



## **Recent Trends and SWOT Analysis of Food-Processing Industry Infrastructure in India: A Review**

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### **ABSTRACT**

*Economic growth, urbanization, increasing labour force participation of women and associated changes in lifestyles have contributed to the rise of the food processing industry relative to other sectors. Food processing sector is indispensable for the overall development of an economy as it provides a vital linkage and synergy between the agriculture and industry. It helps to diversify and commercialize farming; enhance income of farmers; create markets for export of agro foods as well as generate greater employment opportunities. Food processing or Agro-processing is a techno-economical process carried out for conservation and handling of agricultural produce to make it usable as food, feed, fibre, fuel or industrial raw material. Food and Agro-processing industry refers to the subset of manufacturing that processes raw materials and immediate products derived from the agricultural sector. Food-processing industry thus means transforming products originating from agriculture, forestry and fisheries. Across the world, food-processing is considered to be a sunrise sector because of its large potential for growth and socio economic impact. It not only leads to income generation but also helps in reduction of wastage, value addition, and foreign exchange earnings and enhancing manufacturing competitiveness. The main aim of this study is to throw light on the present scenario of the industry in the country and to find the opportunities and challenges faced by the industry in India. The study will also try to point out the issues that need to be tackled to make global food processing industry globally competitive.*

Received: 4.01.2018

Revised: 02.02.2018

Accepted: 25.02.2018

### **INTRODUCTION**

Food processing industry is of enormous significance for India's development because of the vital linkages and synergies it promotes between the two pillars of our economy, industry and agriculture. Fast growth in the food processing sector and simultaneous improvement in the development of value chain are also of great importance to achieve favorable terms of trade for Indian agriculture both in the domestic and the international markets. The sector however has to go a long way. Even important is the crucial contribution that an efficient food processing industry could make in the nation's food security for instance the post-harvest losses of cereals are 10 to 18 percent and fruits and vegetables are about 25 to 30 percent in our country. Even marginal reductions in these losses are bound to give us better returns and thereby improve the income level of the farmers [1-5].

During the last decade, India moved from a position of scarcity to surplus in food. Given the trade in production of food commodities, the Food Processing Industry in India is on an assured track of growth and profitability. It is expected to attract phenomenal investment in capital, human, technological and financial areas. The total food production of India is estimated to double in the next ten years. Hence there is an opportunity for large investments in food and food processing technologies, skills and equipment. The major interventions in this context are, for example, Canning, Dairy and Food Processing, Specialty Processing, Packaging, Frozen Food / Refrigeration and Thermo Processing. Fruits and vegetables, fisheries, milk and milk products, meat and poultry, packaged /convenience foods, alcoholic beverages and soft drinks and grains. Health food and health food supplements are other rapidly rising segments of this industry [6].

The Food Processing Industry sector in India has been accorded high priority by the Government of India, with a number of fiscal relief and incentives, to encourage commercialization and value addition. As per a study conducted by McKinsey and Confederation of Indian Industry (CII), the turnover of the total food market is approximately Rs.2.5 Lakh crores out of which value-added food products comprise Rs.80,000 crores [7-9]. The liberalization of the Indian economy and world trade and rising consumer prosperity has thrown up new opportunities for diversification in the food-processing sector and opened new vistas for growth. A study has revealed that there is tremendous potential in India to build a profitable business in the sector. This industry ranks fifth in the country and employs 16 lakh workers, comprising 19 per cent of the country's industrial labour force. It accounts for 14 per cent of the total industry output with 5.5 per cent of the GDP. Its turnover is estimated at Rs.1,44,000 crore, of which Rs.1,11,200 crore is in the unorganised sector. The industry has started producing many new items like ready-to-eat food, beverages, processed and frozen fruit and vegetable products, marine and meat products, IQF products, etc. [10]. The Indian consumer is being fast introduced to newer high quality food products made by using the latest state-of-the-art technology that is also giving the industry a competitive edge.

