PalArch's Journal of Archaeology of Egypt / Egyptology

AN ARCHAEOLOGY OF INDIAN SEABED AND ITS EXPORT POTENTIAL IN GLOBAL GEOGRAPHY: AN EMPIRICAL ASSESSMENT

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Sameer Shekhar and N. Jena , An Archaeology of Indian Seabed and its Export Potential in Global Geography: An Empirical Assessment -Palarch's Journal Of Archaeology Of Egypt/Egyptology 17(12), ISSN 1567-214x

"*By and large it can be said that even in the past and remote ages, it was the seafaring nations that prospered, prospered both from point of view of power and wealth because of trade and commerce. I do not say that landlocked nations have not been powerful, they certainly have been powerful for periods at a time, but on the whole the importance of sea power has been a dominant feature of history*."

– Pandit Jawaharlal Nehru

Abstract

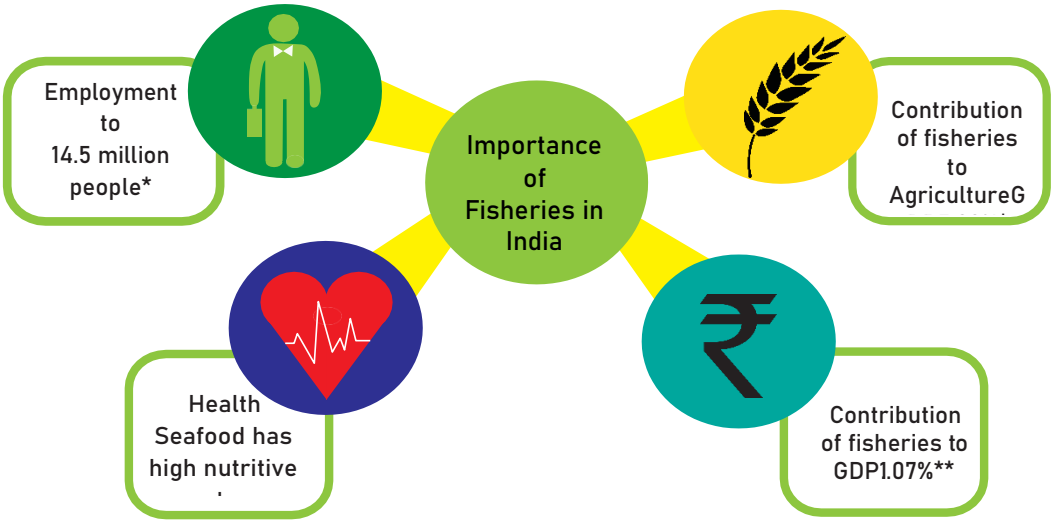
The geographical situation of India makes it very old and opulent in having seabed resources, and thus, the significance of water body and borne has been historical to the development of civilization and development of the nearby regions. Marin Industry in India plays vital role in supporting the economic growth and development with the abundance of seabed resources and variety of sea food items demanded by the countries across the globe. Keeping in view the increasing marine export year on year, the study aims at presenting an overview of the Indian marine trade profile and analyzing the export potential. Entire assessment has been made based on secondary data collected from database of national and international importance. Most of which have been taken from DGCIS and Trade Map for year 2019 and 2020. To examine the export potential of marine products for the significant five exporting countries, Revealed Comparative Advantage (RCA) analysis has been conducted based on data for latest year. The study gives an overall view of India's marine export composition, export direction and export trend during the last one decade.

Keywords: *Marine Export, Fisheries, Trend Analysis, Revealed Comparative Advantage*

Introduction

From the ages, the trade of seaborne has been recognized as important aspect of the world trade contributing towards employment generation, food and nutritional item supply, economic value creation and acting as significant linkage to the growth of global economy. Especially the countries which are situated touching water body enjoys greater benefits to others, not only of being better able to use the sea routes as cheapest mode of transportation assisting in export and import of large volume cargo but are prosperous enough to catch marine creatures for domestic use and export as well.India's fisheries have emerged to be an important part of the agriculturesector.

