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Export Potential and Competitiveness of Processed Food Products from India

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Authors' contributions

This work was carried out in collaboration between both authors. Author RR along with the author DBP designed the study. Author RR wrote the draft of the manuscript and results and discussion. Author DBP checked the draft manuscript and made final manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

The liberalization of trade and India's accession to the World Trade Organization (WTO) have brought about significant changes in India's agricultural trade and food processing industry. This study aims to evaluate the export competitiveness of processed food products from India by analyzing their comparative advantage and export potential over a specified time period.
The study utilizes secondary data from sources such as the Agricultural and Processed Food Products Export Development Authority (APEDA), Food and Agricultural Organization (FAO), and International Trade Centre (ITC) for the analysis. The selection of processed food products is based on the major processed food products exported by food processing industries in Gujarat. Analytical tools employed are compound annual growth rate (CAGR), revealed comparative advantage (RCA), and nominal protection coefficient (NPC). These tools help assess growth rates, comparative advantage, and competitiveness of the selected commodities with the data on export potential Provided by ITC.

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The study highlights the export potential and unrealized potential of processed foods which is more than 7.9 billion dollars and 4.5 billion dollars respectively. Among the selected commodities the food preparations with HS code 210690 are observed to have the highest potential. The analysis identifies the largest unrealized potential was in countries such as the United States, Saudi Arabia, China, and UAE for many of the selected processed food products. It was also observed in the export performance of selected processed foods for the last 10 years, with notable growth rates observed in miscellaneous preparations and bread, pastry, and other baked foods. This study concludes by highlighting the Potential of selected food products and also shows the presence of competitive advantage of selected foods in the USA, UAE, UK, Australia, and Saudi Arabia. It highlights the opportunities for manufacturers to expand their exports, capitalize on untapped market potential, and enhance their business growth.

Keywords: Export potential; export competitiveness; comparative advantage; processed food; export performance.

1. INTRODUCTION

The liberalization of trade has brought about significant transformations in the export and import dynamics of developing countries, including India. India's accession to the World Trade Organization (WTO) [1] has created opportunities for the country to tap into its export potential and experience growth. The levels of comparative advantage for numerous agricultural commodities on the global market have changed as a result of the Agreement on Agriculture's ratification. Consequently, the composition of India's agricultural trade has undergone structural changes.

Processed foods refer to food products that have undergone various techniques, such as cooking, canning, freezing, drying, or adding preservatives, to extend their shelf life, enhance their flavor, or alter their texture. These foods are typically ready-to-eat or require minimal preparation before consumption. According to the UN Nova classification processed foods are divided into four categories based on the extent of processing. They are.

1. Unprocessed or minimally processed foods: Foods with minimal alterations, such as fruits, vegetables, nuts, seeds, and grains.
2. Processed culinary ingredients: Derived from unprocessed or minimally processed foods, used for cooking or seasoning, like oils, fats, salt, sugar, spices, and vinegar.
3. Processed foods: Combination of unprocessed or minimally processed ingredients with additives, creating products like canned vegetables, canned fish, bread, and cheese.
4. Ultra-processed foods: Highly processed foods with many added substances, like preservatives, sweeteners, and flavor enhancers. Examples include soft drinks, packaged snacks, frozen meals, and sugary cereals.

After China, India is the second largest producer of food. The food processing industry in India has witnessed significant growth due to changes in consumption patterns and the overall expansion of the economy [2]. In the past, India's food processing sector primarily focused on, packaging, food preservation and transportation. However, the sector has broadened its focus as a result of the introduction of new markets and technological advancements. It now encompasses a wide range of products, including processed and frozen fruit, ready-to-eat food, beverages, Processed vegetable products, meat and marine products, etc. This shift towards processed food exports has led to a transformation in India's traditional food export patterns [3].

India's food processing industry has experienced remarkable growth due to changes in consumption patterns and the overall expansion of the economy [4]. The shift in consumer preferences from cereals to diverse products like milk, vegetables, and processed foods has further fueled the development of the food processing industry in India. The Indian food processing business is sizable, but there is still an opportunity for growth, as it only represents 2.3% of global trade in this industry. (MoFPI, 2023). However, it is worth noting that the industry is primarily export oriented (APEDA, 2023). Setting up fruit and vegetable processing units does not require an industrial license, which promotes ease of doing business in this sector

[5]. Due to continuous efforts Processed food contributed 22.6% of food exports from India in the financial year 2021-22 and it has been rising continuously from 14.9% in 2017-16 to 22.6% in 2021-22.

