An Empirical Assessment of Seafood Export Performance and Competitiveness in Gujarat, India

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Article Information

Review Article

ABSTRACT

Gujarat with 11 maritime districts owns the longest coastline (1640 Km) and has the widest shelf area. The coastline of about 1640 km consists of 173 landing centers. The shelf area covers about 1, 64,000 sq.km, of which 64,800 sq.km falls in the depth range 0-60 m, which can be exploited by traditional as well as mechanized craft. Marine fish export stands Multibillion dollar industry where fisheries sector supporting 1 per cent in nation's GDP. The present study analyses the growth, performance, trends, competitiveness of marine fish and fish product from Gujarat and India during 2001- 2014 using the parameters Viz., Exponential Growth Function, Export Competitiveness Index (XCI), Revealed Comparative Advantage (RCA), Revealed Trade Advantage (RTA). XCI expresses the changes in market share of different products for seafood export in Gujarat which was indicating improvement in XCI (>1) over the years, hence it founds competitive in the export of seafood from Gujarat. An Indian seafood export depicts XCI greater than one throughout the study period. RCA was estimated for the confining efficiency, performance and competitive ability for the Gujarat seafood export and India's seafood export. RCA value of India and Gujarat seafood export showed a fluctuating trend which may be due to the high dependency on wild capture rather than culture for

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the export. India reflects the strong competitive power in the export of seafood as it was greater than 1 to a large extent. RTA has estimated for Indian export experienced the value >1 during 2001-2015-16, which become possible due to the high RXA and fewer IMA from India made its trade advantage and growth positive and faster. With respect to current development trend of export from Gujarat and India, there is urgent need to focuses decline in marine catches and over- exploitation, conservation, diversity, and policy framing. There has still needed for further improvement which may encourage more trade, rural development and foreign exchange in near future.

1. INTRODUCTION

The fisheries sector plays a significant role in the Indian economy contributing nearly 1 percent to the nation's GDP [1,2]. It provide livelihood to many poor households located in the coastal areas [3]. India exported seafood worth of ₹. 33,441.61 Crore in year 2014-15 which had a growth of 11 percent compare to year 2013-14 [4,5,6]. In dollar terms, the export value stood at $5.51 billion, up by 10 per cent year-on-year [7]. Fisheries are arising sector in Gujarat providing livelihood to nearly 3.2 lakh in marine fisheries [8]. It also contributes a share of 12.11 per cent in value term of seafood export from India [5]. Gujarat occupies 1.64 lakh sq. km and 2.14 lakh sq. km of continental shelf area and exclusive economic zone [9]. Gujarat owns rich marine resources with 1600 km long coastline which make it major contributor in marine fish production (7.12 lakh M.T., 2014-2015) and export [10]. It exported 242,000 tons in FY13 (worth ₹. 2929.61 crores), which grew to 251,000 tons in FY14 (worth ₹. 3658.57 crores). Thus from the point of view of employment and income generation, international trade has considerable significance as well. Even though Gujarat seafood industry's good performance, its full potential is yet to tap when it came to marine products exports [11]. Gujarat seafood export industry needs to focus on several aspects with respect to supply demand scenario of seafood and its relative market strategies. The competitiveness and relative advantage of state in seafood export can provide an idea about the strength and weakness of industry and also aware the lacuna needs to upgrade in order to make industry more competitive and earn foreign exchange. Hence it is the trade advantage and competitiveness of seafood trade aspect of the sector that would be the focus of the current study. In this study, an attempt has been made to analyze the status, performance, relative trade advantage and competitiveness of Gujarat fish export.

The study is based on the data collected from the different sources like *MPEDA, SEAI, Indiastat.com, Gujratstat.com*, and DoF Gujarat etc. for the period 2001-2014. Gujarat exports seafood (worth ₹. 3658.57 crores) includes seven different forms with highest share to South East Asia (46.11), China (16.56) and the European Union (12.31) (Fisheries Statistics of Gujarat, 2013). The competitiveness was targeted to estimate due to the significant share and change of seafood export from Gujarat over the time period in total seafood export from India.

(**Note**: ₹ *sign represent the Indian Rupee (INR) and* **$** *sign represent the USD*).

