr>
<td>Marine Fish</td>
<td>0.91</td>
<td>9.61</td>
<td>0.91</td>
<td>10.52</td>
<td>4,315</td>
</tr>
<tr>
<td>Inland Fish</td>
<td>0.17</td>
<td>4.18</td>
<td>1.05</td>
<td>6.23</td>
<td>3,766</td>
</tr>
<tr>
<td>Egg</td>
<td>0.36</td>
<td>4.88</td>
<td>2.31</td>
<td>7.19</td>
<td>1,320</td>
</tr>
<tr>
<td>Poultry Meat</td>
<td>0.66</td>
<td>2.74</td>
<td>4</td>
<td>6.74</td>
<td>3,942</td>
</tr>
<tr>
<td>Cereals</td>
<td></td>
<td></td>
<td></td>
<td>4.65-5.99</td>
<td>20,698</td>
</tr>
<tr>
<td>Pulses</td>
<td></td>
<td></td>
<td></td>
<td>6.36-8.41</td>
<td>3,877</td>
</tr>
<tr>
<td>Oilseeds</td>
<td></td>
<td></td>
<td></td>
<td>3.08-9.96</td>
<td>8,278</td>
</tr>
<tr>
<td>Total Losses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>92,651</td>
</tr>
</tbody>
</table>

A well-functioning agri-logistics and warehousing machinery is a prerequisite to nation’s food security, as it is to healthy income for farmers. Without access to storage, a farmer is a mere ‘price taker’ who must sell at prevailing rates, which every so often translates into distress selling. With lack of affordable and sufficient scientific storage facilities at production hubs, the farmer is compelled to sell the produce at throw away price to avoid deterioration of his farm produce. Ability to ‘store’ empowers a farmer and turns him into a ‘price maker’, as he can wait for the ‘right time to sell’.
Traditionally, agri warehousing industry was looked upon as an asset-heavy model giving importance to creation of the warehousing space alone, i.e., the focus was laid on creation of physical infrastructure rather than being innovative and creating a services based warehousing industry. However, lately a paradigm shift has been observed by moving the focus on providing ‘services’. This has led to creation of an integrated model wherein warehousing management, collateral financing and agri financing are provided under one umbrella. This model is a boon for agri-producers as it provides them with agri financing within hours of approval and ensures uninterrupted farming activity through generation of negotiable warehouse receipts against the produce in the warehouses. This provides the much needed liquidity for sowing the next crop. It also allows the transfer of ownership of that commodity stored in a warehouse without having to deliver the physical commodity and makes the trading of his produce hassle free. An impetus to such integrated models, with focus on scientific storage, is very much needed for the prosperity of the farm sector.

Scientific Storage—Need of the Hour

Technological advancement is now playing a vital role in stimulating growth with vertical scientific storage structures gradually replacing the traditional horizontal flat-bed warehouses for agri storage. Silo is a vertical tank like structure made of steel or concrete for bulk storage of food grains in controlled atmosphere. Silos offer several advantages depending upon their layout and automation. Silos require 1/3rd of the land as compared to conventional warehouses; for a 50,000 MT silo, it is estimated that 7 acres land is required. The storage of grain in a silo is possible for long periods without quality loss or damage through rodents. If food grains are stored in silos and transported in bulk, losses due to theft, pilferage and transportation would be negligible compared to food grains storage in bags in conventional warehouses. Mechanical devices such as conveyor belts arrangements for automatic aeration, etc. are used for automation. While mechanization makes silos comparatively more capital intensive, they require less time for construction. Because of mechanisation, silos use less labour in operations, handling is rapid and the overall operating cost low. Being a closed structure, aeration in a silo can be tightly controlled and fumigation operations can be carried out more easily, efficiently and effectively.

These modern and scientific means of storage constitute International Best Practices globally for grain storage and handling. As a result, in line with the suggestion made by the High Level Committee (HLC), Food Corporation of India (FCI) has been trying various models of Public-Private Partnerships (PPP) for its planned 2 Mn MT capacity creation through silos. The envisaged capacity creation is possible only through high level of investments from private players. Public-private sector partnership (PPP) brings in synergy, mobilizes resources and generates, validates and transfers technologies. The private sector is adept than government at bringing in the most up to date and cost effective technologies. Hence, it is imperative that private players take the responsibility for creating these agriculture infrastructure projects. In fact, this experience is pushing private players to construct silos for their own captive consumption.

Conclusion

Since “a food grain saved is a food grain produced”, need of the hour is to invest in scientific silo storage on a priority basis with corresponding dedicated transport facilities through bulk handling railway wagons. This will close the supply-demand gap and bring about a major transformation in the storage and logistics eco system. Scientific warehousing and logistics will be the key enabler of growth for the Indian food & agri-economy as it serves the twin objectives of achieving food security and enhancing farmer income.
Indian Agriculture: Waiting for the Next Revolution

Indian Agriculture is just waiting for the next revolution. India has the second largest arable land in the world (its 160 Mn hectares of arable land parcel makes it second only to US). It also has one of the lowest productivity figures across the world for most of the agri-produce – for Cereals, the productivity in India is 3.0 tons per hectare which compares low compared to 7.6 tons per hectare in US and 5.7 tons per hectare in Europe. If India were to equal the land productivity of USA, it would have a share of 25 per cent in world agriculture production, from the current 10.6 per cent. While the supply side has sizeable growth potential, there is no dearth in domestic demand of food, with a projected population of 1.52 Bn by 2030. Though the share of Agriculture in India’s GDP has shrunk considerably over the last 3 decades, at 17 per cent of GDP it is still an important lever of the Indian Economy, with 60 per cent of the country’s rural households still depending on Agriculture and its associated industries for their livelihood.

Low productivity in the sector is the result of various structural challenges. Only 51 per cent of the land is self-irrigated – the balance depends on rains for water. And the level of mechanization in Indian Agriculture is only 40 per cent - in comparison, agriculture in developed countries are almost 95 per cent mechanized. The individual land size is small - 70 per cent of land holdings are less than 1 Hectare, for whom the expense on cultivation is more than the income and hence these farmers are always under distress (most of them are below poverty line), having limited scope for working with newer technology. Equipment / technology, quality inputs as well as real-time information are not available, and the right price is not available for the produce in the absence of post-harvest stock protection and transport infrastructure and an absence of effective direct marketing facilities. As the reduction of available labour in the agricultural field is making the situation worse, the need for automation and increased awareness of modern farming techniques is more acute.

Food Service Industry is currently sized at ₹3 lac crore and is likely to cross ₹5.6 lac crore by 2022

The Demand Story

The demand for food in India is growing. That trend is likely to continue as disposable incomes increase and changes in consumption patterns favor a wider range of value-added, ready to eat foods. As urbanization continues and more women choose to work outside homes, the number of occasions for families to buy food from outside (rather than cook at home) is going up at an accelerated pace. The smaller towns are also catching up now on this trend. And an ever increasing number of people are now willing to experiment with their food – importantly, price is no longer the sole criteria to drive demand. A segment of consumers, particularly in metro cities, is also asking for healthier, fresher food ingredients that are free from preservatives, pesticides, antibiotics etc. All this is causing unprecedented demand for high value added agri-produce that go much beyond the traditional cereal based menu. Here is an opportunity for the Indian farmer to change the product mix and the farming techniques – and move to high value produce that can generate much higher value from the same hectare of land.

Food Service Industry is currently sized at ₹3 lac crore and is likely to cross ₹5.6 lac crore by 2022. There are 1.5 Mn restaurants in the country and this number is growing in high double digits. Given the relatively lesser investment needed to start a restaurant, and the creativity available due to the availability of all regional cuisines in every part of the country, more people are venturing into this space. Today, the industry is highly unorganized – only 3,000 restaurants out of 1.5 Mn restaurants are in organized sector. With the onset of food tech companies, every restaurant suddenly has a much wider reach – the daily orders being served by these food aggregators have reached half a million orders a day and are likely to reach 20 lacs orders a day in 2020. Interestingly, food service industry has a high value multiplier - the cost of goods sold is around 1/3rd of the value realization. It is also a sizeable employment generator - almost 25 per cent of the total restaurant costs comes from the labor cost.
Food Services Industry: The Catalytic Role

Food Service Industry is catalyzing transformation of Indian Agriculture in multiple ways:

- It is creating a demand for high value added products that can significantly increase the farmer’s income from the same hectare of land. And it doesn’t necessarily need land parcel consolidation as specialized ingredients of a large variety can all be produced in smaller plots of land.

- It gives a direct outlet to the agriculture produce by direct sourcing of fresh produce such as vegetables, fruits, spices etc. particularly as the demand is ever increasing for freshness, direct sourcing from farms, traceability to origin farm, increased sensitivity to usage of preservatives and additives, and increased awareness about the usage of pesticides and antibiotics.

- Restaurant industry is an all-round consumer of farm produce, dairy, poultry, fisheries, and horticulture. This encourages farmers to diversify into dairy and poultry / fishery thus reducing the risk associated with rain-led crop failures.

- Restaurant industry works at the forefront of preservation techniques as it needs to work with a large range of menu, brought together from various parts of the country and that have to be stored for longer duration as the consumer demand cannot be predicted easily. Research is ongoing along with various universities / research organizations to enhance the shelf life of whole & cut vegetables that will facilitate moving such vegetables long distances – directly from farms to the restaurants.

- The part load movement for frozen products have not yet taken off the way the courier industry is working so effectively in the country. As the restaurant industry expands and becomes more organized, the frozen couriering is going to get a boost.

- The road-side hawker business is undergoing a complete makeover, with the multi-fold increase in hygiene focus being driven by the Food Safety authorities. With the expansion in the restaurant industry, in the food tech / aggregator space and in the requirements of the street food industry, a whole new segment of ingredient suppliers is emerging that will consolidate food ingredients sourced from all parts of the country and from all kinds of farmers / farms and distribute the same to the individual restaurants, using the latest techniques in preservation and transportation. The day is not far when each farmer can become an on-line seller / marketer to such restaurant input suppliers and thus create direct market access for himself without worrying about either the post-harvest preservation or the right price realization.

Growth in the food service industry is going to be inextricably linked to the revolution in Indian Agriculture. The coming years are going to be the most exciting for this segment of Indian Economy.

Growth in the food service industry is going to be inextricably linked to the revolution in Indian Agriculture. The coming years are going to be the most exciting for this segment of Indian Economy.

Opinions expressed in the article are the author’s own
Building Sustainable Commodity Value Chains: A Win-Win for Farmers & Markets Alike

Giridhar Rao
Director - Global Spice Network
Griffith Foods

On the need for a collaborative synergy between farmers & the industry for developing sustainable commodity value chains

Farming is the most risky enterprise; more so with small holder farmers. In India the average land holding of farmers is less than an acre adding to the challenge.

Over the last few years, the advent of several cold chains in the country supported by collateral management services offered by Banks and Non Banking Financial Institutions has helped absorb some of the risks associated in storage. By and large, the farmer is severely exposed to uncertainty right from the time he prepares his land for sowing till the time he sells his produce. On the other side, there is a similar high degree of uncertainty facing the processors of Agricultural commodities or the exporters. They too are exposed to the risks of volatile markets, crop size, quality and authenticity.

While there are several hedging mechanisms available, they cover only a part of the risk and also cost money. Huge amounts of working capital is also needed to mitigate market and supply uncertainties by holding stocks.

Unfortunately the Futures markets in India have not evolved to provide proper hedging option to the producer or the end user and have been used merely as a platform for speculation.

In the end, both the producers as a group and the processors as another, face risks which to a large extent are complimentary. This brings in the idea of collaboration between the two entities in mutually beneficial relationships.

Currently such a synergistic relationship is not natural due to the prevailing trade practices. The result is that the farmers are exposed to the unorganized lending and trading channels leading to their exploitation. This, after continuing to grow crops exposed entirely to the vagaries of nature and poor knowledge of pest management. On the other side, end-users are exposed to highly unreliable supply chain which not only makes the product expensive but also unsafe.

Considering these pitfalls, there is a good case for the direct interaction of the producers with the consuming sectors. The bond may be in form of loose buy back agreement or can also evolve into an highly structured contract cultivation relationship.

In India the existence of developed markets and ease in access to on-line market price makes it easier to work out a mutually satisfactory pricing mechanism that helps in eliminating a major hindrance to the relationship.

Even, where the commodities grown are not traded in the market, the proxy method, of providing comparable returns to the farmers helps in sealing a good pricing agreement.

The participating company is able to pay premium to the farmers over the market price as they avoid several unnecessary costs normally incurred under the heads of handling, testing, warehousing, better yields, reduced processing wastage and above all completely eliminating the possibility of commercial adulteration.

This forms the essence of a mutually beneficial relationship between the two entities leading to long term sustainability of the cultivation as well as the processors’ business.

Picture Credit: Shutterstock
The table below depicts, how the benefits can be shared between the two entities thereby creating a “Shared value” relationship

<table>
<thead>
<tr>
<th>Benefits to the farmers</th>
<th>Corresponding benefit to the processor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better pest management promoted by the processor, leading to lower input costs and higher yields</td>
<td>Lower rejection percentage, lower cost of testing (example the company can test for only a few high risk molecules), Lower process loss</td>
</tr>
<tr>
<td>Good agricultural practices leading to reducing cost of production and improving yields</td>
<td>Consistency in quality, authentic sourcing and safe raw materials</td>
</tr>
<tr>
<td>Promoting Sustainable practices which benefits farmers in terms of better standard of living and better health</td>
<td>Leads to create a better relationship with farmers and their families and prevents loss of material through selling outside the relationship</td>
</tr>
<tr>
<td>Promotion of community welfare projects through farmers participation (e.g. drinking water, education support and so on)</td>
<td>Loyalty of farmers, more responsible farmers means the company can reduce cost of supervision and monitoring, lower cost of hedging</td>
</tr>
<tr>
<td>Buy-back guarantee provided by the processor to farmers provides an assured market to the farmer who need not worry about selling the produce in a regulated market where the sales are not assured or where he has to often resort to distress sales</td>
<td>Traceable sourcing leads realizing better prices for the products in the international market and better acceptance in supermarkets</td>
</tr>
<tr>
<td>Saving in time and cost for farmers as they don’t have to carry the produce to the markets. The processor buys at a nearby ‘collection center’ or even directly off the farm</td>
<td>Traceability, fresher and cleaner produce and improvement in market value of the end products made using these raw material</td>
</tr>
<tr>
<td>Warehousing taken care by the Processor and the farmer can use the common warehouse which is better maintained by the processor leading to better realization to the farmer</td>
<td>Better shelf life of the produce due to scientific storage methods in the common warehouse prescribed by good QA processes; Cut lead times in sourcing</td>
</tr>
</tbody>
</table>

Fundamentally, the companies involved in promoting backward integration programs and working directly with farmers stand to gain a lot from the experience in terms of better acceptability in the international market for their produce, better cost management and overall enhancement of the product shelf life

**Spices Map of India**

The table below depicts, how the benefits can be shared between the two entities thereby creating a “Shared value” relationship
Introduction

There was a heightened sense of expectation from the budget that it would address the farm sector stress through some near term measures and the budget did outline measures focussing on Agriculture. Note the Niti Aayog has already presented a framework identifying seven sources of growth that can help double farm incomes by 2022.

Indian farmers collectively produced 5x food grain over the last 6 decades and horticultural output is up 3x in the last 26 odd years. Moreover, food grain and horticulture outputs stood at a record 272 Mn tonnes and 295 Mn tonnes, respectively in 2017. Government policy initiatives are an important determinant of farm incomes but they typically get triggered in the event of crop failure and do not adequately address the issue of overproduction and consequent loss in realizations for farmers. Thus, the policy response function for agriculture must recognise that absence of rain or poor rainfall is not the only driver of stress. Even ‘normal’ or good rains can cause stress as higher output often translates into lower realisations.

Current policies do not adequately address the eventuality of lower realizations arising due to excess output.

Typically, Governments use a combination of Minimum Support Price (MSP) increase and higher procurement along with rural infra spend to alleviate farm distress. Even the budget leans heavily on the Market Assurance Scheme, which is a decentralised procurement of MSP-notified crops other than wheat and paddy by States where it shall be the responsibility of States to handle and dispose off the procured commodity. The Centre will compensate the States for losses, if any, in the process to a maximum of 40 per cent of MSP of the procured commodity.

However, there is enough documented evidence on the shortcomings of this approach i.e., constraints of FCI, the wastages involved, limitations of State Governments and the subsidy burden.

The need for a Three Pronged Approach:

- **Adopt State specific policies:** Agricultural households derive income from varied sources. Large farm households, i.e., owning more than 10 hectares of land depend primarily on cultivation. Whereas, small households with lower size classes of land derive their income mainly from wages and salaries. The composition of farm and non-farm income varies widely across states. More than 70 per cent of the income is derived from farm business in the states of Madhya Pradesh, Assam, Haryana, Punjab and Uttar Pradesh. Whereas, less than 50 per cent of the income is derived from farm business in West Bengal, Kerala and Tamil Nadu.

  Understandably, the growth path of the States in each source of farm income varies. Chhattisgarh registered highest growth in income from cultivation followed by Haryana, Madhya Pradesh, Andhra Pradesh, Odisha, and Punjab.

  High growth in income from cultivation in Chhattisgarh can be partially explained by the high budget allocation on agriculture and allied activities in comparison to other States. However, increase in budget outlay in other States, like Bihar had very less impact.

  While these measures are cyclical in nature, a more competitive price can be ensured to farmers through agricultural marketing reforms.

  The other important sources of farm income growth which directly improves output and reduces cost is increase in cropping intensity, area under fruits and vegetables and yield of food grains. Cropping intensity has improved in most of the States. The yield of food grains and area under fruits and vegetable increased considerably mainly in Madhya Pradesh and Karnataka.

  Diversification of household income to other agri-allied activities like livestock and non-farm activities is found to be a significant contributor to farm income growth. In most states, real income from livestock has
more than doubled in 10 years. Non-farm sector has the potential to create more productive employment as it contributes nearly 69 per cent of the National Domestic Product (NDP) by engaging merely 39 per cent of the workforce.

Growth of Madhya Pradesh has been remarkable in all the factors of income growth. Growth path other fast growing states differs - while income from non-farm activities in Andhra Pradesh and Odisha had a significant growth, Rajasthan witnessed high growth in income from livestock.

The two relatively important factors that can impart a positive nudge to growth in income of farmers are - **better price realization** and **diversification of income**. The key premise here is that co-opting of States will be critical to actualize the goal of doubling farm income. The role of an enabling environment by States has been more decisive in attaining tangible goals. A case in point is the stellar growth of Agriculture in Madhya Pradesh, where the leadership fixed both supply as well as demand side problems. The States will have to continue to play a meaningful role in next-gen agri reforms (legalising of land leasing, contract farming, repeal of APMC Act, eNAM etc.) and for expansion/modernization of farm marketing networks.

**Liberalization of Agriculture:** The fact remains that agriculture is still in the clutches of hugely restrictive laws which have inhibited it from developing into an efficient market place for agricultural produce. This is an area where the Centre can continue to play the lead role. There exists a maze of laws especially the Essential Commodities Act, the Land Ceiling Act, the APMC Act and the Foreign Trade Act, 1995, which enables arbitrary slapping of export restrictions, minimum export prices, and unfair imports.

Unless agriculture is unshackled and liberalised, both man and nature will continue to conspire against Indian farmers.

**Create mechanisms for responding to excess production:** Since it is equally likely that farmer realisations will be hit in times of overproduction, key variables including soil nutrients, environmental factors, progress of monsoons and sowing patterns etc. can be monitored by an expert panel (crop and region wise) and respective agencies can step in with alternative or diversified crops, and the required infrastructure if there is a likelihood of excess production. A case in point is the Karnataka Government which stepped in last year in the Cauvery command area to make farmers opt for ragi or other millets cultivation over their preference for paddy or sugarcane as drought loomed. Technology can also be leveraged to do this much more effectively now.
Food Processing: Adding Value to Agriculture

Sanjiv Puri
CEO & Executive Director
ITC Ltd.

On creating a vibrant agri-food sector through an integrated enterprise approach

Agriculture is the Lifeline of India’s Economy

It engages nearly half of India’s workforce and provides food security to the nation’s 1.3 Bn people. It also generates livelihoods for over 70 per cent of rural households. However, this sector is besieged by myriad challenges. It consumes around 90 per cent of India’s renewable freshwater, a fifth of total electricity and a significant part of Government subsidies. Farmers are the most vulnerable to the vagaries of nature. Fragmented and small land holdings, low productivity, poor farming knowledge and know-how, coupled with weak last mile connectivity, create a vicious cycle of low incomes and low investments, and thus aggravating rural poverty. Agri wastage is rampant, estimated at ₹92,000 cr annually. It is, therefore, quite obvious that agriculture needs special focus, given the enormous impact it has on the economy. In such a context, the Hon’ble Prime Minister’s clarion call to Double Farmer Incomes is laudable and can spur powerful growth drivers across the economy.

Adding value to agriculture is critically important and can unleash a multiplier impact that will be a springboard for rapid economic progress. It is here that food processing can play a major role, given its tremendous potential to transform agriculture and contribute to overall economic growth.

Driving Growth Across All Sectors

Food processing is uniquely positioned at the intersection of all three sectors of the economy - agriculture, manufacturing and services. It drives competitive agri value chains by significantly adding value to crops, promoting sustainable agriculture, combating agri-wastage, enhancing rural incomes, managing food inflation and generating sustainable livelihoods. By linking farmers to value-added markets, it enables better transmission of market signals, enabling an alignment of agri production to consumer demand, securing sustained returns for farmers.

