Export of fisheries products from India: status, challenges and way forward

A. Suresh[1], Satyen Kumar Panda[2] and V. Chandrasekar[3]

Abstract

Marine products have remained a consistent and leading foreign exchange earner to India over a long period of time. The paper analyses the status and trend in marine product exports from India and sketches the way ahead. Augmenting exports without hampering domestic nutritional security calls for enhancing domestic fish production through science-based culture practices; promoting value addition; improving quality assurance systems; and effecting enabling policy changes.

Keywords: aquaculture; SPS measures; traceability; fish value addition; shrimp export, food safety

Marine products are the largest group of primary agricultural commodities exported from India: in the year 2019–20, India exported marine products worth US $6.68 billion (Rs 46663 crore), accounting for about 4.1% of the global seafood exports and 19% of India's total agricultural exports[1]. During the period of 2010–2020, marine products have shown the highest growth rate among the exports of several agricultural commodities. The Government of India has declared its intention to raise the fish export earnings to Rs one lakh crore by the year 2024-25[2] and has earmarked an amount of Rs 200 billion to be expended on the fisheries sector over a period of 5 years from FY 2020–21.

[1] Principal Scientist (Agricultural Economics), ICAR-Central Institute of Fisheries Technology, Kochi

[2] Principal Scientist (Quality Assurance and Management), ICAR-Central Institute of Fisheries Technology, Kochi

[3] Senior Scientist (Agricultural Economics), ICAR-Central Institute of Fisheries Technology, Kochi

Achieving the export targets calls for focused attention on entire value chain including production and processing. In this context, this article examines the performance of marine products from India and discusses the prospects of improving them.

Trends in the export of marine fisheries from India

The trends and pattern of export of agricultural commodities have undergone shifts with the liberalisation of the economy and India's accession to the World Trade Organization (WTO) with effect from 1995, and several other bilateral and multilateral agreements that India has entered into thereafter[3-5]. During 1995-96 to 2019-20, marine products' export from India grew from 0.3 million tonnes (mt) to 1.29 mt, with a corresponding improvement in earnings from US $ 1.1 million to US $ 6.68 billion[6] (Figure 1). The share of fish products exported hovers around 10–13% of total production during the entire period[7].