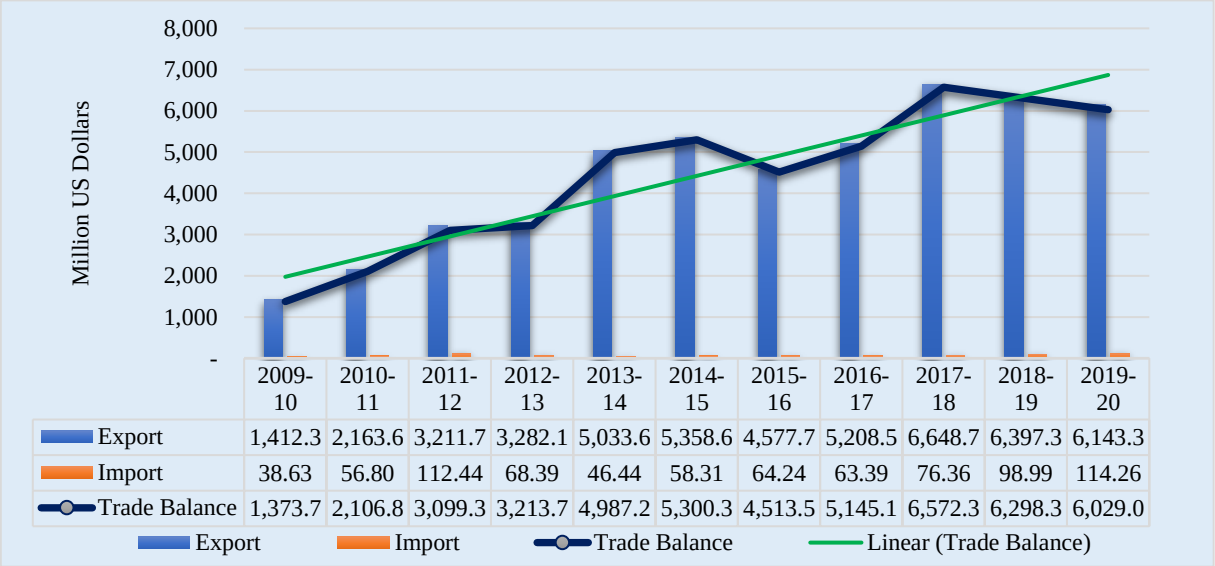
Having a costal extension of around 7500 kilometers being surrounded by Bay of Bengal in east, Arabian sea in the west, and Indian ocean in south has huge access to the seabed resources. Indiaisrichinbiodiversityandabout11%ofknownspeciesoffishesinthewor ldarefound in Indian coastal and inland waters bodies. There are about 50 commercially important species (fishes and crustaceans)andthetopexportedspeciesincludeScampiPrawn,TigerPraw nsandCuttleFish.India is blessed with an abundance of natural resources, 8129 kilometers coastline, exclusive economic zone of 2 million square kilometers holds great potential of production as well as exports of the surplus.India is the fourth largest exporter of marine products in the world and contributes nearly 5% to the global marine products export market (ITC, 2020). The marine industry of India has a share of 6.3% in the global fish production and has engaged around 14.5 million people directly or indirectly in its various economic activities (Economic Survey, 2019). During the financial year 2018-19, India exported 1,282,968 tons of sea food worth US $ 6.35 billion (ITC, 2020).



Source: Economic Survey, 2019*, National Fisheries Development Board, 2020**

Figure 1: Importance of Fisheries in India

Figure 1 reveals significance of marine sector in India from different perspective. Indian marine sector contributesnearly 2% to the total Indian exports and the global marine sector contributes 0.66% to the total global exports (Trade Map, 2020), and this makes the marine sector play a very crucial role in Indian trade. As has been mentioned about India's competitive edge due to its topographic uniqueness being surrounded its peninsula from west, south and east has easy access to the different economies by sea routes as well as have been enjoying the privilege of exporting the sea foods across the globe. The marine products export from India has been growing exponentially over the years and with current export of the products to more than 100 countries. USA (35%) and China (22%) alone have demand for India's total marine export across the globe in 2020. The growing export trend of India's marine products have been found increasing with the time as have been shown in Figure 2.The marine products export is targeted to cross US $ 10 billion in coming 2-3 years (Srinivas, 2020), however, by the values from the trade map the current Indian export stands at US $ 6.14 billion.