### DEFINITION OF FOOD PROCESSING

The need for defining what should be construed as Food Processing was necessary because of different classifications by various departments/organizations (*Ministry of Statistics and Programme Implementation, DGCI&S, DIPP etc.*) on what Food Processing includes. Since this ministry has to compile the data from all such sources, there is a need for conceptual clarity on food processing. Henceforth this Ministry will include under food processing industries, items pertaining to these two processes viz.

(a) **Manufactured Processes:** If any raw product of agriculture, animal husbandry or fisheries is transformed through a process [*involving employees, power, machines or money*] in such a way that its original physical properties undergo a change and if the transformed product is edible and has commercial value, then it comes within the domain of Food Processing Industries and

(b) **Other Value-Added Processes:** Hence, if there is significant value addition (*increased shelf life, shelled and ready for consumption etc.*) such produce also comes under food processing, even if it does not undergo manufacturing processes.<sup>5</sup>

### Need of Food Processing Industry:

India produces about 600 million tons of raw food materials of plant and animal origin which are refined, stored and transformed into various usable products using conventional and modern postharvest and food processing technology. It involves operations like cleaning, grading, drying, storage, milling, packaging, transport, marketing and utilization. At the end of each operation, value is added to the product. The lowest and the highest monetary values of a food commodity are, respectively, when it is in raw and fresh form and when it is in processed and ready to consume form. Post harvest and food processing technology are commodity and location specific. It enhances and augments per capita food availability from a unit arable land and other resources by preventing avoidable post harvest losses and adding value to the fresh agro-produces. It also creates opportunities for employment and income generation. Integration of production agriculture with on-farm primary processing is needed to have higher and sustainable production, productivity and better quality end products for domestic and export markets. It, therefore, demands establishment of Agro Processing Centers in the production catchments itself to facilitate backward linkage with farmers, have fresh and best quality raw food materials for processing and value addition, minimize material movements, check migration of rural people to urban areas for jobs and thereby reducing pressure on public utilities in urban areas. Such centre would be a very strong tool for rural reconstruction and its upliftment. It would help in reducing rural urban disparity and ensuring household food and nutritional security for all at an affordable cost.

The technology is available but political will and commitment is required to implement the program to shape a new India in the new millennium where everyone would be healthy and happy. It is in the interest of the nation and its people. In India, the post-harvest losses are to the tune of Rs. 92,651 crore (\$13 billion USD) per annum, giving out a gruesome picture of industry. A substantial amount of these losses could be prevented if appropriate agro-processing centers having backward linkage with farmers to ensure constant supply of quality raw food materials are established and operated. The two major goals of Post harvest technology are loss prevention and value addition to the raw food commodities through preservation and processing. Raw food materials are cleaned, graded and then they are either stored or processed. Processing is done to make raw commodities edible through primary and secondary processing and ready to eat through tertiary processing. Estimated value additions to the raw food materials through primary and secondary/tertiary processing in India are 75 per cent and 25 per cent respectively ([www.ibef.org](http://www.ibef.org)). Now, we will explore some of the conventional and improved agro processing technologies which are used in food processing industry. Indian food processing industry is

growing at a healthy rate, and two sectors which are driving the growth are dairy sector and horticulture sector.

#### **Processed Food:**

Disease reduction is an important benefit of food processing. As raw food begins to rot or spoil, it becomes contaminated by molds and bacteria that may cause you to get sick. Processing methods destroy those harmful pathogens. Processing foods also makes it possible for manufacturers to provide consumers with a greater variety of foods. The people can enjoy processed food items that are out-of-season or not native to the region. Processed foods are also easy to prepare and less time consuming than making a dish from scratch. *The United States Federal Food, Drug and Cosmetic Act, Section 201, Chapter II* defines processed food as "any food other than a raw agricultural commodity and includes any raw agricultural commodity that has been subject to processing, such as canning, cooking, freezing, dehydration, or milling." This definition establishes parameters for the Food and Drug Administration to regulate quality and safety in the food processing industry. In consuming processed foods, consider whether the benefits outweigh the potential negative effects of food additives such as sweeteners, salts, artificial flavors and colorings, factory created unhealthy fats and chemical preservatives. Too much sodium can lead to serious consequences such as high blood pressure. Processed foods also often contain excessive amounts of sweeteners, fat and salt. These enhancements may encourage you to eat greater quantities of foods that have been stripped of valuable nutrients such as fiber, healthy fats and antioxidants, which are substances found in foods that can help prevent disease.