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Potential of food processing sector in India

Today, India is one of the largest consumption markets in the world and by 2025, the consumption is projected to triple to US$ 4 trillion, with bulk of expenditure happening in foods. With increase in incomes, urbanization and globalisation, there has been a perceptible shift in food consumption patterns over the past decade or so. Today’s consumers seek greater safety, superior taste, better quality and value-added food products. Increasing awareness of health and wellness has also spurred demand for different types and qualities of grains, including traditional and forgotten grains, apart from fortified and super foods.

Despite being an agriculture powerhouse, India processes less than 10 per cent of its agri-produce, which is significantly lower than advanced and emerging economies where food processing ranges between 40 to 70 per cent. Therefore, there is tremendous headroom for growth in India’s food processing sector. Studies have indicated that with improvement in agricultural yields and increase in processing level from the current 10 per cent to around 30 per cent, food processing GDP can increase by as much as 5-fold by 2030. This is possible given capability and versatility of Indian farmers as well as entrepreneurial vitality of country’s business and industry across the small, medium and large sectors.

ITC: Contributing to National Priorities in Agri-Food Sector

A quantum leap in agri-food sector growth will require a multitude of challenges to be met. Agri productivity needs to be raised manifold, driven by science and technology as well as large-scale transfer of knowledge and know-how to farmers. Market signals of changing consumer preferences and demand must reach farmers effectively and in time to align production of crops. Farmer incomes need to be raised through crop diversification into value-added crops and by achieving cost savings in production.
Investments in food processing industry to meet differentiated consumer demand, development of Indian trademarks that can capture more value, and building of an efficient supply chain and distribution infrastructure among others will be imperative to create a vibrant agri-food sector. The private sector with its power of entrepreneurship and capacity to innovate is certainly well poised to drive a market-based approach that can support sustainable agriculture growth and ensure remunerative returns to farmers.

ITC’s integrated approach to agri-food sector growth is inspired by its vision to serve larger national priorities. Its century-old engagement with farmers and growing presence across agriculture, manufacturing and services has enabled it to play a meaningful role through multiple businesses that significantly add value to agriculture. At the core of its agri and rural development programmes is the globally celebrated ITC e-Choupal initiative that has played a pioneering role in empowering 4 Mn farmers. The integrated programmes focus primarily around the broad themes of enhanced crop productivity, adoption of mechanization and practices like zero tillage, introduction of improved varieties, crop diversification, increasing crop intensity, income diversification and augmentation of natural resources to ensure sustainable and climate smart agriculture. Using new techniques like Block Chain, ITC is now implementing a pilot programme in rural areas with producer organisations and consumer groups to provide access to better quality seeds at competitive prices. The effective market linkages provided by ITC e-Choupal empower farmers with better price discovery and access to markets.

ITC’s Foods Business, which has grown to the country’s third largest in a short span of time, anchors competitive agri value chains that drive sustainable agriculture benefitting farmers and rural development in its areas of operations. The recent foray into fruits and vegetables such as Farmland potatoes and dehydrated onions and frozen seafood such as ITC Masterchef Supersafe prawns will also contribute further to adding value to agri and farm products. The foremost priority in ensuring high quality and safety of foods products is also manifested in offerings such as the ITC Masterchef range of SuperSafe Spices, which undergo more than 470 tests as per stringent European Standards, making it a supersafe product with no parallel.

Paperboards Business of ITC drives a wood value chain that benefits farmers through large-scale afforestation and agro-forestry that helps in generating significant livelihoods. The Company has greened over 6.8 lakh acres generating 125 Mn person-days of employment. ITC’s social investment programme implements a multitude of interventions to provide alternate livelihood opportunities. The company’s livestock development programme has extended animal husbandry services to over 15 lakh milch animals, helping 6 lakh farmers to upgrade their low yielding milch animals. As part of the commitment towards women empowerment, ITC’s Women Empowerment programme enables development of entrepreneurial skills, besides making available assets for income generation, benefitting nearly 60,000 women till date. The social investments programme also focuses on developing sustainable resources for the future through watershed development for example, which has brought soil and moisture conservation to 8.5 lakh acres. By building the competitiveness of its agri-food value chains, ITC aspires to contribute to the twin national priorities of Doubling Farmer Incomes and Make in India.

The Next Horizon

The Government of India’s reinvigorated focus on agriculture and food processing is a step in the right direction and will go a long way in fostering inclusive growth and strengthening the competitiveness of the Indian economy. The recent thrust provided in the Union budget through measures like Operation Greens, creation of institutional mechanisms for forecasting prices and demand through the use of future/options market, expansion of warehouse depository system and specific measures to boost exports will help transform Indian agriculture into a demand-driven competitive value chain that will benefit both farmers and consumers. The creation of Gramin Agricultural Markets, electronically linking to eNAM and exempting this system from APMC regulations are forward-looking interventions and will meet the critical need to bring farmers closer to markets. Rural growth will fuel consumption demand, enable an uptake in private investment, thereby creating a virtuous circle of demand-consumption-investment led growth that will add value across the three sectors of the economy.

Conducive policies that support end-to-end corporate participation in food processing is important for the development of this sector. A larger involvement of the private sector can spur development along the entire value chain, right from agri sourcing to processing, cold chains, to manufacturing as well as distribution of branded packaged products that delight consumers. The fiscal framework must also help in stimulating demand for food processing, enabling better returns to farmers.

ITC’s journey so far in the creation of competitive agri value chains that has empowered millions of farmers has been immensely fulfilling. We are confident that the measures taken by the Government, to provide a fillip to this critical sector will progressively build a world-class food processing industry in India that will not only transform the country’s agricultural and rural sector, empower and enrich farmers, but also create a new dimension of growth for the nation.

A larger involvement of the private sector can spur development along the entire value chain, right from agri sourcing to processing, cold chains, to manufacturing as well as distribution of branded packaged products that delight consumers.
Since Independence India has been scripting great success stories in agriculture and has significantly revamped its production base. This has been possible largely due to the ‘Green Revolution’ in the early 1960s. The introduction of high-yielding varieties of seeds coupled with increased use of fertilizers and irrigation helped India in becoming a self-sufficient nation. The Green Revolution drastically changed the total area under the high yielding varieties from 1.9 Mn Hectare in 1960 to 96.9 Mn Hectare in 2011, which is almost a growth of 50 times in total area under the high yielding varieties within less than five decades.

**Strength of Indian Agriculture**

Though the share of agricultural sector in the economy has witnessed a declining trend, it still holds a very prominent position. The sector provides livelihood to more than 50 per cent of the population and is the source of food and nutritional security for the nation. Furthermore, the sector has the potential to create economic growth in rural areas. It generates job opportunities in due course of adding value (as in the food processing industry), in bringing agricultural products to the consumer (market linkages), and in providing support (infrastructure, information, quality control and training).

India has made significant advances in agricultural production in recent decades, owing to the introduction of high-yielding seed varieties, increased use of fertilisers and improved water management systems. Reforms in land distribution, water management and food distribution systems will further enhance productivity and help India meet its growing demand for food.

**Weakness of Indian Agriculture**

Most people in rural India depend directly or indirectly on farming for their livelihood. Despite this, not enough attention has been given to agriculture. It is widely accepted that agricultural growth and human development are key for rural development. Various studies show that investment in agricultural growth helps reduce poverty and ensure pro-poor growth more than any other intervention.

Rising population means more demand for food. Improved standards of living also mean greater demand for quality food. If these demands are to be met, national farm outputs must rise, and farmers must produce different types of products. Also, access to food must be improved for those who still fail to meet their basic needs, wherever they live – in remote rural areas, marginal areas or urban slums.

**The Need to Improve Agricultural Productivity**

- Severe hunger and poverty affects nearly 1 Bn people around the world.
- By 2050, it is estimated that the earth's population will reach 9 Bn. Global food production will need to jump by 70 per cent to 100 per cent to feed these people. Rising incomes, increasingly scarce resources, and a climate change are causing additional strains on agricultural productivity.
- Two billion people in developing world are malnourished. Malnutrition continues to be the world’s most serious health problem and is the single biggest contributor to child mortality.
- The power of investing in agriculture is clear. Agricultural development is two to four times more effective at reducing hunger and poverty than any other sector.

**Role of Patanjali in Nation Building, Agriculture and Food Processing**

Patanjali aims to strengthen agriculture, farmers and peasants through the following ways:

- Provide state of the art infrastructure across the country via cluster approach
- Increase income levels of farmers by linking them with the demand side of food chain and reducing wastages
- Ensure value addition of agricultural commodities
- Establish a sustainable raw material supply chain for each cluster
Facilitate induction of latest technology
Foster inter-agency linkages for pooling of resources food processing
Quality assurance through better process control and capacity building
Bringing the entrepreneurs, farmers and other like-minded investors to come to a common platform by capitalizing opportunities in agriculture and food processing
Integration of supply chain to provide farmer-market linkages that allow efficient flow of produce
Showcasing each pre-identified cluster’s potential and investment opportunities in agriculture and food processing sector

Patanjali’s Food Parks are comprehensive industrial estates for food processing units where the industries would have provision of common facilities like cold chain, effluent treatment plant, warehousing, power connection, water facilities, sewerage etc. The creation of these common infrastructures would benefit individual units particularly the small and medium scale units, because these are cost-intensive. Therefore, a common park with comprehensive infrastructure would help in growth of food processing industry and also in reducing wastage.

**Glimpse of Patanjali’s Contribution to Food Processing:**

<table>
<thead>
<tr>
<th>Farm Produce</th>
<th>Food Processed during the year in India (Quantity in MT)</th>
<th>Food Processed during the year By Patanjali (Quantity in MT)</th>
<th>Share of Patanjali in Food Processing (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Present:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td>1,09,00,000</td>
<td>11,56,000</td>
<td>10.61</td>
</tr>
<tr>
<td>Spices</td>
<td>25,20,000</td>
<td>10,104</td>
<td>0.40</td>
</tr>
<tr>
<td>Vegetables</td>
<td>72,90,000</td>
<td>4,45,400</td>
<td>6.11</td>
</tr>
<tr>
<td>Pulses &amp; Rice</td>
<td>2,98,60,000</td>
<td>92,772</td>
<td>0.31</td>
</tr>
<tr>
<td>Wheat</td>
<td>1,94,50,000</td>
<td>2,67,518</td>
<td>1.34</td>
</tr>
<tr>
<td><strong>Future:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td>1,09,00,000</td>
<td>32,81,300</td>
<td>30.10</td>
</tr>
<tr>
<td>Spices</td>
<td>25,20,000</td>
<td>52,800</td>
<td>2.09</td>
</tr>
<tr>
<td>Vegetables</td>
<td>72,90,000</td>
<td>15,10,000</td>
<td>20.71</td>
</tr>
<tr>
<td>Pulses &amp; Rice</td>
<td>2,98,60,000</td>
<td>30,25,200</td>
<td>10.13</td>
</tr>
<tr>
<td>Wheat</td>
<td>1,94,50,000</td>
<td>30,75,700</td>
<td>15.81</td>
</tr>
</tbody>
</table>

Opinions expressed in the article are the author’s own
How does Walmart India stand to benefit from the landmark tax reform measure of GST?

GST is a game-changing structural reform that our country has seen recently. Progressive measures like this highlights Government’s intent to improve ease doing business in India. Initial teething problems notwithstanding, reports suggest that GST regime is not only positively impacting key sectors of the Indian economy but is also resulting in a host of benefits for the end consumers by way of lower prices on a wide range of goods and services, greater transparency and formalisation of the Indian Economy. GST is indeed transforming the way India Inc. conducts its business because of efficiencies created by ‘one single market’ and reduction of transaction costs in the inter-state movement of goods and services in many ways. Our SME suppliers and local kiranas in the country now understand the huge positive impact that GST will create.

Lot of our suppliers are small and medium enterprises and regional suppliers and we are working with them and will continue to work with our kirana members to educate and support as they transition to GST regime. In a bid to help in the transformation, Walmart India had conducted a series of workshops for SME supplier partners to help them evaluate their GST compliance levels and help them in the transition. We also launched a National Toll Free Helpline to address GST related queries, clarify doubts and explain the nuances of this biggest structural reform.

Your comments on how Walmart is eyeing a big space for itself and benefit in India and growth plans?

We are pleased with our established and successful omni-channel B2B cash and carry business and plan to grow this format. We have 21 such stores under the brand name of ‘Best Price’ across India and plan to take the total number of Best Price stores in India to 70 over the next few years. Through our operations in India we are creating Shared Value for all stakeholders.

Spurring employment and sourcing from Indian markets. How does it give a competitive advantage to Walmart India?

Walmart India is augmenting the local economy by creating thousands of local jobs (at least 2,000 direct and indirect jobs per store). We employ unskilled local youths and make significant investments in training them. With more than 95 per cent sourcing from within India, our focus on local sourcing brings in significant amount of collateral advantages. It aids in the growth of local SME suppliers, small farmers, creates skilled jobs and contributes to local prosperity of the communities.

It provides the small suppliers, especially small and marginal farmers with the opportunity to become part of the inter-regional/global supply chain. As we source local, we are able to cater to the regional and local tastes. For example – AVG Prasad, a grower from Rajahmundry, Andhra Pradesh, started by supplying seedless watermelon and yellow flesh melon, pomegranate, coconut and guava to our Best Price Stores in Guntur, Rajahmundry and Hyderabad. Eventually, his produce was sourced for our stores in Kota in Rajasthan; Bhopal and Indore in Madhya Pradesh and Raipur in Chhattisgarh. Prasad was one of the first farmers of the region to grow a unique variety of melons (seedless watermelon and yellow flesh melon), which we introduced in our stores in Guntur, Rajahmundry and Hyderabad in 2015. By 2016, he had started introducing crops like pomegranate, coconut and guava. Backed by encouraging feedback from members, we steadily increased sourcing from Prasad. Eventually, with an efficient supply chain network in place, he started supplying guavas and coconuts to our stores in Kota, Bhopal, Indore and Raipur. We clocked a record sale of 90,000 units of coconut in 2017 in our Kota store alone. He says, “Price transparency is the biggest benefit apart from a lot of support from the company’s teams in identifying members’ needs and sharing volume forecast accordingly. Being part of their inter-regional supply chain makes me firmly believe that I took the right decision when I quit my job to start farming.”
Has it been Doing business in India and how do you see it evolving given the current climate?

Walmart India has been delighting around one million members, especially Kiranas & other small businesses since it opened its first store in the country in 2009. We have been striving to create ‘shared value’ for our members, local suppliers, small farmers, employees and the community and contributing to the national and local economies through employment generation, by establishing inter-regional supply chain network, developing SME suppliers, sourcing directly from farmers, enhancing women’s economic empowerment and the community at large.

This is India’s time. With a young demographics, increasing disposable income & consumption, extraordinary talent, improved connectivity, entrepreneurial environment, India is emerging as one of the most open economies globally. There is tremendous focus from Central and State Governments to improve ‘ease of doing business’ which is giving further boost to Retail, FMCG and e-commerce industries to grow and flourish. Initiatives such as ‘Make in India’, Skilling India, Digital India to realize the common goal of bringing long-term benefits to the country has created tremendous potential for Retail to create millions of skilled jobs for our young population as well as boost domestic manufacturing and consumption.

Is Walmart looking to foray into food retail, as the government now permits 100 per cent FDI in the sector?

As mentioned, we are committed and focused on growing our B2B omni-channel Cash & Carry business in India. However, we certainly think that this progressive decision by the Hon’ble Prime Minister to allow 100 per cent FDI under Government approval route, including through e-Commerce in trading of food products manufactured and/or produced in India is far reaching. It will help in reducing food wastage, farm diversification and encourage industry to produce locally within the country. This reform will benefit farmers, give impetus to food processing industry and create vast employment opportunities. We welcome this reform.

How does a robust in-house research driven approach help in sustaining in the Indian market? And also keeping pace with the fast-changing demography and consumption patterns?

A strong Research and Analytics team helps the organisation with primary data, analysis, consumption patterns, unbiased market insights and thus helps immensely in aligning our growth strategy. Digital influence has a strong play today and leveraging big data, analytical, sophisticated CRMs and digital marketing, today retailers can more effectively serve and delight their customers.

What is the Women’s Economic Empowerment Program and how is Walmart promoting women entrepreneurship?

By training women in agriculture, factories and retail (with support from Walmart Foundation); and sourcing, our Women’s Economic Empowerment Initiative is significantly expanding economic opportunities for women across India. Through the flagship ‘Women Entrepreneurship Development Program’ launched in 2016, we are enhancing women entrepreneurs’ professional and personal skills for building robust businesses. This program is not only helping us build our pipeline of suppliers but also providing a pool of trained women owned business for the industry at large. We trained 32 women owned businesses in the first edition and are training 64 in the second edition. Working with women entrepreneurs is more than just a social desire. The objective is to bridge the gender gap between women entrepreneurs and the supply chain. From marketing, access to finance, soft skill development, and mentorship, we try to provide training on several industry-relevant topics. We will continue to make a difference to the lives of women and the overall growth of society and the country as a whole.

Indian e-commerce sector: A battleground of sorts. Your views on the scenario.

I believe that providing the best ‘total’ retail experience is not a case of online versus offline, it is the seamless integration of both the platforms. Today’s customer demands omni-channel experience so that she can buy anytime and anywhere, choosing the channel as per her convenience. Businesses that understand that well and adapt accordingly and are customer centric, grow well. As we see today, the landscape continues to evolve. While online players are trying to make it a ‘touch-feel’ experience by setting up physical stores, brick and mortar players are walking the online path. This continuum Omni-channel is the reality.

All our Cash & Carry Best Price Stores offer omni-channel shopping options as our members could buy directly from the stores, by calling customer centre and by booking order through the Best Price app or e-commerce site and also through our Business Development Associates.

Opinions expressed in the article are the author’s own
Introduction

India’s arable land of roughly 160 million hectares is the second largest in the world and the country is also the second largest producer of Fruits and Vegetables. Despite this, level of processing of Fruits and Vegetables is very low (less than 6 per cent). India is blessed with 15 agro-climatic zones, which means we can grow most of the fruits.

In absence of consistent fruit supply, the industry cannot assure a supply to its customers. They are reduced to marginal players, processing table varieties and filling the gap left by crop failures in some other parts of the world. This leads to uncertainty and low capacity utilization of processing units. Most processing units in India, run for less than 150 days in a year.

Let us try to compare the global value chain to ours. Presently, the fruit as well as fruit juice concentrate prices in India are way higher as compared to global prices, making it uncompetitive. For example, in orange the average ex-factory gate price in India for the last three years has been higher by 60 per cent as compared to Brazil. Furthermore, Brazilian oranges have more juice and are sweeter than their Indian counterpart. Because of this, Brazilians use 40 per cent less oranges to make 1 kg of juice concentrate. All these factors put together, brings our cost to around ₹220 per kg, whereas Brazil manages it at less than ₹10 per kg of concentrate.

The biggest challenge faced by the fruit processing industry is, limited and in-consistent availability of fruits for processing. Although India is the second largest producer of fruits, the per capita availability is quite low. This leads to most fruits finding their way to retail markets, and almost nothing being left for processing. In short, demand for fruits is still more than supply. This, coupled with low farm productivity makes fruit processing a non starter or at best a high cost producer. Hence, we need to immediately work to significantly improve both-overall fruit availability and farm productivity.

Level of Food Processing: India Vs Other Nations

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Country</th>
<th>Yield (MT/Ha)</th>
<th>Annual Per capita Production (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>India</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Brazil</td>
<td>25</td>
<td>3</td>
</tr>
<tr>
<td>Apple</td>
<td>India</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>China</td>
<td>18</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: FAO stat (2014), United Nations Population Division (Department of Economic and Social Affairs -2015)

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Brazilians segregate their fruit, do better irrigation and have big financial houses in fruit processing. As a result, the prices of processed concentrates are much cheaper even after accounting for the additional import cost including logistics cost and import duty of 35 per cent. The case is no different for lemon or apple where the imported juice concentrates are cheaper, despite a 50 per cent duty, compared to cost of juice concentrate produced in India.
Within these challenges, there lies a significant opportunity for us to be a dominant global force in fruit and vegetable processing. Globally, the three big crops that are processed are Tomato (40 Mn tonnes), Orange (20 Mn tonnes) and Apple (12 Mn tonnes). We are amongst the top 5 producers of all these commodities, but have a negligible presence in their processed products. A meagre target of 5 per cent would lead to processing of 4 Mn tonnes of fruits.

Reforms Across the Value Chain

The bad news is that we are lagging in some of important ingredients for processing. The good news is that we can only improve from here. We have the right land, varied climate and we want to do something about it. A few simple things we need to work on level are:

Farm Intervention

Varietal Improvement

It is critical to encourage and facilitate the cultivation of multiple superior varieties that have higher juice content, higher brix content and have a distributed production. A distributed production by introducing early, medium and late yielding varieties would prevent glut and stabilize the prices and hence decrease market risk for farmers. For processors, this would increase the duration of plant operations and reduce the cost of carrying leading to economic viability. Private sector and Horticulture Centers of Excellence should work together to select the right cultivars which are suitable for Indian agro climatic conditions and set up nurseries to provide true to cultivar saplings in large numbers with low mortality rates.

