FOOD PROCESSING

Towards Sustainable Growth Opportunities

Sector Profile

Fruits and Vegetables

Contents

Preface

The Indian food-processing sector has witnessed remarkable growth, during the last 9 years ending 2023-24 with Average Annual Growth Rate (AAGR) of around 6.55% as compared to around 6.06% in manufacturing at 2011-12 prices. The sector constituted as much as 7.93% share of FPI in manufacturing sector in 2023-2024. The sector is one of the largest employment providers in the organised manufacturing sector with 12.91% employment in the total registered/organised sector. This highlights its competitiveness and capacity to cater to global markets.

India is the world's largest producer of milk, pulses and jute and ranks as the second largest producer of rice, wheat, sugarcane, groundnut, vegetables, fruit and cotton. It is also one of the leading producers of spices, fish, poultry, livestock and plantation crops. This abundant raw material base offers immense potential for value addition and export. Notably, India reported the processed food exports amounted to USD 10.09 billion in 2024-2025 with significant shares in processed vegetables and fruits, pulses, cereal preparations etc. Further, the sector has attracted 7.21 billion FDI inflow in the last one-decade ending 2024-25. Recognizing the sector's significance, Ministry of Food Processing Industries has extended support and incentives for creation of modern infrastructure with efficient supply chain management, creation of employment opportunities, reducing post-harvest losses, increasing the processing level and enhancing export of the processed foods.

The fruits and vegetable processing industry in India showcases significant growth opportunities both domestically and internationally. Leveraging India's rich pool of raw materials, adapting to evolving consumer preferences, and tapping into the escalating demand for healthier options are pivotal strategies entailing the development of innovative products, adoption of advanced technologies, and implementation of sustainable packaging solutions, among other initiatives. As the demand for convenient food continues to rise, processing of fruits and vegetables in India presents substantial opportunities for value addition.

India, renowned for its rich biodiversity and agriculture, stands as a global powerhouse in the cultivation of fruits and vegetables. The dynamic landscape of the fruits and vegetable industry is influenced by elements of production, consumption, and the transformative role of modern retail. As global markets continue to evolve, modern retailers have strategically positioned themselves as key orchestrators in this agricultural symphony, implementing innovative strategies to enhance the entire supply chain.

1. Introduction

A robust food processing industry, underpinned by cutting-edge technology, plays a pivotal role in enhancing value addition, mitigating post-harvest losses, fostering employment, and boosting export revenues. It also addresses global food security and nutrition concerns.

Global Scenario of Fruits and Vegetables: The global landscape of fruits and vegetables is dynamic and evolving, with steady increases in production driven by rising demand due to population growth, urbanization, and changing dietary habits. According to the Food and Agriculture Organization (FAO), world fruit production recorded a growth of 63% from 2000 to 2022, reaching a total production volume of 933 million tonnes. Similarly, global vegetable production increased by 71% since 2000, reaching 1.17 billion tonnes in 2022[1].

Table 1: Top 10 fruits (in terms of production - World) for 2024-2025[2]

S.No	Fruits	Production Volume (000' MT)
1	Bananas	135112.3
2	Watermelons	99957.6
3	Apples	95835.9
4	Oranges	7641.04
5	Grapes	74942.5
6	Coconuts, in shell	62409.4
7	Mangoes, guavas and mangosteens	59151.8
8	Pineapples	29361.1
9	Peaches and nectarines	26354.5
10	Pears	26324.8

Table 2: Top 10 vegetables (in terms of production - World) for 2024-2025[3]

S.No	Vegetables	Production Volume (000' MT)
1	Potatoes	374777.7
2	Sugar beet	260998.6
3	Tomatoes	186107.9
4	Cucumbers and gherkins	94718.3
5	Yams	88257.15
6	Sweet potatoes	86410.35
7	Eggplants	59312.6
8	Carrots and turnips	42233.3

[1] FAO. (2023). Agricultural production statistics 2000–2022
[2] Most Produced Fruits in the World (2025 Global Rankings)
[3] Top 10 Most Produced Vegetables in the World (2025 Data)

9	Spinach	33116.2
10	Beans, dry	28346.1

Table 3: Top 5 fruit producing countries in 2022 published in 2025[4]

Country	Fruits production in Million Tonnes
China	48.3
India	14.8
Brazil	19.7
Mexico	9.3
Spain	5.6

Table 4: Top 5 vegetable producing countries in 2021-2022 published in 2025[5]

Country	Fruits production in Million Tonnes
China	616
India	145
US	27.1
Turkey	26.6
Vietnam	17.8

India's Position in Global Production: India, endowed with diverse agro-climatic zones, cultivates an extensive range of tropical, sub-tropical, and temperate fruits and vegetables. It stands as the world's largest producer of several agricultural and horticultural crops, including lime, lemon, ginger, and okra. Additionally, India ranks as the second-largest producer of staple vegetables such as potatoes, onions, cauliflowers, brinjal, and cabbages, and is at the forefront in fruit production, particularly bananas, papayas, and mangoes. As per the final estimates of production of horticultural crops for 2023–24, India's total horticulture production is estimated at 354.74 million tonnes, a slight decrease of 0.65% compared to the previous year.

Post-Harvest Losses and Processing Levels: The increased production of fruits and vegetables can often lead to substantial post-harvest losses across all stages of the supply chain due to their perishable nature. Fruits and vegetables are among the largest contributors to post-harvest economic losses in India. To mitigate such losses and enhance farmers' income, processing these perishables becomes imperative.

[4] Fruit Production by Country 2025

[5] **Vegetable Production by Country 2025**

2. Global Trends in Processed Fruits and Vegetables Products

The fruits and vegetable processing sector stands at the forefront of the global food industry, representing a dynamic landscape driven by evolving consumer preferences, technological advancements, and changing market dynamics. The market size of global [i]fruits & vegetable is as below[6]:

- Revenue in the Vegetables market amounts to US$ 1.16tn in 2025 and is expected to grow annually by 6.59% (CAGR 2025-2030) wherein Processed & Frozen Vegetables market amounts to US$ 284.55bn in 2025 and is expected to grow annually by 6.34% (CAGR 2025-2030).

