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INDIA IS THE FOOD BASKET FOR THE WORLD?

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ABSTRACT

In this paper we identify emerging opportunities in the food and cold chain sector in India and present ways in which existing market challenges in India can be overcome using technology and experience. In particular, we identify opportunities for improvement in real estate and cold chain infrastructure, establishing food processing plants, wholesale, retail, third party logistics and technology. In Section 2, we discuss the current state of This research was carried out when the author was Professor at National University of Singapore and Deputy Executive Director of TLI-AP. This work was supported by the Institute of South Asian Studies, Government of Singapore under the project *Cold Chain Management.* the agricultural industry in India. In section 3 we present the state of food processing industry in India. In sections 4 and 5, we present the cosmic view of the food supply chain and its various constituents. We outline the current initiatives promoted by the Government and the Private sector in Sections 6 and 7. In Section 8, we bring to focus the areas that need attention. A sample list of research areas for Or specialists is discussed in section 9. We wrap up our analysis with conclusions presented in section 10.

Keyword: - Cosmic, Overcome, Technology

Introduction

In India, 52% of total land is cultivable as against 11% in the world. All 15 major climates of the world, snow bound Himalayas to hot humid southern peninsula; Thar Desert to heavy rain areas all exist in India. There are 20 agro-climatic regions and nearly 46 out of 60 soil types in the country. Sunshine hours and day length are ideally suited for round the year cultivation of crops. India is the centre for biodiversity in plants, animals, insects,

micro-organism and accounts for 17% animal, 12% plants and 10% fish genetic resources of the globe. In the live stock sector, India has 16% of cattle, 57% of buffalo, 17% of goats and 5 % of sheep population of the world. Agriculture contributes 24.2% to GDP, 15.2% of total exports and provides employment to 58.4% of country's work force.

As mentioned in the FICCI report of October 2004 India is the

• Second highest fruit and vegetable producer in the world (134.5 million tones) with cold storage facilities available only for 10% of the produce.

• Second highest producer of milk with a cold storage capacity of 70,000 tonne.

• Fifth largest producer of eggs. Investments in cold chain required to store 20% of surplus of meat and poultry products during 10th plan requires Rs 500 Crore (US$ 100M)

• Sixth largest producer of fish with harvesting volumes of 5.2 million tones.

Investment required is estimated to be Rs 350 Crore (US$ 70M)

In spite of the vast natural resources and abundant agricultural produce India ranks below 10th in the export of food products. Conservative estimates put processing levels in the fruits and vegetables sector at 2%, meat and poultry at 2%, milk by way of modern dairies at 14%, fish at 4%, bulk meat de-boning is to the tune of 21%. Currently, the food processing sector, though in the nascent stage, constitutes 14% of manufacturing GDP amounting to products value of Rs.2, 80,000 Crores. It employs 130 lakh persons and is supposed to increase at an annual rate of 7%.

3. THE INDIAN FOOD PROCESSING INDUSTRY

3.1 Food Industry

According to a study by McKinsey & Company, the Indian food market is poised to grow from US$ 155 billion in 2005 to US$ 310 billion by 2015 and US$ 344 billion in 2025 - at an approximate compounded annual growth rate of 4.1%..

The development of the food industry in India stems from the consistently increasing agricultural output. With the second largest global arable land area, India is one of the key food producing countries in the world, sec-ond only to China.

- Currently, India ranks second in fruit production and third in vegetable production in the world.
- In 2007-08, food grain production in India had registered a 4.6% growth with 227.32 million tonnes as against 217.28 million tonnes in

2006-07, according to estimates by the Ministry of Agriculture.

- The output of coarse cereals in 2007-08 was 39.67 million tonnes, 17% higher than the 33.92 million tonnes in the previous fiscal.
- The total output of oilseeds is estimated to have risen to a record 28.2 million tonnes, about 16% higher than the 24.29 million tonnes in 2006-07.
- The production of pulses has risen to 15.19 million tonnes, registering a year-on-year growth of 7% and touching a new high.

*3.2 **Food Processing***

India's food processing industry is one of the largest industries in the country - it is ranked fifth in terms of production, consumption, export and expected growth. India is one of the world's major food producers but accounts for only 1.7% (valued at US$ 7.5 billion) of world trade in this sector – this share is slated to increase to 3% (US$ 20 billion) by 2015.

