



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 2, February 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.569

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

The Future of Food Processing Technology in India

Arnav Jain¹

Student, GD Goenka Public School, Vasant Kunj, New Delhi, India¹

ABSTRACT: Food processing contributes to agricultural produce by employing different methods such as grading, sorting, packaging, and so on, which extends the storability of food products. Hence, a robust and changing food processing sector would accelerate a country's overall economic structure. Moreover, the food processing sector provided important connections and synergies between agriculture and industry, and it has been classified as having the instant potential for growth and jobs. Our Indian food processing sector has grown over the last fifty years, beginning with many facilities mainly operating on a domestic or cottage scale. This review entails the present condition of the food processing sector, export, career as a food technologist, and many more significant points.

KEYWORDS: Food processing, Agricultural produce, Economic structure, Food processing sector. Food technologist

I. INTRODUCTION

With India transitioning from a state of food shortage (Bathla, & Kannan, 2021) to excess in terms of food production, the possibilities for growing food processing levels are numerous. In recent times, India's food processing sector has been renowned for its great profit and growth, growing its contribution to the global food trade every year (Venkatesh, 2021).

Presently, India processes under one-tenth of its agricultural production, portraying huge potential for higher processing levels and attracting investments in this sector. With farming and its related industry being the greatest means of income in India, more than two-thirds of rural families still rely mainly on agriculture for livelihood.

As a result, this industry has a high potential for job creation. The food processing sector has been regarded as a significant key focus industry by the Indian government. It is now being supported through various tax breaks and incentives (Padmavathi, 2019).

With the government's concentration and a favorable policy environment, the food processing sector grew at an Average Annual Growth Rate (AAGR) of around 8.41 percent between 2014 and 2018. The sector accounts for 8.83 percent and 10.66 percent of gross value added in the manufacturing and agriculture sectors, respectively.

The output of the Indian food industry is projected to reach \$535 billion by 2025-26. Increasing family incomes, urbanization, and the expansion of organized retail are some market's major drivers (Arya, Kaimal, Chib, Sonawane, & Show, 2019).

As per the 2016-17 Annual Survey of Industries (Sinha, & Tripathi, 2021), food processing was recorded for:

- 15.95% of all factories
- 11.36 % of the workforce is employed
- Output is 14.09%
- Operational factories are 16.78%

The Indian market is rapidly progressing, with significant changes in consumer habits due to urbanization, modifications in the workforce gender composition, and rising consumption rates. Due to these factors, food consumption is projected to reach \$1.2 trillion by 2025-26.

But to achieve such a huge number (Sharma, Rastogi, & Gogia, 2019), we must also consider unprocessed food that microbial attack, biochemical processes, and the infestation can spoil. Post-harvest practices, for example, good processing methods and appropriate packaging, transportation, and storage of processed foods, can also help reduce wastage and increase the shelf life.



II. FOOD PROCESSING MARKETS IN INDIA

With higher consumption by modern customers, the market for processed foods in India is growing significantly. The ease of marketing and distribution tasks, consumer convenience, cleanliness, higher food continuity, food shelf life, year-round product availability, and other factors are garnering food processing technology to be prepared (Tripathy, & Shaik, 2020). The transit of more exotic food items, as well as the eradication of hard labor, provide present eaters with effortless access to a broad range of food unbelievable to their forefathers. The Indian food processing sector has seen rapid growth over the last decade, but the food processing level remains small against the country's vast production. As a result, its expansion should be recognized to boost the Indian economy.

Following the devastating famine of Bengal in the 1870s, the relevance of an agro-processing sector was first recognized and recorded. The British government established the Royal Commission on Agriculture in 1928, which advocated for a scientific method to farming and the development of rural industries and co-operatives. The post-independence era in India saw fast expansion in the agro-processing sector, particularly in the 1980s. Surprisingly, the Indian food processing market has grown significantly and is now valued at Rs. 4,50,000cr. The government's vision for 2015 was to increase farm produce processing from 3 percent to 10–15 percent. The government also prioritized its focus on this sector, providing numerous tax breaks and commercialization rewards. Aside from wheat, rice, and other cereals, India's food processing industry includes a diverse range of products such as fruits, vegetables, meat and poultry, milk and products prepared using milk, cocoa products, confectionaries, mineral water, chocolates, cocoa products, and soy-based products, and high protein food.

