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## Exim Bank Study: Fairtrade – A Fairway of Enhancing Export Value

Exim Bank's study 'Fairtrade – A Fairway of Enhancing Export Value' highlights the significant role that Fairtrade movement can play in enhancing export value of certain farm produce from India, and strategies that could be adopted for development of Fairtrade movement in India.

Fairtrade is an organised movement, which promotes equitable standards for international labour, environmentalism, and social policy in areas related to the production of branded and unbranded goods, which may range from handicrafts to agricultural commodities. The movement focuses, in particular, on facilitating exports from developing countries to developed countries.

Fairtrade Labelling Organization (FLO) and International Fairtrade Association (IFAT), recently named as World Fairtrade Organisation (WFTO), are the two main standard setting and certifying bodies for Fairtrade.

Fairtrade standards takes into account social and economic development of smallholder producers by: payment of a fair price and a social premium on the goods traded under Fairtrade channel; capacity building for attaining sustainability in business operations; gender equity and no child labour; quality and safe working conditions (including remuneration); and environmental security.

Products for which Fairtrade standards have been developed by FLO include: *food products* - banana, coffee, cocoa, fresh fruits, juices, honey, nuts & oilseeds, rice, spices & herbs, sugar, tea, wine, and composite food products; *non-food products* – flowers, ornamental plants, cosmetics, sportsball, and cotton products.

### Global Fairtrade Market

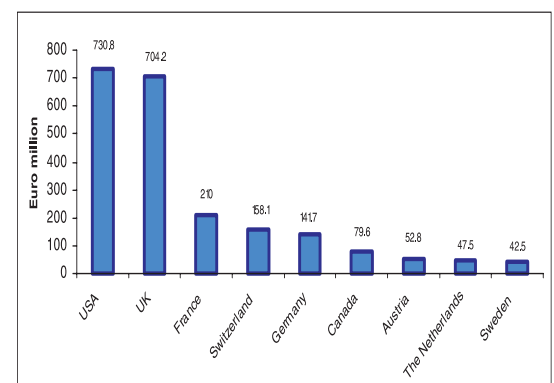
Global Fairtrade markets have grown rapidly over the past decade. Fairtrade sales, according to FLO, have been growing on an average 40 percent per

year since 2000. In 2007, US\$ 3 billion worth of Fairtrade labeled products were sold worldwide, an increase of 47 percent over the previous year. The global market for Fairtrade is projected to be worth US\$ 9 billion by 2012, registering a CAGR of 25% since 2007, and is projected to reach US\$ 20-25 billion by 2020.

Europe and US are the leading markets for Fairtrade products. In 2007, the value of sales in the UK and US grew by 72 percent and 46 percent, respectively. Besides UK, Switzerland, France, and Germany are the major European markets for the Fairtrade products. Other significant markets registering reasonable growth in Fairtrade sales include Japan (51 percent), Australia and New Zealand (59 percent). Fairtrade certified products are now available in more than 60 countries.

Coffee and bananas are the largest selling Fairtrade products. Other products, showing significant growth in sales in recent years include Fairtrade cotton, wine, fruit juices and flowers.

### Global Retail Values of Fairtrade Products



Source: Compiled from FLO-data, 2007

### Fairtrade Movement in India

The movement is in a very nascent stage in India. There are no national certification bodies for Fairtrade in India. International labeling and



certifying organizations such as TransFair USA, Fairtrade Foundation, UK, certifies all Fairtrade products currently traded from India. Handicrafts occupy the major share of products traded from India under Fairtrade channels, using IFAT's FTO mark. Agriculture products, for which India has acquired Fairtrade certification, that are traded under Fairtrade label from the country include tea, cotton, rice, coffee, cashew, juice, flowers and vanilla. India has the largest number of Fairtrade certified producers of tea and cotton. India and Thailand are the only two Fairtrade certified producers and suppliers of rice to the Fairtrade markets in the USA, and is also one of the leading suppliers of Fairtrade cotton apparels to the major retail chains in the UK.

### Prospects and Strategies

With large population of smallholder farmers in India, Fairtrade initiatives can play an important role in development of the smallholder farmers. Some other strategies include: combining Fairtrade and organic movements to curtail costs of certifications, adapting Fairtrade products in domestic markets particularly in public and private procurements, and efficient marketing of Fairtrade products in export markets.

Strategic areas where India can adopt Fairtrade initiatives include: smallholder fruits such as oranges, citrus, mango, pineapple, lychees, coconut, grapes, apple, passion fruit and banana; herbs and spices such as vanilla and cardamom; nuts and oilseeds such as peanuts, cashew, sesame seeds; honey; flowers and ornamental plants.

## Climate Change: Implications for Food Safety

Climate change may have both direct and indirect impact on food safety at various stages of the food chain. Climate change does not imply increased average global temperature alone; other effects of climate change include trends towards stronger storm systems, increased frequency of heavy precipitation events, extended dry periods, and rise in sea level due to contraction of the Greenland ice sheet.

### Climate Change – Likely Impact on Agricultural Sector

#### *Crop Production*

Crop production is extremely susceptible to climate change. Climate change affects the microbial population of the macro-environment i.e., soil, air and water, and the population of pests or other vectors, thus, significantly affecting the occurrence and gravity of biotic diseases. Alterations in abiotic factors arising out of climate change such as nutrient deficiencies; and air pollutants, and temperature/moisture extremes also affect plant health and productivity, which in turn may have significant impact on the prevalence of environmental contaminants and chemical residues in the food chain.

#### *Animal Production*

Rising temperatures, as a result of climate change can have both direct and indirect effects on animal production. Heat stress caused by the inability of animals to dissipate environmental heat can have a direct and detrimental effect on health, growth and reproduction of animals. Changes in the nutritional environment such as the availability, quality and quantity of livestock feeds can have an indirect effect.

Climate change may affect zoonoses (diseases and infections which are naturally transmitted between vertebrate animals and human) in a number of ways. It may increase: (i) the transmission cycle of many vectors; and (ii) the range and prevalence of vectors and animal reservoirs. In some regions it may result in the establishment of new diseases.