Food processing is a procedure in which food is prepared for consumption. People often use this term to refer specifically to making packaged foods, but technically anything which transforms raw ingredients into something else is a form of food processing, ranging from grilling vegetables in the back yard to making television dinners in a food manufacturing facility. The sector focused on processing food employs large numbers of people, many of whom are unskilled laborers [18].

There are several purposes to food processing. The most basic goal is to prepare food which is palatable. This can include processing ingredients which are not safe to eat raw, flavoring foods to make them more interesting, and making dishes which comply with cultural and religions norms surrounding food, in addition to addressing issues such as allergies. Processing food is also usually intended to make food which is nutritious, and can include activities such as food fortification, in which vitamins and minerals are added to food during processing to increase the nutritional value. Safety is also a major concern in food processing, especially industrial processing to create packaged foods which are sold commercially. These facilities can be easily contaminated and the contamination can quickly spread, causing widespread illness. Part of making food safe includes processing it to remove any potential risks, such as bacteria in milk, in addition to maintaining strict safety procedures to reduce the risk of introducing harmful organisms during processing.

#### **Highly processed foods:**

Highly processed foods are made from combinations of unprocessed food, minimally processed food and processed food ingredients. Many are designed with consumer convenience in mind. They are often portable, can be eaten anywhere and require little or no preparation. Discussions of processed foods in the popular media often refer to products in this category. Highly processed foods include snacks and desserts, such as cereal bars, biscuits, chips, cakes and pastries, ice cream and soft drinks; as well as breads, pasta, breakfast cereals and infant formula. Highly processed animal products include smoked, canned, salted and cured meats and products made from extruded remnants of meat, such as nuggets, and some sausages and burgers. Many vegetarian alternatives to meat are also highly processed. Highly processed foods are made using techniques like mixing, baking, frying, curing, smoking and the addition of vitamins and minerals [11]. Given the wide variety of foods that could qualify as highly processed and the lack of any clear, widely accepted criteria for defining them as such, it is difficult to make any generalizations about the nutritional value of highly processed foods. Some health professionals, however, have expressed concern over the growing popularity of certain highly processed foods in diets.

#### **Organic Food:**

Organic foods have been accepted due to their perceived health benefits over conventional food. The organic industry is growing rapidly and has caught the attention of farmers, manufacturers and, above all, consumers. Organic foods protect from heart disease and cancer, as they contain Phenolic compounds. Organic food ensures high food quality, which other conventional foods cannot give. Many people prefer to grow organic food in their home gardens, because it costs about 20 per cent more than the conventional food. India today is on the threshold of an organic revolution and Indian Organic Food industry though at a nascent stage, has experienced steadfast growth in past few years. The country's budding organic food market is transforming into world's fastest growing organic food market backed by a shift in consumer behavior and spending patterns. Organic Food Industry has been blossoming in India.

Trends in the Industry-

- Organic Food Stores
- New Varieties on offer
- Rising Investments
- Marketing Techniques

#### **NOVEL FOOD PROCESSING TECHNOLOGY:**

Currently most of the processing in India is manual. There is limited use of technology like pre-cooling facilities for vegetables, controlled atmospheric storage and irradiation facilities. This technology is important for extended storage of fruits and vegetables in making them beneficial for further processing. In case of meat processing, even with the presence of over 3600 licensed slaughter-houses in India, the level of technology used in most of them is limited, resulting in low exploitation of animal population. Bringing in modern technology is an area that existing as well as new investors in the sector can focus on, this will make a clear difference in both process efficiencies as well as quality of the end product. However, there is increasing acceptance of these products amongst the urban population. India has a large untapped customer base and even a small footprint in the domestic market would enable the player to gain significant volumes.

