

INDIAN FOOD PROCESSING SECTOR

5 point call to action to tap export potential

September 2022

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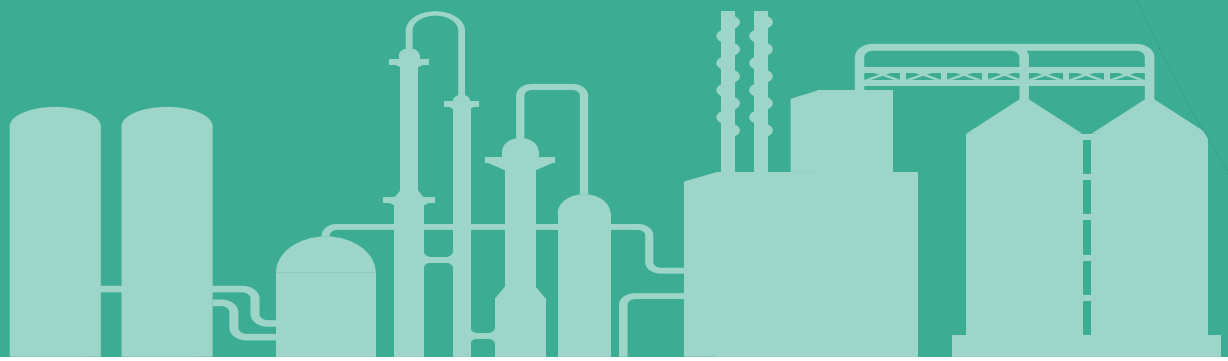
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Message from Hon'ble Minister of State for Food Processing Industries and Jal Shakti

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भारत सरकार
MINISTER OF STATE FOR
FOOD PROCESSING INDUSTRIES
AND JAL SHAKTI
GOVERNMENT OF INDIA

Date :12.09.2022

Message

Food processing sector plays a pivotal role in the socio-economic development of the Nation. Being a production hub of various kind of agri-horticulture produce and with the global rise in demand for Processed Food/ healthy & organic food / RTE / RTC, the Indian food processing sector can leverage the available resources and contribute significantly to value addition, employment generation and boosting exports of the country.

The Government is committed for the development of this sector and has initiated various progressive reforms and schemes for the holistic development of the food processing sector. The Government and industry needs to work closely to ensure taking the food processing sector to a higher growth trajectory. Suggestions/ recommendations for policy changes and interventions given by the industry are considered appropriately by the Government. In this respect, the present publication and suggestions for boosting exports will also be very useful.

(Prahlad Singh Patel)

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Message from Secretary, Ministry of Food Processing Industries

Anita Praveen, IAS

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भारत सरकार
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Secretary
Government of India
Ministry of Food Processing Industries

MESSAGE

The food processing industry is playing an increasingly important role in the Indian economy. The agricultural sector directly or indirectly engages almost 46% of India's workforce. Whereas the food processing sector has almost 4 times higher gross value add per employee than agriculture, which can translate to significant benefits for all. Thus, it becomes essential for India to build upon its strong position in terms of agricultural produce, and make concerted efforts and investments in the industry – especially in categories that are set to witness high growth in demand in upcoming years – to take center stage in production and export of processed food products. The value generated thus will be crucial in the socio-economic upliftment of millions of Indians.

This report aims to look at India's positioning and future growth opportunity in the processed food export sector. It also captures the key underlying industry drivers and consumer trends that will be of prime concern for the stakeholders in this industry. I am confident that this joint effort by FICCI and BCG will be instrumental in inspiring discussion and action among the stakeholders in order to grow the processed food exports.

Dated: 09 September, 2022

(Anita Praveen)

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Message from the Federation of Indian Chambers of Commerce and Industry (FICCI)

India is a global giant in terms of production in the agriculture and allied sectors. The industry in India is worth over USD 400 Bn, and we are ranked among the top producers across multiple categories. The importance of the sector is further accentuated by the fact that it affects millions of lives. The sector has grown in recent years due to push from private and public actors, and favorable macroeconomics. Now, it is time to focus on the food processing industry where India has the opportunity to become a market leader.

The food processing industry forms an important segment of the Indian economy and we believe that the next wave of growth will come from the food processing industry. This sector is highly employment intensive and unlocks significant value. Thus, advances in the food processing sector will have significant impact on socio-economic growth of the country.

We now live in an increasingly connected world. Consumers everywhere have access to products from across the globe. At the same time, there have been fundamental shifts in the consumer behavior as well – both due to and irrespective of – the COVID – 19 pandemic. With growing awareness, health consciousness, need for convenience and improving lifestyles, consumers everywhere are increasingly moving towards processed & packaged foods. These have created new opportunities for the food processing industries around the world. It, therefore, becomes crucial for Indian food processing sector to focus strongly on exports – as we not only have the opportunity, but also the capability to address the global market.

This is the inspiration behind the report 'Indian Food Processing Sector – 5 point call to action to tap export potential'. The report baselines the position of Indian processed food industry - setting it against the current Indian and global context. It identifies key levers that will affect processed food exports going forward and then building on them proposes actionable steps and insights for all stakeholders involved. We are thankful to BCG who has worked alongside FICCI in bringing out this report. I hope the concerned stakeholders will find the report a good read.



Arun Chawla
Director General, FICCI

Message from FICCI Food Processing Committee

We are living in an increasingly open and globalized world. Consumers now have access to goods and suppliers from all around the world – a fact that consumers are leveraging to achieve the highest value goods at the best possible price. The same is true for processed food products as well – with many global brands becoming a household name in India, as well as many Indian brands making their mark worldwide.

This has created an opportunity to cater to a much larger market and generate huge returns. However, India still lags in terms of processing and export of food products, despite being a global leader in agriculture produce. For example, India is the largest producer of dairy, but ranks 46th in terms of export. Similarly, India is the 2nd largest producer of vegetables, but ranks 15th in exports. India has the potential to become a processed food export powerhouse - with a rich agricultural resource base, strategic geographic location and proximity to food-importing nations and an extensive network of food processing training, academic and research institutes. Thus, it is crucial that the industry as a whole – along with all stakeholders across the value chain – come together and make concerted efforts in this direction, and achieve a position of supremacy in processed food exports.

Further, the demand for processed food products is on the rise in India driven by post COVID-19 lifestyle and demographic changes. This signals a huge opportunity for the Indian food processing industry – to rise to the occasion and address this space with products that satisfy the highest standards of quality and made with state-of-the-art processes and a robust and sustainable value chain. The Indian food processing sector has started taking first steps towards these goals, and with improved collaboration among stakeholder, we can see enormous returns from this sector in near future.

We are happy to note that to further highlight the export potential of the Indian food processing industry, the report – "Indian Food Processing Sector – 5 point call to action to tap export potential" is being released. This report identifies the challenges and also provides the way forward to the concerned stakeholders. We expect the report to further help scale up the sector's growth.





Hemant Malik
Chairman- FICCI Food Processing Committee & CEO- Food Division, ITC Ltd.





Srinandan Sundaram
Co-Chair- FICCI Food Processing Committee & Executive Director - Foods and Refreshment, HUL India

Foreword

Global consumption trends indicate a constant growth in the demand for processed food products. This demand growth increases with the level of processing - almost doubling when it comes to secondary and higher processing. This increased demand for processed food is also being shaped by changing consumer behavior. Consumers today are more demanding in terms of convenience, trust, health benefits, and sustainability. We foresee these trends to continue and thus accelerate the growth in the processed food sector. Further, food processing is known to generate significant socio-economic benefits - it creates additional employment and has a higher gross value add in the system. This additional value can be shared among all stakeholders leading to improved income and wellbeing levels.

This makes for a strong case for India to invest in the food processing sector with a special focus on developing its export competitiveness. There are multiple key inhibitors that the industry faces. Concerted efforts from both public and private stakeholders are required to address them and capture the huge potential that can subsequently be unlocked in this sector. To that end, we present this report - **India Food Processing Sector: 5 point call to action to tap export potential**. The report leverages a mix of global trends and industry knowledge - and backs them up with relevant cases from the industry. Building on that, the report identifies key challenges faced by the food processing sector, and proposes a 5-point plan - **"A-R-I-S-E"** - which can help grow the industry with a special focus on exports. The plan outlines action items for the various stakeholders in the food processing industry - ranging from structural collaboration to robust marketing - which we believe can address the key challenges faced by the sector, and can help propel India to the position of a global leader in food processing and exports.

FoodWorld 2022 presents a unique platform for the Food and Agriculture industry to come together and collaborate on the key issues faced by the industry, as well as promote best practices. We believe that the insights and action plan proposed in the report will be of help deepen that collaboration and help open up new avenues for growth for all stakeholders involved.





Sushma Vasudevan
Managing Director and Partner, BCG

Rachit Mathur
Managing Director and Partner, BCG



Executive Summary

India's food production industry is worth over USD 400 Bn[1] and is the primary source of livelihood for ~45%[2] of the country's population. India also has a strong position in food production globally and is ranked the second largest producer of agriculture and allied sector products (first being China).

However, the level of food processing in India across categories is low, especially in higher processing categories (~20%)[3] including secondary and above. To give an example, the level of primary processing in the fruits and vegetables category in India is a meager ~2% while the same is 70% in Brazil, 65% in USA, and ~23% in China[4].

Despite India's strong position in agri-production, the country lags in the export of food products (incl. processed). India's share of agri-production is 9.5% globally[1] while its share in the export of overall food products is 2-3%[5] - with share in export of processed food category even lower at 1-2%[5]. In terms of value, total agriculture and food related exports from India were valued at ~USD 31Bn in 2020 and the growth has been stagnant at <1% CAGR between the 2017-2020 period.

Globally, the demand for higher processed (i.e. secondary and above) food has been growing relatively faster (CAGR of 5-6%)[5] compared to unprocessed and primary processed category (CAGR of 1-3%)[5]. This demand is further expected to accelerate with structural shifts in consumer behavior like demand for convenience, focus on health and wellness, need for trusted brands, and rising awareness about sustainable products and impact on environment[5].

The food processing industry has a substantial positive socio-economic impact on the society through new job creation and increasing income levels. On average, the industry generates employment for ~8 people per rupees 1 Crore of investment as fixed cost which is higher than the industry average of ~5[6]. The gross value added per employee in the food processing industry is ~ 4 to 4.5 times higher compared to the agriculture industry. The higher GVA per employee, if shared with the players in the ecosystem including farmers, can significantly enhance their potential earnings.

There are, however, some key challenges presently being faced by the food processing industry which need to be addressed to enable the industry to achieve its potential.

Low cost competitiveness

While India is perceived as a low cost market due to relatively lower labor costs, processed food products are generally not cost-competitive. The same is driven by high cost of agri-produce due to low productivity as farming in India is dominated by smallholder farmers (SHF). These farmers have limited knowledge about the optimal use of agri-inputs and the prevailing best-in-class farming practices, and lack financial strength to invest in mechanization. For example, the cost of tomato production in India is ~2x[7] higher than in China due to low productivity with farmers not using right set of agri-inputs, fertilizers and pesticides.

Product quality concerns

In recent years, the export of Basmati rice (by volume) to Europe decreased by ~44%[8]. This was due to excessive use of Tricyclazole by Indian farmers, making the produce

1.FAOSTAT 2020; Current USD value. Includes total agriculture and aquaculture production by value.
2. Workforce Changes and Employment: Some Findings from PLFS Data Series - NITI Aayog (2022).
3. Study to determine the level of food processing in India - MOFPI (2021). The percentage of processing is based on production available for processing post adjustment of losses as well as any seed and feed allowance. The food categories considered include cereals, pulses, oilseeds, sugarcane, fruits, vegetables, livestock and fisheries.
4. FAOSTAT 2020.
5. UN Comtrade 2020 data - BEC Categories 1 for overall and 12 for processed food products.
6. Annual Survey of Industries 2020. Industries with employees less than 5 lakhs have not been considered.
7. Expert discussions, Study of Tomato Value Chain and its Financing: Report by College of agricultural banking.
8. Trade Promotion Council of India article – Basmati Rice and Pesticides Where does the fault lie? (2020); Secondary Research.



contaminated as per the newly imposed standards. Incidents like these point towards the fact that Indian produce has quality concerns in global markets. This is driven primarily by limited awareness among farmers with regard to the right kind of agri-inputs and best-in-class farming practices.

Limited brand strength in overseas markets

Perception of brands from India in the global markets is weak. India enjoys strong brand perception primarily among the Indian origin population overseas. Also, India has very few (~110) GI brands in agriculture and food category in the international markets compared to other countries China (~6,200) and UK (~1,500)[9]

Lack of infrastructure for processing, storage, and logistics

The lack of availability of common infrastructure for processing of food items is evident from the low levels of secondary and tertiary processing (~20%)[3] across food categories. Despite achieving significant growth in storage capacity, there is still a need to upgrade the facility with latest technology, as well as provide infrastructure at farm-gate level to minimize wastage.