- Revenue in the Fruits & Nuts market amounts to US$ 923.94bn in 2025 and is expected to grow annually by 6.24% (CAGR 2025-2030) wherein Processed & Frozen Fruits market amounts to US$75.34bn in 2025 and is expected to grow annually by 6.50% (CAGR 2025-2030).

Globally, the fruits and vegetables have traditionally been favoured as in fresh or semi-processed states as dietary choices. However, evolving preferences for convenience and flavour have led to an increased demand for processed varieties of fruits and vegetables worldwide, particularly prominent in western regions globally. Growing global demand for tropical and exotic fruit products, such as mango pulp, guava puree, and pomegranate juice, is driving export growth.

Europe is the world's largest market player in processed fruit and vegetables, absorbing more global supplies than the other continents. In 2023, European imports of processed fruit and vegetables accounted for 47% of global imports in value. Asia came second, with 26%, followed by North America with 18%, Latin America and the Caribbean with 4%, Africa with 3% and Oceania with 2%.[7]

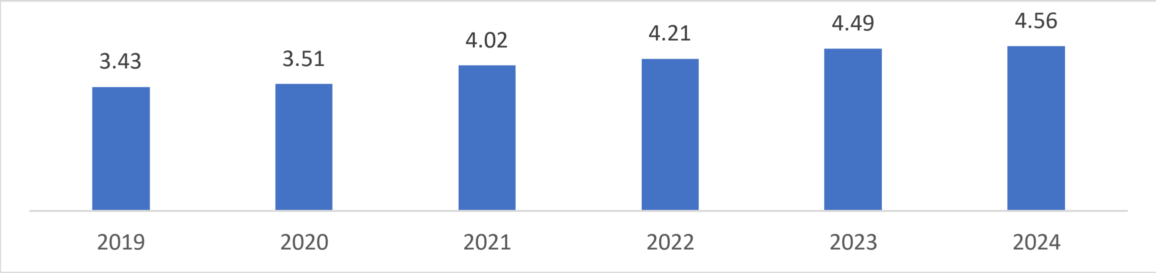
Global exports of processed vegetables: The global exports of processed vegetables stood at USD 3.05 billion in 2024.

Table 5: Volume of exports of processed vegetables (leading countries) in 2024[8]

Country	Export Volume (Lakh MT)
India	2.25
Germany	1.86
USA	1.33
China	0.93
Netherlands	0.75

[6] https://www.statista.com/outlook/cmo/food/fruits-nuts/processed-frozen-fruits/worldwide
[7] ITC Trademap
[8] Ibid

Figure 1: World processed vegetables export trend: HSN Code 2001 (in USD billion)[9]

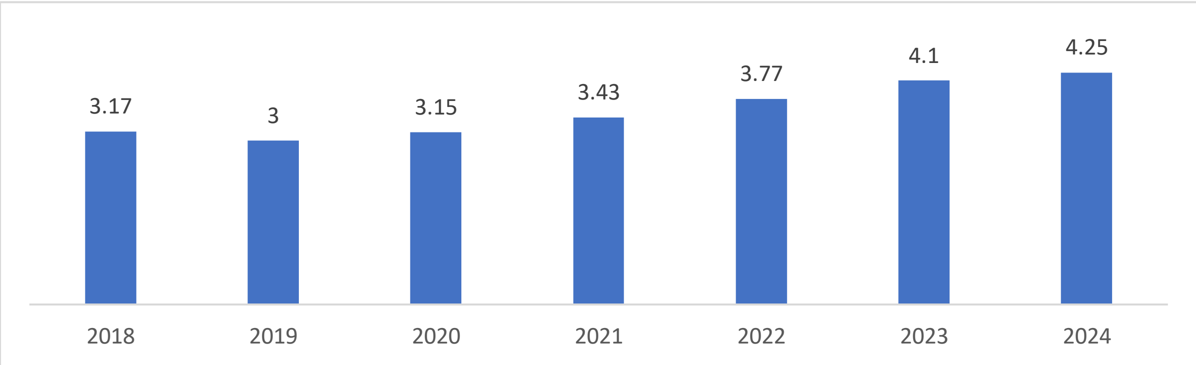


Global imports of processed vegetables: The global imports of processed vegetables stood at USD 3 billion.

Table 6: Volume of imports of processed vegetables (leading countries) in 2024[10]

Country	Imports in USD Billion
USA	0.67
Germany	0.32
Canada	0.19
UK	0.18
Netherlands	0.13

Figure 2: World processed vegetables import trend: HSN Code 2001 (in USD billion)[11]



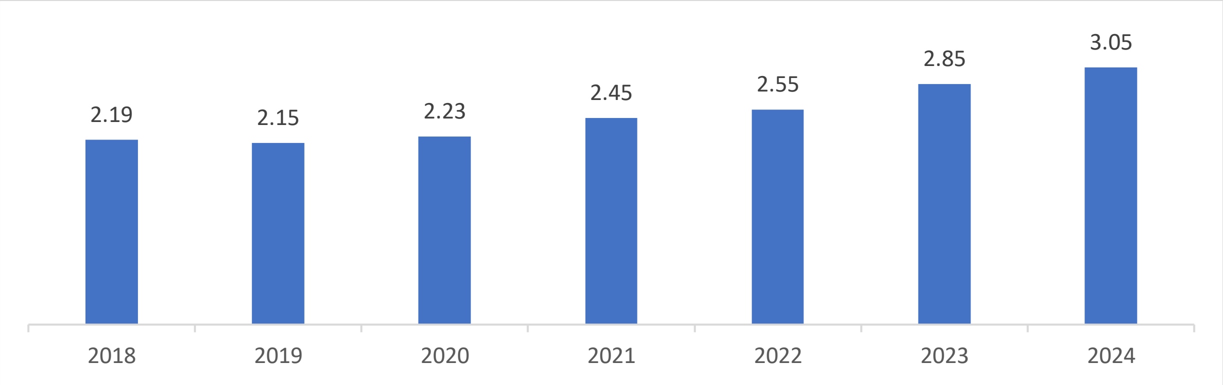
[9] Ibid
[10] Ibid
[11] Ibid

Global exports of processed fruits: The global exports of processed fruits for HSN Code 2007 stood at USD 4.56 billion[12].