Productivity Enhancement

Better land utilization through ultra-high density plantation is an effective way of increasing productivity. Currently, the productivity in India is extremely low as compared to its global peers. Today, the new way of fruit farming is Ultra High Density Plantation wherein fruit trees are planted much closer and in multiples of traditional farming. For example in Mango Ultra high density 600 trees are planted compared to 40 trees in traditional farming.

Productivity comparison of various fruits

<table>
<thead>
<tr>
<th>Fruit</th>
<th>INDIA</th>
<th>BRAZIL</th>
<th>CHINA</th>
<th>ARGENTINA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mango</td>
<td>18 MT/Ha</td>
<td>5 MT/Ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oranges</td>
<td>24.7 MT/Ha</td>
<td>10.4 MT/Ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple</td>
<td>17.9 MT/Ha</td>
<td>6.8 MT/Ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lemon</td>
<td>29.9 MT/Ha</td>
<td>9.6 MT/Ha</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Picture Credit: Shutterstock
Cluster Development

World over, no country is leader in processing more than 1-2 fruits. Every Country focuses on one or two fruits, example Brazil, accounts for most of the Orange juice trade, Europe/China dictate the prices in Apple, Argentina is the most cost effective producer of Lemon juice, and India is the best in Mango.

As a country we are blessed with multiple agro climates hence we need to select fruit to scale, and we need to make small clusters of excellence to pool in all resources in these clusters.

The first step towards pooling all resources is the formation of Fruit clusters (examples: Mausambi in Ananthpur, Orange in Nagpur / Punjab and Mango in Chittoor) and promoting FPOs within them. Within these clusters we should have model food processing units, good logistics support and market linkages to ensure backward and forward integration so that all stakeholders in the Value Chain are close to each other to make the overall fruit processing Value Chain efficient and cost competitive.

Farm Extension and Sustainability

It is very critical to ensure that the advancements in agricultural research reach the farmers quickly through efficient and swift extension mechanism. From the perspective of sustainability, it is necessary to appraise the farmers on cultivation practices and the agronomic requirement of new varieties in terms of water, nutrition, climate etc. (called GAP or Good Agriculture Practice) and most importantly the adverse effects of using pesticides beyond the prescribed dose. This not only affects yields and quality but also makes it difficult for the industry to export pulp/concentrate to other countries.

Also, India is currently facing the challenges of soil health deterioration and injudicious use of pesticides and fertilizers by farmers at a time when the global consumers are increasingly becoming conscious about their health as well as environmental sustainability.

Procurement Efficiency

Building in procurement efficiency in the value chain benefits both farmer and processor. The ability to segregate the raw material at source and creating separate distribution systems ensures that the processing grade and variety goes to the processors, while the table variety goes to the fresh distributors. This maximizes the price realization as per different fruit grades for the farmer.

Industry Level Intervention

Processor level interventions in Apple and Citrus may include introduction of tax incentives and financial subsidies for improving the financial viability of existing units and promoting capacity expansion. Enabling “wealth from waste”, the government may abet additional revenue/profit generation by subsidizing the setting up of integrated units for by-product processing example Orange Oil from orange peels.

Project Unnati

Small and fragmented land holdings is often considered to be the biggest challenge for the Indian agriculture, however the same country has seen the success of a cooperative system in the fragmented dairy sector. Keeping in mind the current agrarian situation in India, we at Coca-Cola have designed an Unnati Project to address all the aspects of competitive deficiencies of India's fruit juice concentrate processing; leading to creation of a fruit circular economy. The project aims to fill in the existing gaps in terms of developing new varieties, productivity enhancement (through ultra-high density plantations), farm extension services (adoption of sustainable practices) and providing an efficient market linkage to the farmers.

This, we believe will significantly increase fruit processing in the country which we intend to use in portfolio of beverages, hence the campaign of “Ras Ras Mein India” which was launched recently. This is our small initiative to make a difference to the Indian Farmers.
Introduction

Farming in India was always revered, respected and cultivated with awareness towards sustainability of ecology, the planet and future generations. However, today Indian agriculture is in a sorry state. The food available in the market is laden with chemical fertilizers, pesticides or injected with oxytocin to obtain early and abundant produce.

The continuous and indiscriminate application of chemical fertilizers, herbicides and pesticides to the soil throughout India, has led to soil health deterioration with serious problems of decreasing fertility, increasing soil pollution, shrinking water table and pest resistance in crops.

Why Organic?

A package of agronomic practices that are sustainable and would reduce dependency on chemicals is required urgently, and this is where ‘organic farming practices’ become imperative. Besides being ecologically and environmentally beneficial, the organic farming methods also retain the inherent nutrients and quality of food. Organic food is grown sustainably, is free from chemical residues and leads to better health of humans and animals. In a world where pollution is constantly growing, affecting every single living being on the planet, organic is the best way to stay healthy. Given the growing concerns on health and food safety, there has been an increase in the production of Organic food in the recent times. Many farming communities are now shifting back to traditional organic farming and promoting organic and health foods.

The Indian Tea sector has also witnessed a significant change in terms of organic production. Organic Tea is currently a miniscule portion of the overall tea industry, however, with the surge in market demand, more plantations are focusing on growing Tea organically.

Tea production profoundly depends on specific and consistent climatic conditions. Climate change can be a significant threat to tea production, as its consequences can be devastating. To secure the long-term tea supply, and to reduce the impact of climate change in the tea gardens, organic cultivation is the only way forward. Under organic cultivation practices, native trees are also planted along farm boundaries to restore carbon, increase soil fertility and stabilize the tea microclimate; which reduces vulnerability to landslides, heavy rains and prolonged droughts.

Making The Change

Going the organic way is a personal choice. Many consumers are now increasingly paying more attention to their health and are concerned about the chemicals in their food. For a conscious change towards a healthier lifestyle, it is imperative to make the right choices in what we eat. Conventionally grown food is laden with pesticides, chemical fertilizers, antibiotics and growth hormones which are detrimental to human health. On the contrary, Organic food gives us better taste along with considerably greater amounts of essential nutrients which play a key role in human health. Living life the Organic Way is a definite way towards our overall well-being.

Opinions expressed in the article are the author’s own
India: The Land of Diverse Cuisine

Indian cuisine is one of the most diverse cuisines across the globe, characterized by its urbane and refined usage of abundant ingredients. Diversity in food preparation style, food habits, use of specific ingredients, culinary presentation of food exists and traverses across regions and from one state boundary to another in the country. The wide assortment of dishes and cooking techniques reflects the varied demographics of the ethnically diverse Indian subcontinent. The multiplicity in Indian cuisine is a result of extensive immigration & intermingling of cultures across the millennia. It is also attributable to diverse climatic variations ranging from tropical to alpine and the presence of 15 agro-climatic zones across India. The cuisines reflect India’s history, as well as cultural aspects and religious beliefs of the various population sects in the country.

The presence of geographic diversity provides a unique specialty to Indian food. On one hand, the Northern part of the country is highly influenced by mughlai style of cooking, major consumption of wheat flour based chapatis/parathas, proportionally high use of dairy products like milk, paneer, ghee (clarified butter) and yogurt. Southern India, on the other hand, offers uniqueness in the ubiquity of sambhar and rasam, usage of coconut oil as well as other rice and value added products (such as idli, vada) as staple food. The eastern part of the country is famous for its sweets & desserts (rasogulla, chumchum, sandesh, mishti doi etc.). Apart from sweets, the region offers delights made from traditional ingredients such as poppy seeds, mustard seeds, black cumin, mustard paste and dishes like rice and fish. Western India has three major food groups classified into Gujarati, Maharashtrian and Goan food.

Indian Traditional Food: Globe Trotting

India is a homeland for traditional food items where rich and diverse range of herbs and spices produced within the country not only add unique taste but also impart nutritional and health benefits to the consumers. Taking an example of range of millets cultivated in the country and their nutritional impact, many food processing players are coming forward and incorporating these millets as key ingredients into bakery products and snacks apart from using them to manufacture, noodles, pastas and pizza bases. The changing lifestyles and advent of more nuclear families has resulted in evolution of concept of food as such in India. While the consumers still want to have the same wholesome traditional food, the preparation time is limited. This has led to numerous innovations and improvisations on how the same Indian traditional food can be made in a quicker and easier manner. In view of the same, RTC/ RTE/ instant mixes foods with endless variants of lentils, rice, biryani, parathas, idli, dosa as a category have grown exponentially in the past decade.

Indian cuisine is now one of the most popular cuisines across the globe, enjoyed not only by the large Indian diaspora settled abroad but also by the native population in North America, Europe, Australia and parts of Africa. According to Britain’s Food Standards Agency, Indian food industry in the United Kingdom is worth £3.2 Bn. The Indian diaspora has played a vital role in popularizing the traditional Indian food items. Food that was conventionally sold as street food is now being well packaged and well presented at hi-end restaurants and has made inroads at every level on the larger gastronomical map globally.

Entrepreneurs are looking at the Indian traditional food as a big opportunity. Innovations in taste, packaging, fusion food, increasing shelf life and reaching out to new global food lovers is the current trend.

Various Indian brands have helped position Indian traditional food across the globe. These brands are largely into ready to cook/ready to eat/ snacks segment and have reached out across the globe with Indian traditional food. Some of the widespread Indian delicacies which are also popular in the US, Canada, UK, Germany, Australia, Middle East, Japan and other SE Asian nations are Tandoori Chicken, Butter Chicken, Mutton Rogan Josh, Kebabs, Biryani, Palak Paneer, Chhole Bature, Kaali Dal and Malai Kofta, Namkeen and Savories, among others.
The Indian Superfood: Regaining Prominence

Today, many of the Indian traditional food and rare native ingredients are well known for their role in impacting human health positively. Some of these are coined and frequently used as “Super Foods”. There lies an immense potential to explore these super foods and present a healthier, nutritive culinary option to the world. For example: Gooseberry or Amla is among the healthiest foods due to its high nutrient content. It is a rich source of antioxidants, iron, vitamin A & C, fiber, potassium, magnesium, calcium, etc. It is extensively being used in health juices and drinks. Other items in this category of food include Jowar/ Sorghum (gluten free and higher Calcium content), Turmeric (rich source of Vit. C, B6, Fiber and Magnesium), Ragi/ Finger millets (high in protein & minerals), Tamarind (anti-bacterial agent) and Ghee/ Clarified Butter (rich source of anti-oxidants & essential fatty acids).

Challenges and Way Forward

Despite being among the world leaders in terms of variety of food ingredients produced in the country and widespread demand of Indian cuisine globally, very few of the companies/brands have managed to make their mark in globalizing Indian traditional food on the world map. Some of the challenges limiting the spread of traditional food are non-availability of quality raw materials and food ingredients, lack of modernization & quality control measures by food companies, absence of standardization and uniformity of Indian taste & multiplication of the same for commercial purpose, nonexistence of focused R&D initiatives for traditional food items and lack of awareness of health & nutritional benefits of Indian cuisines by government bodies of other nations. Several initiatives may be taken by stakeholders across the value chain to enhance the visibility and consumption of traditional Indian food to target not only Indians residing abroad but the native population of other countries. Focus on product innovations & shift towards healthier options, introduction of new technologies for advanced packaging to increase the shelf life, emphasis on adherence to strict quality control complying with importing nations, dedicated spend on marketing & advertisements to educate customers & government bodies globally towards health benefits and product standardization are some of the key initiatives that can be taken by food companies in near future.

Bikanervala: Globalizing Indian Traditional Food

Bikanervala Foods Pvt. Ltd., having a brand presence since over a century, is one of the major players in the packaged snacks and sweets segment in India. Apart from domestic presence of the Bikano brand across geographies, the company has spread its wings to 15 different countries as key export destinations including the US, Canada, Germany, Italy, UK, France, Australia and South East Asian nations such as Singapore, Philippines, Malaysia, Thailand. Bikanervala has also set up 21 retail outlets (sweet shop & restaurants) globally (11 of them are in Dubai). The Brand has worked extensively towards providing uniformity in unique authentic taste of food items standardization across outlets.

Moving forward, the company has plans to position Bikano- its packaged snacks and sweets brand- at various new destinations in the Global Market and also work on enhancing Consumer and Government agencies awareness towards health benefits and goodness of authentic taste of Indian Traditional Foods.
Food is the essence of life and world has come a long way from cavemen collecting food to multi-origin sourcing and processing of food products to provide fresh and safe food. However, sustainability remains an important aspect of the food chain. Sustainability aims at providing economic growth, social growth and ecological growth. Some of the key elements of sustainability in agriculture include good working conditions, fair trade, gender balance, ensuring food supply, good taste and quality of products, conservation of natural resources, biological diversity, clean water, high soil fertility, no chemical pollution, best use of local resources, low use of external inputs and good & constant yields.

It becomes imperative that food sourcing and supply chain should be sustainable to ensure long term availability of food and food products. The various elements of food production system are: Soil, Water, Climate change, Bio diversity, Small holder farmer sustainability and Food quality.

Soil: Due to high emphasis and increased use of fertilizers, people have forgotten the necessity of building and maintaining good soils. Application of farm compost, proper crop rotations are not being followed. This is much more dangerous in tropical climates where it is possible to produce round the year but is very hard to build soil carbon content and maintain the soil structure. Most of the soils in India and other tropical countries have 0.1 to 0.2% of soil carbon content – which means literally lifeless soils. This has resulted in increasing cost of production and high production risk leading to lot of farmer suicides. Organic means of cultivation ensures building fertility through natural means.

Water: There are two issues. First the overexploitation of ground water and rivers results in less availability of water. Secondly poor soil structure, results in less water holding capacity. Both this factors contribute to lower yields and uncertain production. Organic farms with its emphasis on good soils have better water holding capacity and more efficient use of water.

Climate change: It is one of the most urgent issues faced by agriculture. It can disrupt production systems and economic security of farmers. Industrial agriculture with its emphasis on Monoculture is simply not capable of meeting this challenge. Organic Agriculture with its emphasis on diversified farming, local, low cost and flexible solutions is better suited to adapt to the changing conditions.

Lack of biodiversity leads to narrowing of the genetic pool leading to food security risks, loss of valuable germ plasm. Organic farming is a counter movement to increase diversity by using locally adaptable varieties and encouraging multiple species to thrive together.
Biodiversity: Lack of biodiversity leads to narrowing of the genetic pool leading to food security risks, loss of valuable germ plasm. Organic farming is a counter movement to increase diversity by using locally adaptable varieties, encouraging cultivation and use of millets and other nutritious ancient grains and locally adaptable varieties and encouraging multiple species to thrive. This will also mean climate smart agriculture.

Small holder farmer livelihoods: The farmers in majority of developing countries are small and farmers. Organic farming means optimum production with higher and more stable returns. It also ensures low cost and low investment, diversified farming and better working conditions.

There is an opportunity to convert 10 million ha to organic in next 5 to 10 years. The sector is marred with issues like weak market linkages leading to lesser income, high cost of cultivation, health problems in farming families and soil degradation leading to decreasing productivity.

<table>
<thead>
<tr>
<th>S</th>
<th>W</th>
<th>O</th>
<th>T</th>
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</thead>
<tbody>
<tr>
<td><strong>STRENGTH</strong></td>
<td><strong>WEAKNESS</strong></td>
<td><strong>OPPORTUNITIES</strong></td>
<td><strong>THREAT</strong></td>
</tr>
<tr>
<td>Multiple seasons &amp; huge diversity of crops</td>
<td>High cost of production</td>
<td>India’s share in global organic trade only 0.35%</td>
<td>Constantly decreasing prices for organic products.</td>
</tr>
<tr>
<td>Technical and economical feasibility of organic production</td>
<td>Export basket for organic products is getting smaller</td>
<td>A growing Domestic market</td>
<td>Competition from other countries.</td>
</tr>
<tr>
<td>A well developed regulatory system</td>
<td>High transaction costs</td>
<td>Vegan/Vegetarian/ Gluten Free trend</td>
<td>Spurious exporters undermining the India story</td>
</tr>
<tr>
<td>Established players who can build robust export business with the right support as 50 Mn people suffering from type-2 diabetes</td>
<td>Poor infrastructure.</td>
<td>Increasing popularity of Indian cuisine</td>
<td>Farmers losing faith in Organic due to non procurement</td>
</tr>
</tbody>
</table>

Organic - The Way Forward

The organic way of agriculture is promising and is the way forward. However, the sector faces some challenges and bottlenecks which need to be focused upon:

- Streamlining of certification and bringing back the credibility. Reducing the regulatory clutter particularly multiple certification systems and multiple ministries regulating organic production and sales.
- Ensuring funding for R&D and for upgrading manufacturing facilities and creating common facilities. Since Organic business are small and initial capacity utilization will be low this is an imperative to make it economically feasible.
- Funding for Marketing particularly for branded products, as the gestation period is long and the cost of launching products is very high.
- Government needs to incentivize export of organic products and could start with minimum incentive of 5% on all products and higher incentives for processed products and branded products (8%) to effectively compete with other countries.
- Without a robust Domestic market, the growth of organic sector will be limited. Hence, a Public – Private partnership to educate consumers about Organic is necessary to develop the Domestic market.
- For Exports, regular market intelligence should be available for players to analyse the market and improve decision making.

Opinions expressed in the article are the author’s own
India is one of the world’s largest producers of agricultural commodities. The agriculture and food sector forms the very fibre of India’s socio-economic structure with more than 50 per cent of the country’s population directly and indirectly depending on the sector for livelihood. The primary agricultural sector contributes to India’s food security as well as 17 per cent of the national GDP while the food-processing sector constitutes one fourth of the total national manufacturing GDP. India is expected to overtake China as the world’s most populous nation by 2030 and is considered the fastest growing major economy in the world. Considering the growing number of consumers, development of India’s agriculture and food ecosystem is imperative. The overall economy in India is undergoing a major shift due to increasing urbanization and growing prosperity. In such times, it is a matter of national priority to ensure the nutritional security of the country and at the same time provide employment to the increasing urban population. The Indian Government with its several visionary initiatives such as ‘Doubling farmers’ income by 2022’, ‘Make in India’ and ‘Swachh Bharat Abhiyan’ is trying to address major challenges of future. Collaboration with Denmark, with its world-class agricultural sector and food-processing industry, has great potential in terms of achieving the goals of Doubling farmers’ income by 2022’, ‘Make in India’ and ‘Clean India’

India is facing a constantly growing demand for food due to demographic changes and a growing population. Responding to this demand requires development within the primary agriculture production. Denmark has an excellent record in this area, which can help ensure the development of an efficient, high quality and environmental friendly production in India. More specifically, Denmark is capable of delivering high yielding genetics, high quality farm machineries, farm inputs as well as farm management expertise.

While India is one of world’s largest producers within agriculture, dairy and poultry, the food processing and retail sector are still at a relatively nascent stage. Insufficient infrastructure and rigid distribution and marketing systems keep the food & agri sector from achieving its full potential.

In India, an estimated 35 to 40 per cent of food is lost before reaching the dining table. Danish food processing expertise can help India create sustainable development in this sector. Denmark has a strong reputation worldwide for providing high quality food and agro-processing machineries and solutions. It also stands as a leading supplier of food ingredients, enzymes and culture with a global market share of 15 per cent. India is already gaining pace as an important market for Danish offerings. Many Danish companies are producing in India, and many others are planning to enter the market.

Today, food safety is a growing concern among consumers in India. As countries prosper, there is an increased demand for safe and high quality food. The Danish commitment to
producing safe food is widely recognised and has been achieved through cooperation between farmers, the food industry and authorities, backed by an extensive programme of research and development. Denmark has a food safety legislation that often exceeds that of other EU Member States and is supported by the industry in terms of compliance, infrastructure and processes. Between Denmark and India there are many potential areas of cooperation within the domain of food safety such as risk assessment, food testing, training and skill development. Indian FSSAI and the Danish Veterinary and Food Administration are working on joining forces in this domain.

**D for Denmark, D for Dairy**

In the dairy sector, India and Denmark share a long-standing relationship that dates back to India’s dairy development program, ‘Operation Flood’, which established India as a leading milk producing country. Thus, it is not surprising that Denmark enjoys a highly regarded position as a dairy country in India. Across the dairy value chain, animal breeding, animal feed and nutrition, farm management and post-harvest value addition, Denmark can contribute significantly to the development of the Indian dairy sector. Danish companies are already leading suppliers of high-end dairy processing machinery, ingredients and cultures in India.

**Aquaculture**

With its vast water resources, Denmark continues to be a leading country within aquaculture production. Particularly, Denmark has capabilities within sustainable water recirculation technologies that promote resource efficiency and low environmental impact. The aquaculture sector in India is gaining significance due to its high export potential and low cost implications, and it is likely that Danish expertise can be utilized for the development of this sector, where inland production has outgrown the fisheries segment.

**Conclusion**

I believe that Indo-Danish collaboration within agriculture and food provides a major opportunity for India and Denmark. An opportunity that will be mutually beneficial, drive sustainable growth and strengthen the relations between our two countries as agricultural allies.