Limited compliance to sustainability and ethical requirements

The food industry has a massive impact on the environment and accounts for ~26%[10] of the global green-house emissions. Also, there is an increasing realization on the social responsibilities involving fair working condition for workers. For example, around 8 in 10 respondents of an IBM survey in 2020 indicated that sustainability compliance is important for them - with 6 out of 10 willing to change their shopping habits. Therefore, there is expected to be an increasing preference for suppliers that are ensuring that production is in compliance with these norms. This will require countries to reorganize and develop their food value chains to comply with these requirements.

It's time that action is taken to grow the food processing industry in India. We have identified "A-R-I-S-E" - a 5-point action plan that can provide the food processing industry the necessary firepower to achieve its export potential.

Adoption of crop value chains by establishing crop-specific PPP model

A potential way of solving the challenges associated with quality and cost-competitiveness of agri-produce is through regulation of product specific upstream value chain by setting up of robust crop specific PPP models with support from the government and leading private players. The model should ensure adequate financial return for the stakeholders, promote equitable value sharing among stakeholders, and be supported with a robust implementation structure to drive the program. The key action steps required to be implemented for the development of a successful PPP model include:

3. Study to determine the level of food processing in India - MOFPI (2021). The percentage of processing is based on production available for processing post adjustment of losses as well as any seed and feed allowance. The food categories considered include cereals, pulses, oilseeds, sugarcane, fruits, vegetables, livestock and fisheries.
9. Global statistics on geographical indications (Total count by filing office) - World Intellectual Property Organization (WIPO).
10. Environmental impacts of food production article (our world in data website) which leveraged data from Poore and Nemcek (2018), UN FAO and AQUASTAT (2018).

- Develop a refined PPP business model with adequate return and security
- Identify and on-board the right stakeholders (including leading private players) required to support and grow the value chain
- Clearly lay out roles and responsibilities for each of the stakeholders within the eco-system
- Provide required additional support to the stakeholders including subsidies, favorable policies, etc.
- Lead overall orchestration of the program and set-up a Project Management Unit ("PMU") to monitor progress

The contribution of private players in ensuring a successful and robust PPP model to solve the challenges for crop specific value chain would be critical. They need to work closely with the farmers and provide them support on multiple fronts including:

- Identification of winning crop and variety selection required in processed food products
- Providing advice on best-in-class practices to be followed for farming
- Enabling access for farmers to right kind of agri-inputs at affordable prices
- Provide fair remuneration in short intervals to farmers to generate royalty
- Ensure assured demand offtake to provide stability to the farmers

A successful PPP model will have reciprocal benefits for the private players including consistent high quality supply at a fair price.

An example of a successful PPP model is from Andhra Pradesh where the state government partnered with private players for growth of banana production and exports from the state. The government also involved a research institute and local bodies, and provided financial incentives. The model was highly successful - with Andhra Pradesh emerging as the leading producer of bananas across India and seeing a massive growth in export of bananas from 250 Mt in FY-2017 to ~45,000 Mt in FY-2020[11].

Another successful example of a public-private collaboration for mutual benefit is from Vietnam - where Vinh Hoan a private player operating in the competitive market for pangasius - was able to emerge as the market leader by working closely with the farmers - controlling the quality of their produce and thereby differentiating in the end-market through quality. Further, this also enabled small farmers associated with Vinh Hoan to increase their sales and earn a higher income.



Reinvigorate promotion of Indian-origin brands globally

To increase penetration in overseas markets it is critical to improve the brand perception for Indian products. Establishing a strong brand can require significant investment and a lot of effort which can be difficult for a player to undertake individually. Therefore, it will be better if relevant stakeholders within the product specific value chain including food processors, exporters and relevant government agencies come together to pool their limited funds and combine their efforts to develop a common product specific brand with a consistent and harmonized branding strategy.

In Ecuador, 10+ private players operating in the shrimp market - traditionally a low-price market - came together and established a common brand anchored on quality. They established strict protocols for compliance and enabled customers to access information regarding shrimp production by simply scanning a QR code. They were able to differentiate their products in the market and command a premium.

Another example is from Chile where exporters and fruit growers came together to establish a common brand "Fruits from Chile" for their products and followed a harmonized strategy to jointly promote this brand in the overseas markets. The same led to removal of confusion

11. Secondary Research.

among buyers driven by the fragmented branding being followed earlier and helped change the perception of Chilean fruit industry in a favorable way.

The government should facilitate setting up an entity which orchestrates the creation of a common umbrella brand and product-specific sub brands. This entity can set guidelines and standards for marketing and branding, certification and provide support and incentives for brand adoption, through partnerships with ecosystem players.

Further, another important aspect related to branding is that related to Geographical Indication (GI) brands. It is important to develop GI brands in the country and ensure that products specific to geographical locations in India are not being falsely branded in international markets. This will not only help India carve a niche for itself but also enable it to charge a premium for such products. An example for the same can be of Darjeeling Tea where the GI brand was registered that helped protect it from falsely branded products, charge a premium, and penetrate into more countries.

India should also look to capitalize on the increasing preference globally of consuming food products that offer multiple health and wellness benefits. It should leverage its position in those food categories that are considered as healthy/super foods and where it has a strong position in production. Efforts should be made to promote health benefits of these products globally to drive their consumption and in establishing a strong credible Indian produce brand for these products. Some food categories where this can be explored include millets, turmeric and jackfruit. A good example to highlight here would be of the Almond Board of California who were able to increase sales of California almonds through strong brand promotion initiatives. They were able to achieve multi-fold growth over the years with exports increasing 7x from USD 624 Mn in the year 2000 to USD 4.6 Bn in the year 2020[12].



Institutionalize industry-academia collaboration to aid R&D

Technological advancement and development of new differentiated products is an important mechanism that can enable India to differentiate itself in the international markets. The best way to encourage the same is by promoting technological collaboration between leading private players and research institutes.

However, there will be certain challenges that will inhibit a successful industry academia collaboration - including limited industry representation in governing council of research institutes, use of outdated equipment/technology for undertaking research, and limited interaction between industry professionals and research scientists/academia.

To address these challenges steps should be undertaken to ensure adequate industry representation in the governing council with active participation in designing the research curriculum. Also, current industry professionals and retired industry experts should be made members of the research team with clear accountability. Further, private players should provide funding support for the research institutes to update their equipment and technology.



Set up collaboration among private players for setting up and sharing infrastructure facilities

There are challenges involved in developing and efficiently running the infrastructure facilities given the high setup and operational costs involved. For example, cold chain storage infrastructure requires significant setup costs and relatively higher operating costs in India (~USD 9 per pallet per month) is almost 3 times the cost in the developed countries. To address the prevailing challenges, it is important the private players come together and collaborate with each other. They should jointly set up and share infrastructure facilities (e.g. quality testing labs, cold storage and transportation). The same can have a double benefit in terms of enabling partners involved to together meet the significant investment that is required in setting up these facilities as well as drive cost efficiencies from economies of scale.

12. California Department of Food and Agriculture Statistics.



An example of the same can be the partnership between Pepsi and Nestle in Belgium and Luxembourg for their fresh and chilled products. They were facing higher costs in this region due to low business volume and therefore bundled their warehousing, packing and outbound distribution for fresh and chilled products to drive benefits from economies of scale.

Establish sustainability and ethical norms and ensure compliance

One of the key emerging trends is the increasing awareness and inclination amongst consumers for buying products that have been manufactured in compliance with sustainability requirements and in an ethical manner. There is a potential for Indian players to differentiate and promote the sale of their products through compliance with these norms. The government should support these players through establishment of a common body with the following key responsibilities:

- **Define sustainability and ethical norms** to be followed by taking into consideration the best-in-class norms across the globe
- **Increase awareness of important sustainability norms** among the Indian food manufacturers and the increasing preference among buyers globally for the same
- **Extend consultancy support** to help with compliance
- **Provide compliance certifications basis strict protocols** and independent auditing
- **Develop a strong brand** for their certification globally to enable Indian manufacturers that have received certification to build trust in the global market about their compliance

SECTION 1



Setting the context

The potential and opportunity that food processing presents for India can be summarized as follows:

1. India is amongst the largest (2nd rank globally) producer of agriculture and allied sector products.

2. India lags peers in higher-level processing of food products across categories (~20%[3] for secondary and above). Further, India's share of exports is merely 2.5% (incl. processed products).

3. Food processing industry has the potential to create substantial socio economic impact by enabling significant job creation and capturing a higher economic value to increase farmer income.

4. Globally demand for processed foods has been growing steadily (at 3-4%[5])with higher processed (i.e., secondary and above) food products growing relatively faster (CAGR of 5-6%[5])as compared to unprocessed and primary foods (CAGR of 1-3%[5]), underpinned by changing consumer preferences

1 India's leadership in agri-production

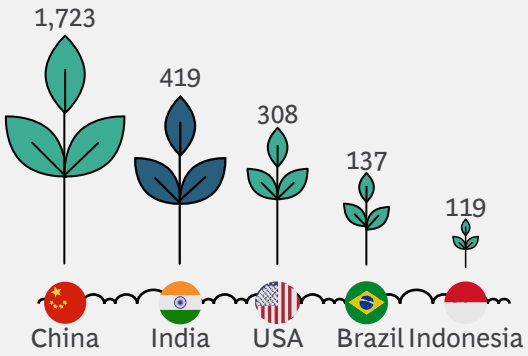
India is the second largest producer of agricultural products (after China) with production over USD 400 Bn in FY2020[1]. It holds great significance for people of India given it affects the livelihood for ~45%[2] of India's total population. This sector has shown strong growth over the last few years driven by new innovations, increasing productivity, push by the government as well as the private sector. The impact of these measures was further amplified by favorable macroeconomic factors on the demand side (rise in disposable income and population growth.)

1.FAOSTAT 2020; Current USD value. Includes total agriculture and aquaculture production by value.
2. Workforce Changes and Employment: Some Findings from PLFS Data Series - NITI Aayog (2022).
3. Study to determine the level of food processing in India - MOFPI (2021). The percentage of processing is based on production available for processing post adjustment of losses as well as any seed and feed allowance. The food categories considered include cereals, pulses, oilseeds, sugarcane, fruits, vegetables, livestock and fisheries.
5. UN Comtrade 2020 data - BEC Categories 1 for overall and 12 for processed food products.

India's standing globally in agriculture and allied sector production

India is the second largest producer of agricultural products across the globe…

Top 5 nations across the world in terms of agricultural production in FY2020 (in Bn USD)[1]



..and has leadership position across multiple food categories[1]

Category	India's rank in total produce	Salient Features
Dairy	1st	India produces around 25% of the world's total dairy production (200 Million tons)
Cattle	1st	India has the largest cattle and buffalo population in the world
Marine	2nd	India is second largest fish producer in the world (16 Million tons)
Food grains	2nd	India produces around 15% of the world's total cereal production (272 Million tons)
Fruits and Vegetables	2nd	The diverse agro-climatic zones in India make it possible to grow almost all varieties of fresh fruits and green vegetables in India

2 Comparing processing and export capability with peers

The level of food processing in India across categories is significantly low - especially in higher processing categories including secondary and tertiary processing. For example, the level of primary processing in the fruits and vegetables category in India is ~2% while the same is 70% in Brazil, 65% in USA, and 23% in China[4]. A similar position is observed in other categories as well.

Low level of secondary, tertiary processing across food categories[3]

Category	Primary Processing (In %)	Secondary Processing (In %)	Tertiary Processing (In %)
Cereals	-33%	-23%	-6%
Pulses	-57%	-35%	-4%
Oilseeds	-50%	-26%	-17%
Sugarcane	-84%	-40%	-40%
Fruits	-3%	-1%	-1%
Vegetables	-2%	-1%	-1%
Livestock	-20%	-4%	-1%
Fisheries	-8%	-2%	-1%
Total	**-41%**	**-20%**	**15%**

1.FAOSTAT 2020; Current USD value. Includes total agriculture and aquaculture production by value.
2. Indian Agriculture and Allied Industries Report - IBEF (Nov 2021).
4. FAOSTAT 2020.

India's share of agri production is 11%[1] globally. However, India's share in the export of overall food products is 2-3%[5] with the share in exports of processed food category even lower at 1-2%. In terms of value, total agriculture and food related exports from India were ~USD 31Bn[13] in 2020. At a sub-category level, while India is among the top 3 producers for major food sub-categories including cereals, fruits and vegetables, and dairy products, it significantly lags its peers in terms of exports. For example, in Dairy – while India is the highest producer in the world, it is ranked 50th in terms of exports; in Vegetables – India is the 2nd largest producer but 15th in terms of exports.