III. FOOD PROCESSING INDUSTRIES: MEANING, OBJECTIVES, AND METHODS

Food processing industries convert food products into usable forms (Alvarez-Ordóñez, Coughlan, Briandet, & Cotter, 2019). They do various tasks such as mincing, cooking, canning, liquefaction, pickling, macerating, and emulsification. They take clean, harvested crops or butchered and slaughtered animal products and transform them into appealing, marketable, and long-lasting food products. Food technology is a broad field that encompasses all aspects of food production and processing. Food processing has several objectives, for example:

- It increases the food products' shelflife.
- It protects food from contamination.
- Transportation and food storage.
- It transforms raw food ingredients into appealing and marketable products.
- It employs a large number of people.

For appropriate food processing, certain criteria must be compiled, ranging from the possibility of a pest or bacteria invading and multiplying on foods to the biological processes of foods. For appropriate food processing, the following methods are used:

- Peeling raw materials' outerlayers
- Slicing or chopping
- Liquefaction
- Mincing
- Emulsification
- Fermentation
- Gasification, such as adding gas in bread or soft drinks.
- Cooking
- Mixing
- Pasteurization
- Spray drying
- Proofing
- Packaging

III. ADVANCEMENTS IN FOOD TECHNOLOGY

Food technology is studying the manufacture, preservation, storage, canning, and packaging of food items. The technology involves all food types — fruits and vegetables, eggs, fish, meat, cereals, milk, cereals, spices, etc. (Priyadarshini, Rajauria, O'Donnell, & Tiwari, 2019).

The digital revolution has altered our perception of how to live in the world. Every industry, including the food processing industry, is becoming more advanced as technology advances. Food production will grow in the coming years, thanks to the five technologies listed below:

1. 3D Food Printing – The Future of Food Manufacturing

Numerous establishments are working on 3D food printing. This technology has been developed in the last few years because it can be a key differentiator in the food industry.

It will allow you to build a layer of the finished product and give it any shape, size, crispness, or taste, so customization is possible according to one's needs in the coming years.

Plus, it will eliminate the waste which traditional cooking produces. Its popularity will be amongst retailers, food producers, and customers.

2. High-Pressure Food Processing – Increasing the storability of food

Expanding the storage life of food without compromising its quality and taste is a serious worry for food producers. Technological advances for preserving food for long periods are being developed. High-pressure processing (HPP) is an example of an innovation that could boost the shelf life of food by tenfold in a short period, which the food industry requires.

It is a cold pasteurization procedure in which packed food is subjected to a high-pressure environment. This will:

- Remove microorganisms to ensure food safety
- Keep the flavor, size, crispiness, and nutrients the same.
- Avoid chemical irradiation.

3. Vertical Farming- Modern Solution to Modern Problems

A fantastic concept and an advanced solution to a modern problem. Traditional agriculture necessitates a large land area for farming, but crop production over a wide area is difficult with more people moving to cities. If we grow crops upwards, we may save some areas.

This farming method is advantageous over traditional farming because it requires less land and allows for all-season cropping.

4. Lab-Grown Meat – Better for the environment

Selling lab-grown meat, also called clean meat or Vitro animals, could soon be possible in the future. This meat type is grown in a lab from stem cells collected by biopsy from farm animals and then processed for several days.

Environmentalists believe that Vitro meat will benefit animal farming, and if this technique were used, most greenhouse gases could be reduced by up to 90%.

This technology is being developed to make it available on the market. Compared to traditional meat production methods, this is quite costly. As technology advances, this technology's efficiency will enhance.

5. Plant-Based Proteins – The best protein source

Proteins are needed to sustain and gain muscle and build strong bones and brain functioning. Protein deficiency may result in losing stamina, muscle mass, energy, and hair.

Eggs, animals, fishes, and various plants also provide proteins. Many of these items are nutrient-dense and can meet your body's requirements. Plant-based protein, such as chickpeas and lentils, is easier to grow and more eco-friendly than animal protein. Plant-based foods must necessarily contain amino acids for growth.

IV. CAREER OPPORTUNITY IN FOOD TECHNOLOGY

There is no shortage of demand for processed and packaged foods in today's highly competitive world, with dual-income urban families (Narayanan, & Saha, 2020) hardly having time to prepare intricate home-cooked meals. This socioeconomic transition has resulted in a new career opportunity: food technology (Dhawan, & Sengupta, 2020). The demand for food and, consequently, for food technologists has soared, making it one of the most appealing employment

of the twenty-first century.

Food technology is India's fifth-largest industry. It currently employs nearly 1.9 million people and can even become India's major sector.