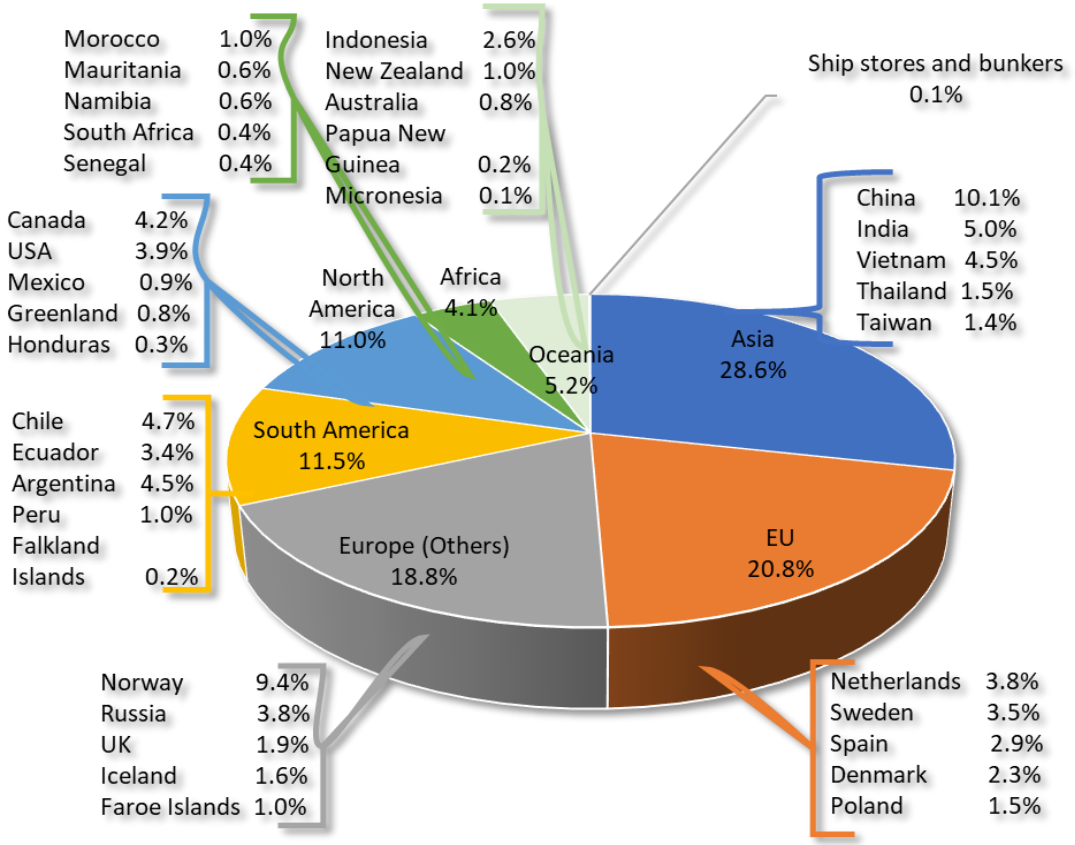
	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Export	1,412.3	2,163.6	3,211.7	3,282.1	5,033.6	5,358.6	4,577.7	5,208.5	6,648.7	6,397.3	6,143.3
Import	38.63	56.80	112.44	68.39	46.44	58.31	64.24	63.39	76.36	98.99	114.26
Trade Balance	1,373.7	2,106.8	3,099.3	3,213.7	4,987.2	5,300.3	4,513.5	5,145.1	6,572.3	6,298.3	6,029.0

