



FOOD PROCESSING SECTOR: OPPORTUNITIES AND CHALLENGES



Notes

Food is one of the basic requirements for our survival. It provides essential nutrients like proteins, carbohydrates, fats, minerals and vitamins, which are necessary for our growth. Raw food materials like grains, fruits and vegetables, milk and fish are produced through cultivation of field crops, horticulture, animal husbandry and aquaculture, respectively. While some of these can be consumed in their natural (raw) form, most of them require processing to become edible. Thus, food processing transforms raw food items into more acceptable, consumable, durable and commercially viable food products like wheat flour, jam, ketchup, pasteurized milk, frozen fish, etc. Food processing has emerged as one of the priority areas of commercial importance in India. It plays an important role not only in reducing food wastage but also developing value-added products. In this lesson, we shall explore the status, scope, challenges, and opportunities in the food processing sector in our country.



LEARNING OUTCOMES

After studying this lesson, the learner:

- defines food processing and explains its importance;
- describes the current status of the food processing sector in our country;
- lists various sub-sectors of the food processing industry;
- discusses the scope and opportunities available in the food processing sector;
- highlights the challenges and constraints faced by the food processing sector; and

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- outlines various schemes and initiatives by the government to support the food processing industry.

15.1 IMPORTANCE OF FOOD

Let us start with definition of food. We know that food is something we can eat. It is defined as material, usually of plant or animal origin that contains essential body nutrients such as proteins, fats, carbohydrates, vitamins and minerals for nourishment. The related terms are defined as:

Food Science: It is the discipline that deals with the study of physical, chemical, and biological nature of food, the causes of their spoilage, and the principles of food processing. Its important sub disciplines are food chemistry, food microbiology, food processing, food engineering and food safety and quality.

Food Technology: It deals with the application of food science to the selection, preservation, processing, packaging, distribution and use of safe food.

Food Preservation: This involves treatments given to food to prevent spoilage and deterioration while preserving nutritional value. Examples include drying, addition of salt, sugar, etc. The main objective is to prevent the growth of microorganisms and reduce water activity.

Food Processing: It defined as the treatments given to raw food materials to convert them into edible, less perishable and value-added products. Examples are milling, pasteurization, fermentation, etc.

Post-Harvest Management: It includes handling, cleaning, storing, grading and transportation operations undertaken after the harvest of agricultural commodities.

All raw food materials are processed to improve their taste, nutritional value and shelf life. Foods are processed for the following reasons:

- Preservation for later consumption or sale to fetch better prices
- Removal of inedible portions
- Destruction or removal of harmful substances
- Conversion into forms desired by the consumers

Food processing industries help in

- Reducing post-harvest losses and wastes as well as using by-products more efficiently.

- b. Increasing farmers' income by enabling them to obtain better prices and enhancing consumer welfare by increasing the availability of agricultural goods.
- c. Maintaining reasonable prices of food produce even during excess production (glut) situations.

The Food Processing Industry (FPI) provides a strong linkage between the two pillars of the economy i.e., agriculture and industry. Food processing plays a crucial role in increasing shelf life, value addition, employment opportunities, farmer's income, export earnings, and reducing wastage of food and food products. This is evident from the following significant factors:

- a. **Employment generation:** Being a direct linkage between agriculture and manufacturing, it provides wide direct and indirect employment opportunities.
- b. **Increasing farmers' income:** With the increase in demand for agri-based products, the price paid directly to farmers increases, thereby increasing their income.
- c. **Reduction in malnutrition:** Fortification of processed foods with vitamins and minerals helps in reducing the malnutrition in the population.
- d. **Reduction in food wastage:** Proper processing of food reduces wastage, resulting in better price realisation for farmers.
- e. **Boosting trade and earning foreign exchange:** Processed food is an important source of foreign exchange. For example, Indian Basmati rice is in high demand in Middle Eastern countries.
- f. **Control of food inflation:** Food processing increases the shelf life of food products and keeps supply in alignment with demand, thus controlling food inflation.
- g. **Nutrient preservation and spoilage prevention:** Proper processing of food preserves the nutritive quality of food and extends shelf life by preventing spoilage due to action of microbes and other agents.
- h. **Enhancing the food experience:** Processing improves the quality and taste of food, offering more choices in the food basket.
- i. **Enhances consumer choices:** Food processing allows food from other parts of the world to be transported to local markets and vice versa.