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**India & Denmark - A brief Comparison**

<table>
<thead>
<tr>
<th></th>
<th><strong>Population</strong></th>
<th><strong>Rural Population</strong></th>
<th><strong>Area Harvested</strong></th>
<th><strong>Cropping Intensity</strong></th>
<th><strong>Average Landholding</strong></th>
<th><strong>Food Import</strong></th>
<th><strong>Food Export</strong></th>
<th><strong>Agri contribution to Exports</strong></th>
<th><strong>Key Exports</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INDIA</strong></td>
<td>1200 Mn</td>
<td>850 Mn</td>
<td>341 Mn Ha</td>
<td>1.7</td>
<td>70 Ha</td>
<td>US$ 16.5 Bn</td>
<td>US$ 21 Bn</td>
<td>13%</td>
<td>Rice</td>
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<tr>
<td></td>
<td>5.7 Mn</td>
<td>0.7 Mn</td>
<td>3.6 Mn Ha</td>
<td></td>
<td></td>
<td>US$ 7 Bn</td>
<td>US$ 14 Bn</td>
<td>25%</td>
<td>Spices</td>
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<td></td>
<td></td>
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<td>Ingredients</td>
</tr>
<tr>
<td><strong>DENMARK</strong></td>
<td></td>
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* Cropping intensity is the number of times a crop is planted per year in a given agricultural area

Source: YES BANK analysis

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The global challenge is well described in any paper about the future of agriculture: global food production needs to increase by 70 per cent by 2050 in order to feed an additional 2.3 Bn people. While the planet should have no problem feeding 10 Bn people, it is not likely to happen if production trends are maintained.

**It’s the Climate**

Feeding a growing population is a major challenge, as the land available for agricultural expansion is limited. With climate change, the challenge is even getting bigger. Supplies of the major food crops could be at risk unless we plan for what the future climate brings. Long term changes in the patterns of temperature and precipitation are not the only relevant aspects of climate change. Shifting production seasons, pest and disease patterns, and a modified set of feasible crops will also affect production, prices, incomes – and ultimately, livelihoods and lives. The latest Economic Survey of India notes that climate change could reduce agricultural incomes by up to 25 per cent. In order to stabilize output and income, production systems must become more resilient, i.e. more capable of performing well in the face of disruptive events. This could to some extent be mitigated by spreading irrigation but water scarcity and depleting groundwater levels will force farmers to rethink existing cropping patterns.

**Is Gene Technology the Answer?**

Many people have a genuine belief in technological progress based on extrapolation of problem solving in the past. It is for certain that genetics and new breeding techniques offer us solutions that we couldn’t dream of before. Plant breeding nowadays blurs the difference between traditional breeding and genetic modification. We can now use gene-editing techniques which switch certain genes off and change the traits and composition of plants without resulting in genetically modified crops. Furthermore, unwanted genes, e.g. leading to susceptibility to diseases or to allergy, can be removed. Tolerance to abiotic factors (e.g. drought) can be obtained too. Similar techniques apply to animal breeding. Animals with desirable phenotypic traits are used for breeding, producing offspring with improved characteristics. In Holland, in particular vegetable seed companies are leading the way to ensure the availability of new generation seeds.

**The ICT-revolution**

The genetic revolution is largely driven by Information and Communication Technologies (ICT). The exponential progress made in ICT has had an influence in all parts of the farming industry and the food business. Food chains are organized with much more precision and detailed data capturing allow for example anticipating variations in the weather. In the years ahead we will face a deluge of data as sensors, satellites, robots, the Internet of Things and all types of machines (including drones) enter the farm and the rest of the food chain. A revolution comparable to the introduction of the tractor and chemical products in the 1950s is in the making. This may raise productivity and improve food security, make farming more climate-smart, and solve environmental issues. As in previous rounds of mechanization, more technology could also lead to greater inequality in agriculture as those who adopt it grow faster than those who do not.

**Towards Bio-economy**

The success of India in ensuring food security for its growing population is a matter of global consequences. Still, we cannot blindly trust that smart genetics and ICT will ultimately solve the problem of food security. Government policies, education and awareness campaigns are needed in many fields, bearing in mind that preparing the world for the food needs in the much cited year 2050 is not something that should be started a few years earlier. Any society with an economy based on renewable resources, in particular biomass, requires that we organize circular production chains that create full value in each step from all the biomass produced. Fixing the cold chain is an
obvious first step towards and it is imperative that wastage of perishables in India is halted. The production potential in fruit, vegetables, dairy, fisheries and other products must be made available to its full potential for demanding consumers. In The Netherlands, an important priority is managing manure production and finding ways to keep minerals in the food cycle. Another form of waste prevention is related to improving levels of food safety. Hi-tech is beautiful but hy(giene)-tech is a necessity, not only for reasons of public health and sustainable use of resources but also to be able to take benefit of the globalizing food trade and export success. The Netherlands and India can work closely together in this field.

Social Innovations

Innovations do not necessarily originate from inventions or research. Changes in consumer demands or in attitudes to food or to working in farming also create innovations. Demographic changes will lead to smaller work forces in the coming decades. The competition for a well-educated labor force will intensify. Jobs in farming and in many areas of food processing are unpopular, a fact that is exacerbated by low pay levels. ICT and robotics will partly solve this, as will farm enlargement. It is important, however, that the next generation of farmers is not rebuffed by the need for high investments in taking over farms and by the profession’s poor image and low incomes. Both education and fiscal policies will be important in this respect.

Honor the Farmer

Agriculture, food, and the environment are not an economic sector in the same way as transportation or manufacturing. This industry is extremely important for our survival to simply leave to ministries and sectoral organizations. Consumers and citizens should be much more aware of the challenges: a commitment to agriculture by all stakeholders in society is essential and it must be based on a proper understanding of how farming and food production work. Farmer organizations and government ministers have often not invested a great deal in communication with the rest of society. It does not have to be this way: the main source of innovation in farming methods are farmers themselves and consumers could become strong allies of farmers.

‘It is difficult to make predictions, especially about the future’, so the saying goes. Climate change, technology revolutions in many fields and social issues interact to shape changing realities. Investing in science and education is a wise thing to do. We should also realize that the challenge is global and that strong international public private partnerships help us to navigate a stormy ocean of uncertainty. The Netherlands and India have much to win to closely work together for a better future in farming and food production.

Opinions expressed in the article are the author’s own
Your corporate website says, “Omnivore invests in startups from India developing breakthrough technologies for food, agriculture, and the rural economy”.

What prompted this focus on agri & rural economy over other sectors?

At Omnivore, we are committed to building the impact investing ecosystem in India and fundamentally transform our rural economy – and what best way to do it through a sector as important as agriculture which impacts lives of majority of population in India? In addition to impacting lives of smallholder farmers & rural communities across India and given the scalable opportunity it brings, there was no other sector that spurs greater interest. Hence, the focus on agri & rural economy. And with the renewed interest in the sector duly supported by proactive policy measures by the Government, we think, our decision was spot on from day 1.

The Hon’ble Prime Minister has announced a goal for doubling of farmer’s income by 2022? In your view, what role does agri-tech / technology play in the same? Can you please give examples from your portfolio companies – how they are contributing to the same

Sure. Like you see, my co-founder Mark (Kahn) and I have created Omnivore fund based on three pillars, which is core to the investment philosophy.

First pillar - Can we increase profitability of farm income and farmers? Here I am not saying more yield or something, but we want to improve profitability of farmers and increase farm income. Our entire focus at the fund is to improve the profitability for our main stakeholder i.e. farmers.

Second pillar - Focus on sustainable agriculture. At Omnivore, we would like to focus on investments which like to use optimal resources like water, agri inputs and avoid destroying soil, water bodies and natural resources. Our investments try to have sustainable farming and reduce fluctuations like, one good year and one bad year.

Third pillar - Reducing uncertainty. This pillar rests on the premise that, as a profession, agriculture is one of the most uncertain profession. For agriculture farmer, one sees uncertainty throughout the year and practically for his entire life - uncertainty in terms of yields, weather, pests and diseases, price, regulations. Reducing uncertainty helps us to create a situation whereby we can help increase farmers’ income.

Some examples about how Omnivore portfolio have been able to increase farmer income: Ecozen provides tech solutions like farm based micro cold storage, where a horticulture farmer is able to increase shelf life of his farm produce and provide an option to store for an optimal time frame. As a result, there is an increased potential to get a better price realization for their efforts. For example, if a farmer is producing pomegranate, I think in peak harvest season, it is ₹25-30 per kg, and you stay on for 35-40 days, the price quadruples. So this is the kind of innovation we wish to support. We are not asking farmers to produce more by putting more inputs, but we are keen for more freedom to the farmers going forward to decide when he wants to sell his produce. So, in this case, after 35-40 days he makes more income than he would have ever got it. For instance, MITRA, Stellapps, help in reducing the cost of cultivation, and thus help farmers reduce costs which in turn helps in increasing their profitability.

Congratulations on the recent investment in Agri-tech startup AgNext!

ThankYou! AgNext’s comprehensive technology solutions will help multiple stakeholders in the AgriFood domain – including growers, supply chain participants, and food processing companies - to improve the transparency, quality, and overall profitability of their operations.
Agri / Rural economy continues to be extremely politically sensitive, predominantly shaped by Government policies / subsidies / targeted schemes which at most times tend to be populist & not necessarily the most optimal. In this overall macro environment, how do you decide on your investments, identify the potential winners and check the robustness of the business plan against any abrupt government policy change?

Focus of both the Governments i.e. UPA as well as NDA, irrespective of political affiliation, has been always that how to get more income in the hands of farmers. So that’s the broad macro ideology political parties have followed. There have been debates over regulatory issues, commodity pricing etc., but whenever there has been a need to help farmers, and for farmers to make more money, I don’t think Government has intervened in curbing that and thus making it less politically sensitive. And I don’t think Government’s interventions are negative to that aspect. In fact the Government has been fairly positive in supporting farmers or with more money and thus does not have a negative impact on our funds. However, Demonetization was a major shock for the agri economy because agriculture is primarily a cash economy, even today. Demonetization sucked out entire liquidity which just took out the wings of entire sector. The farmers were not having money, unable to have credit beyond a point and were forced to sell whatever they had at very low prices for whatever they could get. So this created a major reaction on our portfolio companies and that was major shock to us. Other than that, there have been some issues like, subsidy on a particular product, or approval of new products, as it takes time for the bureaucrats to understand about new products and getting their approvals is a daunting task, and that takes some additional time. Other than that, it is a good business to be in where you get to work with multiple stakeholders, including Government, which is generally supportive.

While we have seen lot of agri / rural startups raising VC / PE investments over the last five years, successful scale up stories are still few & far between. What are the critical enablers & challengers for companies to successfully scale up in this sector?

Most of the VCs, PEs and alternate investors started making investment in the early part of 21st century and we got the first Bn dollar unicorn after may be 10-12 years. AgTech is at a very nascent stage across the globe, and India is still very young. 3-4 years back we were the only VC firm working on AgTech. And now you are seeing more players coming in. Quality of entrepreneurs is improving a lot, and it’s a matter of time that AgTech start-ups will become big. People have started investing and entrepreneurs are picking a larger share of investments from the traditional VC investors, and hopefully this is the start of the journey to create something really big. In next few couple of years, I think we will see few more exits, hopefully the larger ones and that would probably answer the question that you have in mind.

You have recently raised US$ 46 Mn for the first close of your second fund and participating investors included a mix of domestic & international stakeholders, unlike the first which had 100 per cent domestic investors. What do you think has triggered an overwhelming response from international investors?

When we started the fund in 2010-11, it was a tough year for anyone to raise a VC fund. We had issues about US getting downgraded at that time and fund raising getting stalled by lot of investors. Indian investors were comparatively more excited to invest and we realized that it was relatively easier to raise money from Indian investors. To run an international fund has its own challenges and that did not make sense at that time. As a result, we had to forgo the idea and preferred to raise money
only in India. Today, I think the environment is different. It is improving, and we are being able to create significant positive impact in the agri ecosystem and the India improving story is really working well. I think the international stakeholders have also taken cognizance of the fact that AgTech is a way we can solve the food security issue and hopefully improve farmers’ livelihood. And that’s the reason we are seeing more and more international stakeholders getting aligned to funds like Omnivore. We had very few investors back then and today its increasing significantly and Agri as a sector is creating more impact than any sector would do. Lot of investors who are impact investors or looking at social impacts are increasingly looking at this sector.

- **Can you give a sense of the profile of some of your leading LPs? What is the approximate split between commercial capital & impact / development capital in your LP mix?**

We are definitely an financial first impact fund focusing on improving life of the farmers; that’s our agenda and we hope to improve the profitability of farmers. We have a bunch of investors who are interested in development, creating an impact, and some of the investors are looking at the commercial returns. So it is a mix of Development Financial Institutions, Financial Institutions, Foundations. We have got Investors both in India as well as in international.

- **Do you think international participation in a fund also contributes to a shift in work dynamics, integration of international best practices in the invested start-ups?**

Absolutely. Likes of SIDBI, NABARD are keen to see the funds creating value in the portfolio company. SIDBI, NABARD were a part of the first fund and they had great contribution in creating value. International LPs provide a global perspective and help us to align to international best practices. International LPs are generally very strong on the understanding on the global competitive perspective, conflict resolutions, ESG framework and its implementation. They provide a great value by helping us to think through the potential issues and guide us on how to set up the policies, the framework around it and also in the companies. As a fund, we want to have a positive impact on our stakeholders and international LPs really add value to the entire process.

- **How has the equity side of the start-up ecosystem evolved since 2010? How do you think Government policies helped in strengthening this ecosystem?**

It is definitely an encouraging scenario today. Back in 2010, we used to have 1 deal a week. Today we get 5 to 6 deals per week, and this is increasing further. The quality of entrepreneurs have significantly improved. We are now seeing people of top educational institutes like the IITs/IIM, people coming back to Indian from international stints….all trying to do something for this sector. And I think this is where the Government’s start-up impetus has really helped. The Hon’ble Prime Minister’s efforts to bring Start-ups at the front, at the core of it rather than at the periphery is helping more and more entrepreneurs to come forward and more and more investors to look at the sector. It’s working well for us.

- **Can you give a sense on the possible exit options & timelines you are contemplating for with regards your investee companies from the First Fund? In terms of an exit via M&A, do you see interest from foreign players looking to enter this sector? How do see the capital market appetite for the rural / agri sector companies?**

Taking a look at how Omnivore’s portfolio is growing, we have recently announced Mahindra taking a stake in Mitra. One of our portfolio companies is also in talks with a large international strategic partners to take a significant minority stake and hopefully create a roadmap for exit for Omnivore. Out of our investment portfolio that we have, we believe that 60-65 per cent of total exits should come from strategic partners. Because, we feel that Indian start-ups can scale up to a certain level to create a solution for the agri ecosystem, which is difficult to create for large Indian or global players.

Agri ecosystem is a mid-market M&A kind of sorts. Most of agribusiness are profitable business and they generate significant cash year or year: Also the R&D budget of large enterprises isn’t that big and so there is not much R&D happening around it. I see strategic players investing on start-ups, getting the R&D pipeline up and running. My feel is 2/3 rd of exits will happen through strategic investors.

- **We have observed that equity participation has always been at the middle of the value-chain, ie, facilitators and not the farmer sorts. Your take on taking this model to the grass-root level with a granular funding opportunities.**

It is difficult to get funding at grass root level in the existing structure. FPOs can be one good starting platform. Equity investment or Venture investment to agri farmers directly is still early. It needs to evolve. Whereas for investing in start-ups /tech or when they are working with couple of hundred/thousands of farmers and working around that is fairly possible and is definitely increasing. It is difficult to go to a farmer directly. We will always go for a B2B kind of a thing, work with aggregators working with farmers, could be dealer network, could be contract manufacturers and that’s where a start-up can do that. Cost of delivery directly to farmers is too high and might be difficult to sustain, especially at start-up stage. We will work with influencers who are working with farmers.
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Indian Agri Sector

India is blessed with diverse agri-climatic conditions, majority of soil types and long sunshine hours, making the country particularly suitable for round the year cultivation. These unique advantages have helped India become one of the leading nations for agricultural and horticulture production besides being a leader in dairy and livestock. The Gross Domestic Product (GDP) of agriculture and allied sector in India was US$ 244.74 Bn in FY 2016 and is growing at a compound annual growth rate (CAGR) of 6.64 per cent (during FY07–16). In terms of exports, India is amongst the 15 leading exporters of agricultural products in the world. Agricultural exports constitute nearly 10 per cent of the country’s exports.

Natural advantages and the progress made in agriculture over the years has made India a self-sufficient food nation. Rising incomes, increased and diversified food consumption is making the need for food grow rapidly on one end, while on the other end, stagnant farm productivity with continuing dependence of large population on agriculture is stressing the farm sector.

Role of Agriculture in the Economy: India v/s US

Agriculture plays a significant role in the socio-economic fabric of our country as it is the single largest source of livelihood in India. Progress in agriculture affects the lives of the Indian population, making agriculture a complex and extremely delicate subject in India.

American agriculture economy, on the other hand, underwent a remarkable transformation in the last century spurred by technological innovation and changing market conditions. Agricultural production has become a smaller component in the national and rural economies in the US. While the more broadly defined food and agriculture sector continues to play a strong role in the national economy, farming has progressively contributed a smaller share of gross domestic product (GDP) and employed a smaller share of the labor force over the decades. Output from U.S. farms has grown dramatically, freeing a large share of the population to enter nonfarm occupations that supports economic growth and development in the US.

India similarly needs to make efforts to take people off the farm economy while undertaking measures to make agriculture a remunerative occupation to reduce rural distress.

Indo US Collaboration in Food Sector

Evolution of the farm sector in the US and its transformation to agri-business has some significant lessons for India. These solutions have to be used as a guide map to be deployed assessing their suitability in the Indian context and socio-economic environment. Trust based collaboration between US and India at Government and Private sector level has the potential to make a significant impact in addressing the nation’s farm woes.

On unlocking farm sector’s true potential through Indo-US collaboration
Adoption of modern agricultural practices and use of technology in Indian farm sector continues to be inadequate. It is hampered by ignorance, high costs and impracticality in the case of small land holdings.

India needs to focus on modernizing its production practices including soil and crop analysis like in the US and significantly reduce its dependency on human labour. This will help enhance efficiencies leading to uniform annual returns for farmers, reduced wastage, lower risk of crop failure and increased yield.

Seed Technology

Indian farmers currently lose approximately US$ 5 Bn every year to pests and diseases. Droughts, coupled with a lack of irrigation facilities, are further aggravating this problem. With an estimated population of 1.8 Bn by 2050 in India, the need of the hour is to develop seeds that are drought and pest resistant. As the world heads towards severe challenges like climate change and rapid urbanization, we will require some concrete solutions to avert the impending problems of low farm incomes and food self- sufficiency. Adopting the latest seed technology that has the potential to boost productivity and overall food supply is necessary to feed and nourish the growing population in India.

Need for Better Storage and Waste Reduction

According to a recent report, the nation has a significant grain stockpile, just behind that of China, yet 20 per cent of Indians remain malnourished. In 2012, India had a 40 per cent shortage of storage space for a total stock of 82 Mn tonnes of food grains. Improved storage facilities and more efficient food distribution systems will help address these challenges and could improve food supply per person per day from 2,500 kilocalories to 3,500-4,000 kilocalories.

Food wastage is another critical issue facing the nation. India suffers losses of up to £4.4 Bn in fruits and vegetables each year due to the absence of effective technologies to keep produce cool. Short shelf life of fruits and vegetables make the need for cold storages and warehouses critical to stabilize prices and supply throughout the year.

The US has successfully deployed many technological solutions for effective food storage at competitive costs for ex - using renewable energy to cool milk for dairy farmers. There is an urgent need for similar solutions to be developed for Indian farmers.

Moving Forward

US has gone through an economic transformation and India can definitely learn from them. Though Indian agriculture has done well, it continues to face a plethora of challenges. We will need to pick the best solutions from around the world to create a supportive environment and allow learnings to be deployed. Bringing together the Government, private sector and farmer community to implement innovative solutions best suited to our unique needs, will unlock the farm sector’s true potential and help it flourish.

Opinions expressed in the article are the author’s own
My mother was a great cook who insisted I learn cooking early on. I loved food and the whole process of creating tastes and colors with it, so I happily learned. She was also a healer and a naturopath who hardly allowed us to take any allopathy medication. (Contrary to doctor advice my father never took cholesterol medication for over a decade and today he is having the last laugh now that cholesterol is officially off the list of “harmful” substances. Makes you question a lot of health information that is economically driven doesn’t it?). With mom, there was a herbal remedy for everything (some borderline strange ones too) and over the years I learned a lot from her and continued to study “Tebb-e-Sonnati” (Iranian traditional medicine, similar to Ayurveda) some with teachers and rest on my own from her notes. I love nature and I love gardening a lot and learning about plants. It fascinates me. The more I studied, the more I wanted to learn.

Treating cooking as an art I enjoyed creating dishes with ingredients aimed at certain diseases or moods and the challenge was to make them as tasty as possible to treat food as a satisfying healing tool. This was how I created dishes for myself, and how my magic soup became popular. There is a science connecting vegetables in season and the diseases in those seasons. There is a connection between everything and it’s a mighty interesting topic. However original authentic Persian cooking always stayed close to my heart. There is a wisdom to age old recipes in every culture. There is a method to the combinations and an energy balance in the recipes well thought of by those who came before us. I love authentic Iranian food.