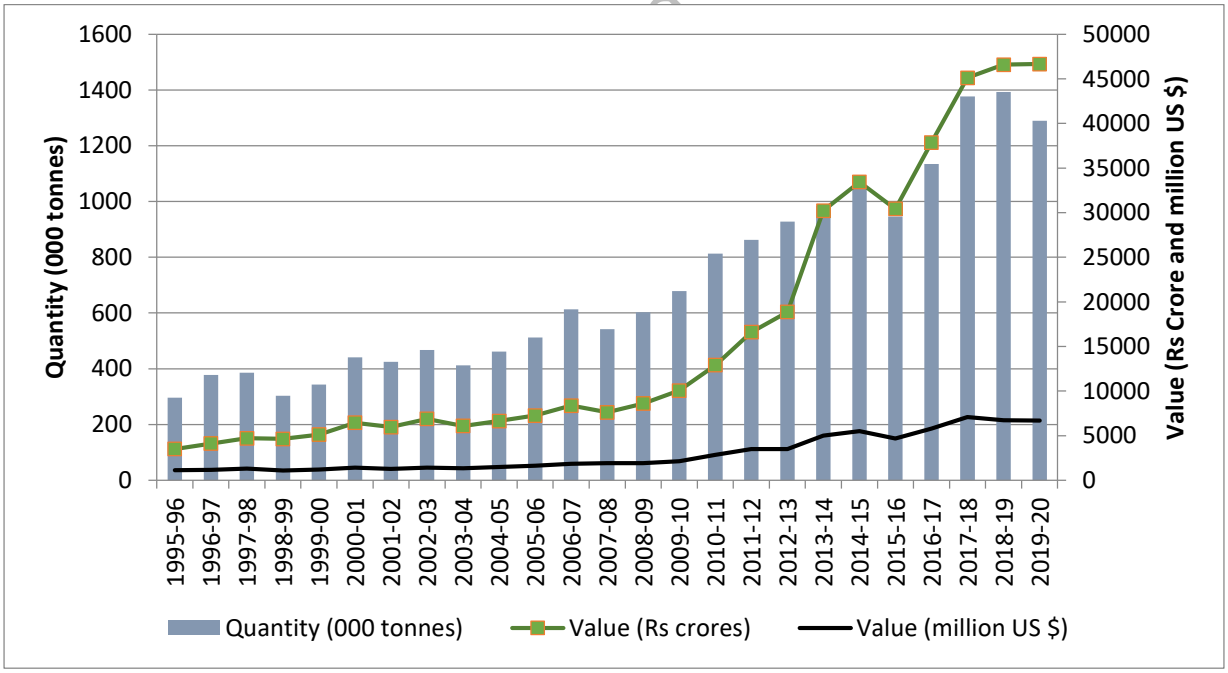

Figure 1: Trend in export of marine products from India, 1995-96 to 2019-206.

Projected exports

The global export of marine products for human consumption is projected to be 47 mt by the year 2030, compared to 43 mt in 2018[8]. Thus, out of the incremental production of 26 mt

during 2018–2030, only four million tonnes would enter the export markets, and the rest would be consumed domestically along with diversion for non-consumption purposes. The domestic demand for fish in developing countries is bound to increase due to growth in real per capita income, urbanization, and changes in the taste and preferences of consumers[9]. China has already emerged as a leading global consumer of marine products and its leading importer, driven mainly by rising national income[10]. During the period 1961-2011, China's GDP growth doubled that of developing countries, with a fourfold increase in daily fish intake[11]. Domestic fish consumption in India is also bound to increase, leaving a lesser quantity for exports, impacting export prospects.

Growth performance of export of marine products

The growth of marine product exports during the period 2000-2020, classified into two equal sub-periods of 2000-01 to 2009-10 and 2010-11 to 2019-20, is provided in Table 1. The trend growth rate was estimated by least square regression method using data collected from Marine Products Export Development Authority (MPEDA). In order to avoid wide fluctuations and to provide stable growth rates, triennial ending (TE) average were used. The data for the year 2020-21 is not used, as the export during this period was impacted by COVID-19. During the overall period, the export growth was at a rate of 10.7% year^{-1}– 12.5% during the latter period compared 5.6% during the former. However, at a disaggregated level, the second period had lower growth, except for frozen shrimp and live items. The growth of exports of frozen shrimp propelled total exports during the latter period.

Table 1: Exports of marine products during 1990-2020 and its trend growth rates, disaggregated into two time periods, by fish products (based on triennial ending average)

Items	Export (000 US $)			Growth rate (% year^{-1})		
	1999-00	2009-10	2019-20	2000-01 to 2009-10	2010-11 to 2019-20	Overall
Frozen Shrimp	837 (70.0)	901 (45.5)	4783 (70.0)	0.6	18.9	10.4
Frozen Fin Fish	148 (12.3)	377 (19.1)	649 (9.5)	11.6	2.7	10.4
Frozen Cuttle fish	74 (6.2)	183 (9.3)	313 (4.6)	14.6	4.3	9.6
Frozen Squid	69 (5.8)	125 (6.3)	353 (5.2)	8.5	8.0	10.3
Dried items	10 (0.8)	122 (6.2)	165 (2.4)	26.6	-0.1	17.1
Live items	9 (0.8)	23 (1.2)	49 (0.7)	10.2	7.7	11.9
Chilled items	10 (0.8)	45 (2.3)	94 (1.4)	15.5	7.1	15.5
Others	39 (3.3)	204 (10.3)	425 (6.2)	17.1	6.5	11.6
Total	1196 (100)	1980 (100)	6830 (100)	5.6	12.5	10.7

Source: Calculated by the authors using MPEDA (2022)[6]

Figures in the parenthesis indicate percentage to the total

Frozen shrimp accounted for more than 70% (in 2019-20). In terms of absolute quantity, the export of fish is on the increase. Given the slow growth of marine capture fish production, mainly of fin fishes, increasing its exports could impact nutritional security, particularly in coastal regions where fish is a major dietary component and protein source.