Table 7: Volume of exports of processed fruits (leading countries) in 2024[13]

Country	Exports in USD Billion
France	0.6
Italy	0.43
Turkey	0.36
Germany	0.29
Spain	0.25

Figure 3: World processed fruits export trend: HSN Code 2007 (in USD billion)[14]



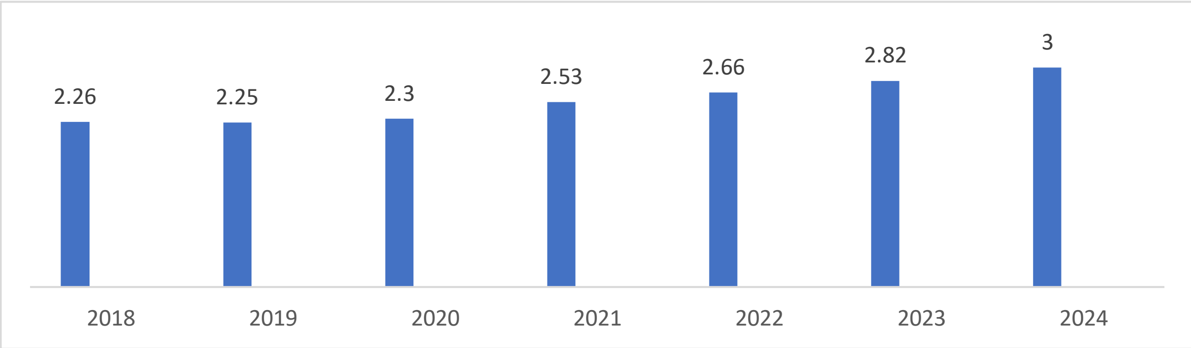
Global imports of processed fruits: The global imports of processed fruits for HSN Code 2007 stood at USD 4.25 billion.

Table 8: Volume of imports of processed fruits (leading countries) in 2024[15]

Country	Imports in USD Billion
USA	0.65
Germany	0.46
France	0.26
UK	0.21
Canada	0.19

[12] https://www.trademap.org/Country_SelProduct_TS.aspx?nvpm=1%7c%7c%7c%7c%7c2007%7c%7c%7c4%7c1%7c1%7c2%7c2%7c1%7c2%7c1%7c1%7c1
[13] Trademap.org, ITC calculations based on UN COMTRADE and ITC statistics
[14] Trademap.org, ITC calculations based on UN COMTRADE and ITC statistics
[15] Trademap.org, ITC calculations based on UN COMTRADE and ITC statistics

Figure 4: World processed fruits import trend: HSN Code 2007 (in USD billion) [16]



The global demand for processed fruit and vegetable products as dietary staples is projected to rise across all regions. This shift in consumer behavior, particularly influenced by western dietary habits, increasing population, and rapid urbanization, is fueling the demand for processed fruits and vegetables. Busy lifestyles and rising per-capita income levels among urban consumers is further propelling the demand for ready-to-eat and on-the-go food items. Further, the growing inclination towards organic, vegan, and fortified products within this sector, particularly among environmentally conscious urban populations in high-income countries presents a lucrative opportunity for producers in emerging economies and small processors to meet consumer preferences for extended shelf life and convenient storage.

[16] Trademap.org, ITC calculations based on UN COMTRADE and ITC statistics

3. Overview of Fruits & Vegetables Processing in India

India is currently the fastest-growing economy in the world and is a leading producer of several agricultural commodities. India is the second largest producer of the fruits and vegetables in the world after China. The country has diverse topography and climate, which ensures availability of fruits and vegetables in every season. During 2023-24, India produced 207.1 million metric tonnes of vegetables and 112.97 million metric tonnes of fruits. The area under cultivation of fruits stood at 7.13 million hectares while vegetables were cultivated at 11.23 million hectares. According to FAO (2022), India is the largest producer of onions, ginger and okra among vegetables and ranks second in the production of potato, cauliflower, brinjal, cabbage etc. Amongst fruits, the country ranks first in the production of bananas (25.56%), mangoes (including mangosteens and guavas) (44.46%) and papayas (38.64%).[17]

During 2024-25, India exported fresh fruits and vegetables worth USD 161.4 million which comprised of fresh fruits like grapes, pomegranates, mangoes, bananas, and oranges while onions, mixed vegetables, potatoes, tomatoes, and green chillies. These contribute largely to the vegetable export basket. The food processing industry stands as one of the largest sectors in India, in terms of significant production, growth, consumption, and export levels. India's food processing sector is diverse covering fruits, vegetables, spices, meat, poultry, dairy, alcoholic beverages, fisheries, plantation crops, grain processing, and various consumer goods like confectionery, chocolates, cocoa products, soya-based items, mineral water, and high-protein foods. The fruit and vegetable processing industry in India benefits from the vast raw material base. Various techniques, including canning, dehydration, pickling, and bottling, are employed to extend the shelf life of seasonal fruits and vegetables. The fruit and vegetable processing industry in India benefits from the vast raw material base. Various techniques, including canning, dehydration, pickling, temporary preservation, and bottling, are employed to extend the shelf life of seasonal fruits and vegetables.