2. REVIEW OF LITERATURE

2.1 Growth Rate, Market Share and Export Competitiveness Index (XCI)

Jean-Michel [12] at the international trade centre (UNCTAD/WTO) analysed the foreign trade statistics by using following measures such viz., percentage and compound growth rates, market share, export competitiveness index (XCI), contribution to trade balance and revealed comparative advantage (RCA). His work emphasizes the usefulness and importance of these measures for the present study.

Mary Wesna [13] used the measure of growth rate, market share and export competitiveness index (XCI) for analysing the competitiveness of Indian squid and cuttlefish products in international seafood market. This highlights the relevance of these measures.

Klasra and Fidan [14] stated that the competitiveness depends on a number of factors, like the nature of commodity composition, targeted market and the overall status of international trade. A country therefore cannot be declared internationally not competitive if its

economy is resource deficient and closed, or its export face stagnating international demand or stagnant markets.

2.2 Revealed Comparative Advantage (RCA) and Relative Trade Advantage (RTA)

Balassa [2] showed that comparative advantage is a approach for analysing trade data. This work first established the idea that comparative advantage can be revealed and thus can be measured by the observed trade flows, which in Balassa's case was based on export shares. RCA has since become a standard tool in studies of trade and trade policy.

Vollarath [15] has given some specifications which aim to measure RCA at the global level, others at a regional or sub global level (as in Balassa'a original specification), whereas Dimelis and Gatsios [16], Gual and Martin [17], Eiteljorge and Hartmann [18] had done analysis on bilateral trade between just two countries or trading partners.

Bender and LI [19] examined the structural performance and shift of export and revealed comparative advantage of the East Asian and Latin American regions over the period 1981-1997. It examines, if there is a relation between changes in export pattern among different regions and shift in comparative advantage between regions.

Hinloopen and Marrewijk [20] study uses the Balassa Index with some innovations to identify the dynamics. The pattern of china's revealed comparative advantage and its implications in terms of competition for other exporting countries has been analysed using the methodology of marker share changes.

Laursen [21] his studies revealed that when using the RCA, it should always (at least in econometric analysis) be adjusted in such a way that it becomes symmetric. The conclusion was based on a theoretical discussion of the properties of the measure, but also on convincing empirical evidence, based on the Jarque-Bera test of normality of the error terms from regressions, using both the RCA and the RSCA.

Ferto and Hubberd [22] assessed the competitiveness of Hungarian agriculture vis-a-vis EU using four indices of the 4 revealed comparative advantages. The four indices are

original Balassa Index, relative trade advantage, relative export advantage, logarithm of the relative export advantage (original Balssa index) and relative competitiveness.

UNIDO [23] studies have asserted the shortcomings of the two measure originally suggested that is export performance and export-import shares even though they used Balassa's [2] criterion of revealed comparative advantage (RCA) to gauge the long term effect of trade liberalisation. Balassa already criticised the net trade measures as biased by the degree of skewness in the cross country pattern of protection. The export performance measures of RCA are also affected by trade policy measures like export subsidization or other policy measures.

Vollrath [15] offered three alternative specifications of RCA; the first of these measures is the Relative Trade Advantage (RTA), which account for imports as well as exports. It is calculated as the difference between Relative export Advantage (RXA), which equals to the Balassa Index and its counterpart, Relative Import Advantage (RMA). His second measure is simply the logarithm of the RXA (ln RXA) and third is revealed competitiveness (RC).

In 1999, these three alternative specifications of RCA measures (RXA, RMA, and RC) were used by Eiteljorge and Hartmann [18] in their recent studies of competitiveness in Hungarian agri-food products. The level of these indicators shows the degree of revealed export competitiveness /import penetration. While the indices RXA and RMa are calculated exclusively based on the either export or import values, the RTA considered both the export and import activities. From the point of view of trade theory and globalisation trends, this seems to be important and due to the growth in intra-industry and/ or entrepot trade, this aspect is becoming increasingly important (ISMEA) [24].