1.1 Objective

The aim of this study is to evaluate the export competitiveness of processed food products from India. The primary objective is to assess the comparative advantage of these products and analyze their export potential over a specified time period. Through an examination of export trends and patterns in the processed food sector, this research seeks to provide valuable insights into the performance and opportunities within the Indian processed food industry.

2. MATERIALS AND METHODS

2.1 Sources of Data

The study was mostly undertaken on a macro framework based on secondary data. The yearly data on export value have been compiled from various sources like the Agricultural and Processed Food Products Export Development Authority (APEDA), Food and Agricultural Organization (FAO) and Agricultural Processed Food Product Export Development Authority (APEDA), International Trade Centre (ITC). The data on the export potential of selected processed foods is obtained and compiled from the International Trade Centre (ITC) export potential map. Primary data about the Free On-Board Prices of the Processed foods were collected from Relish Agro Foods India Pvt. Ltd., Phoenix Frozen Foods India Pvt. Ltd., Sankalp Recreation Pvt. Ltd., and Global Gourmet Pvt. Ltd. and it is used to calculate the averagNominal Protection Coefficient of the exported commodities. NPC of specific commodities is used to explain the competitiveness of specific commodities that contribute in large amounts by value to the export of specific commodities of the HS code.

Processed foods, especially ready-to-eat foods exported by the Food Processing industries around Anand, were selected. These food products account for nearly 716 million dollars' worth of exports out of a total of 3.1 billion dollars' worth of exports of all Food Products (processed or preserved).

2.2 Analytical Tools

2.2.1 Export potential

It is an expected level of trade for a product that combines three key elements.

Supply: The projected market share for a product supplied by a specific country.

Demand: The projected market imports of a product by a country while considering market access

2.2.2.1 Ease of trade

It captures the relative strength of the trade relationship between the countries.

The export potential analysis identifies untapped export potential, market opportunities, and potential diversification of exports across 226 countries and territories, covering 4,363 different products. It serves to identify promising products, markets, and suppliers for export expansion.

2.2.2.2 Unrealized potential

This measure quantifies the deviation between potential exports and actual exports. When actual exports exceed potential exports, it may indicate exceptional export performance in certain markets, while other markets may be overlooked. Conversely, a high untapped potential value indicates opportunities for export growth if obstacles like regulations or buyer-seller mismatches can be addressed.

2.2.2.3 Actual Exports

The value of actual exports is calculated as an average of direct and mirror data from reliable reporting sources over the past five years. Actual exports include only exports to markets where the country has identified export potential and can be equal to or lower than export values reported in other trade databases. To study the export competitiveness of processed food products.

2.2.2 Compound annual growth rate (Exponential growth model)

India's Processed food export growth was studied by using the exponential growth model of type $Y_t = ab^te$. Exponential Growth is preferred because the growth rates are easier to predict than absolute changes [6].

$Y_t = ab^te$

Y_t indicates the Dependable variable (The value of exports of the year t) to be used to calculate the growth rate.
Y indicates the Export (Value) of selected Processed foods.
a indicates Intercept.
b indicates the Regression coefficient.
t indicates the Time variable.
e indicates Residual term.

The above equation's linearly converted estimating form is

$$Ln\ Y_t = Ln\ a + t\ ln\ b + ln\ e$$

By converting the above equation into natural logarithmic form, we get

$$CAGR = [(anti\ ln\ B)-1] \times 100 \quad (1)$$

2.2.3 Revealed comparative advantage (RCA)

Balassa Index is calculated to determine the RCA of the selected commodities exported [7].