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**INTEXT QUESTIONS 15.1**

1. Name five important nutrients present in food.
2. Define food processing.
3. FPI stands for.....

**ACTIVITY 15.1**

Collect ten processed food products along with their raw materials.

.....

.....

.....

15.2 PRESENT STATUS OF INDIAN FOOD PROCESSING INDUSTRY

We know that our country is the largest producer of milk, pulses, and spices in the world. We rank second in the production of fruits, vegetables, tea, farmed fish, cotton, sugarcane, wheat, rice, and sugar. Similarly, we stand third in egg production. The Indian food processing industry accounts for 32% of the country's total food market, ranking fifth globally in terms of production, consumption, export and expected growth. The sector has been growing at an average annual growth rate of around 11.18 %. It contributes approximately 8.80% and 8.36% to the gross value addition (GVA) in the manufacturing and agriculture sectors, respectively.

Despite having a substantial production base, the level of food processing in India remains low (<10%). Approximately 8% marine products, 35% of milk, and 6% of poultry are processed. Although India is the second largest producer of fruits and vegetables in the world after China, only about 2% of the total produce is processed. This is due to the lack of adequate processing infrastructure and techniques, which poses a significant challenge to the sector.

The food industry is divided into four major segments; (a) Agriculture Production; (b) Manufacturing / Processing; (c) Distribution; and (d) Marketing.

Food processing industry in India can be categorized as follows:

- Cereal/pulse milling
- Milk & milk products
- Meat & meat products
- Fruit & vegetable processing
- Beverages like coffee, tea & cocoa
- Bread, biscuits & other bakery products
- Aerated waters/soft drinks
- Edible oil/fats
- Fish, poultry & egg products
- Beer/alcoholic beverages
- Confectioneries
- Breakfast cereals, malt protein, weaning, extruded food products

The categorization of food processing operations includes primary processing, secondary processing, and tertiary processing. Primary processing (Fig. 15.1) pertains to the transformation of raw agricultural produce, milk, meat, and fish into commodities that are suitable for human consumption. This phase involves a series of activities such as cleaning, grading, sorting, packing, etc.



Fig. 15.1: Primary processing of carrots



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Secondary (Fig. 15.2) and tertiary processing industries usually involve a higher level of processing, where new or modified food products are manufactured.

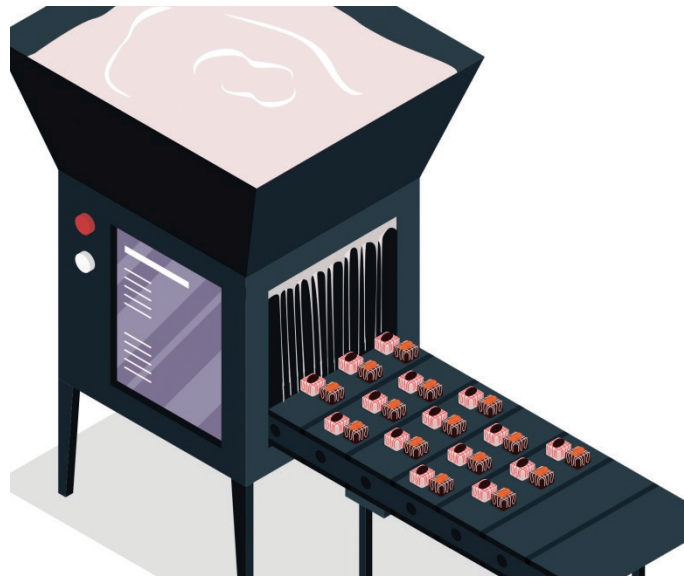


Fig. 15.2: Secondary processing of cakes

Most of the processing operations in India can be classified as primary processing, which results in lower value-addition compared to secondary processing. To boost farmer income and enhance exports, there is a need to improve the value chain in processed food products. Currently, India's agricultural exports primarily consist of raw materials that are processed in other countries, highlighting the potential for India to move up the value chain.