3. DATA AND METHODOLOGY

The study was conducted during the period of May 2016 to November 2016. The study is based on secondary data collected from different sources like UN COM TRADE database (used 2 digit codes of Harmonized System), (ITC), World Trade Organization (WTO), Factfish.com, FAO, MPEDA,Gujratstat.com and Indiastat.com to analyse the growth, performance, competitiveness, comperative advantage and net

trade effect through RTA. The latest version of the Harmonized System (HS) adopted by the United States is published by the U.S. International Trade Commission (ITC) as the Harmonized Tariff Schedule of the United States which was used to determine the numerical code assigned to a particular commodity; the descriptive passages can be helpful to determine the context of a particular commodity within classification.

4. ANALYTICAL FRAMEWORK

4.1 Analysis of Growth and Performance

The growth was measured to estimate the performance of seafood export from the Gujarat. It was focused on analyzing trends in the export of major marine products during the years 2000-2014. The basic export performance, growth in quantity exported, export value and unit value realized from export were analyzed by using the exponential growth function [25,26,27,28,29].

4.2 Revealed Comparative Advantage Ratios

Balassa [2] has developed the first concept of revealed comparative Advantage (RCA). It attempts to identify product groups where the target country has obviously an advantage in international export competitiveness. RCA has emerged as one of the most important measure of export competitiveness.

The formula estimate the country's comparative advantage is mentioned below:

$$RCA_{ij} = (X_{ij}/\sum X_{ij})/(X_{iw}/\sum\sum X_{iw})$$

Where;

RCA$_i$= Revealed comparative advantage for good i and country j
X_{ij} = Export of good i by country j
$\sum X_{ij}$ = Total export by country j
X_{iw} = World export of good i
$\sum X_{iw}$ = Total world export

If RCA$_i$ >1, then country has comparative advantage in good i

If RCA$_i$ <1, then country has comparative disadvantage in good i

In this framework, RCA indices can be estimated by the relative export share of seafood from Gujarat in the total Indian seafood export [30] [28,27]. RCA basically measured the relative export share of Gujarat seafood export with respect to the India [28,26].

If RCA >1, then the state has a revealed comparative advantage in the commodity.
If RCA <1, then the state has a revealed comparative disadvantage in the commodity.

RCA=1, Comparative neutrality.

RCA = (Seafood export of Gujarat ÷Total fish export of Gujarat) /(Seafood export of India ÷ Total fish export of India)

4.3 Export Competitiveness Index (XCI)

The export competitiveness of marine fish was also analyzed using the indices of competitiveness formulated by Fertö and Hubbard [15,26,27,30]. The competitiveness pertains the ability and performance of any product, firm, industry, or country to export in given market comparative to ability and performance of other product, firm, industry, or country. Export competitiveness of finfish in Gujarat is used to estimate the changes in the Indian seafood market share. Changes in the state seafood export share in Indian seafood market over time can indicate the long-term comparative advantage of the product. It neutralizes cyclic fluctuations to large extent show sustained trends in the shifting of market forces toward the new center of gravity.

If the XCI is >1 then it can be said that the state has competitiveness in the export of this product.

Changes in Indian market share

= (Gujarat's Export of product p at time t/India's export)/(Gujarat's export of product p at time t-1/India's export of product at time t-1)

4.4 Relative Trade Advantage (RTA)

Besides using the exports as a factor, as in Balassa index, these indices have taken into consideration imports also. As for the RCA, these indices were worked out with reference to the total marine products export and import from India and the world. The first index was the Relative Trade Advantage (RTA), which included both exports and imports and was the difference between Relative Export Advantage (RXA) and Relative Import Advantage (RMA). The RXA was

the Revealed Comparative Advantage (RCA) using Balassa index, i.e. [31,32,33].

RTA = RXA − RMA

Here,

RXA =   RCA   (or Balassa index)
RMA = (mij/mwj) / (mit/mwt)

Where,

Mij =   Import of marine fish (India),
mit =   Total import (India),
mwj = Import of marine fish (world), and
mwt = Total import (world).

Thus,

RTA =   {(xij/xwj)/ (xit/xwt)} − {(mij/mwj) / (mit/mwt)}

5. RESULTS AND DISCUSSION

Out of the total fish export of India (₹. 33,441.61 crores) for the year 2014-15; ₹. 4423.45 Crore were from Gujarat, accounting for 13.22% of total export. China is the main market for marine frozen fish, accounting for over half of the frozen fish exports, followed by South East Asia (14%) and the Middle East (7%) (17). Gujarat seafood export focused to a destination like South East Asian country (46.11), China (16.56) and European Union (12.31) respectively during the year 2014-15.