A detailed comparison of India's position across food categories in terms of production and exports including export of food products in processed form[14]

Category	India's total produce (Bn USD), Rank	India's total export (Bn USD), %, Rank	India's processed export (Bn USD), %, Rank
Cereals	116, 2nd	8.7, 7%, 5th	1.1, 0.8%, NA
Fruits & Nuts	69, 2nd	1.3, 1%, 25th	0.5, 0.9%, 18th
Dairy	92, 1st	0.18, 0.2%, 46th	0.18, 0.2%,41st
Meat	3.9, 5th	3.1, 2.3%, 15th	0.1, 0.4%, 20th
Marine	16, 2nd	5.1, 5%, 4th	0.7, 4.6%, 4th
Vegetables	75, 2nd	1.2, 1.5%, 15th	1.7, 3.6%, 18th
Tea Coffee and Spices	5, 3rd	3.6, 7.3%, 3rd	1.0, 11%, NA
Sugar	8, 4th	2.7, 6.5%, 2nd	0.3, 3.7%, NA
Other	34, NA	5.1, NA	0.4, NA
Total	**419, 2nd**	**31, 2.5%, NA**	**6, 1.2%, NA**

India has a strong position in terms of production, but its position weakens in terms of export of food products - specially in processed form across categories

3 Socio-economic impact of food processing industry

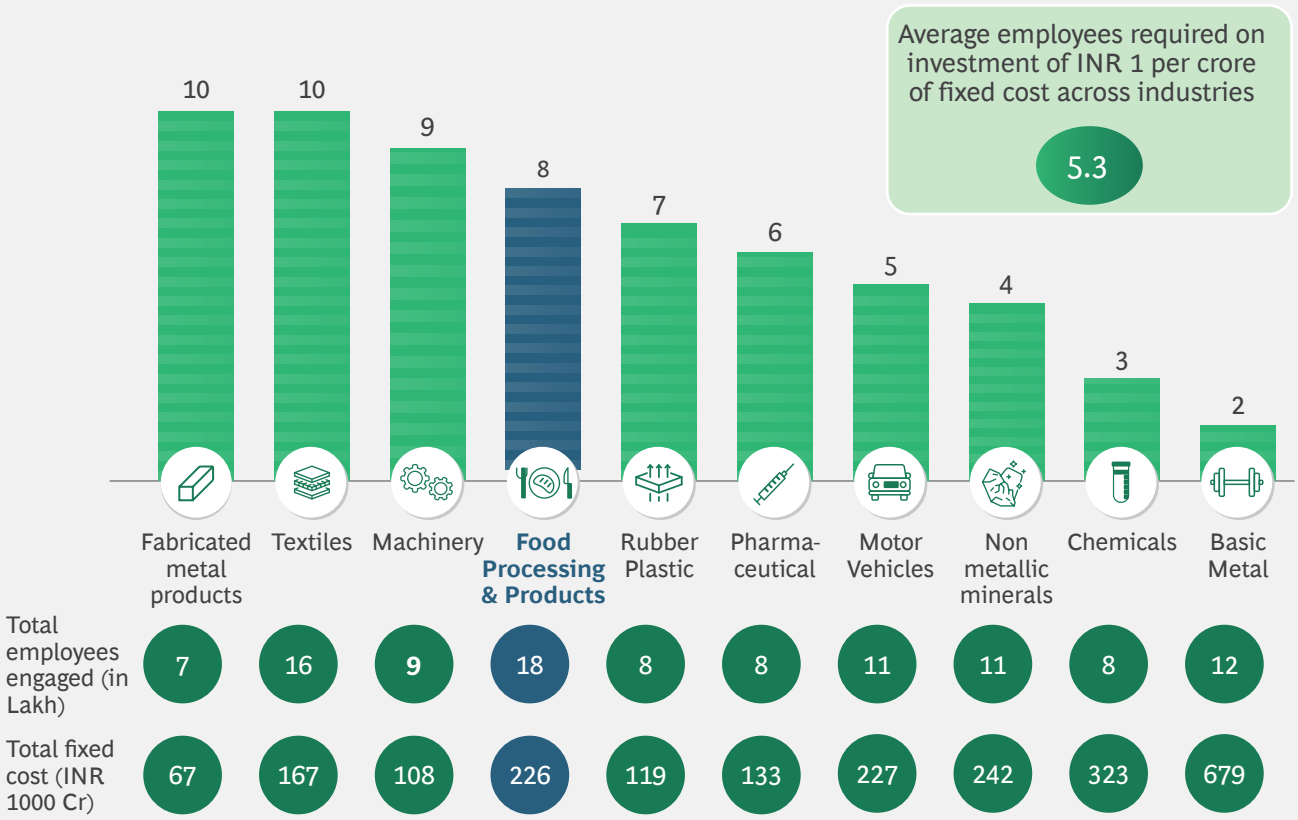
The development of processed food category has a significant favorable impact on the society as it enables creation of new employment opportunities and also provides a significant boost to income levels by capturing a higher economic value.

1.FAOSTAT 2020; Current USD value. Includes total agriculture and aquaculture production by value.
5. UN Comtrade 2020 data - BEC Categories 1 for overall and 12 for processed food products.
13. MoFPI Annual Report FY 2022. CAGR for 2017-2020 used to avoid effect of COVID-19.
14. APEDA website, FAO, UN Comtrade, HLEG Report. Others include milled grain, vegetable extracts, edible fats, beverages, spirits, miscellaneous edible preparations, cocoa, cereal preparation, flour, preparations of vegetables and fruits. Basis 2020 data. India meat production ranking taken basis volume.
Note: Primary processing relates to conversion of raw commodity to one that is fit for consumption. It involves steps such as drying, threshing, cleaning, grading, sorting, packing, etc. Secondary processing involves creation of value added products like bread, wine, sausages, etc. The large scale commercial production of ready to eat food items has brought in another category to food processing, viz., tertiary processing (Government of India, 2019).

In terms of employment creation, the average number of jobs created by the food processing industry per crore of fixed cost investment is ~8[15] - which is higher than the industry average of ~5[15]

Comparison of employment creation by different industries on investment of INR 1 Crore as fixed cost[15]

Employees required on investment of INR 1 crore as Fixed Cost by different industries



The food processing industry also helps to capture a significantly higher economic value. During FY19, the gross value added ("GVA") per employee in the food processing industry was ~INR 3.17 Lakhs[16] - about 4 to 4.5 times the GVA per employee in the agriculture sector which was ~INR 70,000[17] during the same period. The higher GVA per employee, if shared with the players in the ecosystem including farmers, can significantly enhance their potential earnings. A good example to highlight here would be Pepsico - which has contract farming agreements with potato farmers. Pepsico provides the farmers support with regard to cultivation and logistics.

To summarize, given India's strong position in production of agriculture products, there is huge opportunity for India to develop its food processing industry with a strong focus on the export markets. The same will have a significant impact on the socio-economic growth of the country - with the food processing industry promoting job creation opportunities and capturing higher economic value. Even within the food industry there are sub-segments where the opportunity is significantly untapped and where India has a strong starting position - such as fruits and vegetables, dairy and cereals. However, there are also certain challenges which are inhibiting the growth of the food processing industry in India. In the subsequent section of this report, we have highlighted the major challenges and shared a 5-point action plan **"A-R-I-S-E"** to address these challenges and propel the growth of this industry.

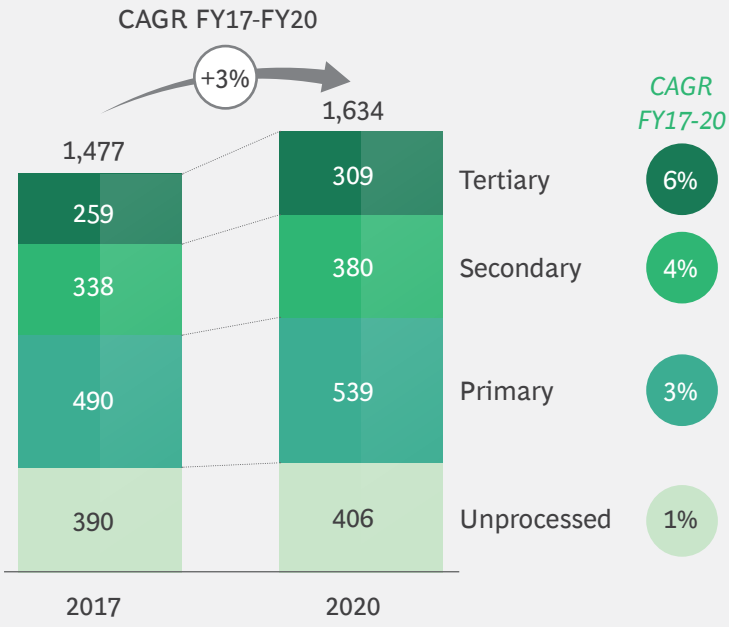
15. Annual Survey of Industries FY2020. Industries with employees less than 5 lakhs have not been considered.
16. MoFPI Annual Report FY 2022. Considering both registered and unincorporated workers under constant growth assumption.
17. SDG National Indicator Framework Progress Report - MoFPI (2022).

4 Growth in demand for processed foods

The global export market for processed food category is growing much faster than the same for unprocessed food category in terms of global exports - secondary and higher processed foods have grown at 5-6% while unprocessed and primary have grown at 1-3% CAGR. This is driven by rising demand for processed food products due to increasing urbanization, higher disposable incomes, emergence of nuclear families, and preference for convenience food products. Also, selling food in processed form enables commanding a higher price and thereby capturing a larger economic value. For example, processing of meat adds 12.7% value, whereas manufacturing of prepared meals adds 30% value to the output as per an RBI estimate.

Growth of global export for food products basis different processing levels[5]

Total food exports across the globe (in USD Bn)



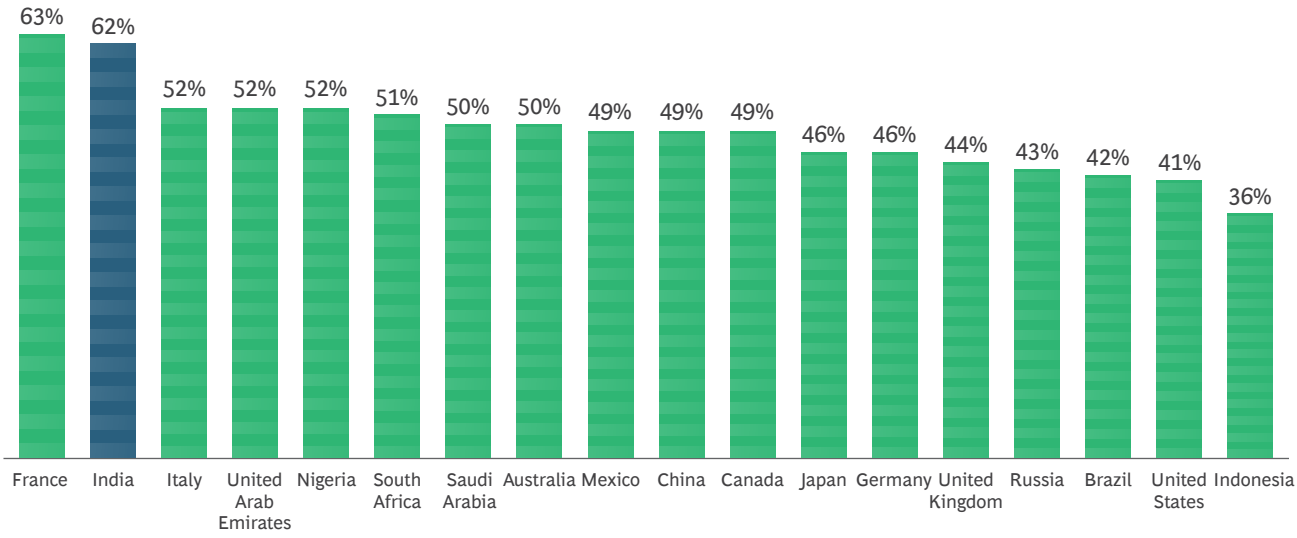
The growth in exports is increasing as we move up the processing form category with the same being higher for tertiary followed by secondary

The rise in preference of processed food is underpinned by two global consumer megatrends - the increasing demand for convenience, and the rising focus on health and wellness. These trends are visible in day to day consumer behavior, and thus present a unique opportunity for the food processing industry to leverage.

