Paper No.: 02

Paper Title: The Principles of the Food Processing & Preservation

Module No. : 01

Module Title: Scope of Food Processing in India with National and International Perspective

1.0 Introduction

Food processing encompasses all the steps that food goes through from the time it is harvested to the time it arrives on consumerôs plate. According to Food and Agriculture Organization (FAO), processed foods can be classified into three types (1) Primary (2) Secondary and (3) Tertiary. The primary processing include basic cleaning, grading and packaging as in case of fruits and vegetables. Secondary processing includes alteration of the basic product to a stage just before the final preparation as in case of milling of paddy to rice. Tertiary processing leads to a high value-added ready-to eat food like bakery products, instant foods, health drinks, etc.

Traditional food processing had two functions: to make food more digestible and to preserve food during times of scarcity. Most crops are seasonal. There are times of the year when either glut can result in high levels of wastage or shortages can arise if adequate measures are not taken to preserve and store the foods. This is particularly important in areas that have a dry season or winter period when crops cannot be grown and animals are slaughtered because of a lack of fodder. In these situations stored dry grains or root crops provide energy; dried, salted or smoked meats, or cheeses provide a source of protein, vitamins and minerals; and processed fruits and vegetables such as pickles, chutneys or dried fruits or leaves provide vitamins and minerals. A few crops, including cassava and some types of beans also contain poisons or anti-nutritional components, which must be removed by processing to make the food safe to eat. Hence, Food processing enables to maintain the health of the human beings throughout the year by increasing its food security.

By processing food, it can be customized to suit the nutritional requirements of groups such as the elderly, pregnant women, infants, young children and athletes. Such foods are characterized by a balanced composition of energy suppliers in the form of fats, carbohydrates and proteins, and by a cocktail of vitamins and minerals composed according to the current state of scientific knowledge. Food processing is a route to creating sustainable livelihoods and economic development for rural communities.

Modern food processing has three major aims:

1. To make food safe (microbiologically, chemically).
2. To provide products of the highest quality (flavor, color, texture)
3. To make food into forms that are convenient (ease of use)

The following table summarizes the item to be controlled in food processing and comments on the major approaches involved in this control.

To be Controlled	Heat	Cold	Chemicals	Active water	Mechanical
Micro-organisms	Prevents growth	Reduces growth rate	Preservatives retard growth	Do not grow below Aw of 0.6	Reduces numbers
Enzymes	Destroyed by heat activity	Decrease reaction rate	Modify activity	Alters rate of enzyme activity	increase ES complex

					formation
Chemical Reactions	Increases chemical rate, browning, oxidation	Reduces reaction rate	May inhibit or activate	Can alter rate of reaction, like oxidation	Not applicable
Physical Structure	Increases effects	Decreases effects	May modify structure	High. Aw may cause caking	Can destroy structures

However, the art and science of food processing has come a long way in the last few decades. The ever changing lifestyles, food habits and tastes of customersô world over are making the food plate look different from what it was yesterday. The world food production and consumption pattern is evolving with the change in the needs of the customer. Increasing demand for ethnic and different foods from customers across the world has redefined the market canvas for food processors across the world. With these changes, producers, processors, retailers and suppliers of food, world over, are reorienting their business plans to meet the new demands of the customers. The significant benefits for different stakeholders involved in food processing are:

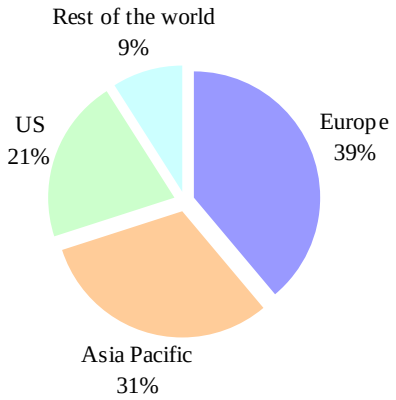
- Farmer ï higher yield, better farm realization, lower risk
- Consumer ï greater variety, lower prices, new products
- Companies ï new business opportunities, demand growth
- Economy/Government ï Employment generation, reduced rural migration

The emerging opportunities in food processing are interesting and challenging as well.

