

Skill Development and Employment Opportunities in Food Processing Industry : A Futuristic Perspective

¹Preeti Dixit & ²R. Ravichandran

Department of Humanities, Science, Education & Research, PSS Central Institute of Vocational Education, Bhopal-462002

Abstract

With an annual growth rate of 7.2%, India has become one of the world's fastest expanding economies. India is one of the world's top producers of rice, wheat, milk, lentils, and a range of fruits and vegetables, and the food processing sector of the country has greatly contributed to the Indian GDP growth. The food processing sector now facing tremendous industrial changes and embracing automation, mechanisation, and technology to maximise the productivity. The evolution of the industry necessitates the acquisition of a variety of technical and specialised abilities. The food processing industry is expected to add 44.34 lakh new jobs by 2022, primarily in entry-level and managerial positions. However, as a result of the industrial revolution, the food processing business will face significant challenges. Approximately 44% of the workforce is employed in the agri-foods processing sector, with the majority of workers lacking any formal or informal skill training causing underutilization of the human resources. There lies the real challenge as well as the opportunity in the food processing industry to skill newcomers and upskill or reskill the existing workforces. NSDC reports a huge skill gap in various sectors of Indian food processing industry. The skill gaps must be addressed to meet the industry skills needs and to harness the maximum potential of the food processing sector. In response to the need for skilled labour and realizing the importance of the food processing industry in the country's development, The Government of India (GOI) is taking major initiatives such as *Aatmanirbhar Bharat*, Skill India Mission, National Education Policy 2020. The present review paper attempts to discuss skill development and employment opportunities in food processing industry in India.

Keywords: Food Industry, Food Processing, Government Policies, Skilling, Skill Gap, Skill-India, Vocational Education, Workforce.

Introduction

Food processing is described as the transformation of agricultural materials into consumable food or the transformation of one food item into another by adding value to it (MOSDE, 2018). The Ministry of Food Processing Industries divides food processing into two sub-categories based on physical properties of the final product: first is manufacturing, in which the original physical properties of the product change through a process involving employees, power, machines, or money and the transformed product are edible and has a commercial value, and second is other value-added processes, in which the product does not undergo any manufacturing but gains significant value addition like increased shelf life, shelled and ready for consumption, etc. Depending on the type and extent of value addition, it is categorised as primary and secondary processing. Primary processing is the transformation of a raw commodity into one suited for consumption. It entails processes

such as drying, threshing, cleaning, grading, sorting, and packing. Secondary processing entails the development of value-added items such as bread, wine, sausages, and so on. The large-scale commercial manufacture of ready-to-eat food items has given rise to a new type of food processing i.e., tertiary processing (MOSDE, 2018).

Over time, India has achieved significant progress in providing food security for its people and has become essentially self-sufficient in agriculture. India is one of the world's largest producers of rice, wheat, milk, pulses and a variety of other fruits and vegetables. However, in spite of having a higher agricultural production, India's food processing industry is still under-developed when compared to other developed and developing countries. The highest share of the processed food is in the dairy sector, where 35 per cent of total produce is processed (Merchant, 2008). The processing level is around 2.2 per cent in case of fruits and vegetables and 21 per cent in meat and poultry products which is very low. This implies that the processing level must be enhanced in order to provide opportunities for better value addition, decreased waste, and different employment prospects.

The food processing industry of India is one of the most fragmented segments and dominated by unorganised sector. Around 42% of the manufacturing is done by the unorganised sector, 25% by the organised sector, and the remaining 35% by local and small businesses shareholders. The majority of the workforce in unorganized sector does not have any kind of skill training or academic qualification creating a huge skill gap. In recent times, the food industry has gone through rapid and constant changes caused by the recent industrial revolution, Industry 4.0 which will further create huge demand for such a workforce having digital and advanced technological literacy.