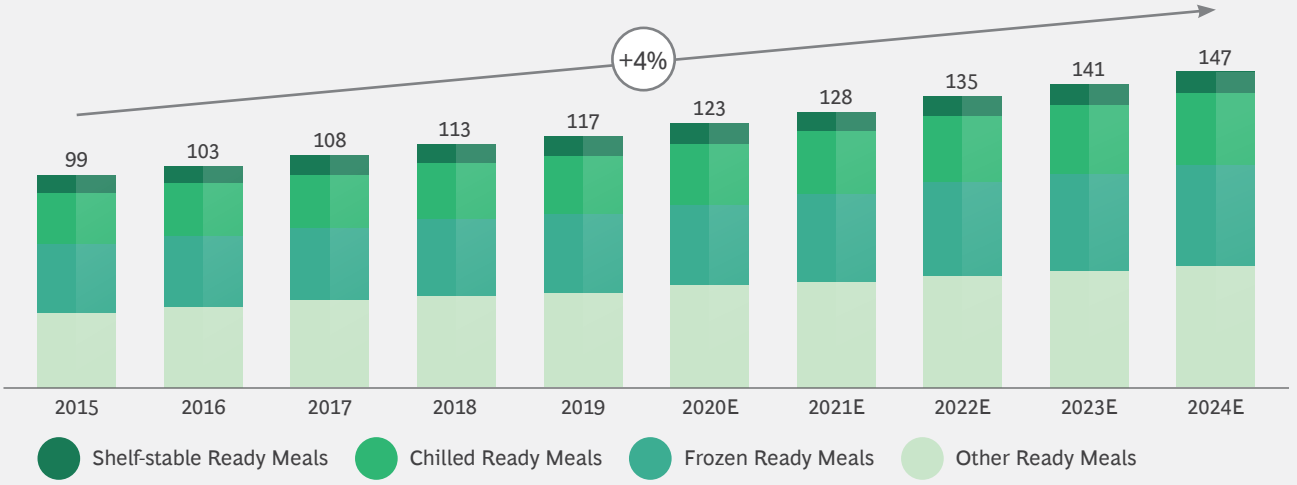
Demand for convenience is a structural shift in consumer behavior – more and more consumers are demanding convenience with respect to their purchases. This is driven by the fact that consumers nowadays are pressed for time – a pattern we can see across all geographies. Indian consumers would be willing to even select a costlier alternative if that allows them to save time[19]. Time compression has become a megatrend with multiple underlying factors – such as explosion of online activities[20], increasing participation of females in the workforce[20], etc. Time compression and the demand for convenience is expected to shape the future of the processed food sector, as we can expect an uptick in the demand of quick and easy meal solutions such as frozen, canned or packed foods. These categories have emerged as areas where consumers are expecting increasing expenses in the next 6 months[21].

5. UN Comtrade 2020 data.
18. Racing towards the next wave of retail in India - BCG x RAI (2020).
19. Coverage- Metro – Tier 3 cities (16 cities), (N = 5,000). Source: BCG CCI consumer trends survey and study, 2019. Ten Trends That Are Altering Consumer Behavior In India - BCG (2019).
20. Megatrends Library: Most Popular Trends – BCG (Jan 2020).
21. CCI proprietary income database, BCG Analysis. Note : Annual household gross income is based on 2019 prices.
Source: BCG CCI consumer trends survey and study, 2019. Ten Trends That Are Altering Consumer Behavior In India - BCG (2019).

Consumers across the world feeling stretched for time[22]



Driven by convenience, global ready meals expected to exceed $ 147 B by 2024[23]



57%

Urban Indians paying for convenience[19]

30%

Global consumers ordering more ready to make meal kits[21]

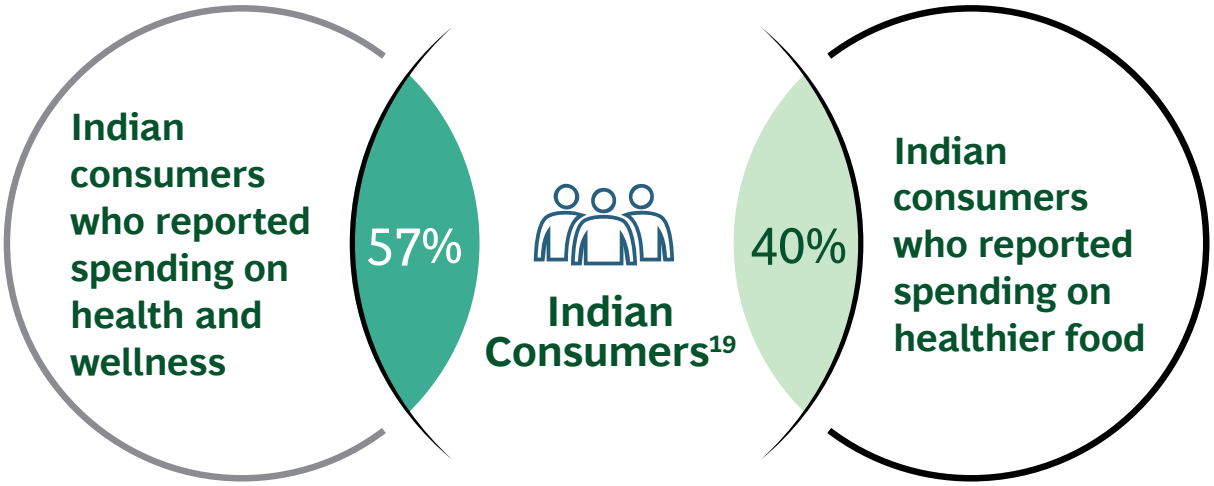
36%

Global consumers planning to spend more on packaged, frozen, or canned food and beverages[21]

We are living in an increasingly connected world – and consumers nowadays have access to choices from across the world. Indian food processing sector is presented with a lucrative market with both domestic and global growth prospects. Thus, investments in processed food products as well as their supply and promotion to key markets can lead to high returns on investment.

19. Coverage- Metro – Tier 3 cities (16 cities), (N = 5,000). Source: BCG CCI consumer trends survey and study, 2019. Ten Trends That Are Altering Consumer Behavior In India - BCG (2019)21. CCI proprietary income database, BCG Analysis. Note : Annual household gross income is based on 2019 prices.
21. CCI data. Survey conducted in April 15-22, 2022 in USA, UK, Germany, France, Brazil, China, India, Indonesia, Japan, Sweden and New-Zealand, BCG analysis.
22. BCG CCI research global drivers of consumer choice, September '20–February '21, (N=~19,000; per country sample ranges from 1,000–1,300 respondents) Q. I'm typically quite busy / stretched for time - How strongly do you agree or disagree with the following statements?
23. Euromonitor—Ready Meals Market 2015-2023—Accessed Jan 2020.

Another consumer megatrend expected to drive the increase in processed food consumption is the rising focus on health and wellness. Globally, consumers are increasingly becoming health conscious. Growing concerns with quality of life, desire to stay healthy, and need to prevent illness are leading to consumers planning to spend more on these products and services. However, it is yet to be seen if consumers actually pay a premium for health and wellness.



Percentage of global consumers planning to increase spend on[21]



A shift towards healthier food choices will have an impact on many of the processed food categories - for example millets – which is perceived as a healthy grain source. While India is the largest producer of millets, generating about 15% of the world's total produce by weight, it is a marginal player in terms of their exports – making up only 3% of the total exports. With consumers across the world now focused on improving and maintaining their health, and the rising knowledge about the health benefits associated with millets, we foresee a strong potential for millets being used as a key ingredient across a wide range of processed foods.

19. Coverage- Metro – Tier 3 cities (16 cities), (N = 5,000). Source: BCG CCI consumer trends survey and study, 2019. Ten Trends That Are Altering Consumer Behavior In India - BCG (2019).
21. CCI data. Survey conducted in April 15-22, 2022 in USA, UK, Germany, France, Brazil, China, India, Indonesia, Japan, Sweden and New-Zealand, BCG analysis.
22. BCG CCI research global drivers of consumer choice, September '20–February '21, (N=~19,000; per country sample ranges from 1,000–1,300 respondents) Q. I'm typically quite busy / stretched for time - How strongly do you agree or disagree with the following statements?

SECTION 2



Key challenges in production and exports of processed food products

In order to achieve its potential, the Indian food processing sector would need to address the following 5 major challenges:

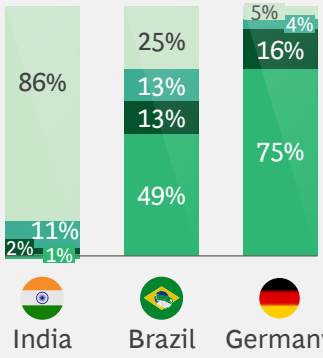
1. Low cost competitiveness
2. Product quality concerns
3. Limited brand strength of Indian products in overseas markets
4. Lack of infrastructure for processing, storage, and logistics
5. Limited compliance of sustainability and ethical requirements

1 Low cost competitiveness

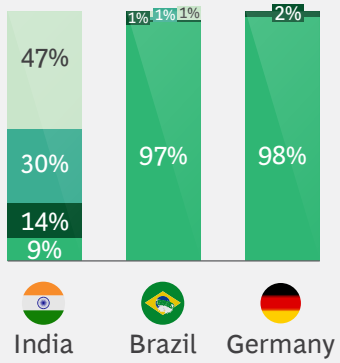
While India is considered a low cost market given its relatively lower labor costs, the processed food products are generally not cost competitive in the global markets due to high cost of agri-produce. This high cost is, in turn, a factor of low productivity - which results in poor unit economics for food processing industry and drives away the advantage India has of relatively lower labor costs. A major contributor to the same is that in India, farming is generally dominated by small farmers which contrasts with some of the other developed and developing nations like Germany and Brazil.

Distribution of farmlands and agricultural area in India is dominated by farmers with small land holdings - which is in contrast with other countries like Brazil and Germany[24]

Distribution of farmlands basis landholding (% of farms)



Distribution of farmlands basis landholding (% of agricultural area)





Challenges faced by small holder farmers (SHF)

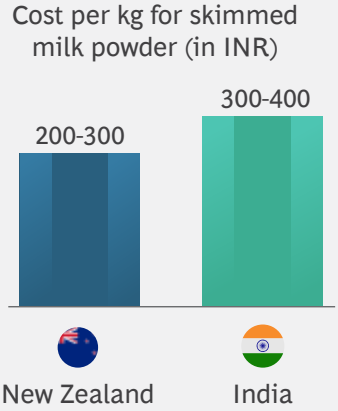
- Lack the financial strength and risk appetite to make significant investment
- Limited knowledge on right kind of agri-inputs to be used and best-in-class farming practices
- Generally excluded from modern market arrangements such as contract farming

24. FAO UN - Farms, family farms, farmland distribution and farm labour: What do we know today? (2019).

Select examples highlighting the high cost of agri-produce in India

1 Cost of milk production in India is ~1.5x[25] higher than in New Zealand - reflected by the difference in the price at which skimmed milk powder is sold domestically in the two countries

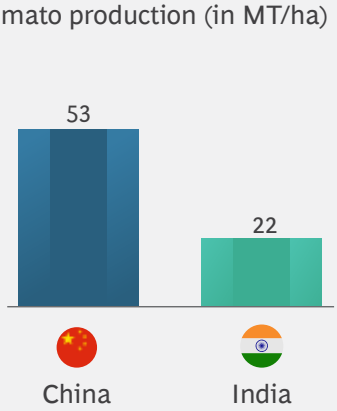




Higher cost in India is primarily driven by low cattle productivity with Indian farmers not giving right kind of cattle feed and veterinary services

2 Cost of tomato production in India is around 2x[7] higher compared with China driven by lower productivity





India's lower productivity is driven by farmers having limited knowledge on right kind of agri-inputs and fertilizers to be used

2 Product quality concerns

Another major challenge is product quality concerns driven primarily by the poor quality of agri-produce. This, again, is to a large extent an outcome of the fact that there is:

- **Limited awareness amongst farmers on best-in-class farming practices:** Farmers are generally not aware about the right set of agri-inputs, fertilizers and pesticides to be used which impacts the quality of their produce and ability to sell the same as either fresh produce or in the form of processed product in the export market.

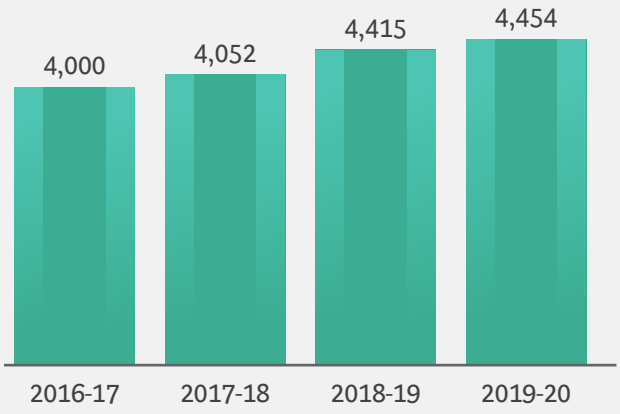
- **Rampant use of fertilizers, pesticides leading to contamination of the produce:** Another challenge is excessive use of pesticides and fertilizers beyond specified limits leading to contamination of produce and making the same unfit for exports. India's use of nitrogen, phosphorus, and potassium per area of cropland in 2017 was ~157 kg/hectare[8] - which is 1.3x higher than the world average of ~123kg/hectare[8]. Indian farmers excessively use Tricyclazole - a fungicide used for rice blast control. As a result, there are excessive levels of Tricyclazole present in rice from India. In 2018, the European Commission reduced maximum permissible residue levels for Tricyclazole to 0.01 parts per million[8] ("ppm") from 1 ppm for all crops. The Indian farmers, due to their excessive usage, were unable to comply with these norms resulting in a drastic drop of exports in FY 2019 vs FY 2018.