#### *Fisheries*

Global fisheries production may remain same with higher temperatures; however, the spatial distribution of fish stocks may change due to the migration of fish from one region to another in

search of suitable conditions. Other impacts include: alterations in surface winds, which may alter both the delivery of nutrient into the photic zone; alterations in strength and distribution of ocean currents, alterations in ocean acidity due to high CO<sub>2</sub> levels; and variability in precipitation may affect sea levels. Climatic changes could affect productivity of aquaculture systems and increase the vulnerability of cultured fish to diseases, thereby reducing returns to farmers.

### Climate Change – Possible Impacts on Food Safety

Climate change impacts not only on primary production but also on food manufacturing and trade.

#### *Food Microflora*

The microflora of a food consists of the microorganisms associated with the raw material, those acquired during handling and processing and those surviving the preservation technique and storage. These are pathogenic to humans and frequently contaminate the food supply through various sources. The growth and survival of these pathogens and contamination events are influenced by intrinsic, extrinsic, and presence of other competitive microflora, which are significantly affected by undesired climatic changes.

Climate changes influence the range of infectious diseases, and affect the timing and intensity of outbreaks. Other potential impact of global climate change on food safety include (i) impact on microbial evolution and stress response; (ii) pathogen emergence and re-emergence; and (iii) changes in water availability and quality.

#### *Zoonotic Diseases*

Climate change is one of several 'global change' factors driving the emergence and spread of diseases in livestock and the transfer of pathogens from animals to humans. Additional impacts of climate, which are specific to zoonotic diseases include:

- Increase in the susceptibility of animals to disease;
- Increase in the range or abundance of vectors / animal reservoirs;
- Prolonging the transmission cycles of vectors.

#### Toxinogenic Fungi and Mycotoxin Contamination

Climate changes such as variations in temperature, humidity and precipitation can significantly affect the toxinogenic fungus that produces highly toxic chemical substances called mycotoxins in crops. These changes include changes in their population, colonization, and stress response. Human dietary exposure to mycotoxins can be directly through consumption of contaminated crops. For example, frequent hot and dry summers in Italy, in the recent years have resulted in increased occurrence of *Aspergillus flavus*, with consequent unexpected and serious outbreak of aflatoxin contamination, uncommon in Europe.

#### Marine Food Contamination

Climatic alterations such as increase in temperature, precipitation, and flash floods, exacerbate eutrophication (nutrient loading) causing phytoplankton growth, and increased frequencies of Harmful Algal Blooms (HABs), particularly of toxic species in marine environment. Accumulation of these toxins by filter feeders (bivalve mollusks, primarily shellfish) and the subsequent consumption of these products have serious implications for humans.

Furthermore, an increase in water temperatures promotes the growth of organisms such as *Vibrio vulnificus* leading to an increased risk from handling or consuming fish grown in these

waters. Besides, temperature increase facilitates methylation of mercury and subsequent uptake by fish.

#### Other Impacts

Other climate change factors indirectly impacting food safety may include movement of crop production areas, resulting in different ecosystem exposures, including microbes and pests. This may result in growing incidence of foodborne zoonoses, which may result in increased use of pesticides and veterinary drugs. Consequently, this may increase the levels of pesticide residues and veterinary drugs in food. Flooding may lead to soil and ground water contamination.

#### Addressing Food Safety Implications of Climate Change

Improving ability to understand and to control emerging microbiological hazards at all stages of the food chain, occurring as a result of climate change, will require efforts in a number of key areas including mathematical modelling; application of new scientific tools that allow us to characterize complex microbial communities; improved epidemiological surveillance, new tools for monitoring or screening programmes for foodborne pathogens; strengthened animal health surveillance; and improved coordination among food safety, public health and veterinary health services.

### Examples of some zoonotic agents that are expected to be affected by climate change

Virus	Host	Mode of transmission to humans
Rift Valley fever virus	Multiple species of livestock and wildlife	Blood or organs of infected animals; unpasteurized or uncooked milk of infected animals, mosquito, hematophagous flies
Nipah virus	Bats, and pigs	Directly from bats to humans through food; (e.g. date palm sap). Infected pigs present a serious risk to farmers and abattoir workers
Hepatitis E virus	Wild and domestic animals	Faecal-oral. Pig manure a possible source through contaminated irrigation water and shellfish in coastal waters
<b>Bacterium</b>		
Salmonella	Poultry and pigs	Faecal/oral
Campylobacter	Poultry	Faecal/oral
E. coli O157	Cattle and other ruminants	Faecal/oral
Anaerobic spore forming bacteria	Birds, mammals and livestock	Ingestion of spores through environmental routes, water, soil and feeds. Anthrax in livestock and wild animals, blackleg ( <i>Clostridium chauvoei</i> ) in cattle and botulism in wild birds after droughts. Meat and milk from cattle with botulism lethal for human consumption.
Leptospirosis	All farm animals	Leptospirae shed in urine to contaminate pasture, drinking water and feed
<b>Parasite</b>		
Tapeworm ( <i>Cysticercus bovis</i> )	Cattle	Faecal-oral
Liver fluke ( <i>Fasciola hepatica</i> )	Sheep, cattle	Eggs excreted in faeces, and lifecycle involves lymnaeid snail hosts. Spreads in human by ingestion of marsh plants such as watercress
<b>Protozoan</b>		
<i>Toxoplasma gondii</i>	Cats, pigs, sheep	Spreads by handling and consuming raw meat from infected sheep and pigs
<i>Cyptosporidium</i> and <i>Giardia</i>	Sheep, cattle	Faecal-oral transmission.

## The Spices and Herbs Market in the EU

Europe is the largest market for spices and herbs in terms of manufacturing and consumption followed by Asia. According to FAOSTAT (2007), the market for spices and herbs in the European Union (EU) is about 310,000 tonnes, growing at a CAGR of 7%. With a very high paprika consumption, Hungary is the leading consumer of spices and herbs amongst the EU member countries, accounting for around 21% of the total EU spice consumption, followed by Germany (16%), the Netherlands (13%) and the UK (13%).

The leading spices consumed in EU are pepper, paprika and allspice (pimento), while leading herbs include thyme and oregano.