The public's understanding of safe, diversified, and healthy foods is always expanding. Consumers are more interested in the origin of their food, as well as the technique of processing, storage, and shelf life. They wish to broaden their dietary options to meet their specific requirements. The expanding awareness for processed foods, fueled by the country's enormous capabilities in developing a safe ecology for processing food products, as well as the implementation of beneficial schemes and initiatives, are assisting the industry's growth. There are several prospects for skill development in this area, and because its future appears promising, it should continue to offer significant employment opportunities. The current paper provides an insight on various dimensions of skill development and employment opportunities in food processing industry in India. In addition, the paper analyses the role of vocational education in this regard.

Indian Food Processing Industry

The food processing business in India is one of the largest in the world, with output anticipated to reach \$535 billion by 2025-26. The food processing industry in India plays a crucial role in connecting Indian farmers to customers in both domestic and international markets. The food processing industry employs around 1.93 million people and accounts for 12.38% (at the 3-digit NIC classification). According to the NSSO 73rd Round data, the unregistered food processing sector employs 5.1 million people. Grain, sugar, edible oils, drinks, and dairy products are the major areas of India's food processing business (NSSO, 2016). The key sub-segments of the food processing industry in India are fruits and vegetables, poultry and meat processing, fisheries, food retail, dairy industry, etc. As per the latest report (Sensarma, 2022), some of the major achievements of the Indian food processing sector are as follows:

1. India is the world's top producer of milk, contributing 23% of the total amount produced globally, which is expected to reach 209.96 MT in 2020–21 at a CAGR of almost 6.2%.
2. India is the third-largest producer of eggs in the world, producing at least 122.11 billion in 2020–21, with 91 eggs available per person annually.
3. India is the world's second largest fish producer, accounting for 7.56% of worldwide output. The overall fish production for fiscal years 20-21 is anticipated to be 14.73 MMT.
4. India's sugar exports stood at 8.6 MT in May of the current 2021-22 marketing year, which ends in September.
5. By 2025, it is expected that India's online grocery retail market would reach \$10 billion to \$12 billion, with a CAGR of over 50%.
6. Despite the sector's difficult circumstances, India's marine product exports reached \$7,740 million in 2021-22. It experienced 30% higher growth than in 2020-21. The top three favourite destinations for Indian marine exports are the United States, China, and Japan. Exports to these three nations accounted for 63% of total exports.
7. Other cereals exports climbed from 102 MT in 2019-20 to 521 MT in 2020-21.
8. India ranks eighth in the world for meat output. The country's meat production has climbed from 6.69 million tonnes in 2014-15 to 8.80 million tonnes in 2020-21. (Provisional).
9. According to preliminary projections, the output of wheat is expected to be 111.32 MT, rice will be 127.93 MT, and nutri/coarse cereals will be 49.86 MT in 2021–2022.
10. During the same time period, the CAGRs for cotton, oilseeds, and pulses were 7.9, 6.1, and 2.8%, respectively.
11. In August 2022, rice exports reached a value of \$1032.48 million, accounting for 3.13% of all exports that month.

Skill Gaps in Food Processing Industry

Indian food processing sector has vast scope for skill training as there is a significant need for trained personnel in all sectors particularly for individuals with short-term course training and education levels below the Grades 10 - 12 (Hicks, 1991). Majority of workforce engaged in food processing industry have low level of education, and poor skills set. Low level of education and poor skills are becoming challenges in harnessing the full potential of workers of the industry which is leading to stagnation of the industry. There is a significant mismatch between market supply and demand. A number of critical skill gaps exist in various stages of the Indian food processing value chain that need to be addressed are as follows:

The growing quality consciousness by the consumers requires the workforce to be skilled in basic hygiene and sanitary practices. Major skill gap in basics of food processing, storage of raw ingredients, food safety, product development, operational skills etc. The food processing industry is in need of skilled personnel acquainted and trained in such basic concepts operational in the sector.