Market Size: The India fruit & vegetables processing market size reached USD 876.6 Million in 2024. Looking forward, IMARC Group expects the market to reach USD 1,387.5 Million by 2033, exhibiting a growth rate (CAGR) of 4.7% during 2025-2033.[18]

Attribute	**Key Statistics**
Base Year	2024
Forecast Years	2025-2033
Market Size in 2024	USD 876.6 Million
Market Forecast in 2033	USD 1,387.5 Million
Market Growth Rate 2025-2033	4.7%

[17] www.fao.org
[18] https://www.imarcgroup.com/india-fruit-vegetables-processing-market

3.1 Major Producing & Processing States

3.1.1 Producing States

Fruits: India is a leading producer of a variety of fruits, with the top producing states being:

- India is the world's largest producer of bananas, mangoes Guava and papayas.

Table 9: Top fruit producing states in India

States	Production (000' MT) (2023-2024)
Andhra Pradesh	17780.85
Maharashtra	15453.97
Uttar Pradesh	13460.29
Madhya Pradesh	9863.80
Gujarat	8383.32

Vegetables: The states that lead the production of vegetables include:

- India is the largest producer of Potato, Onion, Tomato several other vegetables.

Table 10: Top vegetable producing states in India

States	Production (000' MT) (2023-2024)
Uttar Pradesh	34430.38
West Bengal	29200.96
Madhya Pradesh	24350.12
Bihar	17150.06
Gujarat	15264.55

Processing Capacities:[19]

- **Fruits**: The states with the largest processing capacities for fruits are **Punjab, Gujarat, Maharashtra, Karnataka, Kerala, Andhra Pradesh & Tamil Nadu.**

[19] https://www.mofpi.gov.in/sites/default/files/final_report_of_lop_july_2021.pdf

- **Potato & Onion:** The states with the largest processing capacities for Potato & Onion are **Gujarat, Maharashtra, Karnataka, Telangana, Tamil Nadu, West Bengal, Madhya Pradesh & Uttar Pradesh.**
- **Other Vegetables**: For other vegetables, the leading states in processing include **Tamil Nadu, Andhra Pradesh, Maharashtra, Rajasthan, Gujarat, Kerala, Telangana & Odisha**.

India's Global Rankings:

- **Fruits**: India ranks first in the production of Bananas, Mangoes and Papayas
- **Vegetables**: India is the largest producer of Onions, ginger and okra among vegetables and ranks second in the production of Potatoes, Cauliflowers, Brinjal, Cabbages, etc

Table 11: Trends in Horticulture Production[20]

Year	Production (MMT)
2018-19	311.05
2019-20	320.47
2020-21	334.60
2021-22	347.17
2022-23	355.48
2023-24	354.74

Table 12: State-wise Fruits and Vegetable Production in 2023–24[21]

State/UT	Fruits (000 MT)	Vegetables (000 MT)
Andhra Pradesh	17780.85	6345.76
Arunachal Pradesh	110.42	16.43
Assam	2341.66	3938.61
Bihar	4589.19	17150.06
Chhattisgarh	2423.72	6752.19
Gujarat	8383.32	15264.55
Haryana	856.32	5668.82
Himachal Pradesh	637.23	1819.48
Jammu & Kashmir	2643.23	1996.18
Jharkhand	1273.17	4389.21
Karnataka	7140.69	6334.29

[20] Department of Agriculture & Farmers Welfare| Horticulture| Area and Production of Horticulture crops for 2023-24 (Final Estimates) - https://agriwelfare.gov.in/en/StatHortEst

[21] Ibid

Kerala	3177.05	2895.63
Madhya Pradesh	9863.80	24350.12
Maharashtra	15453.97	12334.25
Manipur	480.70	317.76
Meghalaya	401.83	548.32
Mizoram	346.07	225.07
Nagaland	344.77	456.93
Odisha	2951.70	10620.21
Punjab	2508.83	6884.72
Rajasthan	1172.06	2403.78
Sikkim	50.80	135.77
Tamil Nadu	7563.78	9259.74
Telangana	1864.81	1076.25
Tripura	622.15	1286.69
Uttar Pradesh	13460.29	34430.38
Uttarakhand	342.05	514.94
West Bengal	4102.55	29200.96
Others	91.02	590.76
Total	**112978.02**	**207207.84**

Table 13: Category-wise Production of Horticulture Crops in 2023–24[22]

Crop	**Production ('000 MT)**
Fruits	112978.02
Vegetables	207207.84
Aromatics & Medicinal	726.23
Flowers	3535.31
Honey	146.26
Plantation Crops	17666.19
Spices	12483.79
Total	**354743.64**

[22] https://agriwelfare.gov.in/en/StatHortEst

3.2 Trade Scenario

India's exports of Processed Food were Rs. 7,701.66 USD Millions in 2023-24[23]. The major products exported include:[24]

- Mango Pulp: USD 75.32 million
- Processed Vegetables: USD 787.28 million
- Prepared and Preserved Cucumber and Gherkins: USD 256.58 million
- Processed Fruits, Juices, and Nuts: USD 682.58 million
- Guar Gum: USD 541.65 million

3.2.1. Processed Vegetables (HS Code 2001)

India is one of the major producers of processed vegetables such as preserved onions, cucumber & gherkins, mushrooms, green pepper in brine, dried asparagus, dehydrated garlic powder & flakes, dried garlic, and potatoes. The top export destination countries in 2024 are listed in the table below.

India is the major producer of Processed Vegetables like Preserved Onions, Cucumber & Gherkins, provisionally preserved, Mushrooms of the Genus Agaricus, other Mushrooms and Truffles, Green Pepper in Brine, Dried Truffles, Dehydrated Asparagus, Dehydrated Garlic Powder, Dehydrated Garlic Flakes, Garlic Dried, Potatoes Dried, Grams, Grams Dal, Onion Prepared/Preserved etc. data add

Many non-traditional vegetables mainly processed cucumber and gherkins and other vegetables produced like asparagus, celery, bell pepper, sweet corn, green and lime beans and organically grown vegetables are also being increasingly exported.[25]

The individual products under this sub-head are Preserved Onions Cucumber & Gherkins, Mushrooms of the Genus Agaricus, other Mushrooms and Truffles, Green Pepper in Brine, Dried Truffles, Asparagus Dried, Dehydrated Garlic Powder, Dehydrated Garlic Flakes, Garlic Dried, Potatoes Dried, Peas Frozen/dehydrated, Peas Prpd./Presvd, Sweet corn frozen/ canned, Grams, Grams Dal etc.