Diversification of export destinations

Diversification of export destinations is critical to reduce market risks and to realise higher unit prices. Indian marine products' export is concentrated in certain countries (Table 2), mainly in the United States, focusing on frozen shrimp. Over the years, the destinations have changed, characterised by a decline in exports to certain traditional markets like the European Union

(EU) and Japan, along with an increase to China. Diversification of Indian exports by consolidating the existing markets and by penetrating the newer markets is a need of the time.

Table 2: Exports of marine products, 1990-2020 and its trend growth rates, disaggregated into two time periods, by export destination (based on triennial ending average)

Country wise	Export (000 US $)			Growth rate (%/year)		
	1999-00	2009-10	2019-20	2000-01 to 2009-10	2010-11 to 2019-20	Overall
Japan	572 (47.8)	288 (14.5)	430 (6.3)	-6.9	2.6	0.9
USA	163 (13.6)	231 (11.7)	2409 (35.3)	0.8	25.4	13.2
European Union	162 (13.6)	645 (32.6)	965 (14.1)	15.6	4.6	9.4
China	156 (13.0)	305 (15.4)	804 (11.8)	9.0	3.2	5.8
South East Asia	78 (6.5)	216 (10.9)	1492 (21.8)	8.2	18.2	20.5
Middle East	33 (2.8)	107 (5.4)	291 (4.3)	14.7	9.7	14.4
Others	32 (2.7)	188 (9.5)	439 (6.4)	21.6	8.6	14.3
Total	1196 (100)	1980 (100)	6830 (100)	5.6	12.5	10.7

Source: Calculated by the authors using data from MPEDA (2022)[6]

Figures in the parenthesis indicate percentage to the total

Trend in the unit value of Indian export

The unit value of Indian exports is low. During the period from 2000-01 to 2019-20, unit prices have grown at a rate of 3.46% per year. The growth rate of unit price for overall exports for China, Japan, the European Union, South East Asian Countries, Middle Eastern Countries, and the USA was at the rate of 9.9%, -0.23%, 3.75%, 2.61%., 4.76%, 2.5%, respectively. A similar analysis for exported items indicated a growth rate of 1.13% for frozen shrimp, 5.82% for frozen fin fish, and -0.04% for dried items. The growth rates were 4.83%, 3.96%, and 2.55% per year for frozen cuttlefish, frozen squid, and live items. Poor adoption of high-end processing is one of the reasons for the slow growth[12]. Indian export firms have to venture into advanced value addition, including ready-to-eat (RTE)/ready-to-cook (RTC)/ready-to-serve

serve (RTS) products[13]. Export of sashimi grade tuna to Japan realises better prices but needs customised on-board handling, pre-processing, and processing facilities[14,15]. Another example is the export of live fish, including lobsters and crabs, which are considered delicacies in certain countries[16,17]. Live transportation for long distances requires associated infrastructure[18]. Also, the export of ornamental fish is quite insignificant, compared to its potential.

Prospects for boosting India's marine products exports

India faces stiff competition from some Asian countries for global markets, and therefore, a concerted effort is needed to boost export earnings. The ensuing session provides a broad sketch of the approaches needed, focusing on four aspects: domestic fish production for exportable surpluses; fish processing and value addition; quality assurance system; and policy changes.

1. Technology led augmentation of fish production to generate an exportable surplus

The government of India has proposed a production target of 22 mt of marine products by the year 2024-25 from 13.7 mt by the year 2020–21, warranting a growth rate of 9-10 % year^{-1}. The marine fisheries account for only 35% of total fish production as of 2021. Further, its growth has been stagnating (2.1% per year during 2000-2020). Therefore, the increased export is to be found from aquaculture. Despite the high growth rate of about 7.8% year^{-1}, India's aquaculture sector loses its sheen when compared to the competing countries, warranting focused attention (Table 3).