The term 'food processing industries' covers a wide range of relatively modern food processing sectors such as dairy, confectionery, marine products, horticultural and vegetable products, as well as meat and poultry products.

- The cereals sector (wheat, rice, maize, millets) belongs to the first category of processing. Improving efficiency in this sector would lead to higher recovery of desired products and create a number of potentially useful by-products, some of which are not being fully utilized at present.
- The next category is the processing of milk and milk products. This extends the scope of linking the farmers in rural areas to markets, thereby increasing their income.
- The third category relates to processing activities that extend the storage life of seasonal food products such as fruits and vegetables.

To meet the current demand for food materials, the industrial food processing sector has emerged. The food processing sector in the country is mainly handled by the unorganized sector, which contributes approximately 42% of the output. The organized sector accounts for 25% with the remainder coming from small-scale players. The small-scale food processing sector is a significant source of employment.

However, the small-scale food processing sector faces increasing competition from large manufacturers in terms of presentation and marketing. Good packaging is an area of vital importance for small and medium-sized food manufacturers. Food processing has the potential to maintain a safe and continuous food supply for millions of people, including those living in remote and difficult localities. Improvements in processing efficiency, by increasing the yield of unstable products, are one of the important means of reducing food losses and increasing the food supply. The demand for convenience in food preparation at homes, institutions, and restaurants has created a need for food processing industries to provide food ingredients as well as new food forms.



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INTEXT QUESTIONS 15.2

1. Food processing industry in India ranks.....in terms of production, consumption and export.
2. GVA stands for.....
3. Thesector belongs to the first category of processing.

15.3 SCOPE OF FOOD PROCESSING SECTOR

The food processing industries has an enormous potential to boost India's Economy.

- India has a considerable raw material base in the agricultural sector, which provides ample opportunities for the processing sector, which can, in turn create employment. It also has the potential to enhance India's presence in the global export market of food items. Hence increased government intervention and policies are crucial to implement measures that facilitate the growth and development of this industry.
- Estimates suggest that India's current food processing industry is estimated at USD 130 billion and is expected to attract huge domestic and foreign investment.

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- India ranks first in the world in the production of milk, ghee, ginger, bananas, guavas, papayas, and mangoes. Additionally, India ranks second in the world in the production of rice, wheat, and several other vegetables and fruits. Surplus production of cereals, fruits, vegetables, milk, fish, meat, and poultry can be processed and marketed both domestically and internationally, presenting immense opportunities for growth in the sector.
- Due to rapid urbanization, food habits are shifting towards value-added foods.
- India is among the fastest growing economies in the world and has substantial market potential to attract foreign investment in the food processing sector.
- Estimates indicate that around 35% of total food production is wasted due to inadequate facilities for transportation, storage, processing, and marketing. This shows the significant scope for the development of food processing sector.
- In India, the food sector has emerged as a high-growth and high-profit sector due to its potential for value addition, particularly within the food processing industry.
- The food processing industry indirectly employs millions of people in India. The demand for healthy, modern food products is increasing, particularly due to the rising number of working women and nuclear families in urban areas. Thus, the food value chain creates multiple opportunities for investment and employment in storage infrastructure, farming, retail, and quality control.
- The agricultural sector provides employment opportunities for farmers, and self-employment opportunities are available in this sector particularly for women. However, infrastructural facilities like storage and processing centres, transportation networks, and research and innovation for value addition to the product are also crucial.
- The Government of India has launched the SAMPADA scheme to boost the food processing industry in the country. Thus, policymakers have identified food processing as a key sector for encouraging labour movement from agriculture to manufacturing.