Persian food has influenced Indian cuisine greatly over the centuries and in return has borrowed spices and styles of cooking from Indian cuisine. There is also influences by the Greeks (mainly via physicians) who believed consumption of too much meat (especially red) does not help the body and Persian non vegetarian dishes further evolved to include a lot of vegetables in the non-veg recipes. They further influenced the cooking by the medicinal belief that ingredients possess opposing qualities of Sardi/Garmi (hot and cold in nature) and therefore certain ingredients considered too hot or cold in nature will always be accompanied by others of balancing nature. Persian food is delicate and flavorful and on the healthier side. Many chefs in Iran are women. Generally most men don’t cook but expect the best dishes from their mothers and wives. Iranians consider most food in restaurant second class to home food which is considered precious and more appreciated. Rice is central to Persian cooking and is usually “dam pokht” literally meaning “brewed cooked” and very precise. Often they would judge someone’s cooking standards by the way they cook plain rice!

Persian cooking in India however at the moment has no authentic representation. Parsi cuisine and Irani café food are a genre worthy of individual acclaim as these cuisine have evolved over 11 centuries from Persian cuisine with influences by Indian/Gujarati, British and Portuguese.
Cooking is an art deep rooted in every culture. Every chef an artist. So when AD Singh of Olive group asked me to do a Persian food pop up for them I thought why not? My only criteria was authenticity and when I met their brand head Mohit Balachandaran I was all ready to get emotional over curries if anyone insisted I add mirch masala to my recipe! To my utter delight he said authentic was what he wanted. It is a risk. What about the original rice less Beryani? Persian food is different, no chilies, are you sure? I asked. He was sure. That’s how the journey started, there is so much history and culture shared between these two ancient civilizations. So much exchange. So many Iranians live here. How come no one has done this before? I do not have a sure argument for this. All I can think is perhaps the timing had to be now and am mighty happy it happened to be me sharing something of my roots with the country I love and call home.

So we did a popup. The new fad in food. From not wanting to experiment with food , to wanting to try something new all the time, the Indian food customers have journeyed very far and popups seem to present a great opportunity to share a cuisine or test it out. And the food... I had discovered a new form of art and one that was as much if not more powerful than anything else I had shared before. I dare say even music or paintings. After all, people literally EAT your art! And the results are instant. Your stomach doesn’t joke, your taste buds will crave for a second helping only when pleased. With good food, you ‘feel’ it. It is one of the most basic ways of connecting to your energy, once you learn to tune into your body and food and absorb the best of it all. But then again, that’s another topic and one that is my true passion. Energy work and understanding how this artistically beautiful human vehicle works on multiple levels.

The popups were a great success. Thane was the first, followed by Delhi and Bangalore. Our Esfahan Biryani , is an appreciated surprise. The word “Beryan” is a verb meaning “to roast”. Beryani Literally means something that’s roasted in fire. The original dish, is of fire roasted minced mutton (usually lamb) mildly spiced and cooked in its own juices and served to you in a Naan. The story goes that the dish traveled to India with the Mughals. The Indian chefs added Rice to the dish to make a more complete meal for the army and that addition was a brilliant one. They still called it Biryani (which has no meaning and contrary to some stories I have read the word does not come from Berenj, meaning rice. The word Beryani is a complete word, already) Over the years the Indianized version became popular all over the world and chicken, fish and vegetarian versions of the Indian Biryani were born. The original dish however comes from the city of Esfahan the Persian capital during the Mughal times and our Esfahan Beryani recipe comes from one of the Oldest joint in that city called “Beryani-e-Reyhoon” belonging to an uncle of mine. So if you have not tried it yet, the only place in India you would currently get it is at SodaBottleOpenerWala at Powaii.

And now am working on more food related ideas. Music has for the first time taken a back seat. The second part of my meditation album is pending, first one was on international charts last year (we went to no 17 on the UK itune charts and on different charts in Sweden, Newzealand and Turkey as well, first time for a meditation album!) and I have been working on a special album since 2011 which is now almost over. This one is a journey of loving discovery. It is entirely my production and music based on Rumi Poems in their original version/language, shared with me by my father over the years. It is a gift to him and so I have been working and reworking on it for long, I intend to wrap it up when i feel it is ready. For now I have discovered a strong passion shaping itself to delicious creative projects and am excited to explore its every creative avenue. That’s what we are here for after all. To discover differences that helps us expand and harmony that helps us create. We are creative beings living at the leading edge of creation. That is life. Delicious! Noosh-e-jaan!

Opinions expressed in the article are the author’s own
Regulatory issues are a key area of concern for both investors and trade in food businesses. To ensure transparency, consistency and predictability of business environment, the food regulatory ecosystem has to be based on the principle of One Nation, One Food Law. This requires two things - a nationwide law plus consistent implementation of this law in every part of the country. A uniform national law, the Food Safety and Standards Act, is now in place. However, despite a single nationwide Act, implementation across individual states and UTs remains fragmented and inconsistent, which has been an area of deep concern.

The reason behind fragmented implementation across individual states and Union Territories (UTs) can be traced largely to legacy issues. The Food Safety and Standards Act was enacted in 2006 by consolidating 9 existing food safety legislations spread across numerous Ministries and Departments. The FSS Act marked a paradigm shift in policy, moving from mere prevention of adulteration to a more holistic approach of ensuring safe and wholesome food. Ideally, implementation of this entirely new philosophy should have been built on a fresh foundation, with resources aligned to the new policy. In reality, the erstwhile employees and institutional structures were cobbled together under the new system, resulting in several legacy issues e.g. each state having its own individual structure (often spread across different departments and Ministries), employees from the old regime with mind-set issues as they were essentially enforcement oriented and differing priorities across states. The result has been fragmented and weak systems and structures in many State Food Authorities. Given the clarity of the policy intent viz. to ensure safe and wholesome food to every Indian citizen, it was imperative to create a unifying implementation framework.

In the past year, FSSAI has taken a number of systematic steps to create just such a unifying framework. The objective is to ensure consistent implementation of the law across every state and UT in India, FSSAI has concentrated its efforts in following major areas:

- Establishing globally benchmarked food product standards and food safety practices & processes
- Ensuring enforcement of the law across all States & UT
- Facilitating hassle free food imports
- Assuring credible food testing through a robust lab network
- Large-scale training and capacity building of food businesses

To ensure transparency, consistency and predictability of business environment, the food regulatory ecosystem has to be based on the principle of One Nation, One Food Law.

Food product standards are set centrally by FSSAI, which also codifies food safety practices and notifies various regulations to be followed. The actual implementation is then done primarily through states and UTs. Between the years 2011 to 2017, much of the work related to the setting of standards and aligning them to global norms has been completed by FSSAI. Regular revisions and updates are an ongoing process.

The focus of FSSAI in recent times has been on ensuring consistency in enforcement across States and UTs. Towards this end, a systematic two-pronged approach has been adopted, which would have far-reaching implications. First, a single nationwide manual for Food Safety Officers has been created. The manual documents functional content, as well as 10 points for ethical behaviour by FSOs to bring about a much-needed change in mind set. A nationwide systematic training program for regulatory staff has also been initiated. Secondly, in an innovative and extremely effective use of technology, a digital inspection platform has been created for use by all states and UTs. This system, called Food Safety Compliance through Regular Inspections and Sampling (FoSCoRIS) has been designed to replace manual inspection being practiced today, with digital inspections. It can be used on handheld devices like mobile phones and tablets by food safety regulatory staff. Food Safety Commissioners of the State can monitor inspections real time. For transparency and consistency, standard inspection checklists have been prepared and would be available in the public domain. FoSCoRIS is a game changer,
as it would ensure a consistent experience to food businesses, thereby building confidence in the regulatory systems.

In alignment with the Government’s policy of Digital India, the power of technology has been harnessed in other areas also to ensure standardization, efficiency and transparency. A Food Regulatory Portal, a friendly portal for food businesses is being launched on 2nd November 2017. The Food Regulatory Portal is a unique and comprehensive full service platform for food businesses, to cater to both domestic operations and food imports. The portal hosts multiple IT platforms at one point to facilitate food businesses and reduce compliance burden. Notable among these are a fully online licensing and registration system (FLRS) and an online food import system fully integrated with customs. Other major steps taken towards bringing One Nation, One Food Law into practice include a nationwide integrated network connecting all food testing labs on a single technology platform through InFoLNet. This would ensure standardization and transparency in food testing.

While, FSSAI is the principal regulatory authority for food, six other agencies are also involved for specific purposes. To ensure a single point of information for all food related business compliances, the Food Regulatory Portal also hosts important information and links to other national agencies in the food safety ecosystem such as Legal Metrology, Customs, Plant and Animal Quarantine, Bureau of Indian Standards (BIS) and AGMARK.

FSSAI has thus been making systematic efforts aimed towards laying a solid foundation for uniform implementation of the food law, thereby creating a stable environment for food businesses.

Further, to facilitate trade and investment through a quick resolution of inter-agency issues in the food regulatory space, a dedicated institutional Coordination Mechanism for easing food safety regulatory compliances is being created in the form of a high level inter-ministerial committee, which would speed up and sort out such issues, and rationalise overlapping requirements and adddress other gaps in the system. This institutional mechanism would also serve as an integrated grievance redressal mechanism across food regulatory agencies.

FSSAI has thus been making systematic efforts aimed towards laying a solid foundation for uniform implementation of the food law, thereby creating a stable environment for food businesses.

Opinions expressed in the article are the author’s own
Indian agriculture is one of the main drivers of India’s economic growth. It ranks high in production and is moving from a supply driven to a market-driven segment. An efficient post-harvest management and agri-logistics system including aggregation, pre-conditioning, pre-cooling and refrigerated transportation not only helps to reduce food loss, but also aids in expanding the reach to distant markets. The extension in holding life using controlled atmosphere cold storage also overcomes price fluctuations based on seasonality. A well-established cold chain can play a crucial role in enhancing the economic returns to farmers, and thus has been a focus area in the recommendations for the government initiative on Doubling Farmers’ Income.

Majority of Indian farms are small and are not in a position to invest directly in infrastructure or transact at wholesale markets. A study by the National Center of Cold Chain Development (NCCCD) highlighted that cold-chain development is incomplete due to a large gap in farm gate infrastructure or pack-houses along with refrigerated transportation. Without such preconditioning centres, the produce cannot be readied for the cold-chain.

The recent announcement by the Government for upgradation of existing 22,000 rural haats into Gramin Agricultural Markets (GrAMs) will allow development of physical infrastructure. These GrAMs will be electronically linked and will allow farmers to make direct sale to consumers and bulk purchasers.

The Government has also approved a Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters (SAMPADA) with a focus to create modern infrastructure with an efficient supply chain management from farm gate to retail outlet. Such initiatives would help to create employment opportunities and reduce agri wastage. There is huge opportunity to reduce food loss and improve food distribution by implementing cold chain technology. With a focus on the Agri-logistics sector, we are working closely with several stakeholders to help plug the identified gaps by offering Carrier cold chain solutions, such as availability of reefer trucks in remote areas where cultivation/harvesting takes place. These infrastructure interventions have helped our customers get better returns over their investments and have benefitted farmers, traders as well as transporters.

To clear the perception that the cold chain is complicated and too expensive for small-holder farms, a pilot study was conducted on the impact of the Cold Chain on the kinnow fruit from Punjab. The study measured the effects of cold storage and refrigerated transport from Abohar to Bangalore, a roughly 2,500 km (1,600 mi) overland journey that is a four to five-day drive by truck.

The study demonstrated that investment in refrigeration pre-cooling equipment and refrigerated trucks can reduce food loss by 76 per cent while increasing profit margins up to 23 per cent. As a result, the kinnow selling season was extended by one month, the selling region was expanded by 2,500 km, from Punjab to Bangalore, and CO2 equivalent emissions from wasted food were reduced by 16 per cent. Further impact of the pilot has been in the second year, with more than 80 refrigerated ocean containers of the fruit shipped during the selling season, and around 350 refrigerated truck trips were made — up from zero, just two years ago. The cost per tonnage of refrigerated goods could also be reduced by using multimodal or rail reefer units.

Cargo safety, efficiency and reliability of temperatures are key to effective refrigerated transportation. Carrier products offer superior technology, advance controls, remote monitoring, safety devices and automation. For example a driver on a long trip can set the desired temperature and take a break without worrying about any temperature changes. When running on electric standby mode, the Carrier unit is designed to automatically switch to diesel engine mode should the electrical supply fail. The various cooling, heating and defrost cycles are controlled through an advance microprocessor-based controller with other features such as sleek design, self-diagnostics, error alarms, high customization managed through an easy to handle cab command.

The Indian agricultural landscape is very unique and diverse and the commodity value chains are difficult to organize and stabilize. The concept of “One Size Fits All” does not work in such a scenario. Creation of technology based solutions that are innovative and tailor made and address the challenges across the agri value chain are required to be worked out. This is the key to success in the business of cold chain in India.
How the Cold Chain Can Help Reduce Food Loss and Greenhouse Gas Emissions

The cold chain can help increase the quality, reach and profitability of Kinnow by enabling sales out of season and in distant markets.

**India**

**World’s 2nd Largest Producer**

of Fruits & Vegetables

Citrus fruit rich in micronutrients, common in the Punjab region of India and Pakistan

**Seasonal:** Kinnow is available only 3-4 months a year

**Highly perishable:** Best kept at 4-5°C and relative humidity of 85-90%

Increasing yield and acreage – production is too large for local market.

The study measured the effects of cold storage and refrigerated transport from Atocha, in northern India, to Bangalore, in southern India, a roughly 2500km overland journey that is a 4-5 day drive by truck.

**RESULTS**

Investment in the cold chain – specifically pre-cooling and transport refrigeration equipment – can reduce food loss by 76% and CO₂ emissions by 16%.

**PAYBACK**

Pre-cooling equipment: 2 YEARS
Refrigerated trucks: 4 YEARS

**REACH**

Increase in geographical reach of the supply chain with cold chain investment

Bangalore, Russia, Dubai and Bangladesh

**PROFITABILITY**

Transporter profitability rate: 23%

2 Trips per month

For more information about Carrier Transicold, go to Carrier.com or follow @smartcoldchain on Twitter.

Source: Carrier Transicold

Opinions expressed in the article are the author’s own
Below are some startling facts and most of these challenges need to be addressed by the food and beverage industry in India.

- 70-80 per cent of Indians are ‘Protein Deficient’
- Three out of four Indians have are lactose intolerant
- ‘Obesity’ is a growing concern across all age-groups
- 70-80 per cent of Indians lack the ‘Recommended Fiber’ in their diet
- Prevalence of ‘Irritable Bowel Syndrome’ is on the rise amongst youths in India
- India is being called the ‘Diabetes capital of the World’ with as many as 50 Mn people suffering from type-2 diabetes

Leading a healthy lifestyle with proper diet and exercise has indeed become the new trend, and this is facilitated by the multiple convenient and affordable food formats available in the market.

**Weight Management with Adequate Fiber, Protein in Your Diet**

India, has been infamous for its high malnutrition rates. But lately, it’s also a place where obesity has sky-rocketed into a national crisis across age-groups with changing lifestyles, limited physical exercise and adverse climatic conditions making outdoors a difficult choice for kids and elderly. In this scenario the consumer is seeking out for food which is balanced and right for their families to prevent the issue of obesity and other associated health issues.

According to the World Health Organization (WHO), obesity is one of the most common, yet among the most neglected, public health problems in both developed and developing countries. Global food manufacturers have an important role to play with food products that help consumers control their calorie intake more easily and consistently. Appetite control is a relatively new focus area for the food industry. As a result, a new category of food and beverage products is emerging, positioned to minimize hunger between meals, reducing the desire to eat and resulting in lower energy intake. For example, dairy snack options (Greek yogurt, lassi, chaas), ready-to-drink dairy and non-dairy beverages as well as some quick snack bytes.

**Alternatives to Lactose Intolerance in Milk and Milk Products**

Another food related health challenge is being lactose intolerant. The most important long-term health consequence of lactose intolerance is calcium deficiency that leads to osteoporosis. Vitamin D deficiency is less common but may also occur and compound the bone disease. But the real problem is that many lactose intolerant people who consciously or unconsciously avoid milk do not realize that they need a supplement. On the other hand, many Indians are not even aware of the intolerance towards lactose. There are many innovative solutions in the market which offers advanced dairy food formats which are lactose-free. And of course, there is more work that can happen in this area to develop products alternatives that are tasty and affordable. We can see products from popular brands on retail shelves which address the twin issues of lactose intolerance and strengthening the gut. These products contain completely natural enzymes, cultures, and probiotics which are healthy and provide an excellent taste to the product.

**Improving Gut Health**

Digestive health can be impacted when the delicate ecological balance in the gut is not supported through proper diet or is disturbed by environmental or physiological factors. Dietary supplements and functional foods containing probiotics or fiber represent effective options for promoting optimal digestive function in response to certain challenges that impact gut health. There are many high fiber products available in the market now.

Probiotics is another emerging category of products for the Indian consumer to address their digestive and immunity related issues.

Probiotics are micro-organisms and completely natural, they are an essential requirement to strengthen the gut with good...
bacteria. Globally probiotics have been used in many dairy and beverage applications. China, Australia, and the US are leaders in this category and many millions of consumers have benefitted by eating these products. In India, we are yet to see mass market brands containing probiotics. However, the trend towards preventative healthcare is picking up. Many brands are now keen to launch new products with specific health exciting ingredient that’s comes with substantiation of science.

Information to the Consumer

In a globalized and knowledge intensive world, consumers tend to make purchasing decisions based on the information that is widely available. What might also accelerate innovation towards a healthier food and beverage market are the labelling initiatives. Clear nutrition signposting on the front of food packaging is an important tool to help people make healthier food choices. Repeated consumer surveys across the globe show that people want a single, trusted system of nutritional labelling that uses a consistent approach, wherever they shop, whatever the brand. While many sceptics view them as mere marketing techniques used by food companies, nutrition and health claims on foods do have the potential to contribute to the achievement of public health objectives. However, this role will only be effective when there are clear guidelines, and the industry takes responsibility in adhering to the guidelines, regardless of them being voluntary or mandatory. Many countries have already adopted frameworks to govern this area. For example,

- The Traffic Lights’ Colour Coding system for labelling in Sri Lanka that defines the sugar levels for consumers
- The 5 A DAY Government initiative that recommends that we eat at least 5 portions of a variety of fruits and vegetables a day. Here, the defined 5 A DAY messaging is applied on the labels to promote fresh, chilled, frozen, canned and dried fruits and vegetables, and unsweetened 100 per cent fruit and vegetable juices and smoothies
- Health Star rating for all food products in Australia which clearly demonstrates the functionality of that product

These developments augur well, both for providing a level playing field to the industry and a trustworthy mechanism to ensure ethical delivery of promise to the consumers. Hopefully this will also result in expansion of market for products based on scientific claims. Apart from ensuring availability of products to consumers, success of such products may also result in increased investment in science and technology by the companies involved. All these regulations aim to push innovation towards health and wellness products, and empower the consumers to choose wisely. FSSAI in India has also launched many initiatives which will make food safer and healthier for the Indian consumers in the coming times.

Conclusion

The median age of consumers in India is a young 28. Most youths in urban and rural areas are well versed with the internet and now demand the best that is available globally. This presents both a challenge and an opportunity. Challenge because the average Indian consumer is value conscious, and an opportunity because any company that addresses their needs will be richly rewarded. Consumers today are making more informed choices and paying greater attention to preventive healthcare. Naturally this has created a boom in the market for fortified foods and nutritious food and beverage options. Functional ingredients such as proteins, cultures, probiotics, functional carbohydrates and dietary fiber play a key role in the health and wellness space. These ingredients significantly improve the nutritional profiles of many foods and beverages delivering weight management, immunity and digestive health benefits while not compromising on taste and texture of our local foods.

This industry is clearly a ‘Blue Ocean’ and the winners will be those who act now.

Opinions expressed in the article are the author’s own
Ever since the beginning of civilization, man has looked to nature for taste and flavour. Spices are the result of that quest and are an indispensable part of cuisine around the globe today, adding premium value to food.

Developments in extraction technologies and formulations (such as emulsions and encapsulations) have helped to tailor-make spice oleoresins and essential oils to meet a wide range of demands. Moreover, advances in modern scientific research could unravel the nutritional secrets of many spice phytonutrients.

Spice phytonutrients are the group of chemical molecules naturally present in spices, along with so many other chemical entities, that deliver the fundamental characters of each spice. The innovative challenge lies in developing technology for selective extraction and formulation of bioactive spice molecules for functional use in various food/beverage matrices and also as Nutraceuticals. For instance, the functional benefits of popular spice turmeric (Curcuma longa L.) are shown to be due to ‘Curcuminoids’, a group of polyphenolic molecules present in turmeric rhizomes. These hydrophobic yellow pigment molecules are notorious for insolubility and poor bioavailability. So, technologies should evolve to generate a green process for the isolation and formulation of curcuminoids in stable, soluble and bioavailable forms, ready to use for a set of food matrices. Various improved bio-available forms of curcumin are developed and commercially available globally now. Curcumin has become the largest selling spice ingredient globally in Nutraceutical market now.

Hidden Treasures

Spices are hidden treasures of a wonderful array of phytonutrients possessing much higher antioxidant efficacy than fruits and vegetables. Ginger (Zingiber officinale) and pepper (Piper nigrum) have been proven to enhance the bioavailability of many phytonutrients.

When considering the functional use of spice extracts, the major challenge is around aroma and taste. Functional spice ingredients should develop in such a way that their impregnation in food at relevant dosages per serving should be possible without taste or delivery issues. Furthermore, spice nutrient ingredients should be sufficiently stable under various processing and storage conditions. Their suitability for ready-to-cook or ready-to-consume pre-packed format will add value to such ingredients. Above all, the nutrients should be bioavailable at relevant levels.