Table 3: Change in the level of aquaculture production and its growth rates, between 2000 and 2018, by major producer countries

Country/ Region	2000 *(mt)*	2018 *(mt)*	Increment (mt)	% increase	Annual growth rate (%/ year)
Asia	28.42	72.81	44.39	156	5.4
China	21.52	47.56	26.04	121	4.5
Indonesia	0.79	5.43	4.64	587	11.3
Vietnam	0.50	4.13	3.63	726	12.4
Bangladesh	0.66	2.41	1.75	265	7.5

India	1.96	7.07	5.11	261	7.4
World	32.42	82.10	49.68	153	5.3

Source: Calculated from FAO (2020)[8]

The total production of crustaceans in India (mainly constituted by shrimp production in India) increased from 0.13 million tonnes in 1970 to 1.19 million tonnes by the year 2017[7]. As of 2020-21, the total aquaculture shrimp production was about 0.84 million tonnes, of which 92 per cent is contributed by whiteleg shrimp (*Leptopanaeus vannamei*). A total area of 0.17 million ha is under shrimp cultivation in India (Figure 2).

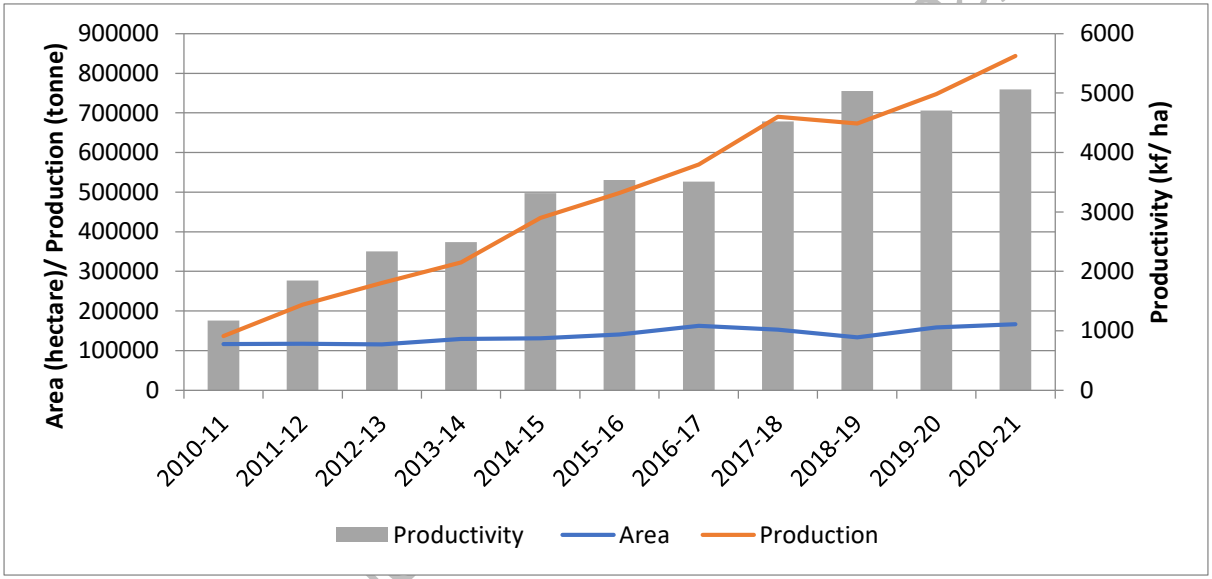

Figure 2: Area, production and productivity of aquaculture shrimp in India, 2010-11 to 2020-21

Source: Calculated from MPEDA (2020)[6]

The estimated potential of fisheries resources in India is 7.16 mt comprising of 5.3 mt of conventional resources (demersal and pelagics of inland; and oceanic and non-oceanic resources of EEZ, Andamans & Nicobar Island and Lakshadweep) and 1.85 mt of non-conventional resources including deep sea Myctophids, oceanic squids, jellyfish and marine macroalgae[19]. The deep-sea harvestable potential, including oceanic tuna, is about 3.3 mt from both the EEZ and areas beyond the national jurisdiction. Indian marine products' exports were

traditionally dominated by wild-caught shrimp from the ocean and tiger shrimp from aquaculture. The tiger shrimp was less productive and more susceptible to white spot disease. Introduction of the specific pathogen-free spawn of shrimp *Leptopaneus vannamei* led to exponential increase in both production and exports of shrimp[20,21]. Given the diminished scope for furthering fish production from marine capture fisheries, culture fisheries need to be focused in both inland and marine waters in its rich water resources that include an area of 2.02 million in seas under its EEZ[19]. Technologies in the domain of breeding, feed management, and, disease management and surveillance are well developed in India[20], which would serve as the engine of future growth of aquaculture.