Germany is the leading EU consumer of the product group anise, badian, fennel and coriander, accounting for 25% of EU consumption of spices, followed by the UK (20%). Ginger is mostly consumed in the UK, mainly due to its large Indian population. The UK accounts for almost half of the EU ginger consumption. Ginger consumption is also high in the Netherlands (17%) and Germany (12%).

### Market Segmentation

The EU market for spices and herbs can be divided into three broad segments. The industrial sector is the largest consumer (55-60%), followed by retail sector (35-40%) and catering sector (10-15%).

In the industrial sector, spices are used particularly in the processing of meat, fish, canned products, sauces, soups, bakery products, beverages and other prepared and convenience food. Amongst the non-food industries, pharmaceutical and perfumery are the largest users of spices and herbs in forms of essential oils, oleoresins and other extractions.

The major EU retail markets for spices and herbs are Germany, France, UK, Spain and Italy, because of their large population sizes. Consumption of exotic Asian foods and their allied spices is highest in the UK and The Netherlands, because of the presence of sizeable immigrant Asian populations such as Chinese, Indian, Indonesian and Thai. Quality standards are very high within this segment.

The amount of spices used by the catering sector is relatively small but growing due to shift in consumer preferences towards convenience food, fast-food and take-away foods.

### Organic Spices

There is a growing demand of organic spices and herbs in the EU due to the growing health-food market. However, quantities consumed vary by product and region.

### Trade

The total EU imports of spices and herbs amounted to Euro 833.2 million in 2006 resulting in an average annual value growth rate of -1% following a further decline for few years. In terms of volume, imports increased by a steady average annual growth rate of 4% in 2006. Leading EU importers of spices and herbs, both intra-EU

and from developing countries are Germany, the UK, The Netherlands, France and Spain.

With a share of 23% of total EU imports of spices and herbs, pepper is the largest product group imported, followed by paprika (20%), mixtures (11%), nutmeg, mace & cardamom (6%), and spice seeds (6%). The product groups with the highest shares of import from developing countries are ginger, pepper, saffron, turmeric and vanilla. Developing countries supplied around 49% in terms of value and 60% in terms of volume of total imports of spices and herbs, in the year 2006, directly to the EU member countries.

EU is a net importer of spices and herbs. A large part of the EU export trade consists of spices and herbs imported in bulk or in crude form and re-exported to other EU and overseas markets, following grinding, processing and/or repackaging. Of all the EU exports of spices and herbs, 69% consists of intra-EU exports. The largest non-EU destinations of EU exports are the USA (7%) and Russia (4%).

### Trade Structure

Around 85% of the spices and herbs are imported in dried and crude form in the EU through a small number of major brokers and traders/importers, which are further processed by processing companies in the EU. Remaining 15% of the imported spices and herbs is crushed/ground spices, essential oils and oleoresins.

### Trends, Opportunities and Threats

Some of the important trends influencing the EU market for spices and herbs are:

- The trend towards internationalisation and increasing consumption of ethnic foods, such as Asian, Mediterranean and Mexican, has created growing interest in spices and herbs. For example, increased use of coriander and cumin, both of which are being used for many dishes other than curries;
- Increase in working women population and change in urban lifestyle leading to growing demand for eating out, convenience and snack foods, fast foods and take-away foods such as hamburgers, mini-pizzas, instant soups and fruit yogurts.
- Shift in consumerism towards health foods leading to increased demand for spices and herbs, as these products are considered healthy and used as natural ingredients compared to artificial flavours and additives. For example, herbal teas are becoming increasingly popular.
- The market for organic food is increasing. However, the mainstream retail market for organic spices and herbs is likely to remain relatively small.

The opportunities for exporters of spices & herbs in developing countries lie in the following fields:

- Ready-to-use segments, like pizzas, sauces and other convenience food.

- Health-food sector, for example, organic spices & herbs and herbal teas.
- New authentic varieties of mixed spices and herbs, like pimento, chillies, allspice (Jamaican pepper), etc
- Competitive issues in EU market are quality and consistency in quality, followed by strong research and development, in order to provide innovation and a variety of flavours.
- Prices can be the decisive determinant in doing business with companies in the EU, since prices of spices and herbs are heavily under pressure.

**EU imports and leading developing country (DC) suppliers of spices and herbs  
2002 - 2006, share in % of value**

Imports	2004 (Euro mn)			2006 (Euro mn)			Share (%)		Leading Developing Country (DC) Supplier
	Total EU	Intra EU	DC	Total EU	Intra EU	DC	Intra EU	DC	
Pepper	159	63	93	189	73	113	39	60	Vietnam (27%), Brazil (10%), Indonesia (8%), India (8%), China (2%)
Paprika	160	71	81	163	72	82	44	50	Peru (15%), China (11%), Brazil (7%), India (4%), Mexico (3%)
Mixtures	79	70	8	89	80	8	89	9	Tunisia (2%), India (2%), Pakistan (1%), Croatia (1%), South Africa (1%)
Nutmeg, mace & cardamom	50	21	28	54	22	31	42	58	Indonesia (34%), Brazil (7%), Guatemala (6%), Grenada (4%), India (3%)
Spice seeds	48	20	26	54	22	31	41	57	Turkey (13%), Syria (13%), India (13%), Egypt (4%), China (3%)
Ginger	47	14	33	45	14	30	31	67	China (32%), Thailand (10%), India (8%), Brazil (8%), Nigeria (4%)
Vanilla	100	30	60	45	13	29	30	66	Madagascar (46%), India (6%), Uganda (5%), Indonesia (3%), Comoros (3%)
Saffron	32	10	22	31	9	22	30	69	Iran (68%), India (1%)
Cinnamon	18	8	10	24	10	14	41	58	Indonesia (24%), Sri Lanka (16%), Brazil (7%), China (3%), India (3%)
Thyme and bay leaves	20	12	6	23	13	8	58	34	Turkey (26%), Morocco (2%), Albania (1%), India (1%), Syria (1%)
Curry	14	7	7	15	7	7	51	47	India (31%), Brazil (6%), Pakistan (4%), Sri Lanka (2%), Thailand (2%)
Cloves	8	3	4	10	4	6	42	57	Madagascar (20%), Comoros (18%), Brazil (8%), Indonesia (6%), Sri Lanka (2%)
Turmeric	9	2	6	9	2	6	24	75	India (65%), Brazil (7%), Indonesia (1%), Sri Lanka (1%), Peru (1%)
Other spices	77	58	12	83	60	17	72	21	Thailand (5%), India (3%), Brazil (3%), Morocco (2%), Turkey (2%)