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Balassa Index (BI): Balassa defined the method of calculating the revealed comparative advantage. It is a ratio of traded products of the industry by a particular country to the world and the total trade of that country to the world [8].

$$Rih = (Xih / Xit) / (Xwh/Xwt) \quad (2)$$

Where,

Rih= revealed comparative advantage ratio for India in product h
Xih = India's exports of product h
Xit = total exports of India
Xwh = world exports of product h
Xwt = total world exports

2.2.4 Nominal protection coefficient (NPC)

The nominal protection coefficient (NPC) is a quantitative indicator used to evaluate a country's competitiveness in relation to a specific commodity within a free trade context. It is calculated by comparing the domestic price of the commodity to the world reference price, also known as the border price. By assessing this ratio, the NPC provides valuable insights into the level of protection or competitiveness a country's domestic market offers for that particular commodity. Essentially, the NPC serves as a direct measure of how well a country's pricing and market conditions position it in the global trade landscape for the given commodity. It is the most accurate index to describe the competitiveness and comparative advantage of a commodity to export or import [9].
Symbolically,

$$NPC = Pd/Pr \quad (3)$$

Where,

NPC = Nominal Protection Coefficient
Pd = Domestic price of the commodity in question
Pr = World Reference Price of the Commodity in question

The Nominal Protection Coefficient (NPC) helps us decide if a commodity is competitive. When the NPC is less than one, it means the commodity is competitive. This means that it can be a good substitute for imports or it's worth exporting. On the other hand, if the NPC is greater than one, it means the commodity is not competitive. This means it's not a good substitute for imports or it may not be profitable to export it.

Table 1. Selection of processed food products

ITC HS Code	Products
200190	Vegetables, fruit, nuts and other edible parts of plants, prepared or preserved
200490	Vegetables and mixtures of vegetables, prepared or preserved otherwise than by vinegar or acetic acid, frozen
190590	Bread, pastry, cakes, biscuits and other bakers' wares, whether or not containing cocoa; communion wafers, empty cachets of a kind suitable for pharmaceutical use, sealing wafers, rice paper and similar products
200410	Potatoes, Prepared or preserved otherwise than by vinegar or acetic acid, frozen
210690	Food preparations, not elsewhere specified

2.3 Research limitations

Because of the limited time and other resources available to the investigator, the study was undertaken with the following limitations.

- This project is mainly based on secondary data and due to the non-availability of some data; reliability is the major limitation of this project.
- Some of the information and data collected is limited by Geography and resources.

3. RESULTS AND DISCUSSION

3.1 To Examine the Export Potential of Processed Food Products in India

From Table 2, it can be understood that the export potential of agro-processed foods was more than 7.9 billion dollars and the Unrealized Potential of 4.5 billion dollars (without Processed Fruits and Vegetables, Milk and Meat Products). Among them, Food Products (Processed or Preserved) have the highest potential and Unrealized potential. These products include most RTE products exported like Pickles, Paratha, RTE curries, and snacks like frozen samosa, chips, etc.

Table 3 clearly indicates the presence of export potential and unrealized potential for selected processed foods. This signifies the substantial opportunities available for manufacturers to expand their exports in these food categories. It highlights the untapped market potential that can be capitalized upon by manufacturers to enhance their export volumes and grow their business.

From Table 4 following observations were made:

The United States, Saudi Arabia, and China were identified as the countries with the largest unrealized potential for bread, pastry, and other baked foods. Similarly, the United States, Saudi Arabia, and Japan exhibit significant untapped export potential for preparations of vegetables, fruits, nuts, and other edible parts of plants. Saudi Arabia, the United Arab Emirates, and Guyana present unrealized potential specifically for potato preparations, with a value of 23 million dollars. For vegetables and mixture of vegetable preparations, Japan, the United States, and Brazil were the countries with the highest unrealized potential, amounting to 286 thousand dollars. Lastly, the miscellaneous food preparations, which were not specified elsewhere, highlight the United States, China, and Vietnam as the countries with unrealized potential in this sector. Exports to some Countries were more than the Export potential Provided by ITC trade map shows that the exporters.

3.2 Export Performance of Selected Processed Foods Exported from India

The growth rate Calculated from formula-1 was used to understand the trend and performance in exports of processed foods. Growth of India's export of processed foods for the period of 2012-21 was 3.1%, it was 1.47% during the period of 2012-16 and it increased to 6.92% during the period of 2016 to 2021. This shows the increasing exports at a rapid rate. A similar trend of increasing growth rate was observed in all the top destinations, except for the destinations like China where its CAGR has fallen from 15% to 10.3%, but still have one of the highest growth rate. The USA was the largest importer of Agro Processed Foods with a share of nearly 13% having a High growth rate (CAGR of 9.75%).