Source: DGCIS, Ministry of Commerce, Government of India

Figure 2: India's Marine Exports Trade Balance

In value, for the year 2019-20, India is the world's third largest exporter of marine products in the world with United States (US) being the biggest importer of our Indian marine products followed by China, Japan, Vietnam, Thailand, and UAE. The total exports to US accounts for 33% of our total marine exports implying a third of exports and the total exports to the Asian destinations account for 40% of our total marine exports implying two-fifths of exports. This can be interpreted to how important the marine sector is not just for India but for our neighbors in the continent. Marine products are not only exported majorly by India and other Asian countries, but they are also big consumers of marine products with US and China leading in imports and China being the largest Asian consumer (Trade Map, 2020). With the observed shift in manufacturing hub from the West to the East, it is imperative that a sector which is highly pursued for culinary and gastronomical purposes need to be kept in focus to gain an advantage in trade as most of the human population are residing in Asia, food and therefore marine products will be of paramount importance in the coming years in trade (National Fisheries Development Board, 2020).

All the countries beside sea and those with the giant water bodies have great export potential of marine products. Figure 3 reveals the share of different countries across globe in export of marine products.



Source: Trade Map, 2020

Figure 3: Region-wise Major Exporters of Marine Products2019-20

From Figure 3, it is clearly reflected that Asian countries and European countries are dominant in supplying marine products as these three regions constitute around 70 percent of the global marine export. In Asia, China, India and Vietnam are the largest supplier, whereas, in European region Norway, Russia, Netherland and Spain are the major exporting economies. For few of the Indian marine export breeds Chile and Ecuador from South American region are tough competitors and are significant contributor to the global marine export.

Mostly exported marine products from India: Among the most exported marine products of India, frozen shrimps and prawns alone contributes around 78% of the total marine export in 6 digits HS code.

Table 1: Top 10 Exported Marine Products under HS Code 03

(Values in USD Million)

HS Code	Product label	2018-19	% Share	Cumulative % Share
030617	Frozen shrimps and prawns	4351.936	68.54%	68.54%
030743	Cuttlefish and squid	624.431	9.83%	78.37%
030389	Frozen fish, n.e.s.	402.172	6.33%	84.70%
030499	Frozen fish meat n.e.s.	248.835	3.92%	88.62%
030359	Frozen anchovies	120.887	1.90%	90.53%
030572	Fish heads, tails and maws	64.93	1.02%	91.55%
030633	Crabs	61.491	0.97%	92.52%
030752	Octopus	57.873	0.91%	93.43%
030354	Frozen mackerel	51.636	0.81%	94.24%
030749	Cuttlefish	48.327	0.76%	95.00%

Source: Trade Map,2019 (Data for the period of January 2019 to December 2019)

Table 1 reflects that HS code 030617 i.e., frozen shrimps and prawns and HS code 030743 i.e., cuttle fish and squid alone contributes for more than 75 percent of the total marine export, which also clearly reveals that the top 10 exported marine products constitutes 95 percent of all marine products exported. Therefore, these 10 products have been taken into consideration for the purpose calculating revealed comparative advantage in the world for the sector and that of each product in the top10 list against the top 5 exporters for each marine product.

Methodology Development along Literature Review

Much research has been conducted to have comparative analysis of export in specific product with respect to different countries using Revealed Comparative Advantage method (Balassa, 1977; Vollrath, 1991; Yeats, 1985; Richardson and Zhang, 1999; Ferto and Hubbard, 2002; Yue, 2001; Bender and Li, 2002; Batra and Khan, 2005; Bebek 2011; Startiene and Remeikiene, 2014; Laosutsan et al., 2017; Nabi and Kaur, 2019). Balassa's (1965) RCA model was the first as index development which was further refined (1977, 1979 and 1986) have been used by many of the research to examine the comparative advantage. However there have been various models developed along modification. Few of the significant models developed have been mentioned in Table 2. The literatures referred

revealed that the assessment have been made to examine the export and import competitiveness across time, trading partners and regions at different level of commodity, but for top marine products export have not been found thus proving a gap and ground to undertake the study which would not only examine the top marine export products' revealed comparative advantage at global level but has also attempted to measure the strength of India in the top 10 marine products against top five exporting countries of each product under 6 digits Harmonized System (HS) code.

The present study has been carried out considering the RCA model as defined by United Nations Conference on Trade and Development (UNCTAD) referring Ricardian interpretation of international trade theory.