7. Expert discussions, Study of Tomato Value Chain and its Financing: Report by College of agricultural banking.
8. Trade Promotion Council of India article – Basmati Rice and Pesticides Where does the fault lie? (2020); Secondary Research.
25. Expert discussion; Secondary Research.

India's export of Basmati rice to EU[8]

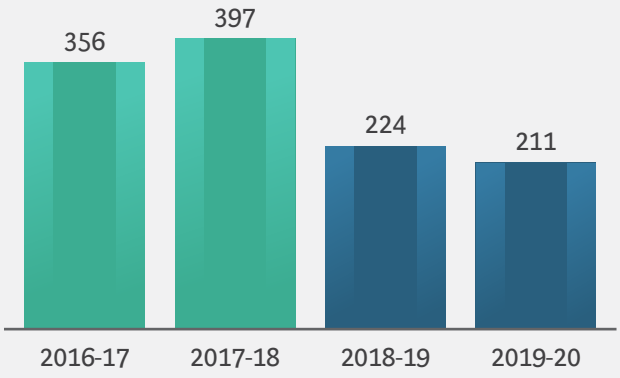
India's export of Basmati rice to the world has grown steadily ….

India's export of Basmati rice to world (In '000MT)



…while export to Europe fell drastically since FY2019 due to the new limits imposed

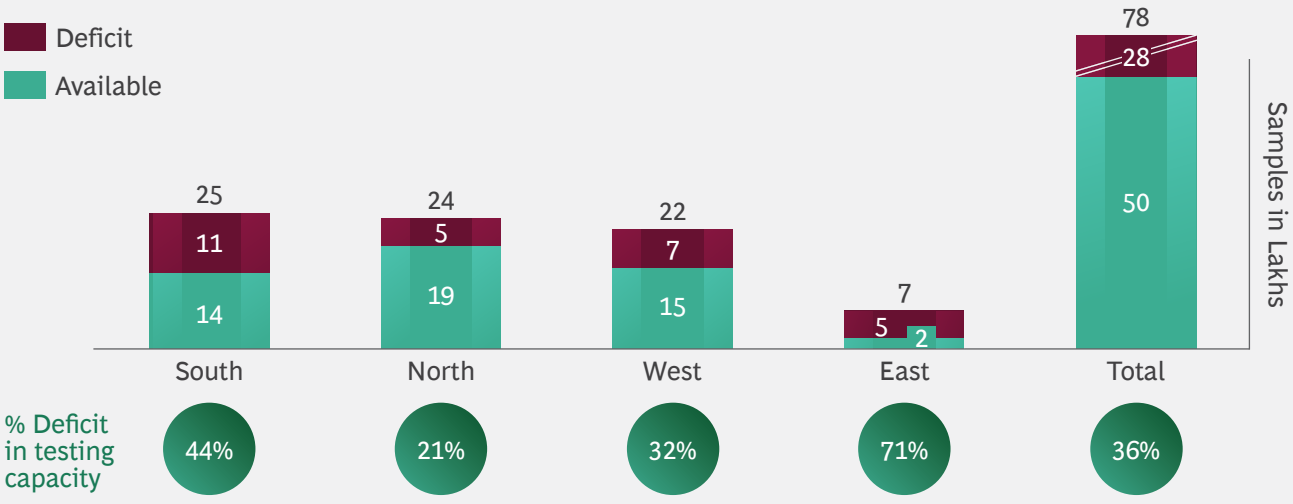
India's export of Basmati rice to Europe Union (In '000MT)



- **Limited awareness among farmers with regard to necessary quality certifications:** Indian farmers are generally unaware of necessary quality certifications and associated quality requirements for their produce which impacts their ability to sell their product in the export markets.
- **Lack of adequate number of facilities available for quality testing in India:** Even if the farmers are aware about applicable quality certification there is another challenge in the form of lack of quality testing facilities. There is an acute shortage of testing facilities across the country - especially in the eastern and southern parts of the country

Significant deficit in availability of adequate testing capacity across India - especially in eastern and southern region[26]

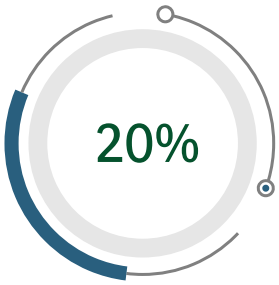
Total capacity required for testing samples in lakhs by the different regions in India



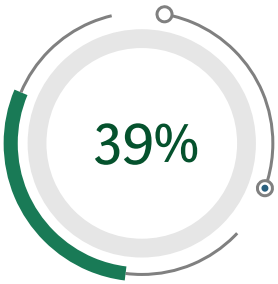
8. Trade Promotion Council of India article – Basmati Rice and Pesticides Where does the fault lie? (2020); Secondary Research.
26. Gap is assuming 100% compliance by food business operators in getting their products tested at least twice a year The same shows deficit in availability of testing capacity if food business operators (FBOs) undertake 100% compliance with 2 tests a year for their products. The study assumed each FBO with 10 products and from a supply side. Only NABL labs had been considered. Metastudy on food testing labs in India – Yes Bank (2019).

3 Limited brand strength of Indian products in overseas markets

A key trend observed is brand consciousness among consumers. As many markets reach maturity, the importance of brand affinity has increased globally[20]. Especially in food sector, consumers are extremely brand conscious about what they buy[27]. At the same time, there is a preference among consumers across the world to extract maximum value for their purchase.



Consumers across the world planning to buy more branded products[21]

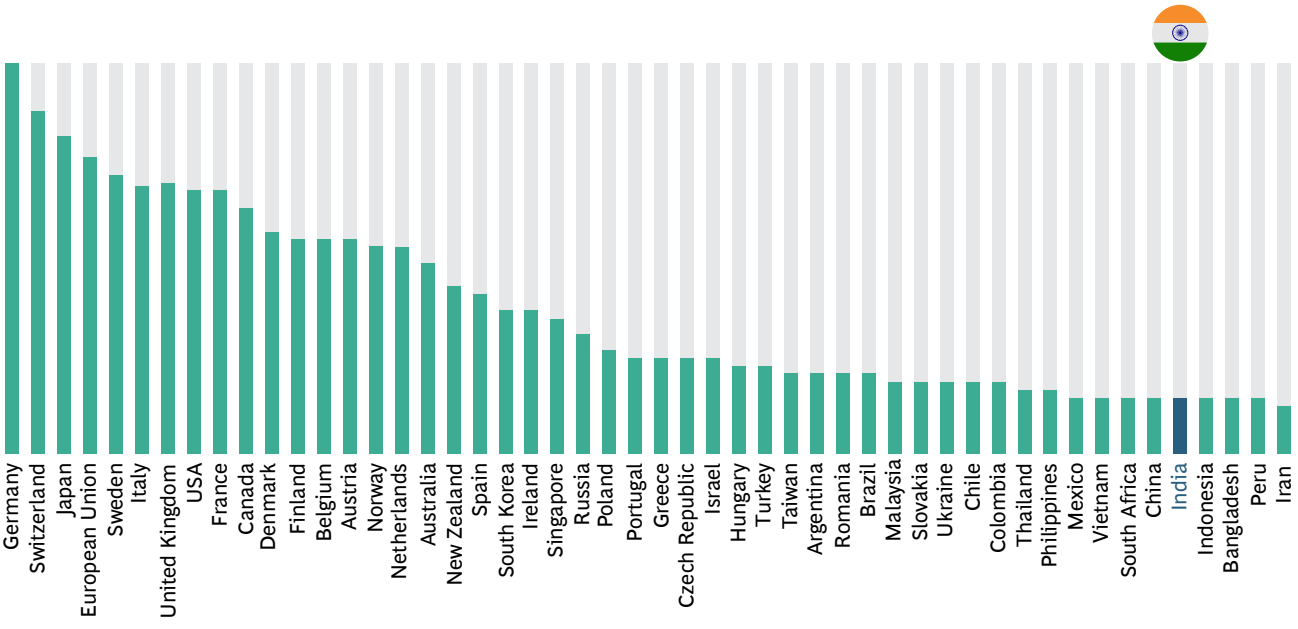


Consumers across the world planning to choose accessible / more affordable brands[21]

In overseas markets, Indian brands generally enjoy strong recall value and high perception only among the people of Indian origin. A survey was carried out by Statista research in 2017 involving 40,000+ respondents from 52 countries on their perception of products from the various countries of origin. In the survey, Germany was ranked highest while India was ranked 46th out of a total of 52 countries - with the perception of India lowest in European countries and Australia[28]. However, the perception of Indian brands was high in gulf countries, where there is a large Indian origin population. Therefore, there is a need to improve the perception of Indian brands in the global market amongst the non-Indian origin diaspora.

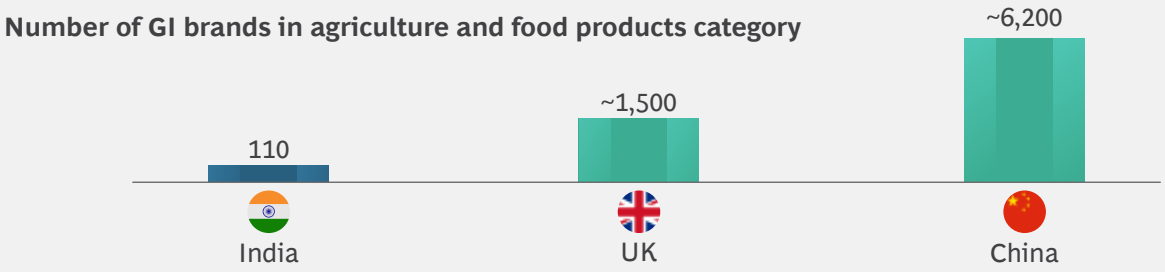
Even the number of GI owned brands from India is significantly less vis-à-vis some of the other countries like the United Kingdom and China. Having GI brands is critical to protect products from false branding in the international market and also enables manufacturers to charge a premium for these products.

India is ranked **46th** in terms of consumer preference in quality



9. Global statistics on geographical indications (Total count by filing office) - World Intellectual Property Organization (WIPO)
20. Megatrends Library: Most Popular Trends – BCG (Jan 2020).
21. CCI data. Survey conducted in April 15-22, 2022 in USA, UK, Germany, France, Brazil, China, India, Indonesia, Japan, Sweden and New-Zealand, BCG analysis.
27. How India Spends, Shops and Saves in the New Reality – BCG (Dec 2020).
28. Made In Country Index – Statista (2017).

India has a significantly lower number of GI brands in the food category versus other countries like China and the United Kingdom[9]



4 Lack of infrastructure for processing, storage, and logistics

To grow the food processing industry in any country another critical requirement is to have proper infrastructure for processing, storage and logistics facilities in place. However, significant development is still required on multiple fronts to reach a strong position and minimize wastage.

A study carried out by Central Institute of Post-Harvest Engineering and Technology ("CIPHET") highlighted that a substantial loss of about INR 1 Lakh crore[29] is being incurred annually along the post-harvest value chain - with lack of proper logistics and storage facility in the country being a significant contributor to the same.

As of 2022, India has been able to substantially build its storage requirements. We currently have a total of ~790 Mn MT[30] of storage capacity for food-grains. This is due to multiple initiatives from the government like Warehouse Infrastructure Fund and Private Entrepreneurs Guarantee scheme - that incentivize both public and private players to help build storage capacity. Even in terms of cold storage, India has been able to achieve a capacity of 37.5 Mn MT[31] against a requirement of 35 Mn MT[31]. However, the storage capacity developed over the years is not distributed well. 70% cold storage capacity in India is limited to 4 states, while some states with large export potential do not have adequate facilities[32]. Further, producers of perishable items need storage capacity at farmgate level - the absence of which forces them to sell produce at a throwaway price when the same is sold in cities at a high price[33]. Thus, investment is needed to rationally increase the storage capacity, as well as undertake modernization of existing storage units.

5 Limited compliance with sustainability and ethical requirements

Food that is produced and consumed has a major impact on our environment.

- Food accounts for almost ~26%[34] of global greenhouse gas emissions
- Half of the world's habitable (excluding ice and desert) land is used for agriculture
- Around 70%[34] of global ocean and freshwater eutrophication (the pollution of waterways with nutrient-rich pollutants) is caused by agriculture
- From the ~28,000[34] species which are under the risk of extinction as per IUCN red list, agriculture and aquaculture is a potential threat for ~24,000[34] of them

Given the impact of food value chain on the environment it is imperative to achieve environmentally sustainable food systems. Also, there is an increasing realization of the social responsibility of only buying those products which have been manufactured by producers offering fair working conditions to their workers.

Worldwide, demand is fundamentally shifting towards sustainability and ethical production, requiring countries to reorganize and develop their food value chains. There is an increasing preference for suppliers that are making their produce following sustainable and ethical farming and food processing practices including properly treating their workers. Certification of farms with global benchmarks and standards becomes crucial aspect of this.