Source: CBI, Netherlands

Reference:  
CBI, The Netherlands

## Frozen Food Market - Opportunities for India in Frozen Fruits & Vegetables

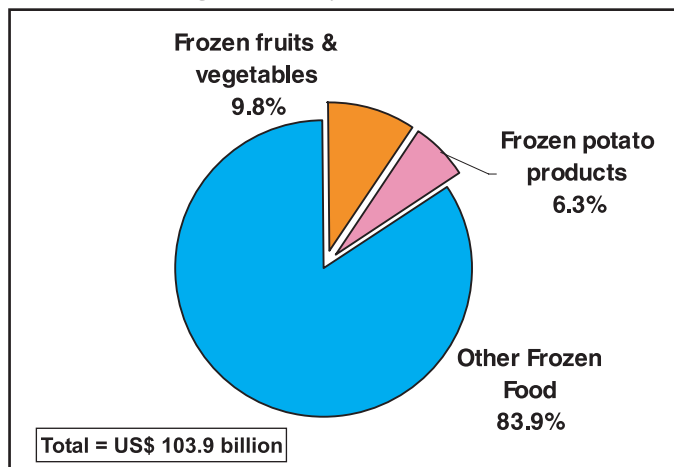
The frozen food market is the one of the largest sector amongst the food sector. The frozen food market consists of frozen fish/seafood, meat products, potato products, vegetables, fruits, pizza, ready meals, bakery products and desserts. The frozen food market grew at a CAGR 3.6 % between 2004-2008 to reach a value of US\$ 103.9 billion in 2008. In terms of volume the market grew at a CAGR of 3.1% during the same period to reach 41.7 million tonnes in 2008.

The market for frozen fruits and vegetables (F&V) in the world continues to gain momentum, as there is a growing awareness of the benefits of fruits and vegetables as an indispensable part of healthy diet.

### Market Segmentation

Frozen F&V segment is one of the largest sub-segment amongst the frozen food sector constituting around 16 % of the total frozen food market. Frozen potato products are the largest segment accounting for around 6.3 % of the total frozen food market.

### Frozen Food Market: % Share of Fruits and Vegetables by Value (2008)



Source: Datamonitor

### Major Markets

#### Europe

Europe is the largest frozen food market in the world accounting for 38.3 % of the global frozen food market in terms of value in 2008. Frozen F&V and frozen potatoes together constitute around 18% of the total frozen food market in Europe.

Germany is the largest market for frozen food in the Europe accounting for 21.9 % of the total market value, followed by United Kingdom (18 %) and France (7.70%). However, sector wise analysis reveals that France is the largest market for frozen fruits and vegetables and potato products, accounting for around 26.3 % of the total frozen food market in France in 2008, followed by United Kingdom (24.3%), Belgium (22.1%), and Germany (10.4%). Sales of frozen vegetables are highest in Italy accounting for 27.3% of the Italian frozen food market's value in 2008. The Netherlands is the largest market for frozen potato products

accounting for 19.4 % of the total Dutch frozen food market value in the same year.

#### Asia-Pacific

With a 36.8% share in the total global frozen food market, Asia-Pacific is the second largest market for frozen food. The frozen food market grew at a CAGR of 4.3 % between 2004-2008 to reach a value of US\$ 35.8 billion in 2008. Frozen F&V and potato products constitute 13.8 % of the total frozen food market value in Asia-Pacific. Japan constitutes the largest frozen food market in Asia-Pacific, accounting for 59.5% of the overall value. Frozen F&V and potato products constitute 15.2 % of the total Japanese frozen food market value.

#### United States

The United States (US) frozen food market constitutes 24.9 % of the total global frozen food market by value. The US frozen food market grew at a CAGR of 2.6% for the period 2004-2008, to reach a value of US\$ 24.2 billion in 2008. Frozen F&V and potato products account for around 7.9% of the total US frozen food market value.

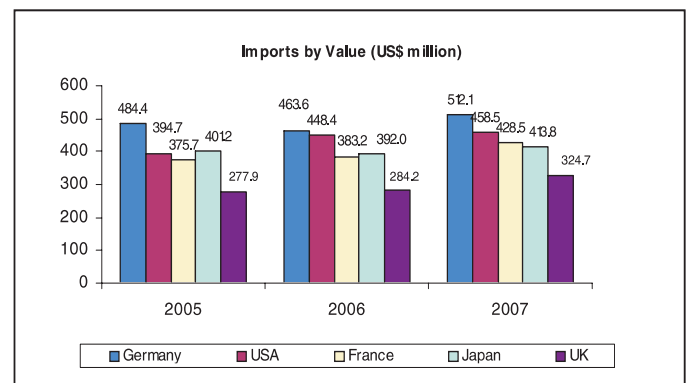
#### Trade

Among frozen F&V, frozen vegetables are traded the most. The frozen vegetable production and trade may be broadly classified into: potato bi-products; and vegetables such as green peas, green beans, cauliflowers, cabbages, sweet corns, spinach, sweet peppers, mushrooms, and carrots.

Top ten exporters of frozen vegetables are Belgium, China, Spain, Netherlands, France, Mexico, Poland, USA, Canada and Germany. Saudi Arabia is the largest exporter of frozen potato products. China is the leading exporter of frozen leguminous vegetables and USA is the largest supplier of frozen sweet corn.

Top ten importers of frozen vegetables are Germany, USA, France, Japan, UK, Belgium, Italy, Netherlands, Spain and Korea.