1.1 Global Food Processing Industry:

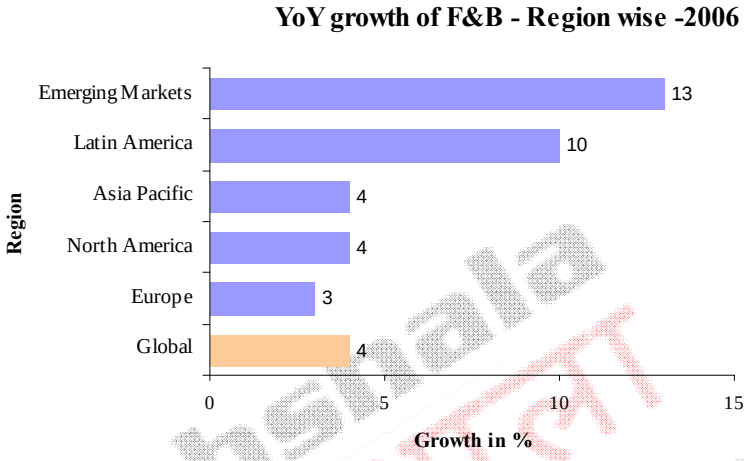
The global processed food industry is estimated to be valued around EUR 2.5 trillion and accounts for three-fourth of the global food sales. The global food industry is ever changing and evolving. However, health, convenience and value continue to be the key value propositions in this industry.

Despite the large size of the industry, only 6 percent of processed foods are traded across borders compared to 16 percent of major bulk agricultural commodities. The United States and European Union together account for over 60 percent of total retail processed food sales in the world.



Trade liberalization policies through multi-lateral and regional trade agreements have led to a rapid growth in food processing. In the Asian region, Japan is the largest food processing market, but India and China are likely to grow at a faster rate in the next decade. The

processed food industry is strong in Japan and South Korea, as they are the leading meat importing countries in the world and consumption of meat is high in these countries. The Australian processed food industry is one of the most technically advanced in the world and it produces products of international standards at comparatively lower prices for the world market. The U.S. continues to live up to its reputation as the ñbreadbasket to the worldò. Countries in the Sub-Sahara African region, Latin America and parts of Asia continue to be on the lower-end of technology prowess in food items and are inclined to their staple diets, whereas, those in Europe, North America, and Japan are on the higher-end of technology, with a sharper shift towards convenience and diet foods.



Apart from the current large size of the processed foods, the growth trends reported are very encouraging. According to a study done by AC Nielsen, ñWhatôs Hot around the globe in F&B in 2006ò, the growth in the global Food and Beverages (F&B) was estimated at 4 %. The most interesting aspect of the study is the growth in emerging markets like India, where the estimated growth is over 13% year over year. Further, the study reports that the worldôs major food processors are looking for low cost sourcing options with proven quality standards, strong backward and forward linkages to ensure uninterrupted, traceable and quality products to the discerning world customers.

1.2 Indian Food Processing Industry:

The food processing industry is one of the largest industries in India and ranks fifth in size. The Indian food processing industry has an estimated size of $70 bn (Ministry of Food Processing, Government of India). The industryôs contribution to the countryôs GDP in 2005 was about 7.3% and had a share of 7% in the total industrial production. It employs 1.6 million workers directly. India is endowed with the second largest arable land, second largest irrigated land under cultivation in the world and advantage of diverse agro-climatic zones across its geographical spread. The countryôs world ranking as a producer vis-à-vis other nations is indicated in table below.

#	Product	Production (Mn Mt)	India's Rank
1	Wheat	72	2
2	Rice, Paddy	124	2
3	Coarse grains (including maize)	29	3
4	Milk	97	1
5	Fruits	60	2
6	Vegetables	115	1
7	Edible Oilseeds	25	3
8	Pulses	15	1

9	Sugarcane	245	2
10	Tea	0.85	1

India can become the leading food supplier to the world and at the same time it has vast growing domestic market with over a billion people and population growing at a rate of 1.6% per annum with food being the single largest component of private consumption expenditure accounting for 53% of the total expenditure. Indiaôs large market size, ravenous appetite for food with growing incomes and changing life styles create incredible market opportunities for food producers, Food processors, machinery makers, food technology and service providers Food processing Industry offers distinct benefits to both the producers as well as processors.

The following four fundamental shifts in the market conditions reaffirm the potential for the sector.