Ricardian theory of trade states that cross border trade among the economies are driven by difference in productivity which can be better reflected by RCA whereinthe pattern of trade is dictated by the difference in productivity levels in the production of a good between two countries. Although determination of productivity is a difficult task, but an approximation can be "revealed" from this estimation. Traditionally, a country is said to have a revealed comparative advantage in a given good when the ratio of its exports of the product to its total exports of all goods (products) exceeds the same ratio for the world as a whole i.e., while RCA takes values between 0 and infinity, a country is said to have comparative advantage in the export of a good if the value is calculated to be more than 1.

Equation 1: To examine the export potential of Indian marine sector in the world following RCA model has been defined:

$$RCA\ of\ India\ in\ Global\ Marine\ Export = \frac{X_{im}/\sum X_i}{X_{wm}/\sum X_w}$$

X_{im} $India's\ Marine\ Exported\ value\ (IME)$

$\sum X_i$ $India's\ total\ Exports\ (ITE)$

X_{wm} $World's\ Marine\ Exported\ value\ (WME)$

$\sum X_w$ $World's\ Total\ Exports\ (WTE)$

Equation 2: To examine the revealed comparative advantage of specific product (HS code based) export out of total marine products export in the world considering top marine exportables *equation 1* has been further extended by product specific inclusion.

$$RCA = \frac{X_{ism}/\sum X_{im}}{X_{wsm}/\sum X_{wm}}$$

X_{ism} $India's\ Specific\ Marine\ Product\ Exported\ value\ (ISME)$
$\sum X_{im}$ $India's\ Total\ Marine\ Exported\ value\ (ITME)$
X_{wsm} $World's\ Specific\ Marine\ Product\ value\ (WSME)$
$\sum X_{wm}$ $World's\ Total\ Marine\ Exported\ (WTME)$

Equation 3: To ascertain the RCA of specific marine product (top 10 exported products under 6 digits HS code) following equation has been used:

$$RCA = \frac{X_{ism}/\sum X_{im} + \sum X_{cm}}{X_{csm}/\sum X_{im} + \sum X_{cm}}$$

X_{ism} $India's\ Specific\ Marine\ Product\ Exported\ value\ (ISME)$
$\sum X_{im}$ $India's\ Total\ Marine\ Exported\ value\ (ITME)$
$\sum X_{cm}$ $Competing\ country's\ Total\ Marine\ Exported\ value\ (CTME)$
X_{wsm} $Competing\ country's\ Specific\ Marine\ Product\ value\ (CSME)$
$\sum X_{im}$ $India's\ Total\ Marine\ Exported\ value\ (ITME)$
$\sum X_{cm}$ $Competing\ country's\ Total\ Marine\ Exported\ value\ (CTME)$

Along these equations reveled comparative analysis have been calculated to reachinference of the study on the data set of marine export by India,

competing countries and the world from Trade Map and DGCIS, Ministry of Commerce, government of India.

Results and Discussion

Based on the global overall export data, global marine export and India's overall export and that of marine for year 2019, RCA of Indian marine export in the world has been conducted and found the result as has been shown in Table 2.

Table 2: Export Competitiveness of India's Marine Products

Code	Product label	RCA India	Relative Comparative Advantage of India with				
			China	Norway	Vietnam	Chile	USA
03	Marine Products	3.03	0.48	0.54	0.99	1.07	1.21

Calculated from data on Marine Export, Trade Map, 2019

From Table 3 it is evident that India has an RCA>1 implying it is highly competitive in the world. In case of relative advantage, China and Norway are strong competitors of India in export of the considered product being placed at a relatively advantageous position than India and Viet Nam is nearly neck-to-neck with India in the marine sector implying that with increased production we can outperform Vietnam, while Chile and USA are relatively low in competition with India in this product. One of the observations made in this analysis has been that, of the top 10 products, India's RCA value has been the highest for the frozen goods (except for frozen mackerel). This constitutes a special focus for 3 major products viz. frozen shrimps and prawns, frozen fish and frozen anchovies. The logistics sector needs to put more focus in these product categories and look into the suggestions made for improving storage capacity, refrigeration capacity and warehousing. Points of value chain where such aspects are of quintessence, needs to be improved and looked at with a new perspective.