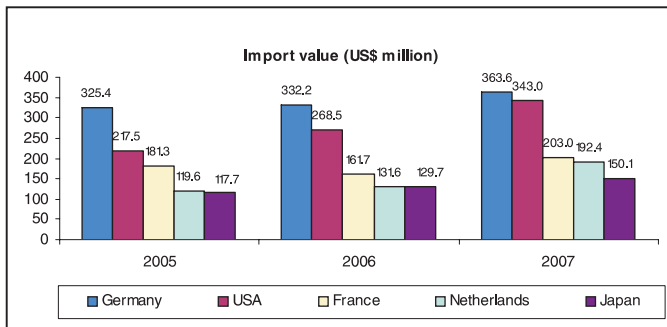
### Leading Importers of Frozen Vegetables



Source: UN Comtrade

Top ten exporters of frozen fruits are Poland, Canada, Serbia, Chile, China, Belgium, USA, Netherlands, Mexico, and Ukraine. Top ten importers of frozen fruits are Germany, USA, France, Netherlands, Japan, UK, Canada, Italy, Belgium and Austria.

### Leading Importers of Frozen Fruits



Source: UN Comtrade

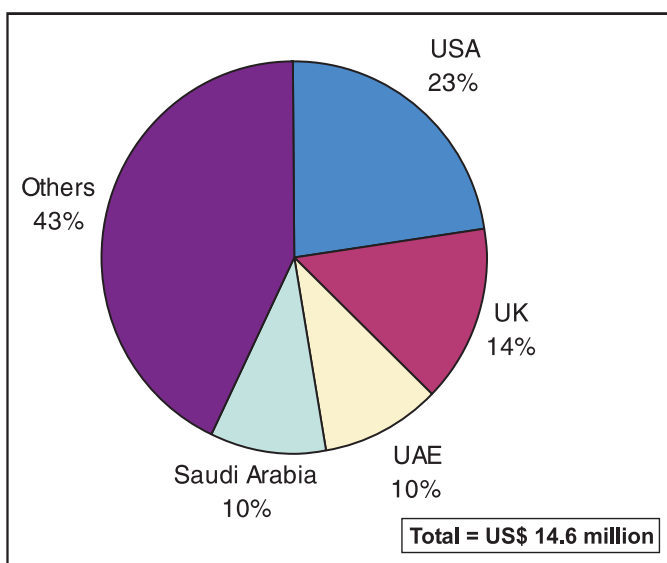
### Distribution Channel

Globally, frozen F&V are marketed through supermarkets & hypermarkets (71%), and by a mix of formats like convenience stores (7.5%), independent retailers (14.5%) discounters (5.2%) that offer huge discounts on all products and others (1.8%).

### Indian Scenario

India currently ranks as the world's second largest producer of fruits and vegetables accounting for 9 % and 14 % of world's fruits and vegetables production respectively. However, India's exports of frozen fruits and frozen vegetables stand at 0.12% and 0.33% of total world exports of frozen fruits and vegetables respectively. Top ten export markets for Indian frozen vegetables during 2008 had been USA, UK, UAE, Saudi Arabia, Australia, Sri Lanka, Canada, Germany, Kuwait, and Nepal.

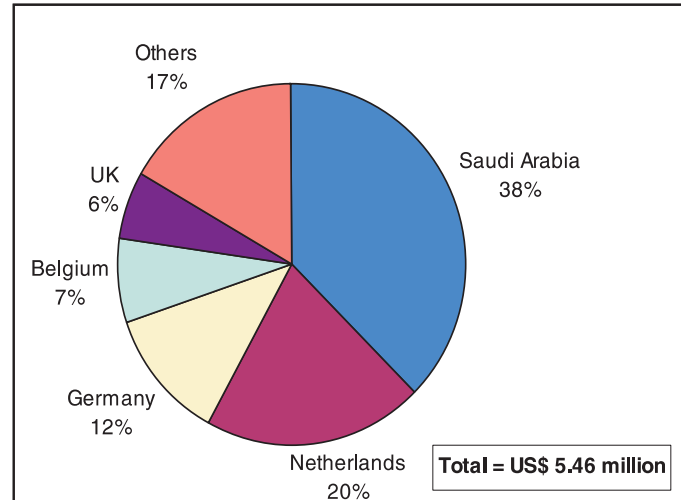
### Export Destination for Indian Frozen Vegetables (2008)



Source: UN Comtrade

Top ten export destinations for Indian frozen fruits are Saudi Arabia, Netherlands, Germany, Belgium, UK, UAE, Yemen, France, Nepal, and USA

### Export Destinations for Indian Frozen Fruits (2008)



Source: UN Comtrade

### Outlook & Prospects

The global frozen food market is projected to grow at a CAGR of 2.94 % by 2013, since 2008, to reach a volume of 48.2 million tonnes. The demand for frozen F&V in the European market was estimated at around 5 million tonnes in the year 2005. The market is projected to grow at an annual rate of 2.8 % between 2008-2013 to reach to around 6.2 million tonnes by 2013. Following the economic downturn, the US market for frozen food is projected to grow marginally across the sector at an annual rate of 1 % between 2008-2013, to reach to around 5.4 million tonnes by 2013. Japan will continue to be the largest market of frozen fruits and vegetables in the Asia-Pacific region and is projected to grow annually at 3.44% to reach 1.5 million tonnes by 2013.

Analysis of six top importers of frozen fruits and vegetables in world reveals that USA and UK offers the highest potential for Indian exporters in this segment, due to the presence of large Indian population and strong alliances. Belgium and Germany offers fair potential for Indian exporters in this segment in certain categories such as frozen mixed vegetables and beans. Quality of the end products remains a strict factor in the case of French markets for frozen F&V, where India has not been able to effectively compete.

Products in which India has potential in Japanese market include: frozen mangoes, berries, and peas. In the European market India has potential for products such as frozen pineapples, mangoes, papayas, grapes, apples, guavas, cherry tomatoes, Asparagus, white mushrooms, gherkins, IQF products, frozen mixed vegetables and herbs such as garlic, garlic sprouts, coriander and pepper.