Certain processed food categories such as snack foods are impulse purchase products where consumers look for novelty and new flavors and hence these categories lack brand loyalties. Visibility through attractive packaging boosts consumption. Increasing time constraints amongst the working middle class has boosted consumption of products like instant soups, noodles and ready-to-make products. Innovation in packaging and product usage is an important success factor for processed foods [12-16].

#### **Advances in Food Science and Technology:**

Drying, canning, chemical preservation, refrigeration (chilling and freezing), and nutrient conservation and fortification were the significant advances of the 19<sup>th</sup> and 20<sup>th</sup> centuries and permitted population growth in more developed countries. Such population growth could only occur if there was sufficient food. The industrial revolution could not have occurred without a food delivery system that allowed people to leave the farms, migrate to the cities, and engage in useful production of goods and services for society. Among the important developments during the early part of the 20<sup>th</sup> century were the discovery of vitamins and the realization of the importance of other micronutrients such as iodine, iron, and calcium. Those with memories of that earlier period recall the bowed legs associated with rickets and the swollen thyroids related to goiter (from iodine deficiency) [17-20].

Technological innovations in food preservation were dependent on advances in the sciences, especially chemistry and microbiology. How these sciences and technologies are applied within each society depends on the economic, biological, cultural, and political contexts for each society. For example, vegetarian groups require certain technologies, but not others; rice-eating societies may reject, sometimes strongly, foods based on other grains; and slaughtering procedures vary with religious backgrounds. Advances in agriculture and food science and technology have led to reduction in nutrient deficiency-related diseases; a generally safe food supply with consistent high quality available independent of seasons; food choices that do not require preparation time; a wide range of delicious foods; reduced food waste; lower household food costs than ever before; convenience foods requiring much less preparation time than before, a benefit for working families; and efficient global food distribution that can be exploited in times of natural and man-made disasters [21].

#### **OBJECTIVES OF FOOD PROCESSING [22-26]:**

Food processing frequently serves multiple objectives. For example, freezing or cooking and freezing both preserve and provide convenience. Heating or fermentation of soy is necessary both to achieve edibility and to remove the hemagglutinins that would be mildly toxic. Processing operations are conducted under controlled conditions to ensure that the process is completed in the most effective and efficient manner. The resulting products include ingredients delivered to food manufacturers to be used in producing foods for consumers, as well as ingredients for consumers to use in food preparation. The development and implementation of new technologies enhances food quality and safety. New and innovative products, some with unique product attributes, have been developed through the use of new processing technologies. The formulation, processing, and packaging of a food or beverage is accomplished for several clearly definable purposes, with numerous benefits to the consumer and society:

- ✓ **Preservation:** This is the oldest and perhaps stills the most common purpose, and the one most familiar to consumers. The purpose of preservation is to extend the shelf life of a food or beverage.
- ✓ **Safety:** The processing of food is designed to remove health hazards associated with microbial

pathogens. Processing operations dealing with raw food materials or ingredients carrying pathogens have significant controls and regulations to detect and inactivate food-borne microorganisms that can cause illness. Pasteurization of milk is just one of many examples of processes that eliminate a health hazard for the consumer and extend the life of the product. Managing food safety, however, goes beyond microbiological risks. Good agricultural and manufacturing practices and other principles address chemical and physical hazards as well. In addition, plant breeding has contributed to reduction of some of the toxicants that occur naturally in foods in small amounts and have been the source of common and sometimes widespread human illness and occasionally death. Processing is, however, still necessary in some instances.