The Indian food processing industry is estimated at US$ 70 billion. According to the Ministry of Food Process-ing, this industry contributed 9% to India's GDP and had a share of 6% in the total industrial production. The industry employs 1.6 million workers directly.

Sustained by high agricultural output, international demand and a strong domestic market, the Indian food in-dustry offers ample scope for large investments in processing technologies, skills and equipment, packaging, refrigeration of frozen food and thermo processing.

Currently, only 6% of the country's fruit and vegetable produce is processed and India's share of the global market stands close to a dismal 0.03%. While the size of the global processed-food market is estimated at US$ 3.2 trillion and nearly 80% of agricultural products in the developed countries get processed and packaged (as suggested by 'India Food Report 2008', released at the Food Forum India, in Mumbai), there is huge scope for export-led growth in this particular sector. Recognising this, in the next few years India aims at raising the share of processed food to 20% in comparison to total agri-produce, on the one hand, and enhancing export of these items to 3% on the other.

3.3 The Indian Food Processing Industry

Structure and Composition

Food processing is a large sector that covers activities such as agriculture,

horticulture, plantation, animal hus-bandry and fisheries. It also includes other industries that use agriculture inputs for manufacturing of edible products. However, the Ministry of Food Processing, Government of India has defined the following segments within the Food Processing industry:

• Dairy, fruits and vegetable processing
• Grain processing
• Meat and poultry processing
• Fisheries
• Consumer foods including packaged foods, beverages and packaged drinking water.

While the industry is large in terms of size, it is still at a nascent stage in terms of development. Out of the country's total agriculture and food produce, only 2% is processed. The highest share of processed food is in the grain processing and the dairy sector.

Primary food processing (packaged fruit and vegetables, milk, milled flour and rice, tea, spices, etc.) constitutes around 60% of processed foods. It has a highly fragmented structure that includes thousands of rice-mills and hullers, flour mills, pulse mills and oil-seed mills, several thousands of bakeries, traditional food units and fruits, vegetable and spice processing units in the unorganised sector. In comparison, the organised sector is rela-tively small, with around 516 flour mills, 568 fish processing units, 5'293 fruit and vegetable processing units, 171 meat processing units and numerous dairy processing units at state and district levels.

4. THE FOOD SUPPLY CHAIN

India has a huge opportunity to become a leading global food supplier if only it has the right marketing strategies and of course agile, adaptive and efficient supply chain. India has diversity in terms of its population with several religious groups with different food habits and culture. This diversity should be used to advantage to become the "Halal Food Hub", the "Organic food hub", the "Vegetarian food hub" the "Sea food hub" among others.

The food supply chain is complex with perishable goods and numerous small stake holders. In India, the infrastructure connecting these partners is very weak. Each stake holder: farmers, wholesalers, food manufacturers, retailers all work in silos. Also, demand forecasting is totally absent and the farmers try to push what they produce in to the market. Data integration, financial flow management,

supply-demand matching, collaborative forecasting, information sharing, goods movement synchronization through efficient transport scheduling, are very well practiced in high technology industries with immense benefits. These best practices should find their way in to the food supply chains. Cold chain logistics supply chains should take advantage of technology improvements in data capture and processing, product tracking and tracing, synchronized freight transport transit times for time compression along the supply chain and supply –demand matching..

Also, the supply chain need to be designed and built as a whole in an integrated manner with the processes of new product development, procurement and order to delivery processes well designed and well supported using IT tools and software.

The food supply chain can be subdivided into a number of sectors. Agriculture, horticulture, fisheries and aquaculture are the primary producers, the manufacturers who process the food for ready to eat or cook format together with the packaging companies are in the intermediate stage, and the retailers, wholesalers and caterers are in the last stage of the supply chain. At each stage value is added by the new ownership such as processors, distributors, packers, etc. and the cost and profits are part of the business.

The food items can go to the final consumer from any of the three stages:

1 .from farmers in the

2 .form of fresh produce, to the caterers directly from the manufacturer, and

3. from the retailer (small or big) to the consumer.

The movement of goods from one stake holder to

another is facilitated by the in house or third party logistics service provider. The information management is done by the all the stake holders and their information systems are all interconnected seamlessly. What we described above is the state of food chain in the advanced countries. In India and other developing countries, the state of food chain is more fragmented and primitive we have dealt with it in the earlier sections.