China has been a close competitor to India in all the markets, particularly Japan, which indicates distance is not a factor. Nonetheless, due to its competitive edge in production of fruits and vegetables, and with increased emphasis on quality and standards, and marketing efforts, India stands fair chances in entering emerging markets such as Russia, other East European countries and ASEAN countries where demand for frozen products are on the rise in the recent years.

Reference:

- APEDA
- Datamonitor

## Indian Processed Food Industry – Insights

Indian food processing sector is one of the largest sectors in the country in terms of production, consumption, export and GDP growth. The sector accounts for around 14 percent of total industrial output and around 6 percent of the GDP. The size of the industry is estimated at US \$ 70 billion. Presently, the sector employs about 13 million people directly and about 35 million people indirectly.

The industry is mainly unorganized with 75 percent of the processing units belonging to the unorganized sector. The organized sector is relatively small, with around 5,300 fruit and vegetable processing units, over 500 fish processing units, over 500 flour mills, nearly 200 meat processing units, and numerous dairy processing units at state and district levels.

Of the country's total agriculture and food production, only 2 percent is processed, which is much lower when compared to countries such as USA (65%), China (23%) and Brazil (70%). The level of processing in India is estimated to be 37% in dairy sector, 26% in fisheries sector, 2% in fruits and vegetables sector and 1% in meat and poultry sector.

### Capacity and Production

India is the second largest producer of fruits and vegetables. India's current production of fruits amount to about 58 million tonnes, and vegetables production amount to 112 million tonnes, accounting for 9 percent and 14 percent of the world's total fruits and vegetable production, respectively. The installed capacity of fruits and vegetables processing industry has increased from 1.1 million tonnes in 1993 to 2.47 million tonnes in 2007.

India is the largest producer of milk in the world. India's current milk production stands at 101 million tonnes. With over 650 dairy plants in the cooperatives, private, and government sectors, the organized sector (large scale dairy plants) processes about 13 million tonnes of milk annually, while the unorganized sector (halwaiis and vendors) processes about 22 million tonnes of milk per annum.

India has the largest livestock population in the world. Processing of meat is largely for exports. The total processing capacity in India is over 1 million tonnes per annum.

Presently, about 500 units are engaged in production of frozen fish with a total storage capacity of about 135,000 tonnes. There are over 360 freezing units with a daily processing capacity of over 10,000 tonnes, out of which, 150 units are approved for export to EU. Besides, there are 12 surimi units, 5 canning units and 471 units for pre-processing and dry fish storage.

Primary processing constitutes 96 percent of total grain processing and the remaining is accounted for by secondary and tertiary processing sectors. India currently has total rice milling capacity of 186 million tonnes; over 500 large flour-mills and about 10,000 pulse mills.

India approximately has 1,50,000 oil mills, 779 solvent extraction units, 810 refinery units and 127 vanaspati units providing direct and indirect employment to one million people.

### Exports of Processed Food Products from India

Despite being one of the leading producers for several agricultural commodities, India's share in global agricultural exports stands at 1.5 percent, of which, value added processed food exports accounts for only 0.03 percent.

Exports of processed food items from India increased from 4.3 million tonnes in 2006-07 to 6 million tonnes in the year 2007-08, registering a 27.6 percent growth in terms of value in 2007-08 (Rs. 14,765 crores) over 2006-07 (Rs. 11,571 crores). Products that have registered significant growth in exports by value during the year 2007-08 were dairy products, meat and poultry products, natural honey, jaggery and confectionery, and alcoholic beverages. Major markets for Indian processed food products have been USA, UK, Germany, Japan, Belgium, the Gulf countries, Egypt, China, Indonesia, and Sri Lanka.

### FDI in Indian Processed Food Industry

Cumulative inflow of FDI into the food-processing sector, since January 2000 to September 2008 has been around US\$ 750 million. Among sub-sectors, dairy and consumer food sectors received the highest FDI, during this period.

### Outlook & Prospects

The global processed food industry is forecast to reach a value of US\$ 1,621 billion by 2012. The compound annual growth rate (CAGR) of the market size during 2007-2012 is predicted to be 3.3%. However, the slowdown in overall global exports following the recession in the global financial markets is also likely to affect the processed food industry. The processed food industry, which is a working-capital-intensive industry may face difficulties in investing in critical infrastructure such as creation of value chain, technology upgradation, and investments in R&D, which may result in difficulties in complying with international food regulations and other non-tariff barriers imposed by the developed country markets. Though the processed food product exports from India hold significant potential, the medium term outlook is grim due to several factors, including the pressure on cost competitiveness.

Nonetheless, the Government of India, in line with its Vision 2015 for the food processing sector, in its 11<sup>th</sup> Five Year Plan proposes to give greater thrust on infrastructure development, which will include setting up of Mega Food Parks, cold chain infrastructure, value added centres and packaging centres. The emphasis will be on building strong linkages with agriculture and horticulture, enhancing project implementation capabilities, increased involvement of private sector investments and support for creation of rural infrastructure to ensure a steady supply of good quality agriculture/horticulture produce.