29. Annual Report FY 2020 – CIPHET.
30. Food Corporation of India.
31. Cold Storage Facilities in the Country - Ministry of Agriculture and Farmers Welfare Press Release.
32. Indian Agriculture: Achievements and Challenges – RBI (2022).
33. Reforms in Storage Infrastructure, Department. of Food and Public Distribution (2021).
34. Environmental impacts of food production article (our world in data website) which leveraged data from Poore and Nemcek (2018), UN FAO and AQUASTAT.

This megatrend has translated to an impact on the trade agreements being entered between countries. A recent example is the free trade agreement entered between the European Free Trade Association (including Iceland, Switzerland, Norway and Liechtenstein) and Indonesia to promote trade between the countries. The same also requires the signing partners' obligation towards environmental protection, fundamental rights of workers and sustainable forest resource management.

Thus, there is a potential for Indian players to differentiate and promote the sale of their products through compliance with sustainability and ethical norms. At the same time, lack of compliance can also close key markets for India. India has the opportunity to leverage its strong position in crops such as millets that are easily aligned to sustainability norms - since their production requires limited water and fertilizer application. Externally, this will generate confidence in the global market around the quality of Indian produce. Internally, this will help boost confidence for other crops to be able to match the requirements.

80%

Consumers globally claimed sustainability compliance is important for them[35]

60%

Consumers around the world willing to change their shopping habits to reduce environmental impact[35]

35%

Premium that consumers globally are willing to pay for products that have been manufactured sustainably[35]

35 . IBM Institute for Business Value and National Retail Federation survey conducted across 28 countries from all continents (N=18,980). Meet the 2020 consumers driving change - Why brands must deliver on omnipresence, agility, and sustainability – IBM (2020).



SECTION 3



Unlocking the potential of the food processing industry

It's time that action is taken to grow the food processing industry in India with a special focus on export markets. We have laid out a 5 point action plan - **"A-R-I-S-E"** - that can provide the food processing industry the necessary firepower to achieve its export potential.

1 **Adoption of crop value chains by establishing of crop-specific PPP model:** To provide support to small farmers in addressing cost and quality related challenges for the agri-produce

2 **Reinvigorate promotion of Indian-origin brands globally:** To enable the pooling of efforts/resources and allow for a consistent plus harmonized strategy for brand promotion

3 **Institutionalize industry-academia collaboration to aid R&D:** To facilitate technology advancement and new product development.

4 **Set up collaboration among private players for setting up and sharing infrastructure facilities:** To enable sharing of setup costs involved and also leverage cost efficiency benefit from economies of scale

5 **Establish sustainability and ethical norms and ensure compliance:** To enable Indian food manufacturers in meeting the increasing demand for products that have been manufactured in compliance with sustainability and ethical norms

1 Adoption of crop value chains by establishing crop-specific PPP model

One of the major roadblocks in the growth of India's food processing exports is the cost-competitiveness and quality of agri-produce. The same, as discussed earlier, is largely influenced by farming in India being dominated by smallholder farmers (SHFs) with limited knowledge about best-in-class farming practices.

A potential way for solving this problem is by regulating the upstream value chain through setting up of robust crop specific PPP models involving support from the government and leading private players to achieve success at scale. The model should ensure adequate financial incentive for the players involved - and at the same time promote equitable value sharing among the stakeholders. Also, a robust implementation structure should be put in place to successfully drive the program. The key action steps required to be implemented for development of a successful PPP model include:



a Develop a refined PPP business model with adequate return and security

It is imperative to develop a detailed business model upfront that is well defined with clear roles and incentives for all the stakeholders in the ecosystem. The same will be key to ensure returns for all stakeholders including farmers, processed food sellers and other ecosystem players in the long term. There are 3 key elements in designing a successful business case

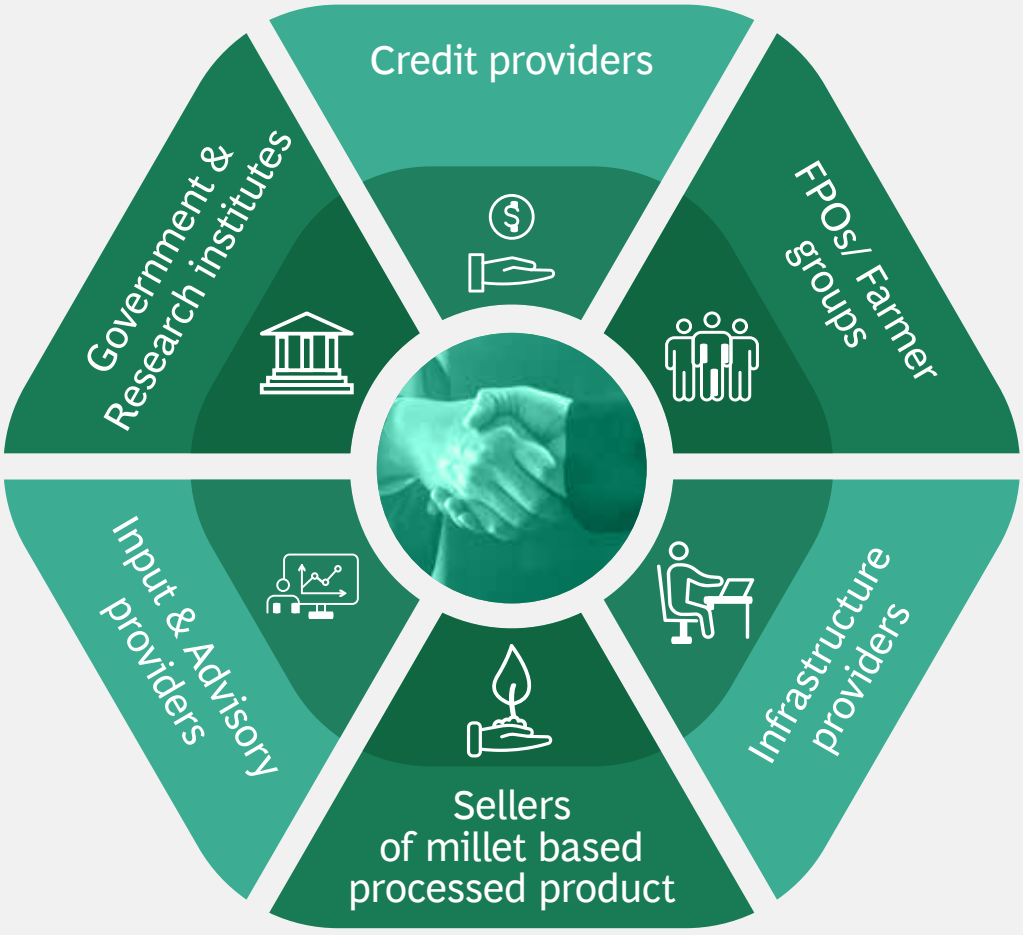
- **Value chain study and key requirements:** Analysis of key requirements across the value chain and gaps involving:
  - Assessment of potential
  - Identification of relevant infrastructure and other requirements
  - Baselining of existing capacity and quality to identify potential gaps/white spaces
- **Assessment of investment roadmap and ROI:** Involves assessment of model economics, viability, challenges and support required including subsidies and involves following steps:
  - Assessment of economics – Potential investment, revenue, opex and profit
  - Identification of challenges limiting investment
  - Study of target economics also considering relevant benefit schemes and subsidy offered by the government
- **Finalize the proposed business model contours:** Same should have adequate return and security for all the stakeholders involved with clearly laid out investment plan and ROI for each stakeholder.

b Identify and onboard the right stakeholders (including private players) required to support and grow the value chain

For success of the model it is critical that right kind of stakeholders have been onboarded to fulfill the different responsibilities within the value chain. The potential stakeholders and their responsibilities would include:

- **Respective government bodies at center, state and local level:** For end-to-end orchestration, ecosystem development, mobilization at local level and providing any other support
- **Research institutes:** For providing support with technology interventions to boost productivity
- **FPOs/Farmer groups:** For aggregating farmers, managing engagement with them and monitoring compliance
- **Private players (i.e. sellers of processed food products):** To support the famers in addressing challenges faced by them and develop the value chain
- **Infrastructure providers:** For setting up adequate logistics, storage and quality check infrastructure to support the ecosystem
- **Other ecosystem players:** Including credit providers for funding working capital/capex requirements and agri-inputs sellers for providing the right set of agri-inputs required for farming

Ecosystem for Success[36]



36. Expert discussions, Secondary Research.

c Clearly lay out roles and responsibilities for each of the stakeholders within the ecosystem:

The same involves developing a clear articulation of outcomes and designing of roles and responsibilities in line with these outcomes. There should be a clear action plan, owned and led by respective stakeholders. There should be a detailed list of interventions (for e.g. infra-setup, FPO formation and technology support etc.) and initiative owners assigned and mapped with a single point of accountability for each initiative.

Proposed model with clear roles and responsibilities across the value chain: Millets Example

Cluster planning	Farmer advisory	Food processors advisory	Credit	Infrastructure, quality testing and technology support	Marketing and sales
1 **Setup cluster team** with all stakeholders, define governance	3 **Provide training** to farmers on best practices	6 **Provide training** to food processors on best practices	8 **Ensure access to financing** for farmers and food processors to meet working capital and mechanization requirements	10 **Setup common cluster infra** for grading, sorting, processing, and warehouse etc.	13 Providing training and support in **marketing and branding** needs
2 **Mobilize farmers** and on-board farmers/FPOs to aggregate procurement across farmers	4 Setup quality check/ **compliance monitoring** plan and team	7 **Increase awareness** about the latest machinery/ technology available for food processing	9 **Provide subsidies** under various schemes to support capex investments	11 **Setup infrastructure for seamless quality testing** and certifications	14 **Undertake initiatives to promote millet-based products** and raise awareness on their benefits
	5 Ensure supply of inputs in-line with the best practices			12 **Provide support with technology** interventions to boost productivity	

15 End-to-end orchestration of the cluster development, tracking and monitoring of progress and results

Stakeholders: Govt. bodies; FPOs/Farmer groups; Private players; Research Institutes; Infrastructure providers; Other Ecosystem players

d Provide required support to stakeholders including subsidies and favorable policies etc.

It is crucial that the government provides stakeholders with support where required to ensure the success of the PPP model. The same could be in multiple forms including:

- **Support stakeholders with subsidies and ensure seamless sanctions with limited documentation overheads:** Identify long list of schemes, define convergence process, limit/support in documentation and ensure fast disbursements
- **Resolve on-ground challenges for ensuring successful implementation:** Conduct regular review meetings to discuss challenges limiting growth, support with inter-departmental coordination, favorable policies and fast-track implementation

e Lead overall orchestration of the program and set-up a program management unit ("PMU") to monitor progress

For the PPP model to successfully deliver it is critical to set up a strong governance mechanism. A dedicated PMU team should be set up for the overall project management and coordination. The same should be led by senior government officers entrusted with the success of the overall program. The key responsibilities of the PMU team should include the following:

- Define the review and governance mechanism for the entire program
- Provide implementation support on a day-to-day basis
- Develop clear set of dashboards, scorecards and metrics to track progress
- Conduct regular reviews with relevant stakeholders to discuss and track overall progress
- Support with any bottlenecks and coordination between different stakeholders and government departments
- Support in designing and implementing corrective action plan
- Highlight any major roadblock/challenge to the highest levels and ensure timely intervention

The contribution of private players in ensuring a successful and robust PPP model to solve the challenges for crop specific value chain would be critical. The private players would need to take initiative, work closely with farmers and provide them with the following support:

- **Identification of winning crop and variety selection:** Guide farmers on the crops and variety that are required in processed food products with the highest demand in the international market and healthy profitability
- **Provide advisory services:** Give advice on best-in-class practices to be followed for farming including knowledge on right set of agri-inputs to be used and extent of use of fertilizers/pesticides to ensure high productivity and good quality
- **Enable access to agri-inputs:** Ensuring farmers have access to right kind of agri-inputs at affordable prices
- **Fair price at short interval:** Provide fair remuneration in short intervals to farmers to generate royalty among them
- **Ensure assured demand off take:** To provide stability to the farmers in the long run

A successful PPP model will have reciprocal benefits for the private players including:

- **Consistent supply:** Long-term contracts and association with farmers will ensure they get consistent supply as per their requirement from the farmers
- **High quality:** Working closely with the farmers and ensuring they follow best-in-class practices will enable farmers to produce and supply high quality product
- **Fair price:** By following best-in-class practices along with quality the farmers will also be able to improve their productivity and thereby reduce their cost of production - thus enabling them to sell their produce at a competitive price and also earning a fair return in the process

This will solve the key challenges presently being faced by the private players with regard to the agri-produce and help in promoting growth of exports from the food processing industry.