The Cold Chain

Cold chain is a logistic system that provides a series of facilities for maintaining ideal storage conditions for perishables from the point of origin to the point of consumption in the food supply chain. The chain needs to start at the farm

level (e.g. harvest methods, pre-cooling) and cover up to the consumer level or at least to the retail level. A well organized cold chain reduces spoilage, retains the quality of the harvested products and guarantees a cost efficient delivery to the consumer given adequate attention for customer service. The main feature of the chain is that if any of the links is missing or is weak, the

Whole system fails.

The Cold chain logistics infrastructure generally consists of

• Pre-cooling facilities
• Cold Storages
• Refrigerated Carriers
• Packaging
• Warehouse and Information Management systems
• Traceability
• Financial and Insurance Institutions

The temperature controlled supply chains or cold chains are a significant proportion of the retail food market. Fast foods, ready meals and frozen products have increased market share in recent years. There are several food temperature levels to suit different types of products. Frozen, cold chill, medium chill, and exotic chill are some of the frequently nomenclatures with identified temperature ranges. The range of temperatures is dependent on the products whether it is meat or ice cream or potatoes or bananas.

Failure to maintain appropriate temperature regimes through out the product life cycle may shorten the product life or adversely affect its fitness for consumption. Cold chain management involves maintaining appropriate temperature regime when the product travels from the farm in Himachal Pradesh to the consumer in London or New York City.

That is why the logistics challenge is formidable in food chains, which is cost conscious industry. There are several governmental regulations in all countries and the responsibility to maintain hygiene and standards falls on the food retailer or manufacturer. The recent developments in electronic tagging could be useful for monitoring the temperatures and also the shelf life of the product.

Supply chain expertise

There is a need to embrace the concept of Efficient Consumer Response (ECR) which was introduced in the United States in the 1990s and is now followed world wide in grocery supply chains. ECR refers to a set of strategies that aims to get companies across a supply chain to work

closely to serve their customers better and at lower cost.

Consumers benefit from improved product availability and choice, while distributors and suppliers derive better efficiency and cost savings. Also collaborative planning forecasting and replenishment is another area that has yielded substantial savings for retailers. Relationship between the stake holders in the supply chain is of paramount importance for ECR, CPFR and other relationship paradigms to work.

Food Packaging

Dairy products, edible oils, farm products, sugar, fruit juices, concentrates, preserves, hot and cold beverages, breakfast foods, biscuits and confectionery, atta, are some major foods of daily necessities where packaging will have excellent potential and growth areas. Package has become the competitive tool to reach the consumer and the task assumes increasing responsibility with more and more of competitive and substitute products being introduced. This has opened the sector for introduction of modern technology for processing and packaging and entry of host of new organizations from all sectors of the economy both domestic and overseas. Cost of packaging ranges anywhere from 10 to 64% of production costs and efforts should be made to reduce these costs through use of manufacturing automation and economies of scale.

Standards

Standardization is a powerful tool for improving supply chain efficiency. There are two kinds of standards in the food supply chain. The first one is the food standard that concerns itself about the content and the manufacturing process and the packaging etc.

There are several such standards for dairy, poultry etc. the second standard concerns regarding the logistics and IT systems like standardization of cartons, pallets and IT software so that seamless transfer of goods and information is possible. Standards enable partners across the supply chain to enjoy increased productivity and economies of scale due to better compatibility and interoperability of their systems and processes.

Food Safety and hygiene

Food safety is a growing concern across the world. There is increasing need to provide greater assurance about the safety and quality of food to consumers. The increase in world food trade and the advent of the Sanitary and Phytosanitary (SPS) Agreement under the World Trade

Organization (WTO) have lead to increasing recognition and adoption of food safety measures. The capacity of India to penetrate world markets depends on its ability to meet increasingly stringent food safety standards imposed in developed countries. Food standards are expected to acquire greater importance given
increasing concerns on food safety on the back of breakout of diseases such as BSE, Avian Influenza, Bird Flu etc on the one hand, and growing consumer demand for products which are healthy on the other. Compliance with international food standards is a prerequisite to gain a higher share of world trade.