- ✓ **Quality:** Processes to ensure the delivery of foods and beverages of the highest quality to the consumer continue to evolve. Quality attributes include taste, aroma, texture, color, and nutrient content. In most cases, these attributes begin to decline as soon as a raw food material or ingredient is harvested or collected. The goal of the processes is to ensure that the decline in quality attributes is minimized. For example, blanching and freezing vegetables immediately after harvesting ensures that the nutrients remain at their peak level. In some cases, the quality attributes are enhanced by processing. For example, processing of soybeans greatly improves their flavor.
- ✓ **Availability:** Food processing helps to ensure that the consumer has access to a wide variety of foods and food ingredients at any time, including those that help to improve the retention of quality attributes for the period of time required for delivery of the product to the consumer. For example, controlling the composition of the atmosphere surrounding apples and other fruits leads to extended freshness.
- ✓ **Sustainability:** Food processing ensures that the resources required producing raw food materials and ingredients for food manufacturing are used most efficiently. Responding to the goals of sustainability requires the maximum utilization of all raw materials produced and integration of activities throughout all the production-to-consumption stages. To maximize the conversion of raw materials into consumer products, efforts begin at the production stage, with activities to reduce postharvest losses and increase use of by-products. Efforts continue, through food manufacturing and beyond, to ensure that energy, water, and other resources are used most efficiently and environmental impacts are minimized. Refrigeration of fresh produce is an example of an action that reduces loss and increases the edible life of the product.
- ✓ **Convenience:** Many processed foods and beverages are developed to allow them to be consumed after limited amounts of preparation. For example, a frozen or refrigerated entree is delivered to the consumer in a form ready for microwave heating. Snack foods are ready to eat when delivered to the consumer.
- ✓ **Health and Wellness:** At a fundamental level, food is viewed as a source of nutrition to meet at least the minimum daily requirements for survival, but there is an ever-greater focus on the desire for health optimization from food. Processing can enhance the nutritional value of foods in a number of ways. For example, refining separation of the anti-nutritional components is the best means of improving the nutritional quality of many foodstuffs of vegetable origin, and processing of fresh tomatoes improves the bioavailability of the carotenoid and lycopene. Some products are specifically designed to enhance individual health and wellness the focus of many current trends requiring specific unique ingredients and an array of processes to ensure desired product attributes. Many products are fortified or enriched with vitamins and minerals and other nutrients in response to defined nutritional needs of consumers. The success of these products often referred to as '*functional foods*' requires that flavor and texture also meet consumer expectations.

#### MAJOR SEGMENTS IN THE FOOD PROCESSING SECTOR:

The major segments in the Food Processing sector comprise of fruits and vegetables, dairy, edible oils, meat and poultry, non-alcoholic beverages, grain-based products, marine products, sugar and sugar based products, alcoholic beverages, pulses, aerated beverages, malted beverages, spices, and salt. Out of these segments, dairy (16%), grain based Products (34%), bakery-based products (20%), and fish and meat products (14%) contribute to a major portion of industry revenues, apart from the manufacture of beverages.

- ❖ **Fruits and vegetable:** Fruits and vegetables processing is dominated by unorganized players, who occupy a share of 70 per cent in the total market size. Over the last few years, the industry has witnessed rapid growth of Ready to Eat foods, frozen vegetables, processed mushroom etc. The major challenge with this sector is unavailability of infrastructure facility to store produce. The cultural preference for fresh fruits and vegetables dominates over processed items.
- ❖ **Dairy:** The current size of the Indian dairy sector is about Rs. 5000 billion and has been growing at a

rate of 5 per cent a year. The dairy sector is mainly unorganized due to which the products do not match international standards.