In India, the technological backstopping for fisheries and aquaculture is provided majorly by institutions under the Indian Council of Agricultural Research (ICAR) and colleges and universities under its ambit. Besides contributing to production of fish through culture and capture technologies, these institutions have developed technologies in the domain of processing and value addition, packaging, quality assurance, and testing for chemical and microbial contaminations. Further, they are involved in developmental activities, regulations, and capacity development by being part of panel of experts of Export Inspection Council, providing training on regulatory norms like HACCP, inspection and approval of sea food exporting firms, developing and implementing biosecurity norms, developing quarantines guidelines and facilities, to mention a few[20].

In order to augment production and link it to export markets, the potential of the small-scale aquaculturists and fishers is to be leveraged fully. The small-scale fishers is to be supported with affordable technologies which are less capital intensive. One important measure is to organise them into groups so as to leverage economies of scale, particularly in procurement of inputs and output marketing. Self-Help groups, producer organisations (of fishers and fish farmers) and contract farming are some of the options. Further, encouraging smallholders to

utilise water bodies for fish culture would augment fish production, but it needs augmented institutional support in terms of inputs and technologies (fish seed, fish feed and agro-chemicals) and extension support (information and training).

2. Processing and value addition of fish

About 75% of the fish produced is marketed fresh and only about 15% is processed[19]. Shrimps, squids, cuttlefish and some finfish are mainly processed for exports. The major processed products include canned fish; battered and breaded items like fish fingers, retort pouch products; stuffed products; and steamed products. The number of fish processing units has increased from 340 in 2007-08 to 593 in 2018-19[21] and further to 625 as on October 2022, with a total processing capacity of 36.3 thousand tonnes. The fish processing sector generates attractive profits - while the Gross Fixed Capital Formation (GFCF) in the fish processing sector increased from Rs 591 crores to Rs 953 crores during 2011-12 to 2016-17, the profits have increased from Rs 263 crores to Rs 1011 crores[22].

The capacity utilisation is quite low- as low as 15-25%, mainly on account of inadequate availability of fish for processing and value addition[22,23]. The exportable surplus can be improved by importing fish to India so as to process it domestically and re-export, as is successfully practised by several countries in Asia, notably Vietnam. This could warrant a strict quarantine facility that can be established at designated ports. Innovative technologies like thermal processing, high-pressure processing, pulse light technology, e-beam radiation and radio frequency heating have been developed suitable for export-oriented processing[20].

3. Adherence with food safety measures

Marine exports from India have to adhere to food safety and quality standards. The Codex Alimentarius Commission (CAC), an organisation jointly established by WHO and FAO, has proposed a slew of measures known as Hazard Analysis and Critical Control Points (HACCP)

as a global standard to be followed. Though WTO encourages members to use standards recommended by CAC, countries generally follow different standards. While USA, the largest importer of fish from India, follows HACCP to govern food safety and quality, the European Union (EU) follows the Rapid Alert System for Food and Feed (RASFF), which is apparently stricter than HACCAP. The food safety regulations set by the EU are harmonized, get periodically updated, and are based on principles of risk assessment[24]. Japan has its own measures of food safety regulations on imports and advocates a positive list system for maximum residue limits (MRL) for the presence of chemicals. The global trend is to establish stricter quality standards that call for enhanced cost of compliance by the exporters.

Institutional mechanisms for ensuring quality and safety of marine products export

Having a strong domestic food safety regulatory regime is a prerequisite for compliance with international Sanitary and Phyto Sanitary (SPS) measures. The Export Inspection Council (EIC) presently functioning under the Ministry of Commerce and Industries, serves as a competent authority for trade compliance. The MPEDA, a statutory body under the Ministry of Commerce & Industry, promotes trade.