(**Note**: ₹ *sign represent the Indian Rupee (INR) and* **$** *sign represent the USD).*

5.1 Export Performance of India and Gujarat Marine Fishery

The Gujarat marine fish export showed an increasing trend and an exponential growth over the years (Fig. 1). India's share in world fish exports very with respect to time and remained less than five per cent till 2015. It was noticed highest (4.82%) in 2013-14 and lowest (2.00%) during the 2009-10. India's share in world market during 2015-16 was 4.56 per cent which noticed decline growth of 0.21 per cent (2014-15) compare to the previous year share in total seafood export. Declining in national seafood export scenario Gujarat's seafood export share was also noticed negative growth with 0.75 percent in quantity but found the positive growth of 1.11 per cent in value term during the year 2014-15 compare to previous year. The exponential growth was found significant in Gujarat seafood export with R^2 (96.5%) during the time of 2001 to 2015. The graph illustrated above explains that the Gujarat has witnessed ≠. 5326.7 crore export of seafood and remain the highest marine fish exporter in the country.

(**Note**: ₹ *sign represent the Indian Rupee (INR) and* **$** *sign represent the USD).*

5.2 Market Share of Major Importers of Seafood Products from Gujarat during 2001 and 2014

Market share of major importers of seafood products from Gujarat during 2001 and 2014 have been shown in Figs. 2 and 3, respectively. China enjoyed the highest market share of 65.19 per cent followed by EU (12.06%), South East
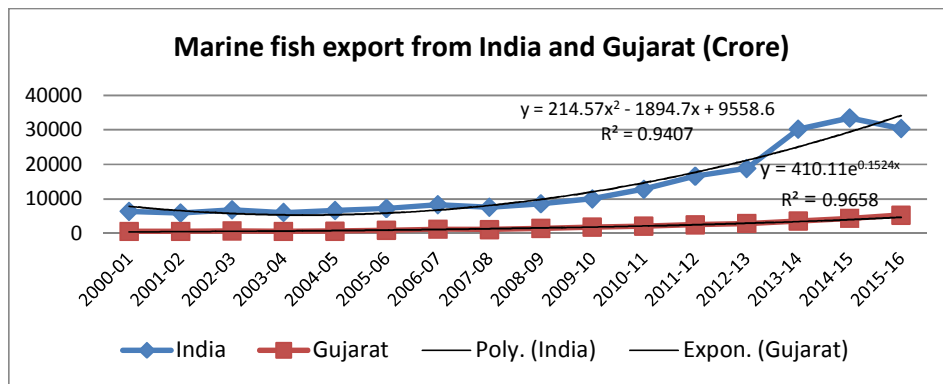

Fig. 1. Marine fish Export of India and Gujarat, trend line during 2001-2015

Asia (8.92%), Japan (5.43%), USA (3.04%), Middle East (2.76%) and others (2.59%). The major shift can be seen in seafood export from Gujarat to different countries in 2014. South East Asia was highest with (46.11%) followed by China (16.56%), EU (12.13%) japan (5.88%), Middle East (2.31%), USA (0.75%) and others (16.04%). Gujarat's seafood export to china declined gradually from 2001 to 2014 with 48.63 per cent and increased to South East Asia with 37.19 percent which illustrated the shift in the market for the export of seafood from Gujarat. It was also registered by MPEDA, 2014 showing the time series country wise export of seafood from Gujarat depicted the shift of market from 2001 to 2014.

5.3 Changes in Species-wise Export of Seafood in Gujarat

The percentage share of Gujarat seafood export of value term has been depicted in Fig. 4. As it was illustrated in Fig. 4 frozen fish export remain on top throughout the period. Frozen fish export share in value term was (53.72%) in 2001 which experienced fall in 2005 with (43.63%) but again it has reached the highest mark with (65.67%) in 2014 which strengthen the Gujarat seafood export. Frozen shrimp and frozen cuttlefish export stated with (9.86%) and (11.17%) in2001 which reached to (6.83%) and (8.32%) respectively in the export. Out of the three species, frozen shrimp and frozen cuttlefish export noticed a decline in percentage share in value term of export where frozen fish experienced positive growth. MPEDA report, 2014 and EIA (Export Inspection Agency) report, 2014 are the references used for the study showing the species wise export from Gujarat. It was also depicted in the reports that the frozen fishes were the major seafood export items (species wise) exported from Gujarat.