Training

The food supply chain is going through a period of great change and needs to be supported through new organizational forms manned by specialists. Training, coaching, counselling and mentoring have to be extended to all the parties in the supply chain. For example, it is important to conduct courses and training sessions on cold chain management to raise the knowledge and awareness on the importance of implementing the cold chain management to ensure that there is no breakdown in maintaining the required temperature throughout the supply chain. In this way a pool of skilled workforce with good knowledge of cold chain management to meet the needs of the industry to be a cold chain will be generated. The same applies to other areas in the food
supply chain such as procurement, retailing etc.

Business model: retail, e-retail, local use, export

The food processing industry supply chain starts at the farm and ends with the consumer. The local consumer could be served though home delivery or through a retailer or a neighborhood kirana store. An international consumer could be served through food malls. Thus the products need to be manufactured for local as well for export. It is important to forecast the demand for each of the channels and serve the customer with in the expected lead time. The service levels and the pricing will determine if the customer returns for his or her next purchase.

5. GOVERMENT INITIATIVES

The Government of India has declared food processing a priority by introducing a number of progressive measures to set up and modernize food processing units, create infrastructure, support research and develop-ment and human resource development and

• The National Policy aims to increase the level of food processing from 2% to 10% in 2010 and to 25% in 2025

• The level of institutional credit to be provided by banks and financial institutions has been increased from US$ 17.41 billion during 2003-04 to about US$ 23.76 billion in 2005-06

• Full repatriation of profits and capital is allowed

• Automatic approvals for foreign investment up to 100%, except in few cases, and also technology transfer

• The government has decided to give a boost to research and development in this sector with its deci-sion to set up the National Institute for Food Technology and Management in collaboration with Cornell University of the US.

• Zero import duty on capital goods and raw material for 100 per cent export-oriented units. Custom duty on packaging machines reduced. Central excise duty on meat, poultry and fish reduced to 8%

• Income tax rebate allowed (100% of profits for 5 years and 25% of profits for the next 5 years) for new industries in fruits and vegetables besides institutional and credit support.

• The government would also set up abattoirs and dairies and will give a grant of US$ 3.1 million per ab-attoir and US$ 2.08 million per dairy.

On the Government side, there is also a renewed enthusiasm to popularise organic food cultivation since ex-ports of organic food have grown to US$ 75.16 million over the past one year from US$ 25.05 million just two years ago. In a bid to boost the food sector, the Government is also developing 30 mega food parks which would cover the entire food processing cycle 'from the farm gate to the retail outlet'. While the Government would provide a grant of US$ 12.53 million for each one, private investment to the tune of US$ 75.21 million would be encour-aged in these parks. The first five such parks would be set up in Punjab, Maharashtra, Andhra Pradesh, Jhark-hand and the North-East region in the first phases.

6. GOVERNMENT INITIATIVES TO PROMOTE FOOD EXPORTS

The Government of India (GOI) has accorded high priority to the establishment of cold chains and encourages major initiatives in this sector.

• Foreign equity participation of 51% is permitted for cold chain projects.

• There is no restriction on import of cold storage equipment or establishing cold storages in India.

• National Horticulture Board (NHB) operates a capital investment subsidy scheme (CISS) which provides 25% (maximum Rs.50 lakhs) subsidies to the promoter. Furthermore, to handle the expected higher agricultural production during the Tenth Plan Period, the Inter Ministerial Task force on Agricultural Marketing Reforms constituted by Ministry of Agriculture, Government of India has recommended the creation of additional cold chain facilities at an investment cost of Rs. 2500 crore of which Rs. 625crore are to be provided as subsidy and the rest has to come as private investment. They have also suggested modernization of existing facilities with an investment cost of Rs. 2100 crore of which Rs. 525 crore are to be subsidy and the balance to come as private investment.

The state governments also have initiatives in the food processing and cold chain sectors. For example the Gujarat government has accorded priority to agro processing and horticulture, in view of the high export potential for fruits like mango, banana and chikoo. The government supports the sector by providing assistance to farmers for agricultural inputs, developing systems like drip irrigation and encouraging development of infrastructure facilities like warehousing, cold chain, etc for better pre-harvest and post-harvest crop management. Gujarat also has good logistical infrastructure such as
airport, seaport and extensive road & railway network. Other states such as Maharastra , Andhra Pradesh, Kerala and Punjab have similar schemes in place.