The food technologist plays an important role in this rapidly growing quick industry. They develop better methods to process, conserve, and preserve food items, inspect food contamination and adulteration and certify nutritive values. To become an expert in this growing field (Ghimire, Dissanayake, Ebner, Joshi, & Thompson, 2021), students can enroll in a variety of study programs that prepare them for jobs in small and large-scale units. Short-term certificates, diploma courses, and crafts are available at various polytechnics across the country for interested students who have completed Plus Two. The Central Food Technological Research Institute (CFTRI), located in Mysore, Karnataka, is the leading postgraduate institute for food processing and technology.

A Plus Two in physics, chemistry, and biology is generally required to enroll in a B.Sc degree in food sciences, though some institutes also require math. However, enrolling in the M.Sc program requires a B.Sc degree in physics, chemistry, biology, math, agricultural/chemical engineering, or agriculture/food technology.

Qualified food technologists are widely accepted by food research laboratories, food processing companies, retailers, wholesalers, hospitals, restaurants, hotels, and other catering institutions. They can also look for work in the manufacturing industry, such as checking hygiene, storage, temperatures, and so on. Entry-level pay and benefits in private and public sector companies are excellent for professionally qualified — Rs.20,000–25,000 p.m. The sky is the limit after gaining knowledge and experience. Furthermore, this industry provides excellent entrepreneurship possibilities (RATHORE, & MATHUR, n.d.), as it has attracted investments totaling more than Rs by now. 20,000 crore in recent years.

V. STATUS OF INDIA'S PROCESSED FOOD EXPORTS

Despite numerous logistics-related challenges in the worldwide buying and selling of commodities (Dhinakaran, & Kesavan, 2020), India's agricultural and processed food exports have grown steadily over the last ten years.

According to data from the DGCI&S (Directorate General of Commercial Intelligence and Statistics), exports of agricultural and processed food products under the APEDA (Agricultural and Processed Food Products Export Development Authority) basket increased to \$20,674 million in 2020-21, up from \$17,321 million in 2011-12.

In 2020-21, the three leading products in the APEDA export basket were:

- **non-basmati rice** accounts for 23.22 percent of the market.
- 19.44 percent **basmati rice**
- 15.34 percent **buffalo meat**

The above items account for 58 percent of total shipments.

In 2020-21, India's non-basmati rice exports were valued at \$4799.91 million, and the leading importers for it from India were Nepal, Benin, Bangladesh, Togo, and Senegal.

Basmati rice exports totaled \$4018.71 million in 2020-21, with primary export places including Iran, Saudi Arabia, Yemen, Iraq, and the United Arab Emirates.

Buffalo meat exports were \$317.19 million in 2020-21, with the leading importing countries including Vietnam, Hong Kong, Egypt, Malaysia, and Indonesia.

As per M Angamuthu, Chairman of APEDA, we will keep focusing on developing infrastructure to promote exports by concentrating on clusters in cooperation with state governments while keeping in mind the goals of the Agriculture Export Policy, 2018.

APEDA has collaborated with state governments to enforce the Agriculture Export Policy.

The following Indian states have finalized their State Specific Action Plans for Exports, while the strategic plan of the remaining states is in various stages of finalization:

- Maharashtra
- Kerala
- U.P
- TamilNadu

- Nagaland
- Punjab
- Assam
- Karnataka
- Rajasthan
- Gujarat
- Andhra Pradesh
- Manipur
- Telangana
- Uttarakhand
- Sikkim
- Mizoram
- Meghalaya
- Madhya Pradesh

According to World Trade Organization (WTO) data, India's agricultural exports reached \$37,371 million in 2019 compared to \$ 2,106 million in 2010, representing a compounded annual growth rate (CAGR) of 5.49 percent over the previous ten years. From 2010 to 2019, the global agricultural export CAGR was 3.11 percent.

India's share of global agricultural exports was 2.1 percent in 2019, up from 1.71 percent in 2010. However, as per WTO data, India's ranking in global agricultural exports fell to 16 in 2019 from 17 in 2010.

In terms of the top products exported under the APEDA basket, there has been little change in the last ten years, despite India's exports reaching more countries across the globe. In terms of market share, the top APEDA exports in 2020-21 were:

- **Those mentioned above** (non-basmati rice, basmati rice, and buffalo meat accounting 58 percent)
- **Miscellaneous preparations:** 3.84 percent
- **Maize:** 3.07 percent
- **Cereal preparations:** 3.08 percent
- **Groundnuts:** 3.52 percent
- **Wheat:** 2.66 percent
- **Nuts and processed fruits and juices:** 2.07 percent
- **Cashew kernels:** 2.03 percent
- **Processed vegetables:** 2.43 percent

VI. OVERCOMING OBSTACLES IN FOOD PROCESSING INDUSTRY

Poor finished product recovery, adequate working capital (PRAJAPATI, & SINGH, n.d.) and management, low capacity utilization, high farming land requirements, low product quality, and unreliable assured power supply are major issues in food processing units.