- ❖ **Meat and Poultry:** Entry of many organized players like Godrej, Venkateshwara Hatcheries, Suguna poultry etc. in meat processing and packaging has accelerated growth of this industry segment. Meat production is estimated at 6.7 MT during 2015-16, which is around 2 per cent of world meat production. The contribution by bovine, ovine, pig and poultry is 43 per cent, 12 per cent, 8 per cent and 37 per cent respectively.
- ❖ **Fish and marine products:** The dietary habits of the people all over the globe are changing fast and India is gearing up to produce and supply value added products in tinned packs by adopting the latest technologies and by tapping the unexploited and under exploited fishery resources. Value addition has been considered as the thrust area. Indian seafood processing units are being encouraged to go in for value addition and export through setting up new units, expanding their capacity and diversifying their current activities etc for value addition.
- ❖ **Snacks:** The Indian snacks market is estimated to be worth Rs. 150 billion with the organized segment accounting for half of the market share and is growing at a rate of 15-20 per cent. The unorganized share is roughly Rs. 75 billion and is currently growing at a rate of 7-8 per. Ready to eat extrudates, potato chips and potato based products occupy almost 85 per cent share of the Indian snack market.
- ❖ **Beverages:** The market for carbonated drinks in India is worth US\$ 1.5 billion while the juice and juice-based drinks market accounts for US\$ 0.25 billion. Growing at a rate of 25 per cent, the fruit-drinks category is one of the fastest growing segments in the beverages market. Major food processing states in India are Andhra Pradesh (13.4% of India's food processing industry, and a centre for fruits, vegetables, grains and livestock products viz. Poultry, dairy, fisheries, meat, etc.), Gujarat (12.7%, and a centre for edible oils and Dairy), Maharashtra (14%, and a centre for fruit, vegetables, grains, and beverages), and Uttar Pradesh (12%, across almost all product categories). There is uneven development of food processing industries in India, most of the states have not fully capitalized their resources, and most of the produce is getting waste.

#### **FOOD PROCESSING SECTOR IN INDIA:**

Food processing is the transformation of raw ingredients into food, or of food into other forms. Food processing typically takes clean, harvested crops or butchered animal products and uses these to produce attractive, marketable and often long shelf-life food products. The processed food industry is divided into the following broad segments:

- **Primary processed food** - which includes products such as fruits and vegetables, packed milk, unbranded edible oil, milled rice, flour, tea, coffee, pulses, spices, and salt, sold in packed or non-packed forms.
- **Value-added processed food** - which includes products such as processed fruits and vegetables, juices, jams, pickles, squashes, processed dairy products (*ghee, paneer, cheese, and butter*), processed poultry, and processed marine products, confectionary, chocolates, and alcoholic beverages.

Across the world, food-processing is considered to be a sunrise sector because of its large potential for growth and socio economic impact. It not only leads to income generation but also helps in reduction of wastage, value addition and foreign exchange earnings and enhancing manufacturing competitiveness. In today's global market, quality and food safety have become competitive edge for the enterprises producing foods and providing services. With proper investment in food processing, technical innovation and infrastructure for agriculture sector, India could well become the food basket of the world. The existing level of processing and the extent of value addition are very low as compared to other developing countries. In India the food processing industry is ranked fifth in terms of production, consumption, export and expected growth.

A strong and dynamic food processing sector plays a significant role in diversification of agricultural activities, improving value addition opportunities and creating surplus for export of agro-food products. It is widely accepted that the food processing sector is the most appropriate sector for creating jobs for rural poor, and thus reduce the burden on agricultural sector for creation of their livelihood. This is due to their familiarity with the agricultural sector which would make it easier to train and place them in food processing enterprises. The multiplier effect of investment in food processing industry on employment generation is also higher than any other sector. Therefore, for the overall progress of economy it is important that the farmers and backward communities working in rural food-processing units are treated at the top of the growth process. Rapid and sustained poverty reduction requires economic growth which is inclusive and the one that allows people to contribute to and benefit from it.

In India, the food processing industry is highly fragmented and is dominated by the unorganized sector. A number of players in this industry are small. About 42 per cent of the output comes from the unorganized

sector, 25 per cent from the organized sector and the rest from small players. Though the unorganized segment varies across categories but approximately 75 per cent of the market is still in this segment. The organized sector is relatively bigger in the secondary processing segment than the primary processing segment. Increasing urbanization, consciousness on health and nutrition and changing lifestyle are changing the consumption habits of India. The number of working women, single students / professionals and nuclear families are creating demand for processed ready-to-eat foods. Growth of organized retail, which makes the processed food readily available, is also driving growth of food processing.