Among the selected Products the growth has been fastest in Miscellaneous Preparations (210690) with a growth rate of 16% approximately. The largest importer was the USA and its imports from India were growing at a rate of 18% and was growing for the last 7 years. Exports to UAE and Australia were growing at a rate of 8.2% and 8.5% respectively.

Bread pastry and other baked foods have been growing at a rate of 10.3%. The growth of the USA was the fastest with a growth rate of 14.8% followed by Canada UAE and Australia.

In vegetable fruit and nut preparations (200190) the exports grew at a rate of 5.9%. Exports to the UK were observed to be stagnant for the last 10 years and the highest export growth rate was observed with Canada at 21% followed by Netherlands and Germany at 14% approximately. Potato Preparations (200410) was observed to be growing at a rate of 8.7% top importers were USA, Nepal and UAE. The exports to the top 5 destinations were observed to be inconsistent, but they grew at a rapid pace in the last three years.

In Vegetables and Mixture of vegetable Preparations (200490), the growth in exports was 8.4%. the exports to Saudi Arabia have been increasing at a rapid pace during the time of 2017 to 2021. Exports to Canada (the sixth

largest importer) were growing at a rate of 15.8%. whereas imports of the largest importer USA were growing at a rate of 11% and the export to all other countries were growing at a rate of 6 to 9%.

From the value of RCA Provided in Table 5, it was inferred that; India has a comparative advantage in exporting processed foods with HS codes 200190 and 200490. However, it lacks a comparative advantage in exporting processed foods with HS codes 200410, 190590, and 210690. Overall, India has a comparative advantage in the export of agricultural processed foods, with an RCA value of 1.564. This indicates that India was relatively efficient and competitive in this sector.

3.2.1 Key findings

The nominal protection coefficient (NPC) calculated from formula-3 was used to assess the comparative advantage or competitiveness of selected products within the framework of a free trade regime. The analysis was conducted on highly processed foods, such as Samosa, Paratha, Roti, Kachori, Chutney French Fries and mango Pulp, which were exported by the companies in Anand to study their competitiveness in international markets. This was evident from the NPC values being less than unity, indicating that these products have a comparative advantage and are favorable for export to other countries.

According to Table 6, Frozen Snacks such as Samosa, Paratha, Roti, Pickles, Mango, and Kachori had an NPC value of less than unity. This implies that these products were competitively positioned in international markets, allowing the exporting company to benefit from their strengths and exploit opportunities for trade. However, the advantage of Pickles and Kachori was only marginal. On the other hand, Chutneys (Mint, Coriander, Coconut) lacked export competitiveness in the United Arab Emirates, Saudi Arabia, and Australia. Additionally, French fries did not possess a competitive advantage in any of the countries the company was exporting to, making them unprofitable for export.

Table 2. Export potential of major processed foods

Processed foods			
Subsectors of exports	**Export potential in $**	**Actual exports in $**	**Unrealized potential in $**
Food Products (Processed or Preserved)	5.5bn	3.1bn	3.1bn
Nuts	1.3 bn	617 mn	766 mn
Pulses	487 mn	294 mn	283 mn
Beverages	345 mn	241 mn	263 mn
Cocoa beans & products	264 mn	186 mn	167 mn
Fruits (Processed or Fresh)	2.3bn	0.94bn	1.5bn
Processed Vegetables (Processed or Fresh)	1.9bn	0.97bn	1bn

(mn =Million Dollars, bn =Billion Dollars)
Source: ITC Export Potential Map

Table 3. Export potential of selected processed foods at hs 6 level from india

HS CODE	**PRODUCT LABEL**	**Export potential**	**Actual exports**	**Unrealized potential**
190590	Bread, pastry and other baked foods	247 mn	178 mn	142 mn
200190	Vegetables, fruit, nuts and other edible parts of plants, prepared or preserved	99mn	69mn	50mn
200410	Potatoes, prepared or preserved frozen	38mn	37mn	28mn
190219	Uncooked pasta, not stuffed or otherwise prepared, not containing eggs	22mn	12mn	14mn
200490	Vegetables and mixtures of vegetables, prepared or preserved frozen	21mn	23mn	7mn
210690	Food preparations, n.e.s.	919mn	409mn	595mn