Agri Export Zones (AEZs):The concept of the Agri Export Zone [19, 20]attempts to take a comprehensive look at a particular produce/products located in a contiguous area for the purpose of developing and sourcing the raw materials, their processing and packaging, finally exporting them. Thus, the entire effort is centered on a cluster approach of identifying the potential products, the geographical region in which these are grown and adopting an end to end approach of integrating the entire process, right from the stage of production till it reaches the market. The government helps in sourcing for
raw materials, the setting up of processing facilities, providing finance at low interest

rates and even matching with international buyers. The export zones mooted by the Agricultural and Processed Food Products Export Development Authority (APEDA) to increase international trade in agri-commodities are an attempt to take a holistic approach to encouraging trade in specific commodities located in contiguous areas. For instance, in Tamil Nadu, the AEZs would focus on grapes, mangoes and chikkoo, in Kerala -- vegetables, in Punjab and Haryana -- kino, wheat and rice, Karnataka -- vegetables and
flowers, Maharashtra -- mangoes, grapes and flower, Gujarat -- bananas, mango, castor and garlic, and in Uttaranchal -- litchi and medicinal plants.

7. PRIVATE SECTOR INITIATIVES

There are several private sector initiatives in the food processing and service sector. A number of companies are actively working on integrating the agriculture supply chain. Here we mention a few of them. These show the feasibility of operating efficient cold chains in the India scenario. They could be treated as pilots and other projects can be built emulating them. Here we consider the following cases

• Mcdonalds-India, a fast food service operator growing its own ingredients such as lettuce, potatoes, etc;

• Amul which is a highly successful cooperative dairy in Gujarat.

• E-choupals which is an ITC success story of procurement of produce from small farmers is an example of supply chain management Indian style.

There are other examples such as Bombay dabba walah which is an excellent example of six-sigma forward and reverse logistics delivery. Also, ITC, Mahindra and Rallis together are creating a network of service providers who offer information on weather and prices, credit, transport and assured demand.

8. OPPORTUNITIES FOR IMPROVING THE FOOD SUPPLY CHAIN

The following are some of the opportunities:

Cold chain infrastructure. Investments in real estate and cold chain infrastructure are capital intensive and will yield slow returns. However, 100% foreign direct investment (FDI) is allowed in this sector. The Infrastructure consists of Coolers, Warehouses, Refrigerated Trucks, Carriers, Shopping malls, etc. One needs to study of the potential risks and the ROI for this activity?

Third Party Logistics: The food supply chain is temperature sensitive and manual

handling reduces the product quality and life. Logistics providers with air conditioned trucks, automatic handling equipment and trained manpower will provide end to end support. They can also adapt state of the art techniques such as cross docking that will reduce the transit times and inventory.

Food processing industry: The Government of India allows 100% FDI in this sector. There are incentives for setting up processing plants either in Agri –Export Zones or outside of them. Sourcing of raw materials either fruits and vegetables or flowers or meat is easier with an AEZ since there are already participants with knowledge about the industry standards. There are opportunities to create in India

a. Halal hub (Export to South-East Asia, Middle East)

b. Vegetarian hub (20% of Indian population + overseas)

c. Organic food hub (Europe and USA)

d. Sea food hub

Retail: Retail, one of the largest sectors in the global economy (USD 7 Trillion), is going through a transition phase in India. One of the prime factors for non-competitiveness of the food processing industry is because of the cost and quality of marketing channels. Globally more than 72% of food sales occur through super stores. In India there are 12 million outlets selling food and related items including push carts, wet markets and neighbourhood kirana stores. The kirana stores are generally located in small space and have no cold storage facilities. They also have restricted capital resulting in lack of shopping variety. The Indian retail sector is estimated to have a market size of about $ 180 billion; but the organized sector represents only 2% share of this market. A strong retail front-end can also provide the necessary fillip to agriculture and food processing, and other industries. Currently100% FDI is not allowed for foreign companies. India presents a huge opportunity and is all set for a big retail revolution. India is the least saturated of global markets with a small organized retail and also the least competitive of all global markets.