The percentage share of Gujarat seafood export of value term has been depicted in Fig. 5. It was noticed that there were ups and down in a share
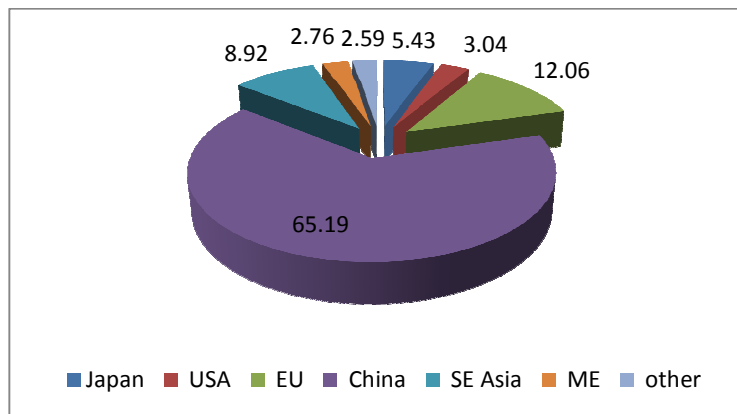

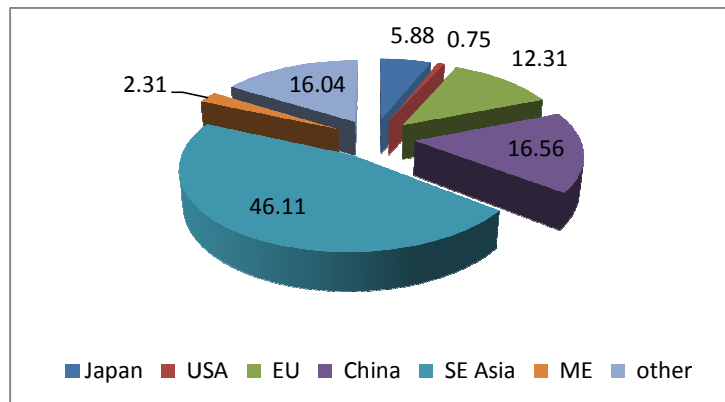**Fig. 2. Market share of importing countries of seafood from Gujarat during 2001**

Fig. 3. Market share of importing countries of seafood from Gujarat during 2014

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of export and remain comparatively low. Frozen squid export share was 12.58 per cent in 2001 which reached at the pick of 21.73 percent in 2005 and again experienced fall remain 6.47 percent in 2014. Dried item export from Gujarat experienced continuous progress starting with 1.06 percent in 2001 reached pick of 11.75 percent in 2009 and again fall down in 2013. Frozen squid shared 3.5 per cent of Gujarat seafood export in 2014-15. Thus Gujarat needs to take care of these emerging competitors in the export market.

5.4 Export Competitiveness

Export Competitiveness Index (XCI) for Gujarat seafood export was estimated for the study period 2001-2014 (Fig. 6). The XCI for seafood export of India was greater than 1 for most of the years. The highest estimated XCI was 1.4 in 2013 and the lowest XCI was 0.8 in 2008. The XCI of seafood export of India in the year 2015 was 0.99 which undoubtedly prove positive export competitiveness for fish export over the years. XCI of seafood export from Gujarat was competitive with 0.97 in 2014. Prithvi Rani [26] and Jayasekhar Somasekharan et al. [34] have

also used the tool to analyse the competitiveness of seafood for India and found the similar results over the time.