More than Flavour and Colour

The major challenge when making use of spices’ nutritional secrets lies in devising strategies and tactics to address fundamental hurdles such as aroma, pungency, toxicity, difficulty in consuming physiologically relevant amounts, poor bioavailability, the lack of stability and the lack of clinically proven efficient preparations.

Spiceuticals, a unique brand of nutraceutical ingredients from spices, is a flagship of our commitment and research to generate highly bioavailable and Blood-Brain-Barrier permeable formulations of bioactives like curcumin through our own patented GREEN technology (FenuMAT) for the targeted oral delivery of phytonutrients. Highly cited articles published in peer-reviewed high impact journals serves the proof for efficacy, mechanism of action, safety and tolerance of Spiceuticals. CurQfen, Clovinol, Capsifen, procynCi and FenuSMART are some examples of ingredients with a difference.

Image courtesy: Akay Group
One of the best examples of this approach would be formulating red chili pepper (Capsicum annuum L. or Capsicum frutescens) extract containing high capsaicinoids as an ingredient for enhancing energy expenditure or as a “Calorie burner.” The extreme pungency of chili extract poses a wide range of handling and consumption limitations because of upper respiratory allergies and gastrointestinal discomforts. Recent breakthrough by our research team in dietary fibre mediated micronutrient delivery technique (FenuMAT) have evolved as a unique solution for the safe handling and consumption of capsaicinoids. Oval beadlets (microspheres) of capsaicinoids at 2 to 5 per cent concentrations are prepared by utilising the gel-forming and gum-like character of non-digestible soluble dietary fibre (Galactomannans) of fenugreek seeds (Trigonella foenum-graecum) and employing state-of-the-art formulation technologies for safe, colon-specific sustained delivery of pungent capsaicin without handling or consumption issues.

- Food grade formulation
- 100 per cent Natural
- No synthetic excipients or additives
- GRAS - listed ingredients
- No use of organic solvents
- No NANO particles
- Commercial production possibility
- Possibility of organic quality
- Availability in water soluble powder or granule forms
- Cost-effective
- Regulation compliance

Spiceuticals – Smart Functional and Nutraceutical Ingredient.

Similarly unique processes are developed for selective removal of toxic metabolites from spice extracts for use in functional foods. Coumarin in cinnamon bark, theobromine and caffeine load in cocoa are typical examples of toxic substances which have been eliminated with efficient selective extraction techniques and clean ingredients are produced.

An ever increasing demand for efficient concept for cost effective technologies to produce spice phytonutrient formulation for various functional food and dietary supplement applications. Recent advances herald a new beginning for smart ingredients from spices-Spiceuticals.

Opinions expressed in the article are the author’s own
Emerging Companies reaping benefits of new production techniques in the primary sector

Exciting digital and robotic technologies like AI, big data analytics, cloud computing, imagery analytics, and IoT sensing have led stakeholders to realize that agriculture value chain provides fertile market opportunities for many technologies that are sufficiently advanced but have not yet found uses in the AgTech space. These changes are ushering in the era of precision agriculture technologies across the globe. Some of the applications that are currently being implemented or envisaged in the very near future are:

- A combination of robotics, machine vision, and AI can help orchard growers to identify the best quality produce and harvest this using robotic arms to minimize physical damage and preserve this quality.

- A combination of satellite imagery & IoT can help to monitor large areas where precision irrigation is being used, thus reducing wastage and improving yield and quality of vineyards, almond & tea plantation, amongst others.

- A combination of visual imagery (vis cell phones) and hyper-spectral analytics (through other handheld devices) can be configured to undertake rapid non-invasive quality tests on all produce for factors such as sugar, moisture, fat, protein and carbohydrate content. These instant quality checks allow decisions to be made immediately on or off the field.

- While many people may have heard of GPS-guided peanut planting and digging, which improved yield by reducing on-farm losses, a combination of machine vision and IoT can help to guide autonomous tractors to undertake various other activities on a precise, selective basis in large fields.

Solutions technologies bring for India in agri-space

Agricultural producers worldwide have been seeing continuous growth in the demand for produce. However, they have been also grappling with issues such as shortage of skilled labor, lack of implementation of various agricultural technologies, and changing climate patterns, which are directly or indirectly leading to slowdown in improvements to yield & productivity. The need for digital technological solutions is also strengthened by the fact that, more than any other industry, the agriculture sector occupies vast areas of land over extended periods and many non-controllable variables impact outcomes. It is still early days, but it does seem that quite a few of these new technologies are scale neutral and can be customized to smaller sized units. Adopting these technological interventions is one way that emerging economies can partly reduce the productivity gaps. By using precision agriculture, emerging economies will also be able to optimize every other aspect of their available resources, include human resources, machinery and soil.

Role of Small & Family Agricultural farms in India

Small family farms definitely have a role to play in terms of equitable rural development and poverty reduction across regions. However, they are at a disadvantage when it comes to engaging capital inputs or accessing marketing. Moreover, in areas where food companies are pushing for traceable raw materials or produce farmed in accordance with any internal or external sustainable agricultural code, small farms may lose out due to the high transaction costs involved in getting those certifications and then complying with the processes year on year. But this is a detailed project that depends on the wider agenda that Governments might pursue in respective regions.
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Agtech: The next big frontier for growth

India is one of the most climate-sensitive countries in the world and also among most water stressed. Indian agriculture, with 60 per cent dependence on rain, and onerous responsibility of feeding 1.3 Bn population, the challenges posed by climate change and water stress seems even more draconian. To top it up, loss of farmers’ interest in farming on account of lack of remunerative prices, can make things worse in time to come. So, what is the hope for Indian agriculture – for me it is “innovations” or “agtech” as it is called.

Agtech in India is still nascent with about 300 odd agripreneurs trying to solve multiple problems in Indian agri supply chain. The combined revenue of all agtech start-ups in India probably is less than US$ 100 Mn, which is a drop in the ocean in market worth more than US$ 350 Bn. Thus, the opportunity to scale and disrupt is right there.

The agtech solutions revolve around EDMM – Efficiency (in selling inputs and aggregating farm produce), Data (captured through imagery - satellite, drone, mobile, spectrometer; sensors, IoT for predictive analysis, yield assessment, risk profiling and credit scoring), Mechanization (farming as a service through pay per use model) and Market linkages (disintermediation in direct-to-farm and farm-to-fork, logistics).

While innovations around data have gone pan-India and even global; other innovations in agtech have followed penetration approach in particular geographies or crops. Integration of technology continue to drive these innovations but scaling would require strong supply chain linkages to go hand in hand with technology deployment.

Despite the importance of agriculture to Indian economy and potential for disruption, agtech has received about US$ 120 Mn of external funding across 60 odd deals over last four years (less than 1 per cent of venture capital investment in the country). Lack and cost of access to small holder farmers to scale the innovations coupled with higher risk perception among investors has led to poor capital flow to the sector.

Agtech: The New Frontier in Agriculture

Fintech in Agtech

Though agtech has solutions for almost every problem that is plaguing Indian agriculture, let me focus this article on two aspects which is more relevant to audience of this article– credit to farmers and crop insurance.

A. Credit to Farmers

The government has classified lending to agriculture and allied activities under priority sector lending (PSL) which should be 18 per cent of the banks’ lending portfolio. The target for PSL lending for current financial year is close to US$ 150 Bn. Despite this, one third of lending to the farmers is from non-institutional sources which comes at a very high interest rate (24 to 36 per cent per annum). Most banks also fall short of meeting their PSL targets.

One key challenge for the bankers in lending to the sector is the inability to do KYC check of farmers and judge their credit worthiness. Agtech start-ups are well positioned to address this challenge. The solution lies in banks partnering with agtech start-ups who are capturing and analyzing weather, farm, soil and crop data which can facilitate decision making for bankers. Many of these start-ups are using satellite images to geotag farms, assess crop health and estimate output. They have also build algorithms for farm monitoring and analytics and use artificial intelligence to automate and improve predictably of yield / farmer income.

This data is extremely useful for bankers to establish farmer KYC, make assessment on yield and potential income which can be used to estimate farmer’s credit worthiness. From medium to long-term perspective, there is an opportunity to create a database like CIBIL for farmers.

This ultimately can lead to improving farmer access to institutional credit and reduce interest burden for farmers. On an average, a farmer in India pays approximately 15 to 20 per cent of his income and about 50 per cent of his gross margin as interest. A 30-50 per cent reduction in farmer’s interest burden is possible with use of technology, data and analytics facilitating informed lending by bankers.
B. Crop Insurance

Like credit, crop insurance in India was a big challenge till the launch of Pradhan Mantri Fasal Bima Yojna (PMFBY) in 2016. The reason it could not take off earlier because the claim to premium ratio was high making it difficult for insurance companies. The penetration of crop insurance has reached about 30 per cent but there is still a long way to go.

PMFBY has increased the sum insured for the farmers (from ₹20,000 – 25,000 to ₹35,000 - 40,000) at a premium of about 1.5 to 2 per cent of sum insured. In addition, any claims beyond 3.5 times of premium paid will be borne by the Government. Government has also made it mandatory to use geo-tagging of CCE (Crop cutting experiment) locations and is also encouraging use of satellite imagery.

Data on soil health and weather pattern can a long way in accurately determining the risk profile of a farm. Also, real-time data from satellite, drones can help in capturing the extent of loss and crop damage. These are early days but there is a strong case for agtech start-ups working closely with insurance and re-insurance companies to start modeling the risk, premium and claim assessment.

A combination of agtech with fintech as discussed earlier for improving farmer access to credit and insurance is a huge opportunity in India. In addition, it can also enable direct transfer of benefits from various government schemes in farmer’s account by reducing leakages.

Digitisation of farm can be another goal which can be achieved sooner than later with imagery applications. There is a strong case for launching and leasing satellites exclusively for agriculture applications. In addition to monitoring acreage, weather, crop type and health, these images can also be used to monitor the construction of rural roads; tag mandis, warehouses, cold storages, irrigation canals and disaster management.

To conclude, innovations will change the way agriculture is done in India. It is high time that banks, MFIs, NBFC’s, financial institutions and insurance companies start integrating technology and adapting innovations for the purpose of lending, insuring and developing products for the sector. I believe data driven agri lending and crop insurance has huge potential to drive the size and health of balance sheets of banks and insurance companies respectively.

Opinions expressed in the article are the author’s own
Introduction

India is a country where 60-70 per cent of the population depends on agriculture, either directly or indirectly and contributes to about 16-17 per cent of the GDP. Over the years, the contribution from agriculture to the national GDP has reduced significantly from over 50 per cent in the 1950s to the current 17 per cent today. A major reason for this declining trend is low value add per workforce in agricultural sector, as compared to manufacturing and services. While such a situation may be attributed to several reasons, however the ability to finance agriculture has been one of the major hindrances in increasing the sector’s productivity. Agricultural lending and insurance are affected by poor risk management practices and lack of better financial institution infrastructure in rural areas.

The Indian farmer is primarily dependent on rainfall for agriculture. The farmer is at risk of losses due climate change and extreme climatic events such as droughts and floods. This is limiting his willingness to invest in key enablers like, better seeds, fertilizers, pesticides, to increase farm productivity and improve yield. These issues are marginalizing small land-holding and tenant farmers, effectively impairing the agricultural potential of India and other developing countries and leading to food security issues.

It is the need of the hour to deploy technology for addressing bottlenecks like, poor access to credit, fair & timely compensation from insurance companies, lack of transparency to fix fair price and market linkages and market access.

Issues in Hand

The three main sources for finance for farmers in India are:

- Institutional
  - Co-operative Societies & Banks
  - Scheduled Commercial Banks
- Non-Institutional
  - Moneylenders

Moneylenders charge predatory interest rates of over 20 per cent for approximately 70 per cent of their loans with approximately half of the loans lent at over 30 per cent interest as compared to only 3 per cent of the loans charged over 20 per cent interest by financial institutions. However, institutional agencies have found it difficult to continue improving the credit line in rural sector due to high NPA ratio and low recoveries.

Institutional agriculture lending has become a high-risk business due to lack of credit history of farmers, especially of small land holding (<3 acres) tenant farmers. This is compounded by frequent farm related issues such as depleting groundwater resources, low productivity due to lack of timely inputs, crop diseases, and decreasing land holding sizes. Thus, institutional lending has become heavily dependent on frequent government interventions in the form of large farm-loan waivers. Despite growth in the deployment of credit towards agriculture in the first half of this decade, lack of profitability has slowed down this growth.

Growth in Credit to Major Sectors

![Graph showing growth in credit to major sectors](image)
The Space aka Satellites Angle

When the scale of problems is large, we often look towards the sky hoping for some miracle. Thankfully, in the case of solving the data asymmetry problems in agriculture, ‘space’ or more precisely satellites are poised to become a key facilitator in agriculture financial risk management practices across the country.

The number of satellites is rapidly increasing and the cost of satellite data is rapidly falling. Satellites can cost-effectively provide answers to the key questions pertaining to agriculture

- What is growing?
- Where is it growing?
- How well is it growing?
- How are crops reacting to environmental risks like drought, inundation, climate change, etc.?

As historical satellite data is available for many prior seasons and sometime goes as far back as a few decades, comparison of agriculture output across seasons can be easily done. These answers can be provided across the entire country at high frequency (say weekly) throughout the crop cycle. Moreover the cost of providing these insights can be as low as ₹1/- per farm per day.

Space technology using satellite imagery has long been used in the West for managing agriculture. Satellite based data analytics is fast gaining relevance and significance for the agricultural sector in the developing world. Advances in technology enable catering for farming practices peculiar to developing world namely small holding sizes, multi-cropping, lack of mechanization and homogenization, etc.

Powerful algorithms are extracting information at large spatial scales through current and historical satellite imagery datasets. One can generate preventive and reactive risk signals pertaining to crop health, damage, acreage, and production across multiple agro-climatic zones. Using advanced analytics techniques like in deep learning and ensemble models, we can more accurately model crop yield and phenology through multi-variable analysis of spectral signatures for crop stress, water stress, and soil health.

Satellite data, layered with agronomic data, weather, and socio-economic parameters helps create a decision intelligence framework for policy makers, Banks, Governments, and insurance companies. This enables better planning of agricultural policies and regulations for financing, insuring and monitoring farms and creating better market linkages for the ‘farm-to-fork’ businesses.

In agriculture finance satellite Big Data can be a game changer for banks by:

- Enabling more efficient customer acquisition by creating farm income profiles based on historical cropping, yield and risk profiles and hence credit worthiness proxies

- Helping reduce NPAs through enhanced crop monitoring as well as location specific insights for loan recovery

- Creating opportunities for financing new business models like ‘uberization’ of farm mechanization by enabling more accurate demand forecast and resource optimization.

- Exploiting opportunities for servicing post harvest financing needs for cold storages, barns, etc. by identifying areas of high yield

- Using crop monitoring intelligence for providing operating funds to new age app-based agriculture market places.

- Allowing banks to penetrate new markets in different countries as satellites enable risk monitoring and data collection for any part of the world.

Similarly, in agriculture insurance, risk modelling can be improved for insurance and reinsurance companies. Crop Cutting Experiments (CCEs) are conducted for estimating total agricultural production. It is a manual and time consuming process. The cumulative cost of conducting CCE under PMFBY scheme has increased significantly, as 10 Mn CCEs are needed to be conducted for the two cropping seasons in a year. Satellite image classification and analysis techniques can significantly reduce cost of conducting CCEs by optimizing the number and location of CCEs through stratified sampling based on detected crop condition.

Conclusion

The motto of India’s national space program has been to use satellite applications for national development. Innovations in space technology are quickly becoming key enablers in driving financial inclusion in the rural sector by driving efficiencies in agriculture financing. Exploiting advances in technologies like analytics, big data and machine / deep learning is essential for the Government, financial institutions and key stakeholders for ensuring country’s agricultural growth and food security and unlocking the enormous economic potential of the agriculture sector across the entire agriculture value chain.
The rise of crypto currencies like Bitcoin and Ethereum has taken the financial industry by storm. Even though many financial analysts have been skeptical of its success and industry heavy weight like Warren Buffett recently stated that investments made in crypto’s are most certainly doomed. However, irrespective of what the future holds for bitcoin and its peers, the underlying technology -blockchain- will most certainly survive and is bound to make inroads in every sector. Even though the blockchain revolution started from banking and finance industry, other industries like healthcare, energy, retail, governance, supply chain and agriculture are going to be disrupted by blockchain application.

What is Blockchain and why is it Unique?
Blockchain is a distributed ledger technology that allows all members to record transactions in a decentralized data log maintained on a network of computers, rather than a physical ledger or a single database. Transactions must be approved through consensus, and everything is secured through cryptography. In simpler terms think of blockchain as google sheets versus excel sheet sent through emails. In google sheets, all members have live access to the data being entered into the sheets and can independently record/track the updates of every entry being made. Add another layer on top of this, where entry once made is recorded permanently and cannot be edited or erased by any member.

What makes blockchain so unique is that data stored on blockchain networks is transparent and incorruptible. Data is embedded on the network as a whole, by definition it is public and data once stored cannot be corrupted by altering any information on the blockchain.

How Block-Chain Works?

Someone requests a transaction

The requested transaction is broadcast to P2P network consisting of computers knows as nodes.

A verified transaction can involve cryptocurrency, contracts, records or other information.

The transaction is complete

The new block is then added to the existing blockchain in a way that is permanent and unalterable

Once verified, the transaction is combined with other transactions to create a new block of data for the leader

Source: PWN
Blockchain in Agriculture

One of the most logical applications of blockchain is in agriculture which is plagued with several challenges (I prefer to call them opportunities). With rising consumer consciousness towards food safety, blockchain application can play a vital role in solving many agri-related problems. Some of the practical applications of blockchain in agri are listed below:

- **Food supply chain – Who is making most profit?**

  Food supply chains in most developing nations are inefficient due to information asymmetry. This directly results in low farmer income as farmers do not receive their due share, even though they are the most important part of the chain (the food producers). With blockchain the food supply chain gets simplified as the data management across a complex network that includes farmers, brokers, distributors, processors, retailers, regulators, and consumers gets simplified and transparent. Improved data sharing can also help reduce the US$ 1 trillion worth problem of food waste. Farmers and all members of the supply chain can access all the information throughout the chain. This will make the entire supply chain more democratic and efficient resulting in lesser food wastage and higher remuneration being paid to the stakeholder adding the greater amount of value.

- **Disbursement of subsidies – Is benefit really reaching the farmer?**

  Across the globe, farm sector is heavily dependent on government subsidies. For example in India 2017-18 budget, US$ 4.9 Bn were allocated for agri-related subsidies to farmers. How much of this amount actually reaches the farmers is always in question. However, with blockchain the distribution and delivery of subsidies can become more transparent resulting in targeted disbursement of subsidies plugging leakages in the existing system. Even though the process to establish this network will be very complexed as multiple stakeholders would need to come together, it is no longer impossible.

  The days of blockchain application have just begun and as with any new technology, blockchain will hit a few roadblocks especially with the government’s regulators across the globe. As true essence of blockchain application is to take the power away from the hands of the powerful by decentralizing information and handing it over to the people-democracy in true sense. Nonetheless as with any movement, if people see value the technology brings into their lives they will rally behind it and blockchain application will become mainstream in most industries in years to come.

- **Food safety - What is the source of my food?**

  Consumers have grown suspicious of the food they are consuming. Food fraud costs the global food industry an estimated US$ 30-40 Bn annually. Food allergies and food related illness are much more common now than 25 years ago and consumers are beginning to demand the information related to the food they are consuming. As this trend continues to rise, big food chains will have no choice but to use blockchain for ensuring accountability, traceability and quality of the food. Blockchain will in fact become competitive edge for brands competing in the competitive FMCG space.

- **Agri Inputs - Are inputs authentic?**

  Farmers are often unaware if the inputs they are buying are authentic. Local level retailers are selling fake products to farmers to increase their profit margins. At times even the retailers are unaware if the products supplied to them are authentic. Big agri-input players are also losing millions of dollars due to pilferage or duplication which also impacts their brand image. Blockchain application will solve this problem by increasing the traceability of each product sold-from manufacturer to end buyer. Retailers and farmers can simply scan the blockchain barcode on each product via their smartphone and get to know about the authenticity and source of the products they are buying.

- **Land title registration – Is the land I am buying or leasing litigation free?**

  Land registration for sale and purchase of land is a very cumbersome process and is most susceptible to fraud. Blockchain can make all kinds of land recording more efficient and accessible as the data recorded is publically available bringing complete transparency in the system. The Government of Andhra Pradesh was the first mover in this space and have partnered with Swedish startup ChromaWay to build blockchain solution for land registration and recordkeeping. This will result in huge cost savings for the government as recordkeeping is a costly and labour intensive process. This partnership shows promise and progression of the AP government vision for the state.

  Smart contracting between corporate farming firms and farmers can result in easier contracting for leasing of land. Ethereum is an open source blockchain project that was build specifically to realize the possibility of smart contracting.
Role of Incubators in shaping start-up ecosystem in Food & Agribusiness

Dr. Ch. Srinivasa Rao
Director - The National Academy of Agricultural Research Management (NAARM)
President - Association for Innovation Development of Entrepreneurship in Agriculture (a-IDEA)

What is a Technology Business Incubator (TBI)

TBI promotes the concept of growth through innovation and application of technology, support economic development strategies for small business development, and encourage growth from within local economies, while also providing a mechanism for technology transfer.