Product Specific RCAfor top 5 Marine Exporters in the World: An RCA comparison for the top 10 exporting marine products of India in their 6-digit code has been done with respect to the top 4 exporting countries of marine products in the world. India itself ranks 4th for the year 2018-19 and the remaining countries to occupy positions in the top 5 exporters in the world for the year 2018-19 are China at 1st, Norway in 2nd, Vietnam in

3rd and Chile in 5th. Below a table of comparison has been shown regarding this:

Table 3: RCA of top 10 Marine Products Export by Top 5 Exporters in the World

HS Code	Product Label	RCA				
		India	China	Norway	Vietnam	Chile
030617	Frozen shrimps and prawns	14.84	0.30	0.00	8.99	0.01
030743	Cuttlefish and squid	6.04	2.67	0.00	2.28	7.93
030389	Frozen fish	5.84	2.07	1.60	1.24	0.76
030499	Frozen fish meat.	5.50	0.98	6.85	13.93	33.40
030359	Frozen anchovies	9.82	1.86	6.92	2.30	n.d.
030572	Fish heads, tails and maws	9.25	0.10	9.59	4.64	0.20
030633	Crabs	3.04	0.29	6.24	0.50	0.01
030752	Octopus	1.69	0.92	n.d.	10.25	1.27
030354	Frozen mackerel	1.41	1.83	30.33	0.57	0.35
030749	Cuttlefish	4.89	1.49	0.02	17.30	-

Calculated from data on Marine Export, Trade Map, 2019

Table 3shows that Indiahas highest RCA index among the five for the products exported under HS code 030617 followed by Vietnam.It establishes that both India and Vietnam are competitive exporters of frozen shrimps and prawns while China, Norway and Chile have a comparative disadvantage in the production and export of the same. Such a high RCA for India is indicative of the fact that it has very high export strength. RCA index for items exported under HS code 030743 have been found greater to 1 for India, China, Vietnam, and Chile indicating these countries as competitive producers and exporters of cuttlefish and squids while Norway has a comparative disadvantage in its export. Similarly, India has been found having high RCA in all the marine products exported under top 10 HS codes in 6 digits.Norway has been found having high RCA for products exported under 030354 and 030633. Chile has been found having highest RCA for HS code 030499 (frozen fish meat items) and 030743 (cuttlefish and squids). Vietnam has been found having highest RCA in products exported under 030749 (cuttlefish items) and 030752 (octopus). It is quite surprising that despite scoring less RCA for the products exported

under top 10 HS codes exported by India, China happens to be the largest exporter of marine products in the world.

An RCA comparison for the top 10 exporting marine products of India in their 6-digit code has been done with respect to the top 5 competing countries for each product category, and a comparison has been carried and presented:

Table 4 shows the relative advantage of India against competing countries in the lowest value in column 5 reflects strong competition to India. As in case of the HS code 030617 relative advantage assessment shows that Ecuador is the strongest competitor for India in its export whereas, Thailand is relatively less competitive. China is relatively the strongest competitor for India in export of the products under HS code 030743, 030389, 030354 and 030749, while Thailand, Senegal, Peru,and Norway are weak competitors of India. USA, Vietnam, Chile, and China are strong competitors of India in export of frozen fish meat items and are relatively at an advantageous position. It is interesting to note that though the percentage share in exports of Frozen anchovies "Engraulis spp.", Indian mackerels "Rastrelliger spp.", seerfishes etc.(in 6 digits), stands on 5^{th} position in top exported product category in 6 digits HS code, its RCA value has been found comparatively higher indicating its strong potential in exports with increased production. In case of relative advantage, China is the strongest competitor of India in export of the considered product and is relatively at an advantageous position than India while Norway is relatively low in competition with India in this product. Same is in case of products exported under HS code 030572, which stands at 6^{th} position by percentage share in total marine export but possess high RCA value of 3.05, and Uganda competes neck-to-neck with India revealing relative advantage index of 0.98. In case of export of marine products under 030633, 030752, 030354, and 030749 the strongest contenders are Russia, Morocco, China and Vietnam.

