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### A study of productivity and efficiency in the India's food processing industry

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#### Abstract

The food processing industry in India has huge potential through value addition in terms of income and employment generation. However, very little of the fresh produce reaches the consumer due to lack of proper handling, storage and processing facilities, resulting in a low shelf-life and enormous losses. Recent changes in consumption pattern in middle and high income groups show ample opportunity for processed food segments in India, which is indicated through a strong growth in consumption of packaged and processed foods. To meet the emerging demand for processed food products it is imperative to capture the huge and exponentially growing food market in India, by adopting sophisticated technology in food processing for competitive success and survival. Analysis of productivity and efficiency changes in the food processing industry in India during pre-liberalization and post-liberalization periods is essential. In India, the large crop and raw material base offer a vast potential for agro-processing activities. For example, value is added to fruits and vegetables by processing them into a wide range of pickles, chutneys and other relishes. These small-scale operations are a major source of employment, particularly in rural villages of India. Small-scale food processing is also particularly suitable for women, who may be the specific intended beneficiaries of development programs.

**Keywords:** Income, employment, storage growth, competitive success and women

#### Introduction

The food processing sector serves as a vital link between agriculture and the industrial segments of an economy. This sector helps in strengthening the backward linkage between the processor and the agriculturist and the forward linkage between the processor and consumer. Strengthening the food processing sector is of critical importance to ensure reduction in the wastage of agricultural raw materials, improve the value of agricultural produce by increasing shelf-life as well as by fortifying the nutritive capacity of the food products; ensure remunerative prices to farmers as well as affordable prices to consumers. The food processing industry in India is a 'sunrise sector' that has gained prominence over the recent years. Availability of raw materials, changing lifestyles and food habits, organized food retail and rapid urbanization are the drivers of growth for processed food industry in India in the post-liberalisation period. The food processing industry is one of the largest industries in India – it is ranked fifth in terms of production, consumption, export and expected growth. Food processing is a large sector that covers activities such as agriculture, horticulture, plantation, animal husbandry and fisheries. The food processing industry in India is categorized into the following five segments: Meat, fish, fruit & vegetables, oils & fats, Dairy products, Grain mill products, other food products and Beverages. This study on food processing industry in India using time-series data for the period from 1973-2008 and panel data from 1998 to 2008, includes the various Sub-segments of the industry as well as the various States / Union Territories of India, respectively.

#### Food Processing Sector in India

Though the food processing industry in India is large in size, in terms of development, it is still at a nascent stage with low penetration. The challenges for the food processing sector are diverse and demanding and need to be addressed on several fronts to derive market benefits. Some of the important issues on the production side of processed food products in India are mentioned below:

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### **Handling of Post-Harvest Agricultural Produce**

India is one of the largest producers of high-value agricultural commodities. It is said that every fourth farmer in the world is an Indian farmer.<sup>1</sup> Indian farmers cultivate a wide range of crops- tropical, sub-tropical and temperate – because of the rich endowments in soils and climate.

### **Marketing of Agricultural Output/Commodities**

Agricultural products are seasonally produced, but are required for consumption throughout the year. Thus, storage is an important marketing function, which involves holding and preserving goods from the time they are produced until they are needed for consumption. Storage is an exercise of human foresight by means of which commodities are protected from deterioration, and surplus supplies in times of plenty are carried over to the season of scarcity.

### **Food-Processing (Importance, Problems and Prospects)**

In the agricultural sector, value addition has received attention. Agro processing is a priority area, along with new areas like Floriculture, Horticulture, Aquaculture and so on. The current stress is on corporatization of agriculture and diversification of cropping pattern. Agro-processing units can eliminate the wastage in agricultural products by providing adequate storage and processing facilities. These units are one of the feasible means of generating rural employment and injecting purchasing power into the rural sector. Above all, they operate as catalyst agents for the development of rural infrastructure. The agro-processing units not only offer services, but also involve the farming community in the agri-business. Such units also play a vital role in the utilization of raw material available in abundance, promoting eco-friendly products and meeting the needs of the vast domestic market.

### **Food Processing (Challenges, Scope, Opportunities)**

The food processing sector in India is multi-segmented, with each segment being highly fragmented. It widely comprises of sub-segments such as Meat, fish, fruit & vegetables, oils & fats, Dairy products, Grain mill products, Other food products and Beverages. India has a huge potential in the food processing sector. India is the largest producer of milk in the world, the largest producer of fresh fruits and the second largest producer of vegetables. It has the largest livestock population, the third largest in marine holdings and fifth in poultry production. India is the largest producer, consumer and exporter of spices. In addition to increased agricultural production, it is equally important to save each grain produced by reducing wastages. Development of food processing industry will reduce wastages, ensure value addition, generate additional employment opportunities as well as export earnings and thus lead to better socio-economic condition of agriculturists and processors. Hence, greater access to a variety of inputs is essential.