Table 14: India's exported vegetable preparations[26]- 4 digit

HS Code	Product group	India's export value in 2024 (USD Thousand)
200110	Cucumbers and gherkins, prepared or preserved by vinegar or acetic acid	1,89,100
2001	Vegetables, fruit, nuts and other edible parts of plants, prepared or preserved by vinegar	2,87,668

[23] https://agriexchange.apeda.gov.in/India/ComparativeStatementAgri/Index
[24] https://apeda.gov.in/ProcessedFoods
[25] Ibid
[26] Trademap.org, ITC calculations based on UN COMTRADE and ITC statistics

Table 15: India's top 5 export destinations for processed vegetables (HS Code 2001) in 2024[27]

Country	Exports in USD thousand
USA	63,811
Germany	37,108
UK	32,844
Canada	23,519
Australia	20,424

3.2.2 Processed Fruits, Juices & Nuts (Chapter 20 of HS Code)

The fruit and vegetable processing industry in India is highly decentralized having wide capacities. The diverse agro-climatic zones make it possible to grow almost all varieties of fresh fruits in India.

India is a significant producer and exporter of processed fruits, juices, and nuts, supplying a wide variety of value-added products to global markets. These include mango pulp and purée, guava pulp, pineapple slices, canned tropical fruits, fruit cocktail, fruit jams, marmalades, jellies, and fruit-based beverages such as juice concentrates and RTS (Ready-to-Serve) drinks. The processed nut segment includes shelled and unshelled cashew nuts, almond kernels, and walnuts, both plain and roasted. Among fruit juices, India exports both single-fruit and blended juices, with mango, orange, pomegranate, and mixed fruit juices being the most prominent. The major destination countries for these exports in 2024 are listed in the table below.

India's processed fruit segment is dominated by mango-based products, especially Alphonso and Totapuri varieties, which are used extensively in purées and concentrates. Other popular processed items include canned papaya, dehydrated banana chips, vacuum-dried jackfruit, fruit bars, and dried figs. In the juice segment, aseptically packed and frozen fruit juices have seen increased demand from health-conscious consumers and food service sectors globally. Indian exporters have also started catering to niche markets with organically processed fruits and nut-based spreads and pastes, such as cashew butter and almond paste. These products are increasingly aligned with international quality standards and HACCP/ISO certifications to meet the demands of developed markets.

[27] Ibid

Table 16: India’s exported fruit preparations (Chapter 20 of HS Code)[28]

HS Code	Product group	India's export value in 2024 (USD Thousand)
2008	Fruits, nuts and other edible parts of plants, prepared or preserved	135,100
2001	Vegetables, fruit, nuts and other edible parts of plants, prepared or preserved by vinegar	413,975
2004	Vegetables prepared or preserved otherwise than by vinegar or acetic acid, frozen	270,435
2007	Jams, fruit jellies, marmalades, fruit or nut purée and fruit or nut pastes	1,35,100
2005	Other vegetables prepared or preserved otherwise than by vinegar or acetic acid, not frozen	51,674
2009	Fruit juices, incl. grape must, and vegetable juices, unfermented, not containing added spirit	26,631
2002	Tomatoes, prepared or preserved otherwise than by vinegar or acetic acid	9,707
2006	Vegetables, fruit, nuts, fruit-peel and other edible parts of plants, preserved by sugar "drained, . . .	5601
2003	Mushrooms and truffles, prepared or preserved otherwise than by vinegar or acetic acid	103

Table 17: India’s top 5 export destinations for processed fruits (Chapter 20 of HS Code) in 2024[29]

Country	Exports in USD thousand
USA	185,943
Netherlands	85,400
UAE	73,084
UK	72,191
Saudi Arabia	69,541

3.3 Key Growth Drivers

The global landscape of fruit and vegetable (F&V) processing, coupled with an in-depth analysis of its dynamics in India, unveils a plethora of opportunities within the sector. Projections of increased demand, both domestically and internationally, are reshaping the processing landscape positively. The growth fruit and vegetable processing in India is driven by several key factors:

[28] Ibid
[29] Ibid

- **Demographics & Disposable income:**

  The demographic aspect stands as a primary growth catalyst for the sector as India has a vast consumer base driven by its population size and predominance of youth fuels significant demand for processed fruits and vegetables. The increase in disposable incomes, driven primarily by urbanization and the prevalence of dual-income households is significantly increasing the demand for processed fruits and vegetables.

- **Rich raw-material base:**

  The availability of a diverse range of fruits and vegetables throughout the year provides a robust raw material base for processing industries, providing opportunity to process and preserve diverse products with immense export potential.

- **Advancements in Technology and Machinery:**

  Increased demand for fortified, natural and nutritious foods, need for integration of better traceability across the supply chain and sustainable packaging solutions has made adoption / development of innovative technologies and machineries pivotal.

- **Structural Shift in Consumption Pattern:**

  Consumers worldwide are increasingly prioritizing convenience in their purchasing decisions, driven by busy lifestyles. This shift is anticipated to greatly influence the processed food industry, leading to an increased demand for convenient meal solutions, such as frozen, canned, or pre-packaged foods. "Convenience Food" that have a significant potential for growth are:

- **Shelf – Stable or Frozen Convenience Foods:**

  Ready-to-Eat (RTE) and Ready-To-Serve (RTS) food products have undergone significant processing and are ready for consumption without any further preparation. Some examples of RTE/RTS products are - Fruit Cups, Vegetable Dips, Canned Fruit Cocktail, Fruit Bars, Veggie Burgers and Frozen Fruit Smoothie Packs

  Ready-To-Cook Food: These are fresh-cut and diced vegetables, such as carrots, peas, and green beans, that are sold in frozen packets, ready to be used in various dishes. Frozen Fruit Chunks, Canned Fruits and Vegetables, Freshly Cut Fruits and Vegetables, Salad Mixes are few examples of RTC Food.