Table 4: RCA of Products Exported under Top 10 HS Code of India and Top 5 Competing Economies for Each Category

Code	Product label	RCA India for Marine Sector	Top 5 Competing Countries	Rel. Comp. Adv. of India in Marine Sector
030617	Frozen shrimps and prawns, even smoked, whether in shell or not, incl. shrimps & prawns...	4.89	Ecuador	1.49
			Vietnam	2.19
			Indonesia	3.23
			Argentina	3.37
			Thailand	6.27
030743	Cuttlefish and squid, frozen, with or without shell.	1.99	China	0.29
			Spain	1.59
			Indonesia	1.60
			Peru	1.77
			Thailand	2.40
030389	Frozen fish, n.e.s.	1.92	China	0.37
			USA	0.95
			Indonesia	2.01
			New Zealand	3.91
			Senegal	4.46
030499	Frozen fish meat n.e.s. (excluding fillets).	1.81	USA	0.45
			Vietnam	0.53
			Chile	0.70
			China	0.73
			Norway	2.11
030359	Frozen anchovies "Engraulis spp.", Indian mackerels "Rastrelliger spp.", seerfishes etc.	3.24	China	0.68
			Taiwan	1.01
			South Korea	2.74
			Canada	3.68
			Norway	3.73
030572	Fish heads, tails and maws, smoked, dried, salted or in brine.	3.05	Uganda	0.98
			Hong Kong	1.00
			Iceland	1.14
			Tanzania	2.26
			Norway	2.53
030633	Crabs, whether in shell or not, live, fresh or chilled.	1.00	Russia	0.15
			Canada	0.49
			South Korea	0.59
			USA	0.60
			UK	0.90
030752	Octopus "Octopus spp.", frozen.	0.56	Morocco	0.10
			Spain	0.15
			Vietnam	0.22
			China	0.24
			Indonesia	0.41
030354	Frozen mackerel	0.47	China	0.10

	"Scomberscombrus, Scomberaustralasicus, Scomber japonicus"		Norway	0.12
			Japan	0.21
			Netherlands	0.34
			Faroe Islands	0.44
030749	Cuttle fish "Sepia officinalis, Rossiamacrosoma, Sepiola spp." and squid etc.	1.61	Vietnam	0.38
			China	0.42
			Spain	0.90
			Senegal	1.31
			Peru	1.83

Calculated from data on Marine Export, Trade Map, 2019

Top competitors' assessment: India's most exported marine products in 6 digits HS code is 030617 refers to shrimps and prawns in which Ecuador stands to be strongest competitor. Ecuador has a relatively low production cost at the farm level. It has a higher quality and better uniformity in raw materials. It has larger sizes of shrimps at harvest. It majorly exports Head-On Shell-On (HOSO) shrimp and prawns to eliminate the cost of employing labour for peeling and/or other value-added products/services. It has successfully captured a big market in the shrimp cooking industry in Europe due to higher quality and better level of uniformity of HOSO shrimp from Ecuador. It has been able to consolidate a demand for its premium marine products in the restaurant sector in China.

The second top product of export from India comes under HS code 030743 which refers to cuttlefish and squid, frozen, with or without shell. This performance was compared with the competing country China. It was found that China has an expertise in fishing in deep sea for long duration, which increases the catchment size and brings in variety in catchment. It has relatively lenient regulations at domestic level and relatively easily satisfying health & phytosanitary requirements for seafood produce in Europe which is the major destination for its exports. It has relatively better transportation and warehousing facilities with temperature-controlled climate chambers and trailers. It has been able to better manage its industry in minimizing post-harvest losses.

China has been found as strong competitor in the marine products export under HS code 030389 referring frozen fish, 030743 referring to cuttle fish, squid with or without frozen shell, 030359 referring to frozen anchovies, and 030354 concerned with frozen mackerel

(Scomberscombrus, Scomberaustralasicus, Scomber japonicus etc.). It was found that China has made huge investments in labour-saving equipment and technology. It has relatively greater storage capacity, better warehousing, and higher quality of transportation.