### **Significance of the study**

The study contributes to the evaluation of the performance of major inputs used in the food processing industry in India. Computation of TE facilitates the identification of the nature and extent of efficiency in the food processing industry in India. Time-series study used to compare the pre-liberalization and post-liberalization period enables to identify the impact of globalization on the food processing industry in India. The study, by analyzing the trend during

the period from 1973-2008, in input efficiency, would provide implications for food processors as well as policy makers for strengthening and accelerating the growth of various sub-segments of the food processing industry and also in addressing critical issues to strengthen sustainable growth and development.

### **Survey of literature**

Kalirajan, K.P. and Tse, Y.K. (1989) <sup>[9]</sup> presented the findings of a firm-level case study examining the role of multinational enterprises (MNEs) in processed food exports from Thailand. The study covered both foreign direct investment (FDI) and non-FDI channels of MNE involvement in the export of four major items, namely, canned pineapple, canned tuna, processed chicken and processed shrimp. The analysis was based on information gathered by interviewing the senior managers of a sample of firms (selected using 'purposive' sampling techniques), and the senior officials of the Thai Processed Food Association. Salim, R.A. and Kalirajan (1999) <sup>[11]</sup> attempted to estimate the extent of post-harvest losses at various levels of marketing, for selected fruits and vegetables in Himachal Pradesh. The number of sampled growers for apple was 120, while 90 other fruit growers (30 growers each of kinnow, mango and peach) were selected (Singh, 2002 <sup>[15]</sup>). The number of sampled growers for vegetables was 200, divided into 40 growers for each of tomato, peas, capsicum, cauliflower and cabbage (Singh and Vaidya, 2005) <sup>[16]</sup>. The number of sampled traders selected for apple at various markets were 50 and 60 at wholesaler's and retailer's level respectively, while for other fruits (kinnow / orange, mango, peach) the number of sampled traders in the markets were 30 and 20 at wholesaler's and retailer's level respectively. In case of vegetables, 20 and 15 wholesalers and retailers respectively were selected for each vegetable under study. Harbir Singh (2009) <sup>[8]</sup> developed a framework through the analysis of the various mechanisms by which transport affects firms, and the identification of key elements and recent trends in spatial organization of firms. This was done on the basis of in-depth interviews with food manufacturers in Spain. The interview evidence provided support for consideration that improved road links could enable firms to reconfigure their activities by substituting transport for other inputs. The interview also highlighted considerable variation in the way transport considerations influenced the spatial organization of firms depending on the particular product and production characteristics as well as the spatial strategies adopted in relation to customers and suppliers. Jabir Ali, Singh, S.P. and Enefiok Ekanem (2009) <sup>[10]</sup> made an objective study of the role and contribution of agroindustries in the economic progress of an economy. The emancipation of rural people from disadvantages arising out of economic imbalances would depend upon how best we diversify rural economy of India, since rural people constitute more than 70 per cent of the population. The strategy of economic progress and emancipation should be such that, it integrates rural and urban economies, by eliminating regional imbalances. This could be achieved only by introducing industry in the rural areas in a big way. Dastagiri, Kumar and Diana (2009) <sup>[12]</sup> observed that, in order to provide the remunerative prices to the farmers, there was a need to eliminate the chain of middlemen, by introducing innovative marketing channels like direct marketing, contract farming and so on and removal of

controls on movement and storage of agricultural produce across the country which would facilitate functioning of common Indian market.

Rahmah Ismail (2009) [6] aimed to analyze technical efficiency change and technical change for the food-based industry and examined to what extent technical change affected the demand for skills for this industry. Two main research questions were to be answered in this study; Firstly, whether the technical efficiency change or technical change contributed mainly to TFP growth in the food-based industry. Secondly whether skills-saving or skills-augmenting technology took place in the food-based industry.

Venkata Rao (2009) [1] attempted to assess the impact and implications of institutional innovations in agricultural supply chains taking the case of potato, the fourth important food crop after rice, wheat, and maize. However, poor seed quality and irregular supply of raw material were among the few major problems in processing and value addition by the private industry. With technological advancement, the private sector had been able to make quality seed available to the growers with buy back arrangements and further processing and value addition. This paper examined the linkages in potato supply chain and their impact on potato growers.

Purushottam Sharma (2010) [14] addressed the issue of whether the storage of food grains in warehouses increased farmers' price realization and hence income, by studying farmers storing their produce at warehouses. The study was conducted in four markets of Maharashtra. Maharashtra State Agricultural Marketing Board, Pune, provided to farmers pledge finance up to 75 per cent of the total value of commodities stored in warehouses of selected 66 markets (APMCs) in the State at 6 per cent interest rate. Primary data was used for the study from the farmers who stored their produce at APMC warehouses and got pledge finance. Six major markets were selected at random from the list where the Scheme was in operation. From the selected markets, a list of farmers was taken, who stored their produce at the market warehouse and availed pledge finance. From the list of farmers, 10 per cent farmers were

selected at random for the purpose of primary data collection. Thus, a total of 49 farmers were selected for the study. Specifically structured schedules were used for the primary data collection from farmers. Tabular analysis was done to meet the objectives of the study. Cost of storage and marketing included: cost of transportation, storage charges, pledge loan processing cost and interest thereon, and commission of agent.