- **Demand for Healthy Food Supplements:**

  The growing emphasis on health and wellness globally is leading to increased demand pf processed food tailored to meet these evolving consumer preferences. Some of the examples of healthy food supplements made from processed fruits and vegetables include fruit and vegetable powders, dehydrated fruits and vegetables, freeze-dried fruits and vegetables, green superfood powders, fermented vegetables, vegetable and fruit juices without added sugars, colour, flavour or essence, probiotic fruit and vegetable blends, etc.

3.4 Key Processed Fruits & Vegetables Products in Indian Market

There are several processed fruits and vegetables that are widely used in India, both in households and in the food industry. Some of the examples include:

- Processed & Frozen Fruits
- Juices
- Jams & marmalades
- Processed & Frozen Vegetables
- Ready-to-eat Meals
- Fresh-cut vegetables
- Purees and Ketchups
- Probiotic fruit and dairy beverages

3.5 Key Industry Players

Table 18: List of major players engaged in processed fruits and vegetables

Key Player	Description
ITC Limited	Offers a diverse range of food products under brands like Aashirvaad, Sunfeast, and B Natural.
Dabur India Limited	Known for its fruit juice brand 'Real' and health drink 'Activ'.
Mother Dairy Fruit & Vegetable Pvt. Ltd.	In March 2024, announced plans to invest USD 89.8 million to set up two new dairy, fruits, and vegetables processing plants.
Del Monte Foods India	Offers a range of canned fruits, vegetables, and sauces.
McCain Foods India Pvt. Ltd.	Specializes in frozen potato products and other frozen foods.
Nestlé India	Provides products like Maggi sauces and ketchups, and fruit-based beverages.
Rasna Pvt. Ltd.	Known for its fruit-based beverages like Rasna Fruit Plus and Rasna Native Haat.
PepsiCo India	Offers fruit juices under the Tropicana brand, and potato chips under Lays brand.
Haldiram's Food International Ltd.	Produces a variety of snacks and sweets, including fruit-based products.
Paper Boat (Hector Beverages)	Offers traditional Indian beverages and fruit-based drinks.
BigBasket	An online grocery platform that offers a range of processed fruits and vegetables.
WayCool Foods and Products Pvt. Ltd.	Engaged in the distribution of fresh and processed fruits and vegetables.
Sahyadri Farms	A leading farmer producer company involved in the processing of fruits and vegetables.
Raje Agro Foods Pvt. Ltd.	Engaged in the processing and export of fruits and vegetables.
Adani Agri Fresh	Involved in the procurement, packaging, logistics, and marketing of apples and other fruits under the 'Farm-Pik' brand.

4. Investment Opportunities in Fruits & Vegetables Processing Sector of India

- **Small-Scale Processing Units:** Establishing small processing units allows entrepreneurs to produce a variety of products such as jams, pickles, sauces, and chutneys. These units typically require lower capital investment compared to large-scale factories, making them accessible for small businesses. By focusing on local markets, these units can cater to regional tastes and preferences, ensuring a steady customer base. Additionally, small-scale operations can adapt quickly to changing consumer demands and trends, allowing for innovation in product offerings.
- **Cold Storage Facilities**: Investing in cold storage solutions is crucial for preserving the freshness of fruits and vegetables. Cold storage facilities help reduce post-harvest losses, which can be significant in the absence of proper storage. By maintaining optimal temperatures and humidity levels, these facilities ensure that produce remains fresh for longer periods, enabling suppliers to meet market demand consistently. Furthermore, cold storage can facilitate year-round availability of seasonal products, enhancing supply chain efficiency and reducing price volatility.
- **Mobile Processing Units:** Creating mobile processing units offers a unique solution for on-site processing of fruits and vegetables at farms. These units can travel to various locations, allowing farmers to process their produce immediately after harvest. This approach minimizes transportation costs and reduces the risk of spoilage during transit. Additionally, mobile processing units can provide farmers with value-added services, such as packaging and labeling, enhancing the marketability of their products. This model also promotes local economies by keeping processing close to the source of raw materials.
- **Organic Processing:** Focusing on organic fruits and vegetables processing taps into the growing demand for organic products among health-conscious consumers. As awareness of health and environmental issues increases, consumers are increasingly seeking organic options. By establishing processing units that adhere to organic standards, businesses can cater to this niche market. Organic processing can include products like organic juices, sauces, and snacks, which often command higher prices. Additionally, businesses can benefit from government incentives and certifications that promote organic farming and processing.
- **Value-Added Products:** Developing value-added products such as dehydrated fruits, frozen vegetables, and ready-to-eat meals can significantly enhance profit margins. These products often have longer shelf lives and can be marketed to a wider audience, including urban consumers seeking convenience. By investing in technology and equipment for processing, businesses can create innovative products that meet the evolving needs of consumers. Value-added products also allow for diversification of offerings, reducing dependency on raw produce sales and stabilizing revenue streams.
- **Local Sourcing and Community Engagement:** Collaborating with local farmers for sourcing raw materials fosters community engagement and supports local economies. By establishing partnerships with farmers, businesses can ensure a consistent supply of high-quality produce while also contributing to the livelihoods of local agricultural communities. This approach promotes sustainable practices and can enhance the brand image of the business as a socially responsible entity. Additionally, local sourcing can reduce transportation costs and carbon footprints, aligning with sustainability goals.
- **E-commerce Platforms:** Leveraging e-commerce platforms provides businesses with an opportunity to sell processed products directly to consumers, expanding market

reach beyond traditional distribution channels. Online sales enable businesses to tap into a growing consumer base that prefers the convenience of shopping from home. By establishing an online presence, businesses can showcase their products, engage with customers, and gather valuable feedback. E-commerce also allows for targeted marketing strategies, such as social media advertising and search engine optimization, to attract potential buyers.