INTEXT QUESTIONS 15.3

1. What is the primary objective of the SAMPADA scheme launched by the Government of India?
2. The Indian food processing industry accounts for% of the country's total food market.
3. It contributes around and % of Gross Value Added (GVA) in Manufacturing and Agriculture, respectively.
4. Around percentage (%) of total food production is wasted due to lack of processing facilities.



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15.4 CHALLENGES IN FOOD PROCESSING SECTORS

The food processing industry accounts for one third of the total food market in India. According to a report by Agricultural and Processed Food Products Export Development Authority (APEDA), the food processing industry accounts for 32% of India's food market. However, the growth of the food processing industry faces several challenges:

- a. Lack of availability of raw materials:** Continuous supply of quality raw materials for the processing industry is a challenge in India because of predominance of small and medium-sized farm holdings. These farmers face challenges to access crop inputs and technical advice.
- b. Lack of infrastructure:** Many small-scale food processing industries suffer from inadequate food storage infrastructure, which affects the storage of raw materials. This limitation makes it difficult to transport food items efficiently.
- c. Lack of adequate connectivity:** Some rural production sites are poorly connected to storage or processing facilities. The goods produced in these areas take a long time to reach the food processing units. There is a need to improve connectivity through roads, railways, rivers and airways in these areas.
- d. Old processes:** The foods are often inspected manually. Upgrading technologies is essential to stay competitive in the global market.
- e. Ignorance and human error:** Many food items are wasted daily due to carelessness in handling during shifting, packaging, storing, and transporting. Efficient measures are needed to reduce such waste.

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- f. **Excess use of fertilizers and pesticides:** Excessive use of fertilizers, pesticides and other chemicals raises concerns about food quality. Such type of processed foods may not be nutritionally balanced and may pose health risks, especially for children, unless fortified.
- g. **Inadequate value addition in processing:** Despite being one of the major producers of agri-commodities, India's level of food processing and value addition remains low, affecting competitiveness and income of farmers.
- h. **Limited ability to control quality and safety:** The food value chain involves many people, making it challenging to enforce food quality and safety standards effectively.
- i. **Low consumer awareness:** Customers are often unaware of nutritional, food safety, and quality issues. It is imperative to address and prioritize these concerns.
- j. **Uncertain climatic conditions:** Adverse weather conditions often cause crop losses for farmers every year, resulting in a limited supply of raw materials for the food processing industry.
- k. **Lack of technology:** Advanced technology adoption in food processing industry is still needed to make it more efficient.
- l. **Food standards:** Every nation has its food standards for consumable food items and thus, the food processing industries must meet national food standards. Adequate laboratories and technical manpower are required to ensure compliance with these standards.
- m. **Perishable commodities:** Perishable items like meat, fish, fruits and vegetables, in particular, have high wastage rates. Minimizing losses in the perishable segment requires significant investment in infrastructure and expansion of processing capacities.
- n. **Marketing of processed food:** It is a major problem faced by food processors, particularly micro and small processors. Limited scale of operations affects their ability to invest in marketing and branding, impacting performance of the sector.
- o. **Coordination:** Several research institutes are currently engaged in research and development activities aimed at improving and developing products, processes, and technologies. Such efforts are crucial to implement a coordinated effort to disseminate research findings to the industry.

- p. **GHP & GMP:** Insufficient emphasis is given to food safety measures along the food value chain. Promoting the implementation of Good Hygiene Practice (GHP) and Good Manufacturing Practice (GMP) is necessary to maintain the standards of food quality. There are other areas such as food testing, quality certification and safety issues that require priority attention and improvement.

Challenges Faced at the Consumer Level

- Lack of awareness
- Lack of standardization
- Poor quality in processed foods
- Conventional food and eating habits

Challenges Faced at the Farm Level

- Conventional farming techniques
- Lack of modernized farm equipments
- Heavy reliance on rain-fed farming methods
- Low farm produce yield
- Improper grading and sorting
- Inadequate cold storage facilities
- Inadequate handling and transportation facilities
- Inferior quality of food produce
- High advertising costs

Challenges Faced at the Distribution Level

- Insufficient infrastructural support
- Expensive packaging costs for products
- High cost of modern transportation facilities
- Limited market support
- High expenses for cold chain facilities
- Inadequate modern transportation facilities and high costs



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Challenges Faced by Food Processing Industries

- Financing
- Higher import duties
- Higher cost of raw material and packaging
- Improper transportation and inadequate cold storage facilities
- Lack of availability of refrigerated containers
- Higher advertising costs
- Limited domestic market



INTEXT QUESTIONS 15.4

1. The food processing industry accounts for of the total food market in India.
2. APEDA stands for.....
3. GHP stands for.....
4. GMP stands for.....