Why are TBI important.
- Act as a “safe house” for start-ups at an early stage.
- Spurring entrepreneurial talent resulting in greater number of start-up ventures.
- Enhance the probability of success of the start-up ventures.
- Center for innovation for industries local to the area where the incubator resides.
- Nodal point for aggregation of stakeholders of the entrepreneurial ecosystem.

Agriculture Incubators-Accelerators in India

The Technology Business Incubators were launched by the National Science and Technology Entrepreneurship Development (NSTEDB) of Department of Science and Technology (DST), since 1983, since then the incubators have been growing in India. With the advent of Start-up India initiative, launched by the Government of India in 2015, the number of incubators have been growing at much faster pace in general and there is an increasing number of agriculture incubators in the country. Since 2005, there are approximately 10 agri-business incubators that have come to existence in the country which are fully or partially focused in agriculture. Further, the Accelerators in Food and Agriculture space have emerged in 2015 with the initiation of India’s first Food and Agribusiness Accelerator by a-IDEA, NAARM with CIIE, IIM-A and further with the Agri Udaan, Food and Agribusiness Accelerator 2.0 in 2017 by a-IDEA, NAARM and CIIE, IIM-A.

Not only the number of incubators in all the focus areas including agriculture are growing in India. But also, India has emerged as one of the top three countries globally in terms of the number of start-ups founded after US and China.

Investment Scenario in Agtech start-ups.

As Indian tech start-ups raised a total of US$ 13.5 Bn funding in 2017, here are a few highlights from the recent funding report: Over US$ 157 Mn invested across 507 deals in seed funding in 2017.

In 2016, over US$ 3.23 Bn was invested in agriculture sector worldwide. Of this, 53 Indian agritech start-ups raised US$ 313 Mn. Globally, category-wise, 40% of the total funding (US$ 1.29 Bn) was invested in food marketplaces or the food ecommerce category, followed by biotechnology start-ups which garnered 22% of the funding (US$ 719 Mn). Investment in precision agriculture technologies, which include data-capturing devices and farm management software, came third at US$ 405 Mn, while investment in Novel Farming Systems, which are start-ups using new and innovative ways to produce agricultural and biological products, was the fourth category wherein funding flowed (US$ 247 Mn).

Healthy trends in agtech start-up investments globally
- Global agriculture and food technology start-ups received a record US$ 10.1 Bn in investments in 2017, up 29 per cent from 2016.
- The number of deals fell 17 per cent to 994 as investors made larger bets on fewer companies.
- Ag biotechnology investments fell 11 per cent to US$ 670 Mn, but included large deals. Microbial seed treatment company Indigo raised US$ 203 Mn, the largest farm tech deal to date.
- The median deal size of agrifood deals was US$ 2 Mn, up from US$ 1.2 Mn in 2016.

About a-IDEA Technology Business Incubator at NAARM,
a-IDEA (Association for Innovation Development of Entrepreneurship in Agriculture), is a Technology Business Incubator (TBI) of National Academy of Agricultural Research Management (ICAR-NAARM), Hyderabad & Department of...
Science & Technology, Govt. of India (DST, GOI), established in 2014. Its vision is to develop an Agri-entrepreneurial ecosystem in India that promotes innovation through cutting edge technology and economic value return and missioned to support powerful agribusiness and technology ventures through capacity building and facilitating access to knowledge and resources.

Agtech start-ups supported at a-IDEA- Focus areas:

a-IDEA aims to help entrepreneurs ideate, incubate and accelerate their innovative early stage start-ups that are scalable to become competitive food and agri-business ventures through capacity building, mentoring, networking and advisory support. The incubator focus is nurture, support and scale technologies that can bring efficacy in the value chains, improve productivity and benefit the stakeholders involved in such Agri-value chains.

NAARM is committed to promote innovation and entrepreneurship in agriculture through a-IDEA, the Technology Business Incubator (TBI). a-IDEA is shaping up the agritech start-up ecosystem through consistent efforts of sensitization, ideation & incubation programs, accelerators (Agri Udaan) and seed investments. The start-up ecosystem will definitely flourish and pave the way for innovative solutions to farmers and agriculture stakeholders.

Key Highlights of a-IDEA, Technology Business Incubator of NAARM

- Launched India’s first food and Agribusiness accelerator program in 2015 and Agri Udaan, Food and Agribusiness Accelerator 2.0 in 2017.
- An inclusive approach of a-IDEA to support agricultural start-ups from idea to investment (Ex:Sensitization-Ideation-Incubation-Acceleration-Seed Investment).
- A pipeline of ~1000 agriculture start-ups approached a-IDEA (i.e. 2015 mid till 2017).
- a-IDEA is the only agriculture focused incubator in the country, which is successfully executing seed investments to its start-ups in equity.
- Diverse technical strength of Institutions and knowledge resources (~6000+ Agri Scientists of ICAR backing various technology support in agriculture and allied sectors).
- Since 2015, at a-IDEA nurtured 40 agritech start-up, 6 seed invested start-ups.

Opinions expressed in the article are the author’s own
Focus Sector: Dairy

Socio Economic Development through Dairying

R. S. Sodhi
Managing Director,
Gujarat Cooperative Milk Marketing Federation Ltd. (Amul)

On the dairy industry’s role in enabling equitable & inclusive growth

Working for 3.6 Mn farmers, 80 per cent of which are marginal and landless, Amul has always ensured to return minimum 80 per cent of consumer rupee spent on milk back to its farmers. Having more than three decades of experience in the dairy industry, but the phrase ‘sustainable socio-economic development through dairying’ is still overwhelming. And whenever in doubt, I go back to the basics!

Dairy industry in India is unique and milk as a crop is one of the highest valued with annual outlay of around ₹6 lac crore which is more than paddy and wheat put together. With six lac villages housing about 90 crore of rural population, dairying is not just a large economic activity but also an integral part of the social and cultural heritage since the inception of human civilization. The uniqueness lays in its unifying power, in the fact that no other industry touches the lives of millions of farmers, particularly women. Complementing this are the Indian climatic conditions that support Animal Husbandry in all parts of the country. Dairy, in effect, could become a great tool for socio-economic development and income distribution in the country. What remains is providing market access by offering stable and remunerative prices to farmers to encourage this generations old sustainable livelihood practice.

It is imperative to note that sustainable livelihood will be one that is built on and promotes people’s existing knowledge base, skills and strengths, requires limited financial investment and adds to the social, natural and physical capital in the long run. From pure business sense, I would like to add that it is also one that deals with high and growing demand. In India, Food accounts for highest share of monthly household expenditure (31 per cent). Within food, Milk and Dairy products account for the highest share of expenditure after cereals for an average Indian household. Further, by 2025, India is likely to exceed China to become the most populous country in the world with 1.4 Bn people. Also, by 2060, 56 per cent of Indian population will reside in urban areas and only 44 per cent in rural areas. India is likely to have 143 cities with a population of more than ten lacs by 2060. However, number of villages will only witness marginal increase; from 6.4 lac villages in 2012 to just 6.75 lac villages in 2060. This clearly indicates that India will face the problem of ‘mouths to feed’ growing much faster than ‘hands to produce’ resulting in tremendous increase in demand for milk products to feed the growing population. Also, as disposable income is rising dietary preferences are shifting from carbohydrate to protein.
and fat rich food. With majority of the population being vegetarian, dairy will fulfill this changed diet pattern further contributing to demand.

Other livelihood options available to the rural population such as agriculture, poultry, aquaculture and beekeeping have high investment, high lead time and high dependence of climate. Dairy on the other hand, is a low-investment business with weekly realization and immensely growing demand. Further, as per NSSO, in ten year period between 2003 and 2013, average farm household income increased by 3.4 per cent CAGR. Income from livestock however in the same became three times. Further, the lowest land class earned 1 per cent of their incomes in crop cultivation while the largest earned 86 per cent of their total incomes from crop cultivation. This clearly implies that for 83 per cent of the farmers, who are marginal and landless, the only sustainable livelihood option available is animal husbandry and dairying.

Other aspects of socio economic development are income distribution and women empowerment. Over the years, we have come a far way from being an agrarian economy to a more service sector driven one, achieving accelerated GDP growth. Every economy aspires to grow; growth however, has a flip side - inflation. Further, if growth is heavily skewed towards the urban side it magnifies the impact of inflation owing to income gap. To keep this evil under check, we need balanced and inclusive growth. For inclusive growth, it is pertinent that our villages progress and if villages are to progress, dairy where 80 per cent of the farmers are landless and marginal will truly result in economic upliftment of the nation.

At Amul, out of 18,600 Village Dairy Co-operative Societies more than 4,800 societies exclusively managed by women. It is a known fact that when women earn, they spend more on food and education, this in general results in inclusive development creating long term impact.

There is development only if you become the voice of the voiceless and create income for the landless (read: resource less/underprivileged). Considering the dynamic environment we live in today, I find the dairy industry full of opportunities. It is an undeniable fact that this industry actively contributes to socio economic development through equitable and inclusive growth.
There are several myths current in India about the dairy sector. Some of these claim that there are huge production shortages; that FDI is the panacea; that western dairy products give higher returns and that the cooperative sector handles more milk than dairies in the private sector. One by one this article exposes these myths and calls for inclusion of private sector also in India’s ‘dairy vision’.

Myth is generally far away from truth. “The great enemy of truth is very often not the lie deliberate, contrived and dishonest but the myth persistent, persuasive and unrealistic” said John F. Kennedy. My focus in this article is to highlight some of the myths on Indian dairying which should be unveiled so that we are pragmatic while organising future activities.

Demand Outstrips Production

The first is the myth of huge production shortages in India, which will require us to undertake massive imports that will only go up in the future.

In 2016-17, India’s milk production crossed 160 Mtn, while registering a compounded annual growth rate of around 4.5 per cent in the last 10 years. As against this, the average growth of milk production in the world is 2.3 per cent. India accounts for over 17 per cent of the world’s total milk output.

These figures provide the base for analysing the myth originating from industry experts and survey reports about how in the last 5-6 years, India’s annual milk production has been increasing by around 4 per cent, whereas the annual milk demand is increasing by 6 per cent. A foreign expert went a step further, stating that India’s domestic milk demand is growing by 10 per cent, thus causing a shortage of a whopping 6 per cent every year.

Depending on whose mantra one takes as sacred or gospel truth, the annual growth gap would range from 2 (Indian expert) to 6 per cent (foreign expert). Either way, it means the country would face a deficit that could be met either through a massive production increase or resort to huge imports.

For example, a 6 per cent shortage figure would cause a gap equivalent of some 8.4 Mtn per year. If this statement is believed, a cumulative shortage of three years would mean that India’s import would exceed the entire current milk production of New Zealand.

Clearly, it would be impossible to make up for a 6 per cent shortage through imports when world production is only growing by 2.3 per cent and a large chunk of world trade of 40 per cent is accounted by New Zealand. Even the world as a whole will not be able to supply India, if its demand is outstripping production by 6 per cent.

Even if we consider the more conservative 2 per cent shortage figure, over the last six years this would add up to 12 per cent. That, on a production of 140 Mtn, comes to around 17 Mtn which is the actual shortage India should have experienced and this would have needed to import by 2014-15 cumulatively going by this theory.

The reality is that during the last decade India imported only 120,000 tonnes of milk solids, which is equivalent to a million tonne of milk. On the other hand, the country actually exported over 1 Mn tonne of powder and casein during this period. Effectively India has been a new exporter during the last decade.

It raises a simple question: Could the country have really been in a position to export over eight times the milk that it imported if there was a shortage? The experts would, then, cite rising milk prices to support their case. But even this argument rests on thin ice: Milk prices have, no doubt, gone up in recent times. But the cumulative increase in the wholesale price of milk from 2004 to 2012 was 110.4 per cent as against 113.8 per cent for all food articles and 115.9 per cent for foodgrains. It is much lower than the 153.2 per cent increase in the wholesale price index for the ‘eggs, meat and fish group’.  

**On the need to view the Indian dairy sector from a fresh perspective**
During 2015, the cooperative and private dairies held a surplus milk powder stock of 120,000 tonnes again equivalent to 1 Mn tonnes of milk. This is after exporting 8.5 Mn tonnes equivalent of milk products in the last decade. The dairy sector has been seeking intervention of the Government of India to incentivise exports. And, many processors today are paying lower prices to milk producers or cutting down on milk procurement volumes.

So, where does the question of a ‘structural shortage’ arise? Dairy exporters in several countries are pressurising the Indian government to lower import duties as well as sign free trade agreements (FTA) in a bid to access the country’s huge market. One could perhaps surmise that such a myth has been created by such lobbyists who want India to be soft on allowing imports of milk products through lower import duties and FTA!

The Panacea Called FDI

The second myth is about the need for foreign direct investment (FDI) to sort out problems in the food processing sector that includes milk. We are made to believe that FDI interventions would reduce wastage and impending shortages in farm produce. The arguments here are similar to those given out in support of FDI in multi-brand retail.

Foreign retailers, it is said, would instil efficiency by one, eliminating the intermediaries between the farm and the fork, compress the value chain to benefit both producers and the consumers, and two, catalysing huge investments in infrastructure for sourcing the farm produce, handling, storage and transportation and distribution and retail.

Both these are flawed assumptions. The evidence at least from the United States home to chains like Walmart, Kroger, SuperValu and Safeway is that the share of farmers for every food dollar spent by consumers has been drastically reduced from 40.9 cents in 1950 to 16.8 cents in 2012. This is from the data of none other than the US Department of Agriculture (USDA). In other words, the supply chain for milk in India is far more ‘compressed’ than in so-called advanced economies. There, much of the value between the farm and the fork is captured by expenses incurred not just in handling, processing, packaging, warehousing, refrigeration and transport, but also financing, insurance, marketing, brand promotion, labelling and shelf display.

As far as milk is concerned, in the United States, during 2012, the average dairy farmer received just US$ 1.81 for every gallon of fat-free milk that retailed at US$ 4.19. That amounted to a 43 per cent share. By contrast, the Indian dairy farmer gets about 70 per cent of the price the consumers.

This links up to the second point. Today, India has an organised dairy industry that handles about 26 Mn tonnes of milk, with the private sector accounting for 52 per cent and cooperatives the balance 48 per cent. The FDI/multinational component in this would not be even 2 per cent! If India’s milk production has grown from 22.2 Mn tonnes in 1970-71 to 58 Mn tonnes in 1992-93 and further to 146.3 Mn tonnes in 2014-15, and our farmers are receiving 70 per cent-plus share of the consumer rupee, it only exposes yet another mythical magic.

Corporate Dairy Farms

The third myth is that promoting fully automatic large corporate dairy farms is the way ahead and the only viable solution to ensure higher growth rate in milk production.

It is advocated that American-scale automated large farms in India can enhance growth in milk production at lower cost. Let me highlight that the US has three times our land size with less than one-fourth of our population. In 2017, the average value of farm land in the US was US$ 3080 per acre. Even if we take the figure of US$ 8,700 and US$ 5,200 for the top two US milk producing states of California and Wisconsin, it does not come to more than ₹ 500,000 an acre. And this is mostly good quality, well-irrigated and developed/levelled land-gradation of not more than six inches over one mile–that would cost at least 4-5 times more in India.

In addition, in the US, cost of capital is very low. It is possible to set up farms with large dairy herds and completely mechanised fodder cultivation, feed manufacturing, feeding, watering, data recording and of course milking operations.

In India, to set up a farm with, say 1,000 acres land, the investment in land at ₹ 10 lakh/acre, would be ₹ 100 crore. Capital for buying 10,000 cows, each yielding 4,500 litres annually, at ₹ 45,000/animal would be ₹ 45 crore. The total capital cost, then, just on land and animals is ₹ 145 crore. At annual interest of 12 per cent, the pay out would be ₹ 17 crore. This interest cost, when spread over 4.5 crore litres of milk (which is what the 10,000 cows would produce annually), will come to ₹ 3.90/litre. If to this, the cost of sheds, rotary milk parlours and other equipment are added, the total interest cost of capital invested on the farm will easily cross ₹ 6 per litre. And we are not even talking of other costs, especially the energy and expensive workforce that would be necessary to run and maintain such factory-size farms!

Therefore, the American model is unviable in India. It can work to a limited extent, provided the farmer-entrepreneur has family land of his own and does not have to invest freshly in land.

The best model of farm mechanisation in India is therefore one which leverages our inherent low labour cost advantage something that seeks to improve the productivity of labour, supplemented with marginal mechanisation, rather than replace it with high-cost capital.
Focus Sector: Dairy

five acres of land can easily rear 30 animals yielding 3,000 litres/year and costing ₹12 lakh at ₹40,000 each. The capital cost over and above this on shed, milking machines, fodder cutter and water guns for irrigation can be limited to another ₹3 lakh. With milk sales of 90,000 litres at ₹25/litre, the farmer would be able to gross a turnover of ₹22.5 lakh. It would be possible for the farmer to do a turnover of 1.5 times the capital with a high margin and efficiency with the simple technology addition. Additional margin comes from calf rearing. If planned properly, it will not take more than 20 months to 24 months to recover the entire investment.

The above model can be replicated over larger farms going up to 150 animals or so. Beyond that, not only capital costs become prohibitive, but the overheads involved in managing and supervising the entire operations (including hired labour) also mount.

Western Dairy Products give Higher Returns

The fourth myth is about value added western dairy products being the only way for corporates to get better valuation in the Indian dairy sector.

There is a general perception among Private Equity (PE) investors that value added western dairy products are the key for better returns. In the developed countries, cheese, yogurts, ice creams and chocolates are considered to be value added products and give higher returns to the milk processors. It is not the same scenario for these four products in India.

The total cheese market in India is about ₹ 2,900 crore. Of this, around 75 per cent is in the B2B category. The two other major categories where dairy products are used as a major ingredient like chocolates and ice cream are less than ₹ 7,000 crore each in market size. With the other categories such as yogurt hardly taking off in India, there seems to be no immediate scope for a large contribution of value added products to the Indian dairy sector.

Indian milk products with value addition are mainly milk sweets, paneer, khoa, channa (used as base for cow milk sweets), curd and ghee. Except for ghee, other products have short shelf life. There is need for technology to ensure longer shelf life for these products. Curd and paneer are gradually converting from commodities to branded products, but for a long time milk has been the main commodity which will control the price volatility and push the growth of the dairy sector in India.

With a large non-organised market still available for conversion from unprocessed to processed (pasteurised and/or homogenised) fresh packaged milk, what is required is technology for increasing the shelf life of milk and traditional dairy products and also to ensure good brand building, quality improvement and efficient cold chain so that a good product reaches the consumers.

The Indian food pallet is quite different and the western dairy products which are successful abroad do not find a ready acceptance in India. For example, the per capita consumption of ice cream is 28 litres/year in New Zealand and 21 litres/year in US as against just 0.3 litre/year in India.

Therefore, processed packaged fresh milk and traditional milk products are still a better option for the dairy processors in India versus the value added western dairy products.

Dominance of Cooperative Sector

The fifth myth is that the amount of milk handled by dairies in the cooperative sector is higher than the dairies in the private sector.

India produced 146.3 Mn tonnes of milk in 2014-15, as against 58 Mn tonnes recorded for 1992-93. The base year is important, for that was when the dairy industry was delicensed and the private sector allowed to freely establish dairy plants, subject to registration and other regulatory requirements under the Milk and Milk Products Order (MMPO), 1992. Till that happened, the country hardly had any large organised private dairies, barring the odd Nestle India or Milkfood Ltd.

But after 1992, a host of small and medium corporates entered the business. Today, apart from the Nestle and Milkfood, there are several private sector dairy plants in different parts of the country handling a million litres per day or more of milk. In addition, several more handle between half a million to a million litres of milk every day.

In 2016-17, cooperative dairies put together procured on an average 33.1 Mn litres of milk per day, whereas the organised private industry, covering those handling 50,000 litres and upwards, accounted for over 37 Mn litres per day. This works out to 48.52 ratio in favour of private dairies.

In fact, out of the total annual milk procurement of 33.5 Mn litres by cooperatives in 2013-14, more than 54 per cent was accounted for by just two state federations: Gujarat’s Amul (13.2) and Karnataka’s Nandini (5.0). Further, in 2000-01 the percentage of milk handled by cooperatives apart from Gujarat and Karnataka was 61 per cent. But in 2013-2014, this percentage had reduced to 46 per cent. This points to the cooperative dairy sector facing stagnation in most States, especially in North India and in the ‘Cow Belt’.

The private sector having overtaken the cooperatives today is implicitly admitted even by the National Dairy Development Board (NDBB). To quote from its Annual Report for 2010-11: “It is estimated that the capacity created by them (private dairies) in the last 15 years equals that set up by cooperatives in over 30 years”.

The remarkable thing about this growth of private dairies is that it has come about without any government subsidies or support from the NDBB. The processing capacities created have largely been on the strength of risk capital and entrepreneurial initiative and with hardly any investment from multinationals!
Two facts emerge from this analysis. The first is that the country’s milk output has more than doubled since 1992-93. Coming on a higher base, it is a spectacular achievement - no less compared to the increase from 22.2 to 58 Mn tonnes registered between 1970-71 and 1992-93. That, of course, coincided with Operation Flood, launched in 1970. But unlike the Operation Flood programme built around cooperatives, much of the production growth and creation of fresh processing capacities after 1992-93 has been powered by the private sector.