There have been examples in India and globally where a crop specific PPP model involving leading private players has helped in development of the upstream value chain and giving exceptional results. One such example is from Andhra Pradesh where the state government, though a PPP model, partnered with private players for growth of banana production and exports from the state. The government also involved research institutes and local bodies, and provided financial incentives. The PPP model was highly successful with Andhra Pradesh emerging as the leading producer of bananas across India and seeing a massive growth in export of bananas from the state.



India

Case Study 1[37]



PPPIAD - HUL and Govt. of Maharashtra collaborated to sustainably source tomato, increase farmer income and reduce import dependence

Context

FICCI and Ministry of Agriculture, Govt. of India jointly developed guidelines for Public Private Partnership for Integrated Agricultural Development. One of the first projects was HUL's collaboration with the Govt. of Maharashtra to sustainably source tomatoes for Kissan Ketchup. HUL, at the time, depended on imports for 30-35% of their requirement, and aimed to achieve 100% sustainability in terms of the tomatoes sourced

Action Steps

The program covered 579 farmers and 440 hectares in its first phase for a period of 1 year. The program is still active, with HU supporting farmers with its agricultural know-how and purchase assurance

Implemented cost sharing mechanism and provide financial incentives

- Assured buyback by HUL for 75% of the produce, ties up with input companies to source inputs at competitive rates
- Maharashtra state government contributes 49% of the 15 Cr investment required as subsidies on infrastructure and logistics
- Farmers provide the remaining 49% and bear labor cost

Used latest technology improved yield

- Better practices: HUL taught agricultural and irrigation techniques to farmers, such as efficient fertilizer use, crop rotation and drip irrigation.
- Better equipment: HUL provided subsidized agricultural equipment to farmers
- Better input: use right type of seeds that produce high quality tomatoes with lesser harvest time

Impact

The program boosted the income of farmers by giving purchase assurance and reducing input cost. It also helped Kissan source 100% of their tomato requirement sustainably from local sources. The program became self sustaining in 2017.

4x
Increase in farmer income

25%
Increase in average yield

5y
program became self sustaining

37. Secondary Research. HUL Annual Reports.



India

Case Study 2[38]



Andhra Pradesh - Govt. partnered with private players to improve production and exports of banana

Context

Till around 2015, Andhra Pradesh was not even among the top 3 banana producing states in the country and had negligible export volumes due to poor quality.

Action Steps

The government partnered with private players, research institutes and local bodies to develop the value chain and improve quality, increase production and grow exports

Private partnership

- PPP with INI Farms, Desai Fruits, Future Groups etc.
- Mandate to setup agri-clusters of banana and provide technical assistance such as crop care and harvesting safeguards

MoA with NRCB

- NRCB on-boarded as 'knowledge partner'
- Developing technological interventions to improve productivity and reduce wastage
- Training - HR development, and hand holding growers

Involvement of local bodies

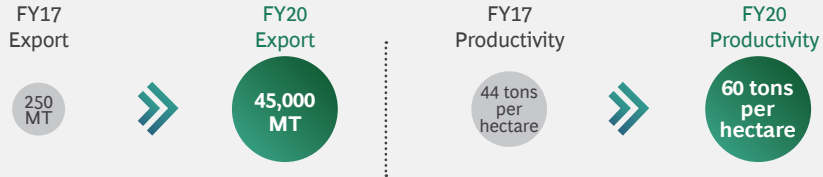
- Roadshows by Horticulture Commissioner to mobilize farmers
- Joint effort to create awareness by private cos. and local govt. village-by- village
- Support from local collectors to monitor farmers' adherence

Investment and incentives

- Investment in infra - micro irrigation, fertigation, and fruit care for boosting productivity, post harvest management infrastructure
- Govt. reimbursed increased labor and training cost incurred by private cos.

Impact

Emerged as the leading state in country for production of bananas accompanied with significant improvement in productivity and exports



38. Secondary Research, Best Practices in Horticulture- APHRDI, Expert discussion, BCG Analysis.

The role of private players is critical in development of upstream value chain for a crop. Any PPP model will find it difficult to be successful if the private players involved do not take initiative and ownership for supporting the farmers. The importance of private players can be highlighted with an example from Vietnam where a private player - Vinh Hoan in this case - was operating in the competitive market for pangasius and was able to emerge as the market leader by working closely with the farmers, controlling the quality of their produce and thereby differentiating in the end-market. The same also enabled small farmers associated with Vinh Hoan to increase their sales and earn a higher income[45].

Case Study 3[39]



Vietnam

Vietnam - Vinh Hoan a private player emerged as market leader in pangasius export by working with farmers and differentiating through quality

Context

Vietnam is the leading exporter of pangasius in the world. However, there is stiff competition with more than 200 players. Vinh Hoan a private player - wanted to emerge as the leading player in the industry

Action Steps

Vinh Hoan planned to differentiate itself from other players by focusing on quality through controlling the value chain, supporting farmers and obtaining quality certifications

Vertical integration across value-chain

- Worked closely with ~300 farmers to ensure compliance with international standards
- Enabled it to ensure high quality and sustainable processing of pangasius

Support to farmers

- Entered long-term contracts with pond owners to provide them stability
- Dedicated in-house team to support small pond operators with breeding facilities, feed formulation and pond maintenance

In-house R&D center

- Established an in-house technology center to search for new technologies in aquaculture
- Setup hatchery complex with high-tech application for improvement in farming performance

Obtained leading quality certifications

- Obtained 8+ global quality assurance and sustainability certifications
- First to obtain Aquaculture Stewardship Council certification and 4-star Best Aquaculture practice certification across the globe for pangasius

(continued on next page)

39. Secondary Research, Vinh Hoan Annual Report.

Impact

Globally

Since 2010, has been



in terms of export for pangasius fish globally

Vietnam

Acquired around

20% market share

basis weight in Vietnam's pangasius export industry.

Acquired around

2x

more than share of the next big player

2 Reinvigorate promotion of Indian-origin brands globally

Another roadblock in growth of exports for processed food products is the weak perception of Indian brands overseas. Thus, it is imperative that efforts are made to strengthen branding in the overseas markets. Establishing a strong brand can require significant investment and a lot of effort - which can be difficult for a player to undertake individually. Also having different brands for the same product category from India can be potentially confusing for the overseas consumers. Therefore, it is important that relevant stakeholders within the product specific value chain - including food processors, exporters, and the relevant government agency - come together to establish a common brand. This way they can pool their limited funds and combine their efforts to promote and strengthen a common brand in the overseas markets. A consistent and harmonized branding strategy can be developed and anchored on promoting premium quality, freshness, and superior taste of the product. This will not only help in improving the brand perception but also help achieve greater penetration in these markets.

There have been successful examples where private players have come together to form a common brand for their product. In Ecuador, 10+ private players operating in the shrimp market came together and established a common brand anchored on quality to differentiate themselves in a traditionally low-price market.



Ecuador

Case Study 4[40]



Ecuador – Private players developed a common brand for their shrimp products anchored on sustainable and high-quality farming

Context

Ecuador is the world's second largest shrimp producer, after India. Farmed shrimp, a commodity market, has traditionally rewarded those with the lowest prices. Those low prices can also mean that best farming practices get sacrificed, which results in a lower quality product and producers can't differentiate themselves or charge a premium

Action Steps

A group of private players in Ecuador got together and decided to counter the low-price market by establishing a brand committed to producing quality shrimp with sustainable practices.

Formed a common organization

- Jointly established the sustainable shrimp partnership ("SSP") organization to further their cause.

Established strict protocols

- Developed one of the most demanding protocols for shrimp production to ensure zero use of antibiotics, full traceability, and no negative impact on the local environment.

Enabled customers to access information on farming

- Partnered with IBM to enable consumers to access information regarding SSP shrimp by simply scanning a QR code
- Customers can check which farm the shrimp is from, how it was farmed and key indicators on its food safety and sustainability profile

Impact

Enables the suppliers to differentiate their product in the global market and increase the sale for their shrimp products - going from 15% market share (USD) in 2016 to 22% share in 2020

40. Secondary Research.

Another example is from Chile where exporters and fruit growers came together to establish a common brand “Fruits from Chile” for their products and followed a harmonized strategy to jointly promote this brand in the overseas markets.



Chile

Case Study 5[41]



Chile – Establishment of a common brand to avoid fragmentation and enable pooling of efforts/resources for joint promotion

Context

Chile is among the leading fresh fruit exporter from South America. However, there were multiple players in the industry having limited resources for brand promotion and following a fragmented branding strategy leading to confusion among the consumers

Action Steps

All relevant stakeholders in the ecosystem including export association, leading exporters and growers in the region coming together to establish a common brand

Develop common brand

- All the players aligned to develop a common brand to promote the fruit products from the country

Financial support for branding

- Up to 60% financing support to private exporters in co-construction of the brand - participation in trade fairs, using brand on packaging, designing and running campaigns

Marketing support with consistent and harmonized branding strategy

- A consistent and harmonized branding strategy for the Chilean fruit sector and its related subsector was introduced
- Webpage for each fruit brand to showcase key statistics, stories of farmers, exporters
- Extensive usage of common identity across trade fairs, social media campaigns, etc.

Impact

Helped showcase the sector with a united vision and strengthen the positive perception of Chilean fruit industry in the global market. Through a perception survey conducted one year post the launch of the brand, ~75% of the respondents (being importers and distributors across markets) considered this as a positive move with ~65% of those surveyed mentioning that this helped to change the perception of Chilean fruit industry in a favorable way

41. Secondary Research, Fruits from Chile website.

The government should facilitate setting up an entity which orchestrates the creation of a common umbrella brand and product-specific sub brands. This entity can set guidelines and standards for marketing and branding, certification and provide support and incentives for brand adoption, through partnerships with ecosystem players. Further, they can also support this organization with financial incentives to subsidize the brand promotion costs.

Another important aspect related to branding is that there is a need for more GI brands to be developed in the country to protect products specific to a geographical location in India from falsely branded products in the market, and help them in charging a premium. The government should again take a lead in setting up a product specific common organization with relevant ecosystem players on board for setting up the GI brand. An example, for the same can be Darjeeling Tea where the GI brand for the same was registered - and that helped to protect it from falsely branded products in the international markets, charge a premium, and penetrate more export markets.



India

Case Study 6[42]



Darjeeling Tea – Government body supports building and protecting GI, creating a strong brand for India

Context

Darjeeling tea, considered as “Champagne of teas”, is highly regarded for its special aroma and is grown in the Darjeeling district located in West Bengal in India. In the international market several brands were falsely using reference of Darjeeling and selling their tea products

Action Steps

In 2004, the Tea Board of India, which controls the tea industry in India, got the Darjeeling registered as the first GI in India and in 2011 got the registration done for the Darjeeling PGI in the European Union

(continued on next page)

42. FAO UN: Strengthening sustainable food systems through geographical indications (2018).

Protect the brand and support the Darjeeling tea stakeholders

- The Tea Board of India is active in taking steps to protect the Darjeeling name and logo. It establishes protection and monitoring measures for the same in other countries
- Also plays an active role in supporting the Darjeeling tea value chain comprising of all the stakeholders including planters, processors, middlemen and exporters by providing technical and financial assistance

Strict monitoring and guarantee systems in place

- Ensures traceability for Darjeeling tea by monitoring all the stages in production (gardens, storage facilities and distributors, including exporters) through an online system
- The online system serves as a basis for issuing certificates of origin
- Also, an independent certification body is responsible for carrying out audits of the commercial chain

Impact

GI certification has enabled Darjeeling tea to charge a premium price higher than competitors and also diversify into new export markets

Premium pricing

GI certification allowed commanding a premium price. For e.g., post registration in 2011 with European Union PGI was able to charge ~INR 150/Kg in 2013 vs. INR 110/Kg in 2011

Superior to competitors

Commands almost double the price compared to teas from Assam and Dooar

Diversify into new export markets



India should also look to capitalize on the increasing preference globally for consuming food products that offer multiple health and wellness benefits. It should leverage its position in those food categories that are considered healthy/super foods and where it has a strong position in production. Efforts should be made to promote health benefits of these products globally to drive their consumption and in establishing a strong credible Indian produce brand for these products. Examples of select products where this can be undertaken are as follows:

- **Millets:** Have a strong nutrient content including dietary fiber, B-vitamins, proteins, essential fatty acids and key minerals like Zinc, iron, magnesium and potassium. Offer a wide-range of health benefits including reducing risk of diabetes, preventing cardiovascular diseases, and antioxidant properties to fight cancer. India is the largest producer (~19%[43]) of millets globally. However, India's share in the global export of millets is low (~0.5%[44]).

- **Turmeric:** Offer benefits including increased antioxidant capacity of the body, lower risk of heart disease, prevent cancer, fight Alzheimer's disease, delay aging and fight age-related chronic diseases. India is the largest producer (~80%[45] share basis volume) and exporter (~70%[45] share basis volume) of turmeric. However, India's global export share has declined by ~6%[45] in the last 5 years. Lack of global branding and recognition for Indian turmeric has been one of the key drivers of this decline.