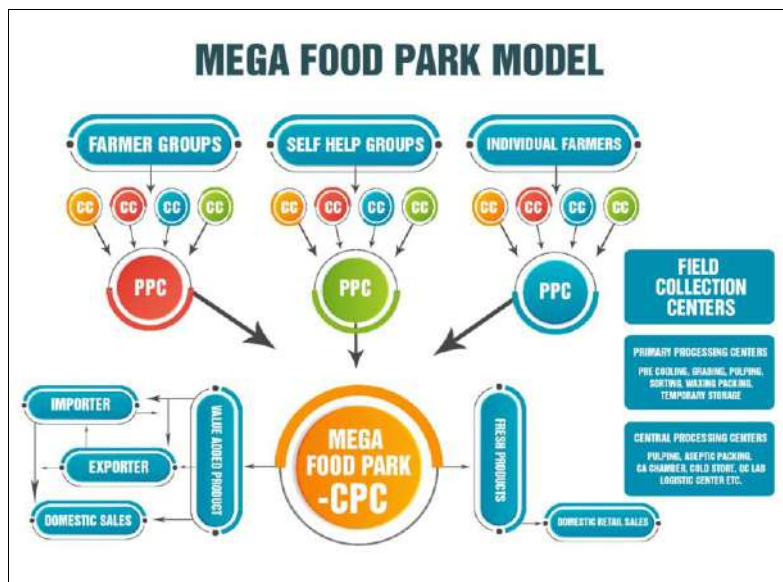
**Growth and development of food processing industry in India**

**Processed Food Market in India**

The food processing industry converts raw agricultural produces into products with much longer shelf-life, resulting in reduction of wastages. The role of the food processing industry in India in addressing core national concerns of agricultural productivity and food inflation is regarded as essentially the need at present. The Government, industry, academia and the farming community need to work together to lift the supply of quality raw materials. The food processing industry can take this high quality and consistent supply of raw material and add value to deliver taste, nutrition and convenience at a price demanded by today's consumers. Adequate production and distribution of food has become a high priority and global concern. In the fast changing world and increasing competition in a globalized economy, there is a need for exploiting the available resources at maximum level and use of best technologies available world over, to cope with domestic demand of food and also to target export market.

**Scheme for Mega Food Parks**

The primary objective of the MFPS is to provide adequate / excellent infrastructure facilities for food processing along the value chain from the farm to market. It includes creation of infrastructure near the farm, transportation, logistics and centralized processing centers. The main feature of the scheme is a cluster-based approach. The scheme would be demand- driven, pre-marketed and would facilitate food processing units to meet environmental, safety and social standards.



Source: mofpi.nic.in

Chart 1: Mega Food Park Model

### Statement of the problem

The first comprehensive economic reform policy statement was formulated for India in July 1991, in the form of industrial and trade sector liberalization. The economic reforms of the 1990's which strengthened the process of liberalization, privatization and globalization in the country have brought new opportunities and challenges before food processors through a competitive market environment. To meet the emerging demand for processed food products, it is imperative to capture the huge and exponentially growing food market in India, by adopting sophisticated technology in food processing for competitive success and survival. An analysis of productivity and efficiency changes in the food processing industry in India during pre-liberalization and post-liberalization periods is essential.

### Objectives of the study

#### The major objectives of this study are

1. To compare the structural composition and growth of various subsegments within the food processing industry in India using time-series data at all India level during the pre- and post-liberalization period.
2. To compare the Technical Efficiency (TE) of major inputs used in the food processing industry in India across major commodity segments over time.
3. To study the performance of States / Union Territories in the food processing sector in India, computing TE by estimating Frontier Production Function using Panel data.

### Methodology of the study

In this study the Annual Growth Rates (AGR) and Compound Annual Growth Rates (CAGR) are computed using time-series data, in order to compare the performance of the various sub-sectors of the food processing industry in India during the pre-liberalisation, liberalisation and post-liberalisation periods. The Stochastic Frontier Production Function (parametric approach) is applied to the time-series data of various sub-segments of the food processing industry in India, which facilitates the computation of commodity specific TE values for the sub-segments. Panel data on 31 States / Union Territories on various sub-sectors of the food industry is used to measure the extent of variation in mean TE across the States / UT's in India. The application of the Stochastic Frontier Production Function model facilitates identification of the most efficient States / UT's in the food processing industry in India, in comparison with the all India level TE.

### Conclusions

The study on Food Processing Industry in India using time-series data on various Sub-segments as well as panel data on States / UT's highlights the positive role of the Government in the growth and expansion of the Industry. The study also supports the hypothesis that there is a positive and significant relationship between factor intensity and technical efficiency in the Food processing industry in India. There is potential to increase the output of the food processing sector with the existing resources. The study also suggests that perishable horticulture produce should move quickly from farmers to consumers. If farmers directly sold their produce to the consumers, it would not only save losses, but also increase farmer's share in the price paid by the consumers. Hence, direct marketing by the farmers is to

be encouraged as an alternative channel. The amendment of outdated laws restricting the establishment of markets to allow co-operatives and private entrepreneurs to set up modern markets, covering not only the cities but also the interior villages in the country, is the need at present.

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