5. Government Interventions for Supporting F&V Processing Sector

The Government of India has implemented various initiatives to support and boost Fruits & Vegetables (F&V) sector in India.

4.1. Pradhan Mantri Kisan Sampada Yojana (PMKSY)[30]:
PMKSY is a comprehensive scheme launched by the Ministry of Food Processing Industries (MoFPI) aimed at creating modern infrastructure with efficient supply chain management from the farm gate to the retail outlet. The key objectives of PMKSY include:

- Creation of modern infrastructure for food processing, including mega food parks, clusters, and individual units.
- Establishment of effective backward and forward linkages, connecting farmers, processors, and markets.
- Building robust supply chain infrastructure for perishable goods.

The PMKSY had seven component schemes viz; (i) Mega Food Parks, (ii) Integrated Cold Chain and Value Addition Infrastructure, (iii) Infrastructure for Agro-Processing Clusters, (iv) Creation of Backward and Forward Linkages (discontinued), (v) Creation/Expansion of Food Processing & Preservation Capacities, (vi) Food Safety and Quality Assurance Infrastructure and (vii) Human Resources and Institutions. The component schemes of Mega Food Park, Creation of Backward & Forward Linkages, Human Resource & Institution - Promotional Activities, Skill Development & HACCP, a component of Food Safety and Quality Assurance Infrastructure have been discontinued.

4.2. PM Formalization of Micro Food Processing Enterprises (PMFME):
The PMFME scheme is a centrally sponsored initiative with an outlay of Rs10,000 crore, which is being implemented over five years from 2020–21 to 2024–25. The scheme provides financial, technical, and business support to existing micro food processing enterprises, aiming to formalize the sector and enhance its competitiveness[31]. The programme has four broad components addressing the needs of the sector: i) Support to individual and groups of micro enterprises; ii) Branding and Marketing support; iii) Support for strengthening of institutions; iv) Setting up robust project management framework.

4.3. Production Linked Incentive Scheme for Food Processing Industry (PLISFPI):
The Production Linked Incentive Scheme for Food Processing Industry has been formulated based on the Production Linked incentive scheme of NITI Aayog under “AatmaNirbhar Bharat Abhiyaan for Enhancing India's Manufacturing Capabilities and Enhancing Exports”. The Government of India has approved the Production Linked Incentive Scheme (PLIS) for the Food Processing Industry, including processed fruits and vegetables. The primary aim of the scheme is to create global processing champions in India by improving the competitive strength of Indian companies in terms of output, value addition, and market linkages.

[30] https://sampada-mofpi.gov.in/
[31] PM Formalization of Micro Food Processing Enterprises (PMFME) Scheme. Available at: https://pmfme.mofpi.gov.in/pmfme/#/Home-Page

The scheme has an outlay of Rs10,900 crore to be implemented from 2021–22 to 2026–27[32].

- The first component relates to incentivising manufacturing of four major food product segments viz. Ready to Cook/ Ready to Eat (RTC/ RTE) foods including Millets based products, Processed Fruits & Vegetables, Marine Products, Mozzarella Cheese.

- The second component relates to support for branding and marketing abroad to incentivise emergence of strong Indian brands.

4.4. Mission for Integrated Development of Horticulture (MIDH):

The Mission for Integrated Development of Horticulture (MIDH) is a Centrally Sponsored Scheme designed for the holistic growth and development of the horticulture sector, covering fruits, vegetables, root & tuber crops, mushrooms, spices, flowers, aromatic plants, coconut, cashew, cocoa, and bamboo across India. MIDH operates through the following sub-schemes:

- **National Horticulture Mission (NHM)**: Launched in 2005, NHM aims to promote the holistic growth of the horticulture sector, focusing on the development of post-harvest management, processing, and marketing infrastructure.

- **Horticulture Mission for Northeast & Himalayan States (HMNEH)**: This scheme promotes horticultural development, including fruits and vegetables, in the North-Eastern region, Jammu & Kashmir, and the Himalayan states. It provides support for infrastructure development, R&D, and marketing.

- **National Horticulture Board (NHB)**: The NHB focuses on improving integrated development in the horticulture industry, enhancing production, productivity, and processing of fruits and vegetables[33].

- **Cluster Development Programme (CDP)** - The Cluster Development Programme (CDP) is an initiative under MIDH that focuses on developing horticulture clusters to enhance productivity, competitiveness, and market integration. The programme aims to leverage geographical specializations of horticulture clusters and promote integrated and market-led development of pre-production, production, post-harvest, logistics, branding, and marketing activities.[34]

Objectives[35]:

- To promote integrated and market-led development of horticulture clusters.
- To enhance productivity and competitiveness of horticulture crops.
- To facilitate the development of infrastructure for post-harvest management, processing, and marketing.
- To encourage the adoption of good agricultural practices, including Integrated Pest Management (IPM) and Integrated Nutrient Management (INM).
- To promote the formation and strengthening of Farmer Producer Organizations (FPOs) and other farmer groups.

[32] Production Linked Incentive Scheme for Food Processing Industry (PLIS). Ministry of Food Processing Industries. Available at: https://mofpi.nic.in.

[33] Mission for Integrated Development of Horticulture (MIDH). Department of Horticulture, Ministry of Agriculture. Available at: https://agricoop.nic.in.

[34] https://nhb.gov.in/CDPMap.aspx?enc=DQ7ZOAcTzApalV0FUWykGqk5kZPafwDHBwTBtCFfIQ20h1xnDHyI7Wq7IDK+09Yd

[35] https://nhb.gov.in/CDPMap.aspx?enc=DQ7ZOAcTzApalV0FUWykGqk5kZPafwDHBwTBtCFfIQ20h1xnDHyI7Wq7IDK+09Yd

4.5 Agriculture Infrastructure Fund[36]:

The role of infrastructure is crucial for agriculture development and for taking the production dynamics to the next level. It is only through the development of infrastructure, especially at the post-harvest stage that the produce can be optimally utilized with opportunity for value addition and fair deal for the farmers. Development of such infrastructure shall also address the vagaries of nature, the regional disparities, development of human resource and realization of full potential of our limited land resource.