15.5 OPPURTUNITIES IN FOOD PROCESSING SECTOR

The Ministry of Food Processing Industries (MOFPI) has launched various schemes to boost the food processing sector. Some of the major initiatives taken by the Government of India to improve the food processing sector in India are as follows:

- a) MOFPI launched the **National Mission on Food Processing** in April 2012, sponsored by the central government. The main aim of this scheme was to establish more food processing industries in India and to monitor and supervise the existing ones.
- b) The **Mega Food Park Scheme** of the Government of India could be game-changing as it directly connects farmers with industries via mega food parks. It aims to promote the development of modern food processing infrastructure in India.



- c) The government is focusing on developing **Agri Export Zones (AEZs)**. Under this scheme, many cities such as Ahmedabad, Anand, Vadodara, etc. have been converted into Agri-export zones. These zones foster healthy competition both abroad and in the domestic market.
- d) Several NGOs are providing connectivity between producers, food processing units, and the market.
- e) The government has introduced several certificate courses related to food processing to increase the skilled manpower.
- f) The government is encouraging start-ups and entrepreneurship in the food processing sector.
- g) The **Food Safety and Standards Authority of India (FSSAI)** is strengthening the food testing infrastructure of India by upgrading 59 existing food testing laboratories and setting up 62 mobile food testing labs.
- h) **Indian Council for Fertilizer and Nutrient Research (ICFNR)** is working on improving research facilities in the fertilizer sector to enhance the quantity and quality of agricultural produce.
- i) **Pradhan Mantri Kisan Sampada Yojana (PMKSY)**: Launched in August 2017, this scheme consolidates various ongoing schemes like mega food parks, integrated cold chains, and food safety and quality assurance infrastructure. It aims to boost agriculture, modernize food processing operations, and reduce agro-wastage.
- j) The Ministry of Food Processing Industries announced the **Human Resource Development (HRD)** scheme in the food processing sector. This scheme is being implemented through State Governments under the National Mission on Food Processing and includes the following components:
 - ❖ Creation of infrastructure facilities for degree/diploma courses in food processing sector
 - ❖ Entrepreneurship Development Programme (EDP)
 - ❖ Food Processing Training Centres (FPTC)
 - ❖ Training at recognised institutions at State/National level

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- k) **Scheme of cold chain, value addition and preservation infrastructure:** The purpose of this scheme is to provide integrated cold chain and preservation infrastructure facilities, without any break, from the farm gate to the consumer.
- l) **Make in India:** As part of the “Make in India” campaign, the food processing sector was identified as one of the 25 focus areas. Allowing 100% foreign direct investment (FDI) through automatic route into this sector is a significant step in this direction.
- m) **Production Linked Incentive (PLI) Scheme for Food Processing Industry (PLISFPI):** The objective of this scheme is to promote Indian brands of food products, increase employment opportunities for off-farm jobs, and ensure higher income for farmers. The Government announced this scheme in the year 2021 with an outlay of ₹10,900 crore. This aims to create 2.5 lakh jobs by 2026-27, boost exports, and expand food processing capacity to generate processed food output worth ₹33,494 crore.
- n) **Pradhan Mantri Formalization of Micro Food Processing Enterprises Scheme (PMFME scheme):** This scheme aims to build the capacity of entrepreneurs through technical knowledge and skill training; improve existing micro food processing enterprises through technology upgradation; integrate them with organized supply chains by strengthening branding and marketing. It is an All India Centrally Sponsored Scheme with an outlay of ₹ 10,000 crores for 200,000 enterprises over 5 years from 2020-21 to 2024-25. It will adopt a One District One Product (ODOP) approach to get benefit of scale in terms of procurement of inputs, availing common services and marketing of products. There may be multiple clusters for one product in a district.
- o) Government established **National Institute of Food Technology Entrepreneurship and Management (NIFTEM), Kundli in Haryana in 2012.** It is a higher education institute operating under the Ministry of Food Processing Industries and has been granted the Institute of National Importance status in 2021.