The following strategies must be formed to address the issues mentioned above:

- Create a national plan to improve and expand food processing technology at the traditional small industry, farm, and modern industry levels. Over the years following the period under review, review the progress of plan implementation adjustments and appropriate actions on a routine basis, and create program details.
- Determine R&D for thrust areas. Develop and execute the medium-term R&D program to promote the national plan for improving and expanding food processing technology at various levels.
- Improve infrastructure in the agro-industrial development catchments
- Decentralize energy production using local resources and the uncertain grid power supply for rural allocations. Similarly, if the raw materials and processed products are perishable or semi-perishable, a cold chain (Aravindaraj, Chinna, & Paul, 2020, February) must be formed.
- Make market information available to the farmer and agro-processor



VII. CONCLUSION

The food processing sector has made a huge jump and is based on the idea that consumers eat good quality food. Digitalization plays an important role, and this has paved the way for food technology which created a new employment opportunity, food technologists. However, B.sc and M.sc in food sciences are two important educational fields at the undergraduation and postgraduation levels. The candidates with expertise and experience have a lot of scope in this industry.

REFERENCES

1. Alvarez-Ordóñez, A., Coughlan, L. M., Briandet, R., & Cotter, P. D. (2019). Biofilms in food processing environments: challenges and opportunities. *Annual review of food science and technology*, 10, 173-195.
2. Aravindaraj, K., Chinna, A. R., & Paul, J. (2020, February). A review: Present scenario of cold chain storage facilities in India. In *AIP Conference Proceedings* (Vol. 2207, No. 1, p. 020009). AIP Publishing LLC.
3. Bathla, S., & Kannan, E. (2021). *Agro and Food Processing Industry in India*. Springer.
4. Dhawan, R., & Sengupta, S. (2020). A new growth formula for manufacturing in India. *Mckinsey*.
5. Dhinakaran, D. P., & Kesavan, N. (2020). Exports and imports stagnation in India during COVID-19-A Review. *GIS Business*, 15(4), 1158-1177.
6. Narayanan, S., & Saha, S. (2020). Urban food markets and the lockdown in India. Available at SSRN 3599102.
7. Ghimire, R. P., Dissanayake, D., Ebner, P., Joshi, N., & Thompson, L. (2021). How Are Egyptian Agricultural Students Preparing for a Career?. *Journal of International Agricultural and Extension Education*, 28(5), 45-64.
8. Padmavathi, N. (2019). *Technical Efficiency of Unorganised Food Processing Industry in India: A Stochastic Frontier Analysis*. Institute for Social and Economic Change.
9. PRAJAPATI, M. R., & SINGH, R. A STUDY ON CAPITAL STRUCTURE ANALYSIS OF FOOD PROCESSING INDUSTRY IN INDIA.
10. Priyadarshini, A., Rajauria, G., O'Donnell, C. P., & Tiwari, B. K. (2019). Emerging food processing technologies and factors impacting their industrial adoption. *Critical reviews in food science and nutrition*, 59(19), 3082-3101.
11. RATHORE, R., & MATHUR, A. Food Processing in India: A New Horizon in Agribusiness Entrepreneurship. *BUSINESS, ECONOMICS AND SUSTAINABLE DEVELOPMENT*, 145.
12. Sharma, A., Rastogi, A., & Gogia, N. (2019). Emerging Consumer Trends of Rural India & Their Financing Needs.
13. Sinha, S., & Tripathi, P. (2021). Trends and challenges in valorisation of food waste in developing economies: A case study of India. *Case Studies in Chemical and Environmental Engineering*, 4, 100162.
14. Tripathy, S., & Shaik, A. (2020). Leverage and firm performance: Empirical evidence from Indian food processing industry. *Management Science Letters*, 10(6), 1233-1240.
15. Venkatesh, G. M. (2021). Status of Agro-based Industries in India: Special reference to Food Processing Industries. In *Virtual National Conference on THE CHANGING ECONOMIC MODELS AND TRENDS IN THE POST COVID-19 WORLD* (p. 139).



**Impact Factor:
7.569**



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details