Rs 1 lakh crore Agri Infrastructure Fund for farm-gate infrastructure for farmers. Financing facility will be provided for funding Agriculture Infrastructure Projects at farm-gate & aggregation points (Primary Agricultural Cooperative Societies, Farmers Producer Organizations, Agriculture entrepreneurs, Start-ups, etc.). Impetus for development of farm gate & aggregation point, affordable and financially viable Post Harvest Management infrastructure.

[36] National Agriculture Infra Financing Facility

6. R&D and Skill Development Ecosystem for F&V Processing

Research and development initiatives and availability of skilled workforce serves as the foundation of a of a thriving and competitive food processing sector. Across India, numerous universities, centres of excellence, technical institutes, and other institutions play pivotal roles in advancing the food processing industry. These entities facilitate the adoption of cutting-edge processing technologies, promote the registration of intellectual property rights for processes and products, and foster skill development among professionals in the field. Below are some key institutions contributing to India's robust R&D ecosystem in the food processing sector.

Table 19: Key institutions and their highlights

Institutions	Highlights
Indian Council of Agricultural Research (ICAR)	• Premier research organization under the Ministry of Agriculture and Farmers' Welfare, Government of India, that conducts research and development in the field of agriculture. • ICAR has several institutes and centers dedicated to food processing research and development. • Central Institute of Post-Harvest Engineering and Technology (CIPHET) and some of the Institutes under the Subject Matter Division of Horticultural Sciences, such as CISH, CPRI, etc. are developing technologies and processes for post-harvest handling, processing, packaging, preservation, and value addition of fruits, vegetables, and other agricultural commodities.
Central Food Technological Research Institute (CFTRI)	• National-level research institute under the Council of Scientific and Industrial Research (CSIR). • Specializes in food science and technology research, including fruit and vegetable processing.
National Institute of Food Technology Entrepreneurship & Management (NIFTEM), Kundli	• Research institute that focuses on research and education in food science and technology, including fruit and vegetable processing • NIFTEM, Kundli has a fruit and vegetable pilot plant which has facilities for sorting, grading and packaging of fresh produce, IQF, CA storage, ripening chamber, processing infrastructure for development of beverages, pulp, paste,

	concentrates, etc. from fruits and vegetables.
National Institute of Food Technology, Entrepreneurship and Management (NIFTEM) - Thanjavur	• Previous known as Indian Institute of Food Processing Technology (IIFPT), NIFTEM – T is an Institute of National Importance (INI) • NIFTEM-T currently offers courses and undertakes R&D projects in the area of dairy and food processing • The institute is designated as Centre of Excellence for non-thermal processing
Indian Institute of Horticultural Research (IIHR)	• Research institute that conducts research on horticultural crops, including fruits and vegetables, and develops technologies for their processing and processed products from fruits and vegetables.
Defence Food Research Laboratory (DFRL)	• Research laboratory of the Defence Research and Development Organisation (DRDO) that conducts research on food science and technology, including processing of fruits and vegetables.
National Horticulture Board (NHB)	• An autonomous organization under the Ministry of Agriculture and Farmers' Welfare that promotes and develops the horticulture sector, including fruits and vegetables processing.
Other Technical Institutions	• Tamil Nadu Agricultural University (TNAU): Conducts research on agriculture and allied subjects, including fruit and vegetable processing. • University of Agricultural Sciences, Bangalore (UASB): Conducts research on agriculture and allied subjects, including fruit and vegetable processing • All 63 State Agriculture Universities, 7 Central Agriculture Universities, and 4 ICAR Deemed Agriculture Universities – total 74

Conclusion

India is well-positioned to emerge as the global leader in the fruits and vegetable processing sector. Owing to its rich agricultural resources and varied production, the fruits and vegetables processing industry in India is poised for substantial growth and advancement. The supportive government policies and regulations have been pivotal in creating a conducive environment and paving the way for significant growth of the food processing industry.

To fully realize the potential of the Indian fruits and vegetables processing industry, continuous government initiatives, investments in technology and infrastructure, and a focus on product diversification are imperative. Strengthening cold chain infrastructure, optimizing processing methods, and promoting research and development can enhance value addition and extend the shelf life of processed products, aligning them with evolving consumer preferences. Additionally, promoting sustainable and organic farming practices, along with measures for food traceability and sustainability certifications, can position Indian processed fruits and vegetables as preferred choices in global markets.

The Government of India is cognizant of the significance of food processing industry in Indian economy and has been actively promoting investments by providing technical and financial assistance for infrastructure development along with facilitating market linkages for processed fruits and vegetables through various initiatives. Under the aegis of the Ministry of Food Processing Industries (MOFPI), initiatives like the PMKSY have catalysed infrastructure development, encompassing the establishment of food parks, agro processing clusters, and integrated cold chain infrastructure. These efforts have not only enhanced value addition but also minimized post-harvest losses and generated employment opportunities. To ensure adherence to quality and safety standards of processed fruits and vegetables, the governance and regulatory landscape is spearheaded by apex regulatory bodies such as Food Safety and Standards Authority of India (FSSAI) and the Agricultural and Processed Food Products Export Development Authority (APEDA). The compliance reassures the consumers trust thereby facilitating the export of high-quality products and enhancing domestic consumption.

By leveraging government support, nurturing a conducive regulatory environment, and embracing innovation, the Indian fruits and vegetables processing market stands poised to make significant contributions to food security, job creation, increased farmer incomes, and positioning India as a global leader in processed fruits and vegetables.

In conclusion, the Indian fruits and vegetables processing sector is poised for expansion, driven by government assistance, regulatory framework, and forward-looking strategies. Through sustained efforts and collaborations among the government, industry stakeholders, and farmers, India can fully tap into the potential of its fruits and vegetables, cementing its position in the global market.

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