**INTEXT QUESTIONS 15.5**

1. MOFPI stands for.....
2. National Mission on Food Processing scheme was launched in the year

3. AEZs stands for.....
4. Pradhan Mantri Kisan Sampada Yojana was launched in the year
5. PMFME scheme stands for.....
6. PLISFPI stands for.....



WHAT YOU HAVE LEARNT

- Raw food materials undergo a transformation into edible products through various processing techniques that results in value addition. The operations involved in food processing can be broadly categorized into primary processing and secondary processing.
- All the raw food materials are processed to improve their taste, nutritional value and shelf life.
- Indian food processing industry is one of the largest and ranks fifth in terms of production, consumption and export.
- Most processing in India can be classified as primary processing, which has lower value-addition compared to secondary processing.
- India is currently the largest milk producer in the world, contributing 23% of global milk production.
- India ranks second in fruit and vegetable production in the world, after China.
- The Ministry of Food Processing Industries (MOFPI) has launched various schemes to boost the food processing sector.



TERMINAL QUESTIONS

1. Differentiate primary processing from secondary and tertiary processing.
2. What is the importance of food processing?
3. How does FPI act as a strong linkage between the two pillars of the economy?
4. Explain the present status of Indian food processing industry.
5. What are the different categories within the Indian food processing industry?



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6. Give the present status of cereals and fruits and vegetable processing sectors in India.
7. Discuss the status of milk processing sector in India.
8. Discuss the scope of Indian food processing sector.
9. What are the challenges faced by Indian food processing industry?
10. What are the various opportunities in food processing sector?



ANSWERS TO INTEXT QUESTIONS

15.1

1. Carbohydrates, proteins, fats, vitamins and minerals.
2. Treatment given to food raw materials to convert them into eatable, less perishable and value-added products.
3. Food processing Industry.

15.2

1. Fifth
2. Gross Value Addition
3. Cereals

15.3

1. To boost the food processing industry and encourage labor movement from agriculture to manufacturing
2. 32
3. 8.80, 8.39
4. 35%

15.4

1. One-third
2. Agricultural and Processed Food Products Exports Development Authority
3. Good Hygiene Practices
4. Good Manufacturing Practices

**15.5**

1. Ministry of Food Processing Industries
2. 2012
3. Agri Export Zones
4. 2017
5. Pradhan Mantri Formalisation of Micro Food Processing Enterprises scheme
6. Production-Linked Incentive Scheme for Food Processing Industry

GLOSSARY

Food Processing: Treatment given to raw food materials to convert them into edible, less perishable and value-added products. Examples are milling, pasteurization, fermentation, etc.

Food: Material, usually of plant or animal origin that contains essential body nutrients such as proteins, fats, carbohydrates, vitamins and minerals for nourishment.

Foreign Direct Investment (FDI): When a company/organization based in one country such as India invests their money in another country such as China, it is referred to as foreign direct investment.

Gross Value Added (GVA): GVA is defined as the total value of all goods and services produced within a country. It can be computed for different sectors of economy like agriculture, manufacturing, mining, etc.

Value Addition: It is the process of transforming original products into a more valuable form, which has higher economic value in the market. For example, production of jam or jelly from fruits, conversion of wheat into *atta* or *maida*.

SUGGESTED READINGS

1. Khader, V. (2013). *Textbook of Food Science and Technology*, Indian Council of Agricultural Research, New Delhi.
2. Srilakshmi, B. (2018). *Food Science*, New Age International Publishers.

WHAT YOU HAVE LEARNT