USA has been found as strong competitor to India in export of marine products under HS code 030499 which refers to frozen fish meat (excluding fillets). It is significant to note that USA has relatively strict regulations imposed to maintain quality of frozen products. The laws have been implemented to ban excessive use of trans fats and other harmful substances. Strict regulations regarding labeling of frozen foods have been operational. Technological advancements leading to high quality packaging, keeping in mind portability of the product, storage conveniences and shelf-life of frozen foods. Private companies are implementing newer and better refrigeration techniques and conveyor techniques to minimize their work processes. Manufacturers on their institutional levels are implementing stricter regulations to accept higher and better quality of raw materials.

Uganda has been found as strong competitor in export of marine products exported under HS code 030572 which refers to fish heads, tails and maws, smoked, dried, salted or in brine. Uganda has organised a code of good practices which is followed at every point of supply chain, which includes production, handling, preparation, processing and handling fish and fish, various stages in the artisanal fishery, and from capture to sale. The code also focuses on providing basic information, laws, regulations, procedures and principles for addressing food safety and quality for fish maws.

Russia and Norway have been found giving strong competition for the export of marine products under HS code 030633 which refers to crabs, whether in shell or not, live, fresh or chilled.Russia and Norway have strongbilateral collaboration at the Barents Sea has been there for a long time. A strong but elastic legal basis has been made to make the relationship legally bound. The cooperation in learning over time mutually benefits both at joint scientific studies to make framework for understanding. They isolate fisheries management from bureaucracy of

region. Their ability to modernise and expand cooperation to brings potential mutual benefit for sustainable fisheries with favourable outcomes has been tremendous. It has relatively better development and implementation of legislation with regulatory and enforcement of measures at the state level and agreement on shared fish stocks and fisheries on high seas at international level.

Morocco has been found giving strong competition to India in export of marine items under HS code '030752 which refers to cuttlefish and squid etc. Morocco has the advantage of its location, long coastline and an established hub connected with the world. It also has a huge area of fisheries. It had implemented the Alliotis Plan which resulted in growth of the sector and brought in private investment boosting scientific research, aquaculture, domestic consumption, investments and combating fish smuggling.

Considering the reports' (World Bank-LPI 2018, Enabling Trade Index, 2019; Ease of Doing Business, 2020; Deloitte LEADS, 2019) results it has been found that lack of strategic measures in warehousing, lack of refrigerated warehousing and reefer containers, poor transit system, lack of mother vessels, complex documentation and clearance, lack of fish catching ships, lack of trained workers for catching, peeling, processing, and packaging etc. have been found responsible to poor value chain and poor competitiveness despite huge potential and geographical privilege.

Conclusion

One of the observations made in this analysis has been that, of the top 10 products, India's RCA value has been the highest for the frozen goods (except for frozen mackerel). This constitutes a special focus for 3 major products viz. frozen shrimps and prawns, frozen fish and frozen anchovies. Among the competitors, Ecuador has been found having grasp over the European market and the restaurant chain in China. A relative comparative study reveals that Ecuador is the strongest competitor for India in the export of the considered product. Though India holds advantage over all the competitors in this product category, Ecuador has the advantages over India across its value chain especially by virtue of production costs at farm level are relatively low, better uniformity and higher quality of raw

materials which implies better seeds and better growth of shrimps, harvest size of shrimps is relatively large, due to high relative labour cost Ecuador majorly focuses on exporting Head-On Shell-On (HOSO) shrimps instead of peeled and/or value-added products which is a popular raw material for the shrimp cooking industry in Europe, and restaurants have great demand for high quality shrimps from Ecuador in China (Solidaridad, 2020).

The higher RCA (i.e., > 1) reveals that India possesses huge capacity and trade potential in marine export terms across the globe having unique product catchment and demand for India seabed foods across the globe. Keeping in view the strategic measures and benchmarking practices by different countries giving strong competition to India in top exported products under 6 digits harmonized system code India needs to put more focus in these product categories and look towards improvement in storage capacity, refrigeration capacity and warehousing. Points of value chain where such aspects are of quintessence, needs to be improved and looked at with a new perspective.

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