#### **GROWTH DRIVERS FOR FOOD PROCESSING INDUSTRY:**

- **Changing Lifestyle of People:** As far as the processed food market is concerned, Indian households are closely knit and the percentage of nuclear families and working women is very low. Therefore, while the market itself is one of the largest in the world, the penetration of packaged and branded products is abysmally low. People prefer homemade or fresh products, which are cheaper than branded products. However, over the last couple of years, private players have started taking enormous interest in the sector, with many MNC's already testing the waters. Their efforts have been aided by the fact that urban India is showing a marked shift towards ready-to-eat food. With urban incomes increasing and urban consumers squeezed for time, they are slowly demanding more of the products they consume. Also, the hygiene factor is facilitating growth. With 200 million people expected to shift to processed and packaged food by 2015. This presents an opportunity for makers of branded products.
- **Growth in Retail:** The Indian retail industry is one of the fastest growing in the world. Retail industry in India is expected to grow to US\$ 1,100 trillion by 2020 from US\$ 672 billion in 2017. India is the fifth largest preferred retail destination globally. The country is among the highest in the world in terms of per capita retail store availability. India's retail sector is experiencing exponential growth, with retail development taking place not just in major cities and metros, but also in Tier-II and Tier-III cities. Healthy economic growth, changing demographic profile, increasing disposable incomes, urbanisation, changing consumer tastes and preferences are the other factors driving growth in the organised retail market in India. The annual growth of the retail market in India is expected to be around 8 per cent and it is expected to be seen 35-40 per cent in next 10 years. Indian market has become the most lucrative market for retail investment in the world. The great Indian consumer market is still going strong. Existing middle class with increasing share of wallet, rapid urbanization, increase in the number of working women, large number of working young population, changing attitudes, tastes and lifestyle, globalization, indulgence and convenience aspects are triggering the retail food industry which in turn will a great boost to the food processing industry. This also attracts global retail giants like Wal-Mart, Tesco, Carrefour SA, Metro AG etc. to enter the Indian markets. With increasing number of shelf space more and more branded and processed food is finding its way in retail stores. With a sizeable amount of supply in pipeline, the retailers and developers would shift the focus of Indian retail market from lifestyle goods to value retailing. FMCG and food retailing is likely to be the least affected in this downturn and some activity is expected in this sector.
- **Food Retail:** Food retail has surpassed the dominating apparel and accessories sector. Contrary to the belief that fashion is the largest segment of organized retail in India, food & beverages is the major segment, worth Rs 8.97 lakh crore. Growing at the rate of 30 per cent, the Indian food retail is going to be and no doubt is the major driving force for the retail industry. The percentage of income spent in households will drive growth in the food market. Food accounts for the largest share of consumer spending. Food and food products account for about 50 per cent of the value of final private consumption. This share is significantly higher compared to developed economies, where food and food products account for about 20 per cent of consumer spending. Currently, the retail food sector is Rs. 3500 billion and is expected to rise to Rs. 7500 billion by 2025. Food has the largest consumption in the Indian economy and will remain the single largest category.

#### **Opportunities in Food Processing in India:**

Diverse agro-climatic conditions lead to a wide-ranging and large raw material base suitable for food processing industries in India. Currently a very small percentage (less than 2%) of these is processed into value added products, leaves opportunity to explore in the sector.

- One of the biggest emerging markets, with more than 1 billion population and 250 million strong middle class sets a large consumer base within the country.
- India is the seventh largest country, with extensive administrative structure and independent judiciary, a sound financial & infrastructural network. Stable and flourishing democracy is also an opportunistic attribute of the country.

- Increasing literacy, rapid urbanization and rising per capita income resulting in rapid growth and changes in demand patterns. This is creating great opportunities for exploring the large hidden markets.
- An average Indian spends about 40 per cent of household expenditure on food items.
- Demand for processed /convenience food is constantly increasing.
- Cheaper workforce availability can be effectively utilized to setup large low cost production bases for domestic and export markets.
- Liberalized policies with specific incentives for high priority food processing sector provide very favourable environment for investments and exports in the sector.