The food safety scenario in India got further regularised with the passage of the Food Safety Act in 2006 and the enactment of the Food Safety and Standards Regulation (FSSR) in 2011. All categories of food produced, marketed, or distributed within India, of both domestic and foreign origin, need to comply with this regulation. The Food Safety and Standards Authority of India (FSSAI) is responsible for laying down science-based standards for articles of food and regulating their manufacture, storage, distribution, sale, and import. FSSAI has instituted a Scientific Panel on Fish and Fish Products that is primarily concerned with the task of carrying out a risk assessment of various commodity-hazard combinations of fish. Apart from the above-mentioned agencies, the Department of Fisheries, functioning under the Ministry of

Fisheries, Animal Husbandry and Dairying, the Government of India issues sanitary import permits for the import of seafood to India as per the Livestock Importation Act (1898; as amended in 2001).

Notwithstanding these regulations, Indian seafood has faced several rejections and import refusals from major trading blocs, but is reducing over time. The major food safety issues fall under the domains of high levels of human pathogenic bacteria in primary production, parasitic infections, residues of agrochemicals, veterinary drugs, and heavy-metal contamination[24]. Some of the management measures in this regard include:

a. Evolving a diversified food safety risk management system

Due to information asymmetry and constraints in enforcement, government agencies often fail to manage food safety risks. Hence, there is a need to evolve a diversified food risk management system that addresses complementarity among all stakeholders, including the government, market forces, and citizens[25]. Newer technologies like machine learning can be effectively used for this[26].

b. Strengthening the framework of enforcement and surveillance

The scope and capacity of existing compulsory food policy instruments are to be widened to include unregulated commodities, particularly the fresh and chilled seafood sold in bulk in the domestic sector. The scope of the National Residue Control Programme (NRCP) conducted by the EIC as a requisite for EU requirements could be extended to include all aquaculture operations and the capture fisheries sector. A comprehensive national monitoring system for

contaminants and residues can be instituted to evaluate food safety risks and to deter inappropriate practices that harm food safety. .

4. Enabling policy changes

The overall policy atmospheres of the exporting countries have a significant role in promoting and facilitating exports, mainly by reducing transaction costs. The major dimensions of the policy support are discussed here:

a. Revisiting financial support and subsidies

Over recent years, the financial requirements of export firms have changed towards quality improvement rather than bulk processing. In the context of sanitary and phytosanitary (SPS) measures and the need to align the existing processing facilities with the requirements of newer export destinations, the financial support accorded to the processing firms is to be revisited with a view to realising better unit value. First, the quantum of credit to the fisheries sector is to be accelerated. The share of the fisheries sector in Ground level credit (GLC) to the agricultural sector as a whole has declined from 1.31% in 2003-04 to 0.30% in 2013-14[27]. During the year 2020-21, the total long-term refinance credit disbursed for the fisheries sector was only about 0.2% of the farm sector credit of about Rs 459 billion, and only 0.1% of the total long-term refinance credit flow[28]. The government has extended the Kisan Credit Card (KCC) facility to fishermen and aquaculturists as well, as a measure to increase short-term credit flow to the sector[29], but the uptake has been quite low. This warrants an initiative to promote credit delivery to the fisheries sector.

b. Skill development in fisheries value chain

Imparting skills for the development of products suitable for export destinations while following international quality standards is a challenge, and warrants professional training. The

domain for skill development includes meeting the SPS requirements, packaging technologies, advanced fish processing technologies of international demand in niche markets, quality assurance and traceability, export and insurance management, and financial services. The intake of students into various branches of fisheries science is to be increased to meet the renewed requirements[30]. The demand for fisheries professionals, para-professionals and skilled workers engaged in a fish processing factory has increased, and the demand is likely to increase[31]. Skill development is integral component to diversify India's export markets, as it warrants development and promotion of country specific products.