9. OPPORTUNITIES FOR RESEARCH IN THE FOOD SUPPLY CHAIN:

There are several significant research issues for an emerging economy like India. Although Agribusiness may look low tech, there are several innovations possible with tremendous consequences. We outline a few of these here:

Strategic Level: Given the fact India has surplus fresh food stuffs that are currently wasted away and also has a very large local market, the Government can invite processed food manufacturers to set up mass production shops in the country which may be marketed through the fair price shops (these shops currently sell fresh foods). Design of the country wide production-distribution system for each of the produces taking into account the constraints on power infrastructure and water and identifying the possible MNCs that can play role will be a challenging task. The formats of small packages combined with "buy before you eat" variety will reduce the load on cold chain and will cater to the large section of people without refrigerators at home. Another important area

of research is to develop predictive models for concerns such as "What happens if 100% . FDI is allowed in retail" and also ''ROI models for establishing cold chain infrastructure", etc.

Operational level: Produce to demand rather *cropping as a matter of routine* is an absolute necessity. This will probably lead to contract farming with ensured quality of the produce. This is a design of experiments problem of choosing the right kind of inputs, and timing for various tasks for seeding, weeding and harvesting depending on the environmental parameters. Design of E-procurement and just in time delivery systems for restaurants and hotels in big cities will save money on inventory, wastage and bulk purchase.

The above a sample of research issues of extreme significance to the country. There are several others that can inspire young and mature minds while creating significant opportunities for growth.

10. CONCLUSIONS

India is all set to become the food supplier of the world but accounts for about 1.7 percent of international food trade.this indicates vast scope for both foreign investors and exporters. It has the cultivable land, all the Seasons for production of all varieties of fruits and vegetables, well developed agribusiness system that works in its own way.

As already mentioned at the beginning of this report, India is one of the world's major food producers but ac-counts for about 1.7% of international food trade. This indicates vast scope for both foreign investors and ex-porters.

The Indian food industry is widely recognised as a "Sunrise Industry" in India

having huge potential for uplifting agricultural economy, creation of large scale processed food manufacturing and food chain facilities, resultant generation of employment and export earnings. India has enormous growth potentials from its current status of being the worlds second largest food producer to be a world's number one producer. The Indian food process-ing industry has the highest number of plants approved by the US Food and Drug Administration (FDA) outside the USA.

India requires an investment of US$ 28 billion to bring the level of processing to 10% - 12% by 2012. It is ex-pected that in future bulk investments and modern food processing technologies are going to turn the fortune for Indian food processing industry. Some of the most promising sub-sectors in the Indian food industry, as identified by the Ministry of Food Processing, include:

• Soft-drink bottling
• Confectionery manufacture
• Fishing and aquaculture
• Grain-milling and grain-based products
• Meat and poultry processing
• Alcoholic beverages
• Milk processing

Some of the main key drivers of the Indian food industry are:

• Food, beverages and tobacco industry dominates the Indian retail industry and is anticipated to grow at a CAGR of nearly 8% during 2008-2012.
• Soft drinks market is anticipated to grow at a CAGR of nearly 12% from 2008 to 2012, and major demand will be seen in health & energy drinks, bottled water and fruit juices.
• Snack food market is estimated to grow at an annual rate of 18% to 20% in coming few years, albeit from a small base of consumers.
• With growing health awareness and concern, the functional food & drinks market is set to grow rapidly in India.
• Changing lifestyle, coupled with growing middle class population and changing eating habits, is an-ticipated to fuel 7%-10% growth in the Indian food service sector annually.
• Low per capita consumption of alcoholic drinks makes the country highly lucrative to expand, with wine consumption projected to grow at a CAGR of nearly 23% in volume terms.

In combination with the potential boom in the organised re-tailing sector, there is bound to be an increase in private labels,

also in the food sector, which will provide a further thrust to the Indian food and food processing indus-tries.

Swiss companies, active in the food and food processing, are well advised to seriously study the vast potential on offer and plan a systematic entry in the Indian market. As a first step, they are advised to promote – to test the market – their products through importers/distributors/agents. In this connection, they can utilise the ser-vices of Osec and the Swiss Business Hub India who have experience in conducting qualified business partner searches working through their excellent network of specialised external consultants.

Additionally, Swiss companies also have the possibility to gain first hand experience of the Indian food and food processing sector by participating at the official Swiss Pavilion at the bi-annualy held Foodtec exhibitin in India. Osec collaborates closely with Kölnmesse in organising the Swiss pavilion.

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