**Challenges in Food Processing:**

1. Unprocessed foods are susceptible to spoilage by biochemical processes, microbial attack and infestation. The right post harvest practices such as good processing techniques, and proper packaging, transportation and storage can play a significant role in reducing spoilage and extending shelf life.
2. The challenges in processing lie in retaining the nutritional value, flavour, aroma, and texture of foods, and presenting them in near natural form with added conveniences.
3. Besides, processed foods need to be offered to the consumer in hygienic and attractive packaging, and at low incremental costs.
4. The challenges for the food preservation, distribution and processing sectors are diverse and demanding, and need to be addressed on several fronts to derive maximum market benefits. Presently, the organizations addressing the educational and R & D requirements are too few, and there is a pressing need for supplementing their efforts.
5. In the emerging scenario, the Food Engineering professional needs to develop sufficient awareness and appreciation of the relevant principles of life sciences, and physical sciences, as well as of a wide variety of other topics including: nutrition, preservation and storage techniques, processing unit operations, bio-processing, waste management, distribution and supply chain management, food laws and regulations and so on.
6. Besides, the professional needs to develop an appreciation of R&D and innovation in critical technology areas such as: newer or novel process development in preservation and storage techniques, theology, colloids and dispersal systems, packaging-polymers and composites, sensors for detection and process control, bioprocess engineering etc.

**SWOT Analysis of Food-Processing Industry Infrastructure in India [27-29]:**

In this section of the study attempt is made to analyse the strengths, weaknesses, opportunities, and threats of the processed agriculture sector. On one side strengths and weaknesses reflect the internal factors and on the other hand opportunities and threat throw light on the external factors. Identification of SWOT is necessary as it will help in achieving subsequent steps in planning the development and growth of sector.

**Strengths:**

1. Round the year availability of raw materials.
2. Social acceptability of food-processing as important area and support from the central government.
3. Vast network of manufacturing facilities all over the country.
4. Vast domestic market.

**Weaknesses:**

1. High requirement of working capital
2. Low availability of new reliable and better accuracy instruments and equipments
3. Inadequate automation information management.
4. Remuneration less attractive for talent in comparison to contemporary disciplines.
5. Inadequately developed linkages between R&D labs and industry.

**Opportunities:**

1. Large crop and material base in the country due to agro-ecological variability offers vast potential for agro processing activities.
2. Integration of developments in contemporary technologies such as electronics, material science, computer, bio-technology etc. offer vast scope for rapid improvement and progress.
3. Opening of global markets may lead to export of our developed technologies and facilitate generation of additional income and employment opportunities.

**Threats:**

1. Competition from global players
2. Loss of trained manpower to other industries and other professions due to better working conditions

prevailing there may lead to further shortage of manpower.

3. Rapid developments in contemporary and requirements of the industry may lead to fast obsolescence.

## CONCLUSION

India is one of the world's largest producers as well as consumer of food products, with the sector playing an important role in contributing to the development of the economy. Food processing industry in India is increasingly seen as a potential source for driving the national economy as it brings about synergy between the consumer, industry and agriculture. A well developed food processing industry is expected to increase farm gate prices, reduce wastages, ensure value addition, promote crop diversification, generate employment opportunities as well as export earnings. The challenges for the food processing sector are diverse and demanding, and need to be addressed on several fronts to derive maximum market benefits. A combination of uncontrollable and controllable factors has affected the growth of the sector and has acted as a hindrance in achieving its potential. Rapid development in the contemporary and requirements of the industry may lead to fast obsolescence. With the fast changing technologies the requirements of better technology is also changing but the actual situation is that research and development could not make pace with the demand of the sector.

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**CITATION OF THIS ARTICLE**

A Sarathe, R Gupta, A.L. Basediya and V Satish Kuchi. Recent Trends and SWOT Analysis of Food-Processing Industry Infrastructure in India: A Review. Bull. Env. Pharmacol. Life Sci., Vol 7 [6] May 2018 : 107-116