Today, a host of private sector dairy companies are working closely with milk producers and providing them technical inputs and extension services. For example, my company procures around 3 Mn litres of milk every day, of which about 20 per cent comes from once Naxalite-prone Krishnagiri and Dharmapuri districts of Tamil Nadu. If we were not to work in close collaboration with the farmers, Naxalites would have remained active.

Many State Governments grant subsidy to state cooperative dairy federations to ensure that the milk producer gets a remunerative price. The subsidy is as high as 20 per cent for cow milk price in some states. It is given arbitrarily and so neither helps the cooperatives nor the corporates. Subsidies are rarely utilised for the purpose they are meant for. There is either a political motive or to ensure that the cooperative does not show financial losses that will prompt their closure.

Subsidies curtail the freedom of the farmer and make the cooperatives slave to the state government. To increase consumer prices, the cooperative has to get clearance from the state government. With the vote bank in mind, the government often refuses to permit further price increase. Thus, the cooperatives end up losing more money. Too much of politics thus gets into milk. It would be better to have a policy at the central level to regulate/discourage this practice.

Subsidies also make the management of cooperative organisations lackadaisical, inefficient and function on financially unsound principles. As the cooperatives lose money continuously, they are reluctant to establish new capacities for the additional milk procured. In turn, the private dairy plants are unable to compete with this unfair competition and thus forced not to invest in such states. So ultimately new plant capacities are not generated by either cooperative or corporates. Since the cooperatives cannot procure all the milk from farmers, the private dairies are forced to procure at lower prices. At the end of the day, it is the farmer who suffers.

The growth of the private sector processors is thus more commendable today as they fight on an uneven ground with no incentives and also unfair competition.

What is unfortunate, though, is the refusal of our policymakers to acknowledge the contribution of organised private dairies to the recent growth of India’s dairy sector, leave alone incorporate them into the official policymaking framework.

Milk is a source of daily cash for the rural households. Its price is relatively stable and bereft of volatility exhibited by most crops. Milk withstands climatic vagaries and natural setbacks better than agriculture. The challenge ahead is to give remunerative price to the farmer, increase productivity of milking animals, bring down production cost of milk thereby increasing profitability of the farmers and helping them stay in the dairy sector.

India’s ‘dairy vision’ must encompass all stakeholders, including private sector dairies.
The dairy market in India should reach ₹16,000 Bn by 2022 and livestock comprising 26 per cent of Gross Value Added (GVA) of agriculture and allied sectors. In terms of value, milk is India’s single largest agricultural commodity, surpassing the total value of output from food grains in 2015-16. Of India’s total milk production of approximately 165 Mn MT (2017), roughly one-half is consumed on-farm; the organized sector – comprising milk unions, dairy producer companies and private dairies – captures about 20 per cent of the remaining marketable surplus. Demand for milk continues to increase and should reach some 210 Mn MT by 2021-22.

Breed improvement, feed optimization and management practices are drivers of increased dairy competitiveness in India. Over the long term, breed improvement will account for some 50-60 per cent of increased productivity potential through successively lifting genetic merit of India’s dairy herd. Adequate nutrition is essential to both ongoing animal health and fertility and increased per-animal productivity – in terms of daily milk yield and total lactation period (i.e., days “in-milk”). The small-scale of over 90 per cent of India’s dairy farms – with less than five milch animals – combined with their constrained cash flow and associated search, coordination and information costs, makes it an unlikely proposition to individually invest risk capital in either breed improvement or nutrition, yet both are crucial to meeting current and future consumer dairy demand.

Animal nutrition is undermined not only by feed and fodder scarcity, but also by farmers’ lack of knowledge on how to better use existing feed resources to improve animal nutrition. In parallel, the large bovine population accounts for an

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**De-risking Technological Innovation to Unleash Capital Investment in Dairy**

Edward W. Bresnyan  
Senior Agriculture Economist, Agriculture Global Practice, World Bank

*On the case for de-risking innovations to “crowd-in” much needed capital formation*

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**India’s Per Capita Daily Consumption of Milk Keeps Growing**

<table>
<thead>
<tr>
<th>Year</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>2/3 Cup</td>
</tr>
<tr>
<td>2006</td>
<td>1 Cup</td>
</tr>
<tr>
<td>2020</td>
<td>1½ Cup</td>
</tr>
</tbody>
</table>

Source: 2014 GAP report

Gross Capital Formation (GCF) in agriculture and allied sectors (as a proportion to the total GCF) declined from 8.3 per cent in 2014-2015 to 7.8 per cent in 2015-16, mainly due to reduced private investment. Despite this, the share of livestock in total Gross Value-added has been on the rise since 2011-12. The 2017-18 Economic Survey further highlights the risk profile of agriculture (including livestock) in regard to production, weather, prices and policy, among others. Policies and instruments that can mitigate or “de-risk” the business of agriculture can accelerate the capital formation sorely needed to spur growth. This article makes the case for de-risking innovations in the dairy sector to “crowd-in” much needed capital formation.

Public derisking measures can include:

- **Policy derisking instruments** seek to remove the underlying barriers that generate risk by supporting innovative policy design, institutional capacity building, resource assessments, and skills development for local-level operations and maintenance.

- **Financial derisking instruments** do not seek to directly address the underlying barriers but, instead, transfer the risks that investors face to public actors. These instruments can include, for example, loan guarantees, political risk insurance and public equity co-investments.

- **Direct financial incentives** (e.g., price premiums, grants, tax breaks) can mitigate residual incremental costs and thereby increase returns. When combined, these instruments can increase the perceived return on investment and attract private sector investment.

Breed improvement, feed optimization and management practices are drivers of increased dairy competitiveness in India. Over the long term, breed improvement will account for some 50-60 per cent of increased productivity potential through successively lifting genetic merit of India’s dairy herd. Adequate nutrition is essential to both ongoing animal health and fertility and increased per-animal productivity – in terms of daily milk yield and total lactation period (i.e., days “in-milk”). The small-scale of over 90 per cent of India’s dairy farms – with less than five milch animals – combined with their constrained cash flow and associated search, coordination and information costs, make it an unlikely proposition to individually invest risk capital in either breed improvement or nutrition, yet both are crucial to meeting current and future consumer dairy demand.
estimated 11 per cent of the gross greenhouse gas (GHG) emissions of the country. To meet the increasing demand for dairy products, "business-as-usual" is no longer a viable option, and approaches to reduce dairy’s carbon footprint while increasing per-animal milk productivity are key to achieving a sustainable and profitable dairy sector.

Under the Ration Balancing Program (RBP) piloted under India’s National Dairy Plan, Phase 1 (NDP-1), dairy producers learn to optimize or “balance” animal feed and nutrition, thereby increasing milk yield, reducing production costs, and decreasing GHG emissions. Farmers take advantage of locally available feed and fodder and location-specific mineral mixture to boost milch animal productivity. A user-friendly mobile app has also been developed that derives balanced least-cost rations for different levels of milk production. To date, the RBP has reached 39,000 villages, nearly 3 Mn milch animals, and 1.5 Mn dairy producers. RBP farmers are earning, on average, ₹7930 of additional net income per lactation per animal. Furthermore, the RBP has extended lactation period by 56 days for buffalo and 20 days for cattle and increased daily milk yields and its constituents (e.g., fat and solid non-fats).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Before RBP</th>
<th>After RBP</th>
<th>Change (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average per milch animal productivity (kg/animal/day)</td>
<td>7.10</td>
<td>7.37</td>
<td>4</td>
</tr>
<tr>
<td>Average milk fat (per cent)</td>
<td>4.72</td>
<td>4.81</td>
<td>2</td>
</tr>
<tr>
<td>Average feeding (Rs./kg milk)</td>
<td>19.59</td>
<td>17.18</td>
<td>-12</td>
</tr>
<tr>
<td>Average cost of feeding (Rs./animal/day)</td>
<td>135.62</td>
<td>118.69</td>
<td>-12</td>
</tr>
<tr>
<td>Increase in net income per animal per day</td>
<td>₹26.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase in net income over lactation period</td>
<td>₹7,930.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: National Dairy Development Board (NDDB)

The public sector can play a vital role in reducing the risk profile of potential capital formation in the dairy sector as well as in the larger context of Indian agriculture. Demonstrating proof-of-concept in innovation – whether in capital investment such as milking machines, chaff cutters, milk data recording or management practices such as mastitis prevention, disease vaccination or the above-mentioned RBP – can significantly reduce or eliminate search and information costs for producers in the organized sector. In fact, the organizing of dairy producers into milk unions and dairy producer companies is itself a derisking strategy to increase market power and improve price negotiation. The public investment in such derisking is already paying off in the organized dairy sector as dairy producers are now making the choice to independently optimize animal nutrition in an overall approach to increase quality and productivity.

Greater knowledge generation and analytics can also improve management decisions in the dairy sector. In 2012, the National Dairy Development Board (NDDB) launched the Indian Network for Animal Productivity and Health (INAPH) with the objective of consolidating breeding and nutrition data to better inform the organized dairy sector and provide transparent analytics to guide dairy producers in choosing services such as artificial insemination and bull purchasing. INAPH is work-in-progress and will improve as the database expands.

Indian Network for Animal Productivity and Health (INAPH) is already supporting the analytics to:

- Verify proof-of-concept for RBP
- Calculate estimated breed values to confirm genetic progress in the dairy herd
- Signal the market to better inform bull pricing

Over time, as awareness and confidence grow with regard to INAPH, the data analytics it can generate will lower uncertainty and facilitate greater investment flows in the dairy sector. Public finance can thus be vital to confirming proof-of-concept for technological innovation in India’s dairy sector and accelerate the influx of capital formation needed to achieve greater competitiveness.

Opinions expressed in the article are the author’s own
Maharashtra’s Agri Advantage

Shri Bijay Kumar Sahoo
Principal Secretary (Agriculture)
Government of Maharashtra

While the State continues to attract investments which is visible from data available with central bodies like MoFPI; APEDA; NHM; however Maharashtra has also unveiled a progressive policy on food processing during the WORLD FOOD INDIA to enhance investments in the State.

Maharashtra enjoys a prominent position on the horticultural map of India with more than seven lakh hectares under different fruit crops. The State ranks third in fruit production with a share of 11 per cent in country’s total fruit production.

- **Ranks No. 1** in production of Grapes, Pomegranate, Custard Apple, Onion, Ginger, Raw Cashew and Poultry Meat
- **Ranks No. 2** in production of Turmeric and Cinnamon
- **Ranks No. 3** in production of Citrus fruits
- **Ranks No. 4** in production of Cut Flowers, Strawberry, Sapota and Capsicum
- **Ranks No. 5** in production of Eggs, Tamarind, Banana and Cucumber

The MAP depicted is only pictorial representation of Maharashtra and does not purport to be the political map of the State and is not drawn to scale and is only impression of select spices availability. Investment and commercial decisions should not be taken only on the basis of illustrations in the map. YES BANK Limited shall not be liable for any loss or damage whatsoever, including incidental or consequential loss or damage, arising out of, or in connection with, any use of or reliance on the information from this map.
The State Government has been very proactively supporting the agribusiness sector in Maharashtra. What are the key initiatives that the Government has taken to boost investments in the state?

As you are aware, the Hon’ble Minister of Industries for the Government of Maharashtra unveiled the Food and Agri Policy at a special event during World Food India (WFI) and also announced a new scheme known as “Chief Minister Agro and Food Processing Scheme”. Proposals have been invited from investors for schemes like Technology Upgradation, New Establishment, Modernization of Food Processing Industries, Cold chain, Value addition and Preservation infrastructure.

Incentives to the approved proposals will be provided on eligible civil and technical plant and machinery in the form of credit linked backend subsidy.

Chief Minister Agro and Food Processing Scheme aims at filling the space created by discontinuation of the centrally sponsored scheme of National Food Security Mission.

While many central government sponsored projects in food parks, food processing and cold chain are in various stages of completion and commissioning for commercial production; the state sponsored schemes will give a fillip to many more new projects.

Furthermore, the policies unveiled in recent budget like RKVY RAFTAR, Operation Green, Dedicated Fund for Food Processing, Fisheries and Aquaculture Infrastructure Development Fund (FAIDF) and an Animal Husbandry Infrastructure Development Fund (AHIDF) will further boost investments in the state. The ₹ 5,000 Crore dedicated Micro Irrigation Fund set up in NABARD under Prime Minister Krishi Sinchai Yojana will be needed to address the water stress areas of Marathwada and Vidarbha.

The ₹ 500 crore ‘Operation Greens’ is of utmost importance as the state is leading producer of onions and also tomatoes. The re-structured National Bamboo Mission is another area that we want to explore as a viable alternative for doubling farmer income.

We will also look at Gramin agricultural markets (GRAM’s) and eNAM more closely which is being further consolidated by replacement of system of licensing of traders by APMCs with online registration of traders and by facilitating settlement of transactions finalized online from outstation locations.

Besides this, most of infrastructure projects are Maharashtra-centric; hence we believe that the State is poised for a rapid growth in agribusiness. Delhi – Mumbai freight corridor; Maharashtra Samruddhi Mahamarg; coastal corridor/ coastal economic zone under Sagarmala at JNPT and Jaigarh will assist in promoting exports.

Maharashtra has been a very prominent player in agribusiness in India. It is the forerunner in agri trade as well. Can you share with us some latest developments in the food and agri space in Maharashtra

The state is witnessing enhanced interest not only from the domestic food processing industry, but equally well form the global players. During the WFI; we had ample interest from global players who visited our pavilion and they are now visiting specific locations in the state to assess setting up units. For instance we had a leading fresh produce processor from Spain who has already assessed Pune and its surroundings for procurement of fresh produce for exports.

Similarly a leading UK Bank met up to explore opportunities in cold chain in Maharashtra for UK companies and is exploring collaborations in the state. In this context, interest shown by Japanese food processing companies also deserves special mention. Kagome Japan which is investing in Nashik region is being supported by state government in its effort for introduction of processing worthy varieties of tomatoes.

Key Facts:

- **Highest Gross State Domestic Product (GSDP) among all states** - 12.98 per cent of India’s GDP (2015-16)
- **Agro climatic zones and a long coastline stretching ~ 720 km**
- **Principal crops** - rice, jowar (sorghum), bajra (pearl millet), pulses, and sugarcane
- **Principal oil seeds** - groundnut, sunflower and soybean
- **Huge areas under fruit & vegetable cultivation with large production of fruits like - mangoes, bananas, grapes, oranges, and vegetables like - onions and tomatoes**
- **Top destination for investment owing to** - Well-developed Infrastructure, Technological Advancement, Availability of Skilled Manpower, Connectivity to Major Areas & Abundant Natural Resources
- **More than 10,000 Companies in the food processing sector - Domestic as well as MNCs**
Focus Region: Maharashtra

Despite all the positives which Maharashtra boasts of, there still are numerous challenges that mar the agri sector. How do you look at these challenges and what are your views to overcome these shortcomings.

Yes, they are. However we have a multipronged approach here. As you are aware, today we have a major challenge of making farming a profitable activity in rain-fed condition for which Unnat Sheti Samruddh Shetkari Programme has been launched. For ensuring protective irrigation for crops, Jalyukt Shivar Abhiyaan (Water Conservation Scheme), a pet project of the Hon’ble CM has been put in place involving deepening and widening of streams, construction of cement and earthen stop dams and digging of farm ponds. Wherever possible, dovetailing with agriculture will be done as a part of MGNREGA to provide wages also.

Project on Climate Resilient Agriculture (PoCRA) under World Bank is planned to enhance climate-resilience and profitability of smallholder farming systems in 15 districts of Maharashtra involving about 5,142 villages in drought-hit Marathwada and Vidarbha. This initiative is named as ‘Nanaji Deshmukh Krishi Sanjivani Yojna’ and aims to improve soil quality, develop food grain varieties which can sustain climate variations and effect necessary changes in the crop pattern. We will take the help of Green Climate Fund (GCF) for watershed planning, use of water efficient technology, better farming practices and market linkages to reduce climate change impact.

What is your pitch statement for investors looking at Maharashtra as the preferred investment destination?

The Government of Maharashtra is acting as an enabler. Most of the policies have been framed in discussion with stakeholders and investors. Maharashtra Industrial Policy of 2013 has been extended for another six months and is very attractive for Greenfield investments. Capital subsidy as well as subsidies in tariffs will go a long way in promoting both Mega and also medium and small enterprises. Many policies have been unveiled at ‘Magnetic Maharashtra: Convergence 2018’ and we urge investors to consider the state which offers unparalleled production base and consumption market at doorstep.

Highest number of GIs in Horticulture & Foods

- Nasik Valley Wine
- Mahabaleshwar Strawberry
- Nasik Grapes
- Kolhapur Jaggery
- Nagpur mandarin oranges
- Ajara Ghansal Rice
- Mangalwedha Jowar
- Sindhudurg & Ratnagiri Kokum
- Waghya Ghevada
- Navapur Tur Dal
- Vengurla Cashew
- Lasalgaon Onion
- Sangli Raisins
- Beed Custard Apple
- Jalna Sweet Orange
- Waigaon Turmeric
- Purandar Figs
- Jalgaon Brinjal
- Solapur Pomegranate
- Bhiwapur Chilli
- Ambemohar Rice
- Dahlanu Gholvad Chikoo
- Jalgaon Banana
- Marathwada Kesar Mango
MAHARASHTRA
An abode of Opportunities

Third Largest producer of Fruits in India

Fourth Largest Producer of Cut Flowers

Sixth largest Producer of Vegetables. Largest producer of Onions

Largest producer of Poultry Meat in the country

3 Mega Food Parks, 25 SEZs and 7 Designated Food Parks

Key exporter of fruits like Grapes and Pomegranate

9 Agro-climatic zones

Cultivation of a multitude of crops, fruits and vegetables round the year
Feasts and Fasts: A History of Food in India

The richness of India’s cuisine today, draws an indelible legacy of the country’s interesting history. The diversity is a manifestation of a mix of various factors starting from the Indus Valley Civilization to the colonial rules of the British, Portuguese, French, the Dutch; climatic & geographic conditions, various Indian kings and of course the Mughals. Indeed, the history of Indian food has emerged to a closely knit one, with the country’s diverse people, culture and traditions.

Today, Indian food in its many incarnations has become a world cuisine. This reflects an increased awareness of the virtues of a traditional Indian diet. It goes without saying the reason why it is indeed interesting to learn the story of India’s culinary culture and legacy.

The book Feasts and Fasts: A History of Food in India traces the history of Indian food from prehistoric times to the present in the context of historical, social, religious and philosophical developments. It addresses topics such as climatic influence on the crops, ritual-encouraged dishes, tradition and vegetarianism. It also highlights the regional cuisines, food habits during religious trends and various associated movements, and also how Indian food had medicinal values and referred to as a recourse to various ailments.

The diversity of India’s crops wrests from its versatile geographic landscape – covering the snow peaks of the Himalayas and the cedar woodlands of Kashmir, tropical forests of Kerala, deserts of Rajasthan to the flood plains of Bengal coupled with a 7,500 miles of coastline and ten major river systems. The book highlights the critical role of rainfall in controlling food supplies and also details the origins of various fruits & vegetables, spices, amongst others. The Age of Ritual chapter captures the mention of Soma - the ancient avatar of alcohol, and describes its importance and role as an offering during worships to Gods. The piece highlights the deep rooted interpretation of the food cycle through Ode to Food from the Taitiriya Upanishad, composed from about 500 BCE. The chapter on Global India & the New Orthodoxy traces the presence of a global fusion in culinary affairs brought about in India by various ruling forces or the merchants across the globe like the, English, Portuguese, Arabs, Egyptians, Jews, Greeks, amongst others. The author refers to an exhaustive culinary spread as a part of traditional culinary offerings across religions mentioned in Mahabharata & the Ramayana; for example, Tantrism found use of madya (alcohol), mamsa (meat), matsya (fish) while he worship of lingam found the use of milk, yoghurt & honey. The articulation of overview of Indian cuisine with focus on regional specialties, present trends and recipes makes the book interesting and a highly recommended one.

Food Politics: How the Food Industry Influences Nutrition & Health

The book Food Politics: How the Food Industry Influences Nutrition & Health narrates the marketing methods of food industry and how it influences consumption pattern and its effect on health. It also talks about methods the food companies use to obtain support from all quarters for the sale of the product. It is an important document that traces the correlation between American food system and its politics.

The efficient food industry in the US does everything possible to persuade people to eat more than the required amount, more often, and in larger portions – irrespective of health hazards. Making food is big business. With stakeholders to please, shareholders to satisfy, and the Government regulations to deal with, it is shocking to learn the way food companies lobby officials, co-opt experts, and expand sales by marketing to children, members of minority groups, and people in developing countries. Further surprising to know that, when it comes to production and consumption for the mass, it is only economics that drive strategic decisions and definitely not common sense or repercussions on health.

The document enlightens us with the fact that the food industry plays politics and it plays way better than other industries. Food Politics will forever change the way we respond to food industry marketing practices. By explaining how much the food industry influences the Government nutrition policies and how cleverly it links its interests to those of nutrition experts, this path-breaking book helps us understand more clearly than ever before what we eat and why.

The facts mentioned in the book are convincing and the industry has found it difficult to refute its findings and has responded by way of promising to make the products healthier and the way the food is consumed.

Book: Feasts and Fasts: A History of Food in India
Author: Colleen Taylor Sen

Book: Food Politics: How the Food Industry Influences Nutrition & Health
Author: Marion Nestle

Book Reviews by
Argyadip Datta
(arghyadip.datta@yesbank.in)
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