1. Rapid growth in organized retail, a catalyst for the food industry

- Increased consumer spend as organized retail and hypermarkets can drive cost down by 35-40%
- Employment generation and higher tax revenue
- Productivity gains across entire supply chain through dis-intermediation and superior technology

2. Consumer trend towards convenience and 'enjoying life' driven by demographic trends in age, income-levels and more women in the workforce

- Explosion of convenience foods, value-added foods and eating-out
- Increasing willingness to pay premium for quality products

3. Global shift to outsourcing from India across products/ services including food

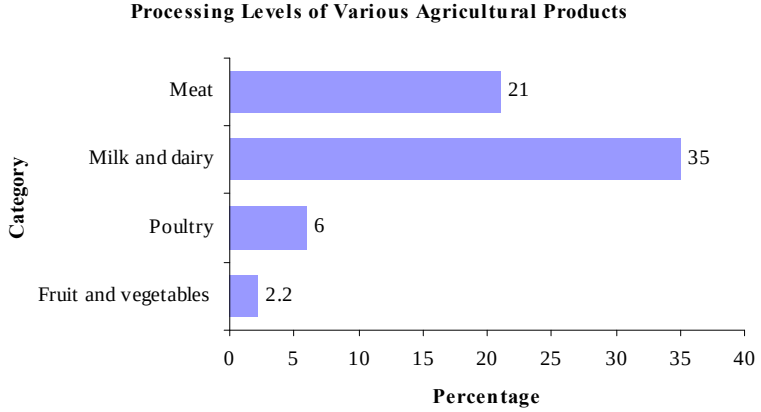
- High-margin businesses possible in niche export markets (e.g. organic foods, herbal products)
- Quality improvement and spill-over to domestic markets, as producers meet stringent export requirements
- Investments in cold chain and transport infrastructure

4. De-regulation and liberalization of the Indian economy, driven by central and state governments

- Ease of entry for new businesses and capacity addition
- Demand-growth from economy growth and rising incomes
- Potential to bring in global technology, know-how and investments

India is the world's second largest producer of food next to China, but accounts for only 1.6 percent of international food trade. The Government aims at increasing this share to 3 percent in the next 8 years. This indicates vast potential for both investors and exporters.

With only 2.2 percent of processing levels for Fruit and Vegetable (F&V), 35 percent for milk, 21 percent for meat, 6 percent for poultry products and 38 percent for agri-produce.



India's food processing levels are significantly low compared to international levels. Processing of agriculture produce is around 40 percent in China, 30 percent in Thailand, 70 percent in Brazil, 78 percent in the Philippines and 80 percent in Malaysia. India's consumption of processed food products is also low, considering a population of 1.1 billion and a strong 350 million urban middle class.

1.3 Food Processing Industry - Key Segments

The food processing industry in India is large and includes segments such as agriculture, horticulture, plantation, animal husbandry and fisheries. These segment also incorporate other industries that use agricultural inputs for manufacturing edible products. As per Ministry of Food Processing Industries indicates the segments within the food processing industries as listed in the table below.

Segment	**Products**
Dairy	Pasteurized and packed milk, Whole milk powder, Skimmed milk powder, Condensed milk, Ice cream, Butter, Ghee and Cheese etc
Fruits and Vegetables	Beverages, Juices, Concentrates, Pulps, Slices, Frozen and Dehydrated products, Potato Wafers/Chips, etc.
Grains and Cereals	Flour, Bakeries, Starch Glucose, Cornflakes, Malted Foods, Vermicelli, Beer, Grain based alcohol
Fisheries	Frozen and Canned products mainly in fresh form
Meat and Poultry	Frozen and packed-mainly fresh form
Consumer Foods	Snack food, Namkeens, Biscuits, Ready to eat food, Alcoholic and Non-alcoholic beverages

Source: www.apeda.com

Though the Food Processing Industry has been growing at an average rate of 7 percent, it has the potential to achieve double digit growth.. Value-addition in food products is expected to increase from the current 8 percent to 35 percent by the end of 2025. Total exports of the Food Processing Industries has jumped from EUR 4.7 billion in 2002-03, to EUR 13.8 billion in 2006-07.

According to a recent ñFood and Beveragesò Survey conducted by FICCI, the segments which are expected to record high growth i.e. between 10-20 percent include branded flour (atta) (16 percent), bakery items like bread, cakes (11 percent), biscuits (16 percent), fruit juices, pulp and concentrates (18 percent) and sauces/ketchups (17 percent). Segments like semi processed/cooked ready to- eat, ice-cream, wine and sugar are expected to achieve 24 percent, 30 percent, 22 percent and 25 percent growth respectively. The market for branded foods across different segments of the industry is growing by 15 to 20 percent.