Processing units are also adopting mechanisation and technology. There is a growing need to impart technical skills to more specialist personnel who are capable of working on imported machines in specific sub-segments. In recent years, 3D printing, edible packaging and many other emerging technologies are entering the market and requires well trained and

skilled professionals in the field. Similarly, the industry has felt the growing need of technical specialist who are capable of working on imported machines in specific sub-segments.

As industrial processes become more automated and digitalized in the next years, the workforce will be accountable for more complex duties. Numeracy, strong literacy, problem-solving abilities, Information and Communication Technologies (ICT) skills, as well as soft skills of autonomy, teamwork, and coordination, will be needed to complete those jobs (Tome & Goyal, 2015). Skills such as decision making, critical thinking and independent problem solving are considered crucial especially in reviewed technical profiles, such as production operators and control technicians (Deming, 2017). Focus also needs to be on the front-end staff for developing customer relationship management skills, which are integral to maintaining healthy relationship with institutional players, such as hotels, restaurants and retailers.

Farm procurement is an important area for processing units and need to streamline their raw materials' supply for the rising demand. At a farm level, the growers are poorly equipped and lack awareness of implementing the best practices for growing. This is where the need for procurement staff to be proactively engaged in crop/production advisory is missing. The rising emphasis on environmental awareness and sustainability has led to a perception that green skills are essential to maintaining the competitive edge of the European manufacturing sector. Therefore, the workforce in the food industry will be expected to possess green skills in the near future.

Skills Needs of the Food Processing Industry

The human resource requirement in the agriculture and food processing sectors is estimated to be about 24.5 and 33.7 percent of the total requirement. The incremental human resource and training needs are estimated to be 6 percent of the total requirement (MOSDE, 2018). Food Industry Capacity & Skill Initiative (FICSI) has prepared a list of skills that are high in demand in food processing sector (FICSI, 2022). These skills are listed in Table 1.

Table 1: Highly demanded Skills in food processing sector

Segment of Food processing	Skills needed in the segment
Innovation and recipe Formulation	Food Fortification Experts, Value- added Nutritional product Experts
	Plant based Protein Developer, Meat Alternative Foods, Vegan Foods
	Flavourists
Laboratory	Food Analyst
Auditing	Internal Auditor - Food safety systems and quality assurance Internal Auditor – lab Export Requirement
Start Ups and Entrepreneurship	Experts to Facilitates Food start-ups Entrepreneurship Skills in Food Processing Artisanal & Home-based Entrepreneurs in Various food processing sector
Sales and Marketing	Marketing and sales personnel Food sales promoters Experts to automate the manual processes in food industry
Industry 4.0 & Automation	Food Packaging Developer, Smart Packaging Automation engineers Robotic engineers

Segment of Food processing	Skills needed in the segment
Food Safety and Hygiene	Food safety team leaders Food sanitation workers Hygiene or sanitation supervisors Food recall and traceability
Data Analytics	Process control operators Statistical data experts
Quality Control Quality Assurance	Consumer complaints Handlers
Fruits and Vegetables	Food Preservation technicians Fruit technologist

Source: (FICSI, 2022)

Industry expansion, as well as the requirement for quality standards and the use of new technologies in manufacturing, are driving the need for new skilling and upskilling in the industry. Grain and Oilseed and Packaged Foods account for the lion's share of job growth in the sector between 2013 and 2022. Technological advancements in processing sector categories such as Meat & Marine and Beverages are predicted to result in lower labour elasticity of 0.3-0.4 over 2013-22, resulting in slower employment growth.

Supervisory and technician roles covered by NSQF Levels 4, 5, and 6 are predicted to be in high demand for labour between 2013 and 2022. As technology and automation become more prevalent, certain professions in technical functions, such as maintenance, will become increasingly crucial. Quality is another domain, which will be in demand due to enforcing of quality parameters and focus on exports. Some technical professions, like maintenance, will be crucial because of the growing adoption of technology and automation.