c. Infrastructure development

A critical issue is the inadequate infrastructure supporting fish export. India has a cold storage facility of 0.43 million tonnes and a chilled storage facility of 24 thousand tonnes, which is inadequate to support fish production and processing[6]. Onboard cold storage facilities can be improved by the advanced technological modification of fishing vessels. Reefer vehicles with adequate cold storage facilities can help in making quality fish available for processing and export. The number of ice plants is only 52 with a capacity of 1580 tonnes daily[6]. Another major area of infrastructure requirement is the development of Hygienic Fish Landing Centres (HFLC) which calls for structural modifications in the landing centre. The formation of food processing clusters would help to appropriate economies of scale, and reduce unit costs.

d. Coordination between different agencies in production, processing, quality assurance and trade

The fish export mechanism involves multiple agencies dealing with production, processing, certification, customs, marketing, trade, and financial services. Proper communication and coordination among different departments are required to fasten the decision-making and

implementation process. The ministries mainly included are Fisheries, Commerce, Agriculture, Food Processing, and Finance.

Convergence in food regulation

In India, multiple agencies are involved in regulating the seafood sector, resulting in persistent problems of crossover and ambiguity in enforcement. The EIC is endowed with the task of regulating seafood exports, whereas the food safety of imported and domestically marketed seafood is managed by FSSAI. Biosecurity measures and some of the food safety issues of imported seafood are regulated by the Department of Fisheries, Government of India. The coastal aquaculture activities are regulated by the Coastal Aquaculture Authority of India (CAAI) which also has a role in assuring the safety of aquaculture commodities as it certifies antibiotic-free farm inputs (feed additives, probiotics, feed, grow-out chemicals, and immune-stimulants). The Bureau of Indian Standards (BIS) has also formulated commodity-specific product standards that address both the quality and safety of fish products. Convergence of these agencies is highly imperative to eliminate jurisdictional overlap and duplication of efforts by different agencies so as to ensure better compliance by producers and traders. It needs consultation of the agencies concerned so as to develop a comprehensive approach.

e. Sustainable Fishery and fisheries subsidy

Niche markets are emerging for products with smaller environmental footprints. The Code of Conduct of Responsible Fishery (CCRF) of FAO recommends adoption of sustainable fishing practices in marine waters[32]. One key aspect of green fishing is to streamline resource-depleting and market-distorting subsidies into green subsidies. India accounts for only a minuscule fraction of the global subsidies to the fisheries sector- US $ 0.28 billion of global fisheries subsidy amounting to US$ 35.4 billion[33]- which can be converted to green subsidies. that would not lead to resource depletion and promote value addition.

f. Diversifying export destinations

Diversifying export destinations is critical to reducing the volatility of export earnings and addressing the disruptions that may occur due to global economic turbulence. Several steps need to be considered in this context. They include technologies for development of value-added products including ethnic fish products specific to prospective export destinations, developing technologies and skills in quality assurance and traceability systems, liberalising regulation of import of inputs and machinery for specific product development, inclusion of marine products in free trade agreements, and trade promotion, to mention a few.

Conclusions and policy implications

The marine products' exports have high growth performance, but it is driven mainly by an increase in the volume exported of frozen shrimp rather than by a significant increase in the unit value arising out of advanced processing and value addition. Further, the exports are not geographically diversified. These issues need to be addressed by bringing in technologies and imparting skills to produce high-value processed products. This warrants enhanced institutional support, particularly in terms of credit and technology handholding. The increased exports are to be realised without compromising domestic nutritional security. The major focus areas for improving exports include generating an exportable surplus; increasing unit value through improved processing and value addition; strengthening the quality assurance system, ; augmenting credit flow; streamlining subsidies; and bringing convergence of developmental agencies. The future production is to be technology-led. The government interventions are to be directed towards incentivizing value addition and adoption of modern technologies including isochoric freezing, online automation in monitoring physical hazards, non-thermal technologies such as electron beam irradiation, and pulsed light and plasma light processing. Compliance with the SPS measures and ensuring traceability is a key element in this. The

fiscal policies – taxes and subsidies- are to be relooked to nudge adoption of responsible and sustainable fishing practices, advanced technologies of processing and value addition, adherence with SPS measures, exploration of newer prospective markets and advanced quality packaging practices. Greater coordination among various departments is anticipated to effect convergence of the efforts and help conflict resolution. Favourable institutional mechanisms and legal and administrative backup are necessary for such a reform.

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