(mn = in millions)
Source of data: ITC Trade Map, UNCOMTRADE DATABASE

Table 4. Unrealized potential of selected processed foods of most important destinations

	Export Potential in Million $					Unrealized Potential in Million $				
Country	**190590**	**200190**	**200410**	**200490**	**210690**	**190590**	**200190**	**200410**	**200490**	**210690**
United States	24	26	1.7	7.7	171	-	21	1.3	0.25	95
United Arab Emirates	37	7	2.8	1	30	27	2.3	2.5	-	-
Saudi Arabia	16	7.3	4.8	0.93	44	12	4.7	4.4	0.03	40
United Kingdom	6.3	7.2	-	0.51	13	-	-	-	-	-
Canada	6.3	4	-	0.5	-	-	-	-	-	-
Australia	11	2.9	1.7	-	17	-	-	0.7	-	-
Viet Nam	5.3	1.9	-	0.16	51	4.5	1.8	-	0.14	50
China	11	-	0.87	-	65	10	-	0.3	-	64
Japan	4.7	3.4	1.8	3.1	-	4.2	3	1.8	3	-
Germany	3.9	8.3	-	0.25	-	2.4	2.4	-	0.1	-

Source of data: ITC Trade Map, UNCOMTRADE DATABASE

Table 5. RCA values of selected processed food products exported from india

HS Code	Commodity	RCA
200190	Vegetables, fruit, nuts and other edible parts of plants, prepared or preserved by vinegar	2.821
200410	Potatoes, prepared or preserved frozen	0.343
200490	Vegetables and mixtures of vegetables, prepared or preserved frozen	1.451
190590	Bread, pastry	0.516
210690	Food preparations, n.e.s.	0.563

Source: Calculated from Secondary data collected from ITC Trade map 2023

3.3 To study the Export competitiveness of processed foods

Table 6. NPC values of selected processed food products exported from india (2022-23)

HS Code	Products	USA	UK	Canada	Saudi Arabia	UAE	Australia
200490	Samosa	0.42	0.20	0.31	0.36	0.34	0.38
190590	Paratha	0.24	0.25	0.32	0.59	0.47	0.37
190219	Roti	0.16	0.12	0.17	0.24	0.20	0.17
200190	Chutney	0.49	0.47	0.49	1.11	1.12	1.02
200410	French Fries	1.19	1.23	1.18	1.10	1.06	1.11
210690	Pickles and Kachori	0.46	0.51	0.49	0.96	0.94	0.64
080450	Mango Pulp	0.32	0.35	0.33	0.56	0.57	0.76

Source: Calculated from Primary data.

4. CONCLUSION

The analysis of the data reveals a significant unrealized potential in the export of processed food products, amounting to $3.1 billion. This presents a valuable opportunity for exporters to expand their business operations in the food processing industry. The findings emphasize the importance of capitalizing on this untapped potential and leveraging it to achieve substantial growth in the sector.

To maximize the opportunities in the food processing sector, exporters should consider adopting strategic approaches like diversifying their product offerings, conducting market research to identify the demand ensuring product quality, infrastructure improvements, complying international regulations, leveraging government support programmers and incentives [10] like Merchandise Exports from India Scheme (MEIS), Market Access Initiatives (MAI) Scheme, Trade Infrastructure for Export Scheme (TIES) [11-12].

The data also highlights specific countries with untapped potential in various food product categories. The study also highlights the countries where the selected food products have the comparative advantage. By targeting countries such as the United Arab Emirates, Saudi Arabia, China, Vietnam, the United States, Germany, and Japan, exporters can strategically expand their market presence and maximize their export performance [13-15].

5. SUGGESTIONS FOR FURTHER STUDIES

An attempt has been made to suggest some topics for future studies, which are considered important by the investigator and are given below.

1. The researcher conducted the study within time and resource constraints limitations. It is important to note that a single study cannot provide sufficient evidence for making generalized conclusions. Hence, it is crucial to replicate this study in various parts of the country.
2. It is recommended to conduct similar studies at different time intervals to enhance the validity of the findings. This repetition will contribute to strengthening the reliability of the research.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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