Employment Opportunities in Food Processing:

In terms of GDP, employment, and investment, the food processing sector has also emerged as an important segment of the Indian economy. The food processing industry employs roughly 13 million people directly and 35 million people indirectly and contributes about 14 percent of the manufacturing GDP, or 2,80,000 crores. According to the NSSO 73 round, 2015-16, the unregistered food processing sector employs 51.11 lakh people and accounts for 14.18% of employment in the unregistered manufacturing sector (Ayush, 2022). By 2022, the food processing industry is expected to generate about 44.34 lakh new jobs, primarily entry-level and supervisory profiles. The demand for processed food items is significantly increasing with the increased population and thus more FPIs are needed to meet the demand.

There are several skill shortages in the food processing supply chain that must be filled. This includes the food processing industry as well as related subsectors like bottling and packaging. Because of its collaborative structure of agriculture and industry, the food processing sector offers numerous possibilities. Industry growth, as well as consumer demand for quality standards and industrial technology adoption, are driving the need for new skill development and upskilling. Various determinants of demand for food processing as shown in Fig.1 are discussed below:

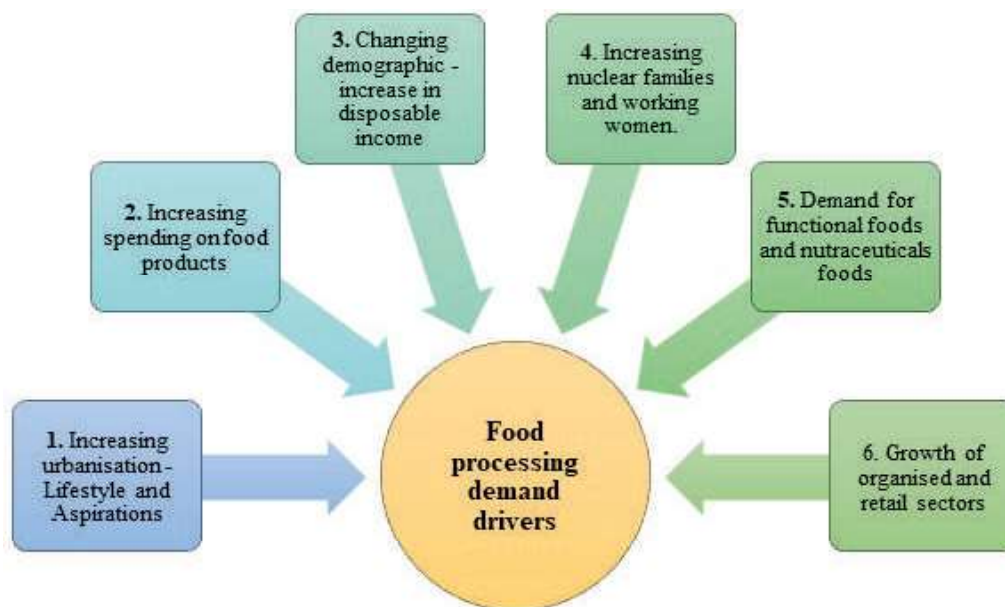


Fig. 1: Food processing demand drivers

According to the Indian government, the nation is the world's second-largest producer of dairy products, several fruits (banana, guava, papaya, mango, etc.), and grain production (rice, wheat, etc.). Accordingly, India has an adequate supply of raw materials to invest in the food manufacturing sector and for domestic consumption (Anonymous, 2015).

There is a sizable market and opportunity for India and even other nations to sell and buy processed food items due to the size of the country and its vast population, which is expanding by 1.3% annually. The country's growing middle class, the changing dietary habits of the vigilant young people, and other factors all lead to the country's processed food business expanding (Anonymous, 2015).

Food processing evolved in tandem with the expansion of India's huge middle class, an outcome of liberalisation. Rapid urbanisation, technical innovation, industrialization, western lifestyle influences, more women entering the workforce, and increased disposable income are some of the causes that will contribute to the rise of the food processing business. This would necessitate increased agricultural production utilisation, as well as considerable changes in food transportation and marketing (Cohen & Garrett, 2010). This also suggests a shift in food system employment, with fewer people working in agriculture and more working in transportation, wholesale, retailing, food processing, and vending (Choudhury, 2022).