- **Jackfruit:** It's packed with nutrients including protein, vitamin C, vitamin A, riboflavin, magnesium, potassium, copper and manganese. It helps in fighting constipation, ulcers, diabetes, high blood pressure, skin problems and cancer. India is again the leading producer globally (~50%[46] share basis volume) but it's share in the export market is minimal (<5%[46])

A good example to highlight here would be the Almond Board of California that comprises 7,500+ almond growers. Almonds are loaded with nutrients and offer a range of health benefits including aiding weight loss, lowering cholesterol, lower blood pressure and improving brain memory. The board was formed with the core objective of promoting California almonds to domestic and international audiences through dedicated marketing efforts. The board undertook an extensive research to identify perception of almonds among different sections of the society, key purchase drivers (health, taste, quality etc.) and target audience (middle aged working women and health-conscious men). It had undertaken a dedicated marketing strategy including media focused outreach plans, brand partnerships, food networks and digital marketing. They have been able to achieve multi-fold growth over the years with exports increasing by 7x from USD 624 Mn in the year 2000 to USD 4.6 Bn in the year 2020[12].

3 Institutionalize industry-academia collaboration to aid R&D

Technological advancement and the development of new differentiated products is another important parameter through which India can differentiate itself in the international markets. The same can help in developing advanced and cost-effective technology for food products as the well as development of new products that specifically cater to the requirements of important export markets. The best way to encourage this is by promoting industry-academia collaboration - as a part of which the academia community can help with technical knowledge while the industry players can support their functional knowledge and product market fit, as well as contribute funds to promote and support cutting edge research. We have highlighted select examples of industry-academia collaboration.

12. California Department of Food and Agriculture Statistics.
43. FAOSTAT 2020 production quantity. Categories considered include Millets, Sorghum and Buckwheat.
44. UN Comtrade 2020. Categories considered include Millet, Sorghum, Fonio and Buckwheat.
45. GMInsights, expert discussions and Secondary Research.
46. Expert discussions and Secondary Research.

Year	Private player	Research institute	Nature of the partnership	Key details[47]
2021	TATA Consumer Products	IIMR	To strengthen research and development in millets and develop new products	Partnership areas around millets and grains: - Innovation (especially in consumer experience) - Understanding suitability for specific consumer applications - Mutual support in gaining analytical and technical expertise in research & processing - Spread awareness on multiple platforms
2021	Fonterra	VitaKey	For dairy science collaboration to enable Fonterra to develop new health focused dairy products	Involves developing dairy products with targeted and time-controlled nutrient release to lock-in their freshness for a longer duration and enable nutrients to be more active and beneficial
2019	Nestle	Center for Microbiome Innovation (CMI), University of San Diego	To research on microbiome with a focus on developing nutritious products	Combine CMI's microbiome expertise with Nestle's research capabilities to develop nutritious products
2017	Pepsi	Kansas State University	To support research in making nutritious food and beverages more affordable and accessible	5-year funding for university to research and develop innovative product ideas focused on convenient, affordable & enjoyable nutrition for consumers

47. Secondary Research and company websites.

However, there will be certain challenges that will inhibit a successful industry-academia collaboration including:

- Limited industry representation in the governing council of research institutes which may limit industry involvement in the research being undertaken
- Lack of latest equipment/technology being used for undertaking the research
- Limited interaction between industry professionals and research scientists/academia

To address these challenges, the following steps should be undertaken:

- Ensure adequate industry representation in the governing council and in designing the research curriculum
- Appoint current industry professionals and retired industry experts as dedicated members of the research team. The current industry professionals can be members for short stints.
- Drive accountability among the industry professionals who are a part of the research team though dedicated KPI tracking linked with the functional requirement expectations
- Facilitate industry participation for prototype/commercial product testing.
- Facilitate funding for the research institutes to update their equipment and technology

4 Set up collaboration among private players for setting up and sharing infrastructure facilities

As discussed earlier, a substantial loss (~INR 1 lakh crore) is incurred annually along the post-harvest value chain - with lack of proper logistics and storage facility in the country acting as a significant contributor to the same. Therefore, it is critical that adequate infrastructure facilities are in place to avoid huge losses.

There are challenges involved in developing and efficiently running the infrastructure facilities given the high setup and operational costs involved. The cold chain storage facilities which are critical for several food categories are a good example to highlight the existing challenges. The cold chain industry in India is fragmented and it will take substantial investment in building technology enabled cold storage facilities to cover the entire value chain from procurement to transportation in refrigerated trucks. The cost of operating a cold chain in India (~USD 9 per pallet per month[48]) is almost 3 times the cost in the developed (~USD 3 per pallet per month[48]). The electricity expenses alone contribute 25-30%[48] of the total expenses in cold storage chain industry in India versus around 10%[48] in the developed. The fuel costs in India are significantly higher than in developed countries.

To address the prevailing challenges, it is important that the private players come together and collaborate with each other. They should jointly set up infrastructure facilities (e.g. quality testing labs, cold storage and transportation network, etc.) as well as pool their existing infrastructure capabilities to promote growth of the overall ecosystem. The same can have a double benefit in terms of enabling partners involved to together meet the significant investment that is required in setting up these facilities as well as drive cost efficiencies from economies of scale.

An example of the same can be the partnership between Pepsi and Nestle in Belgium and Luxembourg for their fresh and chilled products[49]. They were facing higher costs in this region due to low business volume and therefore bundled their warehousing, packing and outbound distribution for fresh and chilled products to drive benefits from economies of scale.

48. Secondary Research.
49. Secondary Research.



Belgium

Case Study 7[49]



Nestle and PepsiCo developed shared infrastructure for common usage

Context

Nestle and PepsiCo had high logistics and warehousing costs in Belgium and Luxembourg for their fresh and chilled products distribution driven by lower business volumes

Action Steps

Nestle and PepsiCo in 2012 entered an agreement to bundle their warehousing, packaging and outbound distribution for fresh and chilled products in Belgium and Luxembourg

Shared infrastructure using a common player

- Nestle and PepsiCo used STEF (European specialist in cold logistics) to setup common logistics infrastructure for them

Maintain neutrality through an independent agent

- Had an independent agent being TRI-VIZOR (Belgian company specialized in logistics horizontal collaboration) for monitoring and guaranteeing the neutrality of their joint operation and ensure anti-trust compliance

Mechanism to share the benefits

- The benefits derived from this collaboration were shared through a fair gain sharing mechanism

Impact

The players were able to reduce their operating costs and deliver better service levels to retail customers

49. Secondary Research.

5 Establish sustainability and ethical norms and ensure compliance

One of the key emerging trends is the increasing awareness and inclination amongst consumers for buying products that have been manufactured in compliance with sustainability requirements and in an ethical manner.

Government intervention will be key for the players in this sector to be able to achieve compliance with the norms. To extend its support, the government should establish a common body with the following key responsibilities:

- **Define sustainability and ethical norms:** Should define the specific norms for different food categories which any player would need to comply with to meet sustainability and ethical requirements. While defining the norms, it should take into consideration the best-in-class norms across the globe
- **Increase awareness on importance of compliance:** Should undertake dedicated efforts to increase awareness among the Indian food manufacturers regarding the importance of compliance with these norms and increasing preference among buyers globally for the same
- **Extend support for compliance:** Should also provide consultancy support to the Indian food manufacturers to help them bring their value-chain in compliance with these norms
- **Provide compliance certifications basis strict protocols:** Should put in place strict protocols for independent auditing of the food manufacturers and only give certification for those manufacturers that follow the established norms
- **Develop a strong brand for their certification globally:** This will be critical to enable Indian manufacturers that have received certification from this body to build trust in the global market about their compliance with sustainability and ethical norms

We have highlighted below select global certification agencies that certify whether food manufacturers are in compliance with sustainability and ethical requirements.

Examples of select global certifications for sustainability

Name of Certification	Origin	Details of certification	Coverage
Global G.A.P.	• Initially started by a group of retailers in Europe to develop a certification program to address consumers concerns regarding safety. • The organization is headquartered in Germany.	• Provide certification for food products that have been produced following safe, socially and environmentally responsible farming practices • Work with 2,000+ trained inspectors and auditors accredited with certification bodies to perform independent audits and issue certifications	• Certifications provided to 2 Lakh+ producers across 130+ countries
Rainforest Alliance	• A non-profit organization established in 1987 with headquarters in USA	• Provides certifications to farms, forest communities and businesses on sustainability standards based on environmental, economic and social well-being	• Certification provided to over 2 million farmers across 70 countries
Sustainable Rice Platform (SRP)	• An independent membership association with 100+ institutional members from public and private sector including research, financial institutions and NGOs • Headquartered in Germany	• Offers certification focused on rice production that has been undertaken sustainably • Offers three levels of certifications – self assessment, second party verification and third-party verification • Partners may choose from these levels of assurance. The aim of having three levels is to accommodate the needs of small farmers as well as export-oriented value chains	• Certification provided to over 5 Lakh farmers across Africa, Asia, Europe and Americas
Ecocert	• A certification body established by agronomists • Headquartered in France	• Provides certifications for product, service or system that follow sustainability requirements involving environmental and social considerations • Undertakes atleast one annual on-site inspection and same is supplemented by unannounced audits during the year	• Operates in 130 countries and has 70,000+ clients

Name of Certification	Origin	Details of certification	Coverage
Fairtrade	• A non-profit multi-stakeholder organization made up of member organizations around the world • Headquartered in Germany	• Through their independent certifier, Fairtrade inspects traders and producers to ensure protection of worker rights payment of fair price to producers and adherence to environmentally sound agricultural practices	• Covers over 18 Lakh farmers
Best Aquaculture Practices (part of GSA)	• Part of the Global Seafood Alliance formed by aqua farmers and seafood companies • Headquartered in USA	• Provides a comprehensive certification program for seafood products based on environmental responsibility, animal welfare, food safety and social accountability • Covers the entire aquaculture production chain, including processing plants, farms, hatcheries and feed mills	• Presence in 35+ countries with ~3,000 certifications





Conclusion

Agricultural and allied industries form the backbone of the Indian economy. It is the source of livelihood for more than half of the Indian population. Thus, improving the gross value addition in the agricultural industry will be a key lever in improving socio-economic conditions in the country. For this, it is imperative that we increase focus on not just improving the agricultural produce, but also on improving the level of food processing and its export – especially secondary and tertiary processing.

In this report, we presented the key challenges that the Indian food processing industry needs to overcome – in order to reach a position of global export leadership.

To tackle these challenges, we propose **"A-R-I-S-E"** – a 5-point call to action to tap into the huge export opportunity, especially given the strong starting position India has in production. The tenets of this plan urge both public and private stakeholders to join hands and collaborate effectively - involving identification of right stakeholders and onboarding them, creation of relevant forums and decision rights, setting up rigorous processes and governance mechanism as well right policy-making/updating.

We should keep in mind that these are only the first few steps in India's journey to becoming an export powerhouse in food processing sector - and would require a strategically concerted effort from the industry as well as the Government.

Glossary

- Primary Processing: refers to the conversion of raw agricultural produce, milk, meat and fish into a commodity that is fit for human consumption by adopting minimal/ basic processing practices such as sorting, grading of produce, removal of inedible fractions from the produce, refrigeration, etc[3].
- Secondary Processing: involve transformation of the minimally processed product into a new/ modified product just before final preparation. The secondary processing includes food items transformed through processes such as pressing, refining, grinding, milling, drying, etc[3].
- Tertiary Processing: combination of primary and secondary food item with addition of processes They also include foods that are typically created by series of industrial techniques and processes, leading to high value-added ready-to eat food products, etc[3].
- Gross Value Added: defined as additional value created by the process of production. This is calculated by deducting the value of total input from total output[50].
- Small Holder Farmers: defined as farmers holding up to 2 hectares of land[24].
- Agricultural Land: land that is used for growing crops (the crops may be food for people, food for animals, or other non-food crops), raising animals, and grazing animals[24].
- Geographical Indicators (GI): aspect of industrial property which refer to the geographical indication referring to a country or to a place situated therein as being the country or place of origin of that product. Typically, such a name conveys an assurance of quality and distinctiveness which is essentially attributable to the fact of its origin in that defined geographical locality, region or country. Under Articles 1 (2) and 10 of the Paris Convention for the Protection of Industrial Property, geographical indications are covered as an element of IPRs[51].
- PPP model: public-private partnerships involve collaboration between a government agency and a private-sector company that can be used to finance, build, and operate projects[52].
- Aquaculture: the farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants[53].

3. Study to determine the level of food processing in India - MOFPI (2021). The percentage of processing is based on production available for processing post adjustment of losses as well as any seed and feed allowance. The food categories considered include cereals, pulses, oilseeds, sugarcane, fruits, vegetables, livestock and fisheries.
24. FAO UN - Farms, family farms, farmland distribution and farm labour: What do we know today? (2019).
50. Ministry of Statistics and Program Implementation.
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