**Export of Processed Food Items from India**

	(Quantity in MTs/Rs. In crores)				
	2006-07		2007-08		% Growth (in Value)
	Qty	Value	Qty	Value	
<b>Processed Fruits &amp; Vegetables</b>					
Dried & Preserved Vegetables (including Pulses)	374420.9	1220.2	296518.3	992.3	-18.7
Mango Pulp	156835.5	504.9	166752.2	509.2	0.8
Pickle & Chutney	180018.7	409.0	171109.3	389.1	-4.8
Other Processed Fruits & Vegetables	138107.5	545.0	136583.9	562.5	3.2
<b>Sub-total</b>	<b>849382.7</b>	<b>2679.1</b>	<b>770963.7</b>	<b>2453.1</b>	<b>-8.4</b>
<b>Animal Products</b>					
Buffalo Meat	494111.5	3206.0	482924.8	3543.9	10.5
Sheep / Goat Meat	5481.5	62.9	7985.3	121.8	93.5
Poultry Products	694618.1	317.8	1355288.9	440.8	38.7
Dairy Products	45585.0	435.3	69415.4	865.7	98.9
Animal Casings	436.0	9.5	619.7	6.8	-28.0
Processed Meat	2158.7	14.1	1948.3	12.5	-11.9
Natural Honey	8135.6	60.8	12231.2	93.2	53.3
<b>Sub-total</b>	<b>1250526</b>	<b>4106.5</b>	<b>1930414</b>	<b>5084.7</b>	<b>23.8</b>
<b>Other Processed Foods</b>					
Groundnuts	251428.7	797.1	269587.6	1053.0	32.1
Guargum	189304.4	1123.8	211166.6	1124.6	0.1
Jaggery & Confectionery	456892.0	862.4	2408129.7	2807.9	225.6
Cocoa Products	3412.3	40.0	4979.3	42.2	5.4
Cereal Preparations	1111434.5	599.4	135971.3	677.7	13.1
Alcoholic Beverages	53137.3	253.5	59089.9	336.8	32.8
Miscellaneous Preparations & Non-alcoholic Beverages	113594.7	1013.8	163401.8	1096.1	8.1
Milled Products	70023.6	95.9	53786.6	88.6	-7.6
<b>Sub-total</b>	<b>2249227</b>	<b>4785.9</b>	<b>3306113</b>	<b>7227.0</b>	<b>51.0</b>
<b>Total</b>	<b>4349136</b>	<b>11571.5</b>	<b>6007490</b>	<b>14764.8</b>	<b>27.6</b>

Source: DGCIS

Reference:

- UNCTAD
- MoFPI

## Biotechnology Applications in Agri & Food Processing

Biotechnology is being used in agriculture with the objective to increase food supply. Biotechnology includes a wide range of diverse technologies and they may be applied in each of the different food and agriculture sectors, such as gene modification and transfer; use of molecular markers; development of recombinant vaccines and DNA-based methods of disease characterisation/diagnosis; in-vitro vegetative propagation of plants; embryo transfer and other reproductive technologies in animals or triploidisation in fish. It also includes a range of technologies used to process the raw food materials produced by the crop, fishery and livestock sectors.

Plant biotechnology is expanding exponentially. Focus of biotechnological innovations is on four most important agricultural needs viz.,

- Crops that breed resistance against specific diseases and common pests and insects;
- Crops that reduce the environmental burden of fertilizers;
- Crops that reduce the demand for irrigation water; and
- Crops with improved yield per hectare.

Several commercially important species of plants have been modified to incorporate seven main transgenic traits:

### Genetic transfer of traits in transgenic plants by recombinant DNA technology

• Herbicide tolerance	• Male sterility traits
• Insect resistance	• Others (production of metabolites /chemicals, improvements of nutritional traits, stress resistance properties, etc.)
• Viral disease tolerance	
• Fungal disease tolerance	
• Product quality improvements	

The important crops include maize, soybean, cotton, tomato, potato, alfalfa, petunia, rape/mustard, rice, wheat, beet, barley, chickpea (gram), cabbage and tobacco.

Food processing has the most established use of biotechnology. Biotechnology in the food processing sector targets the selection and improvement of microorganisms with the objectives of improving process control, yields and efficiency as well as the quality, safety and consistency of bioprocessed products. Approaches to gene-technology have led to advances in selective breeding to achieve further improvements in nutritional quality, appearance, flavour, convenience, cost and safety of foods.

### Biotechnology in Food

#### Fermentation

Microorganisms are an integral part of the processing system for production of fermented foods. Microbial cultures can be genetically improved using both traditional and molecular approaches. Traits, which have been considered for commercial

food applications, include sensory quality (flavour, aroma, visual appearance, texture and consistency), virus (bacteriophage) resistance in the case of dairy fermentations, and the ability to produce antimicrobial compounds (e.g. bacteriocins, hydrogen peroxide) for the inhibition of undesirable microorganisms. In many developing countries, the focus is on the degradation or inactivation of natural toxins (e.g. cyanogenic glucosides in cassava), mycotoxins (in cereal fermentations) and anti-nutritional factors (e.g. phytates).

#### Traditional approaches

Traditional methods of genetic improvement is classified into three broad categories:

Classical mutagenesis – Involves production of mutants with improved strains by exposure of microbial strains to mutagenic chemicals or ultraviolet rays to induce changes in their genomes.

Conjugation - A natural process of transferring genetic material among closely related microbial species.

Hybridisation (i.e. sexual breeding or mating) - Sexual reproduction in yeasts, and thus genetic recombination, leading to improvements in yeasts.

#### Molecular approaches

Genetic modification – Use of recombinant DNA approaches for genetic modification of bacterial, yeast and mould strains to promote expression of desirable genes, to hinder the expression of others, to alter specific genes or to inactivate genes so as to block specific pathways.

Genetic characterization – Use of molecular diagnostic techniques for genetic characterisation of microbial strains, provides tools for the detection, identification and characterisation of microbial strains for bioprocessing applications.

Genomics - Functional genomics, aims to determine patterns of gene expression and interaction in the genome, based on the knowledge of extensive or complete genomic sequence of an organism.

#### Biofortification of Food Crops

Nutrient enhancement of some important food crops to combat malnutrition is referred to as biofortification. Globally, large research projects such as HarvestPlus involving CGIAR Future Harvest Centres, USA; and National Agricultural Research Systems in the developing countries are underway towards biofortification efforts. The focus currently, is on six staple crops such as rice, wheat, maize, common beans, cassava and sweet potato. Other crops identified under these projects include bananas/plantations, barley, cowpeas, groundnuts, lentils, millet, pigeon peas, potatoes, sorghum and yams.

Under these projects a plant-biotechnology approach is being adopted for developing improved germplasm in the crops with characters such as enhancement of provitamin-A content,

enhancement of iron and zinc content, good agronomic performance, and high dry mass content.

#### **Genetic Markers and Food Quality**

Livestock genotyping at commercial levels helps to reveal, prior to slaughter, cattle's propensity to produce desirable meat. This is carried out by analyzing thousands of single-nucleotide polymorphisms (SNPs) in the bovine genome.

Species-specific DNA markers can be used to identify animal species such as commercial molluscs and crustaceans, which represents a high proportion of aquacultural species. For example, species-specific markers are used in Thailand for commercially important cultured black and white shrimps. These markers can be applied to ensure quality control by properly labelling traded shrimp larvae.