The nation has access to a large variety of medicinal plants, producing a wide range of native ingredients for use in nutraceuticals. Due to the usage of Ayurveda and other traditional medicines available in India, which symbolise a culture of natural goods and self-care, for a variety of health benefits at affordable rates worldwide, they are in high demand. The Union Budget 2021 envisaged a 137% increase in healthcare spending to \$30 billion for investments in nutraceutical supplements. In the upcoming years, demand for vitamin and mineral supplements will be considerable. Herbal supplements and protein/amino acid supplements are expected to have comparable market sales in the future, accounting for half of total market income (Instapedia, 2022).

India, the world's second-most populous country, has enormous retail growth potential because both urbanisation and consumerism have been increasing over time (PIB, 2022). The government has undertaken a liberal and transparent approach for attracting FDI, with the majority of industries open to FDI via the automatic route. From 2000 to 2016, the estimated FDI was roughly USD 7.5 billion, which was comparable to India's worldwide share (2.3%). From 2000 to 2020, the biggest amount of investment was made in 2013-14, totaling USD 3982. FDI equity inflows into the sector were USD 4.99 billion from April 2014 to September 2021 (MOFPI, 2017).

Vocational Education and Food Processing Sector

India, the youngest country in the world, may benefit from its demographic dividend if it trains its ready-to-recruit cohort in skills. Skilling through vocational education at school level can enable the country's workforce to fit in with the rapidly changing industries. This dividend is heterogeneous, making it difficult to develop any conventional programme in skilling and vocation that caters to the demands of different locations. Global skilling frameworks divide skilling into two categories: basic and common abilities required of all prospective and on-the-job human resources, and domain specialised or profession particular skills. Vocational Education and Training (VET) must be included as a core component at all levels of schooling. VET in diverse food processing segments such as preservation, food safety, food quality, food production, etc. focuses on developing unique skilling programmes and employment positions with close industry and academic interaction. The purpose of vocational education is to provide students with skills that are culturally relevant, sustainable, and suited to the demands of the food processing sector. The vocational training in food processing technologies includes specialised modules that address recent trends and advancements in the food process, global food business, food manufacturing, application of food processing techniques for food preservation and storage, advanced food processing techniques, production of various value-added products, food processing machinery and cold chain and supply chain management.

The vocational curriculum has also covered the understanding of technological developments and the commercial viability of the food industry. Additionally, a unique element of the programme includes managerial skill workshops, enabling capacity building, leadership development, and assertiveness training, all of which improve the abilities of potential food processing entrepreneurs. *Aatmnirbhar Bharat*, Skill India, Make in India, the National Mission on Food Processing, the *Pradhan Mantri Kisan Sampada Yojana* (PMKSY) and the PM Formalization of Micro Food Processing Enterprises are national efforts in India that aim to educate the general populace about the importance of improving their skills in order to support the spreading wave of Industrial Revolution 4.0.

Conclusion

Food processing is considered as a growing industry due to its great development potential and social effect. It not only creates money but also adds value, earns foreign currency, reduces food waste, and improves manufacturing competitiveness. With appropriate investment in food processing, technological innovation, and agricultural infrastructure, India has the potential to become the world's food basket (Punjabi, 2007). Food processing has the capacity to address the major problem of malnutrition through value addition, food security through abundant production and utilisation, and food inflation through attracting foreign exchange earnings and income growth (Rais et.al., 2013). The effectiveness of skill-

building programmes must be adapted to the needs of the sector and the learners' level of comprehension in terms of quality, outreach, evaluation, and monitoring. Having a qualified workforce capable of handling the advancing technologies is the major difficulty the industrial revolution has placed on the food processing industry. It would be achievable only by addressing current skill gaps between the workforce and industry demands, projecting future skill needs for the sector, and delivering the most practical training and educational programmes.

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