DNA fingerprinting in grapevine enables identifying and

establishing the origin of the varieties and thereby, maintaining the traits.

#### **Functional Food and Nutraceuticals**

Functional Foods and Nutraceutical are foods or dietary components that may provide a health benefit beyond basic nutrition. Biotechnology leads to substantial innovations in the production of healthier food in forms of 'functional food'.

#### **Probiotics and Prebiotics**

Probiotics are microbial food ingredients that beneficially influence human health while prebiotics are non-digestible carbohydrates such as fructo- and galacto-oligosaccharides. Prebiotics are organic food components that exert health-promoting effects by improving the characteristics of intestinal flora. Probiotics and Prebiotics are added to number of dairy products as enhancers, such as in yogurt and ice creams.

### **Examples of Functional Components**

<b>Class/Components</b>	<b>Source</b>	<b>Potential Benefit</b>
<b>Carotenoids</b> Beta-carotene	Carrots, pumpkin, sweet potato, cantaloupe	Neutralizes free radicals, which may damage cells; bolsters cellular antioxidant defenses; can be made into vitamin A in the body
<b>Dietary Fiber</b> Beta glucan	Oat bran, oatmeal, oat flour, barley, rye	Reduces risk of coronary heart disease (CHD)
<b>Fatty Acids</b> PUFAs—Omega-3 fatty acids—DHA/EPA	Salmon, tuna, marine, and other fish oils	Reduces risk of CHD; maintenance of mental and visual function
<b>Flavonoids</b> Anthocyanins—Cyanidin, Delphinidin, Malvidin	Berries, cherries, red grapes	Bolsters cellular antioxidant defenses; maintenance of brain function
<b>Isothiocyanates</b> Sulforaphane	Cauliflower, broccoli, broccoli sprouts, cabbage, kale, horseradish	Enhances detoxification of undesirable compounds; bolsters cellular antioxidant defenses
<b>Prebiotics</b> Inulin, Fructo-oligosaccharides (FOS), Polydextrose	Whole grains, onions, some fruits, garlic, honey, leeks, fortified foods and beverages	Improves gastrointestinal health and calcium absorption

Biotechnological interventions are also underway on various other areas of food production which include modifications of food taste such as molecules that can act as bitter suppressor in food, beverages and pharmaceuticals; compounds that can accentuate or block certain elements in the food, retaining the actual taste of food or even taste better, e.g. low fat products with a sensation of full fat, processed foods such as canned soups, sauces and snacks such as potato chips minus salt, sugar and fat.

#### **Biotechnology and Food Safety**

Food safety is one of the key areas of concern for biotech foods. Nearly all developed and some developing countries have in place laws pertaining to the introduction of bio-engineered organisms and products in the environment. A Biosafety Protocol has been adopted in Cartagena, which proposes different mechanisms; however, there are yet no internationally agreed standards for the field-testing of genetically engineered plants.

Reference:

- UNIDO
- International Food Information Council

## NEWS FOCUS

### Global cotton offtake may fall by 11%

Due to a slowdown in the yarn market the global cotton consumption is likely to decline by 11% during the current cotton season ending July 2009. According to Cotton Outlook, offtake of raw cotton would drop to 23.02 million tonnes, in the current cotton season as against 25.65 million tonnes off-take in the last season. A Cotton Outlook business confidence survey of yarn market reported spinners idling capacity in many major producing countries due to weak demand, rising stocks and unremunerative prices. The survey also referred to heavy investments in cotton production by China, most of Indian sub-continent and South East Asia; however, number of spinners scaling up their operations declined significantly.

According to a forecast by the International Cotton Advisory Council (ICAC), area under cotton in the current production season is projected to decline to 31.15 million hectares from 33.35 million hectares last season. Production is projected to decrease by 6 % to 24.14 million tonnes. Plantings in the next season is also projected to decline. A survey has reported the plantings to be at a 148-year low.

Source: *Cotton Outlook, January 2009*

### Frozen foods in UK benefiting from recession

The frozen food market has been reviving significantly during the constrained economic climate in the UK due to switch in consumer preferences from high-priced chilled foods to frozen alternatives in order to save costs and reduce wastage. The frozen food market in the UK registered a steady growth rate from 3.1 % in 2007 to 5.0 % by end of 2008. At the end of 2008, the frozen food market was valued at £4.867 billion, growing at 5.8 %. Ready meals were the largest growing sector registering a growth rate of 3.8%. Surveys reveal that consumers in UK are purchasing less chilled food that has a short shelf life and high cost. The difference in price between chilled and frozen ready meals is around 40 %; however, the prices vary depending upon product varieties.

Source: *www.foodnavigator.com January 2009*

### World tomato production to reach record indices

World tomato production for processing in the year 2008-09 is projected to reach a record level exceeding the earliest high record, achieved in 2004-05, of 35 million tonnes. According to the Central Department on Markets and Prices (ZMP), Germany, the stocks of finished processed tomato products in the northern hemisphere were almost exhausted at the beginning of the current processing season. Besides, according to the International Committee on Tomato Processing (WPTC), the demand from tomato processing industries increased by almost 1 million tonnes of raw material early this year. However, the raw material requirement in the current season in the tomato processing industry in the EU is estimated at 8.5 million tonnes, which is lower compared to the last year.

Source: *www.freshplaza.com, January 2009*

### New test to detect fake Basmati rice

A UK based scientific research company has developed a DNA screening method for identifying adulteration of Basmati rice. Basmati rice is sold at a premium in the world market, and the 'Basmati' label can only be used to describe certain long grain aromatic rice varieties grown in India and Pakistan. According to the company officials, DNA testing is particularly useful for identifying basmati rice variety, as under the European regulations a basmati product must not contain more than 7% of non-basmati rice, and this identification is possible only by using DNA techniques.

Source: *www.foodproductiondaily.com, February 2009*

The news items and information published herein have been collected from various sources, which are considered to be reliable. While every care has been taken for authenticity of the material published, Exim Bank accepts no responsibility for authenticity or accuracy of such items.

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