5.5 Revealed Comparative Advantage

The Revealed Comparative Advantage (RCA) for India and Gujarat in seafood export were estimated for the study period 2001-2014 (Fig. 7). India registered RCA as >1 in all the years from 2001-2014. RCA was the highest for Gujarat with 2.11 in 2014 and it was found the lowest with 1.48 in 2009. RCA value of Gujarat seafood export depicts handsome comparative advantage in export of seafood from Gujarat and also reflects the greater scopes for the seafood export industry. RCA was found the lowest during 2009 in Indian seafood export and Gujarat Seafood export with RCA value 1.40 and 1.48, respectively which shows the comparative advantage of Gujarat seafood export was greater than India's RCA during its lowest performance. Even though India had throughout positive advantage, but the highest RCA was registered with 4.1 during 2001 which indicates the rapid movement of growth of India in this sector. India had greater RCA of 2.18 in 2007 which later on
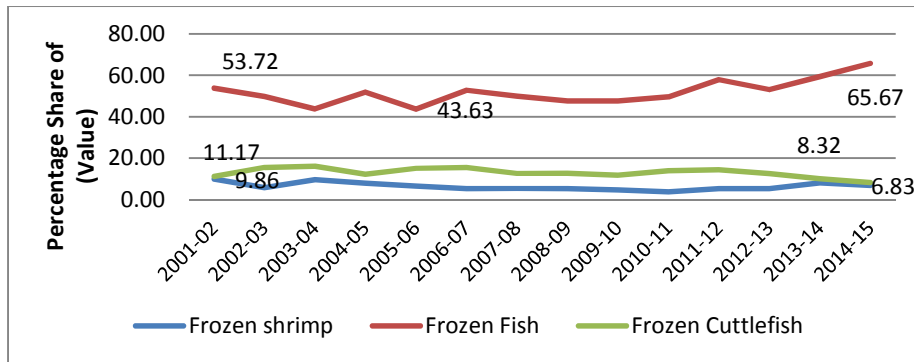

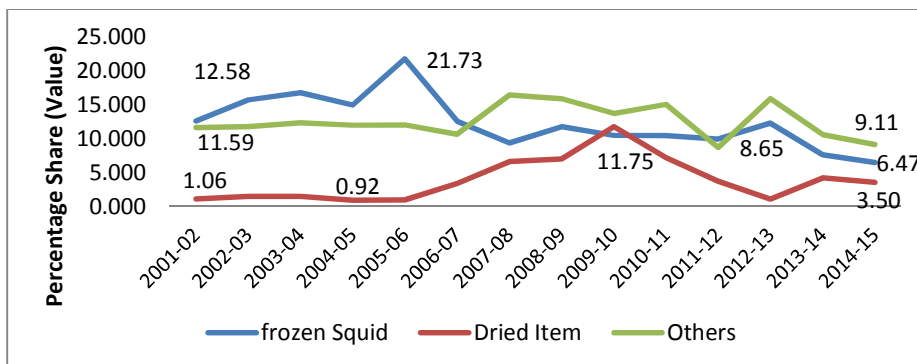**Fig. 4. Percentage share of Species wise Gujarat fish export**

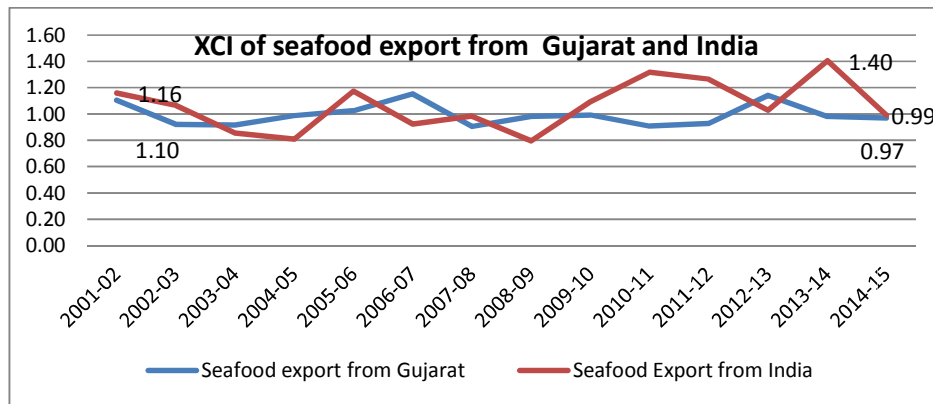**Fig. 5. Percentage share of Species wise Gujarat fish export**

Fig. 6. Export Competitiveness Index (XCI) of Indian Seafood Export during 2001-2014
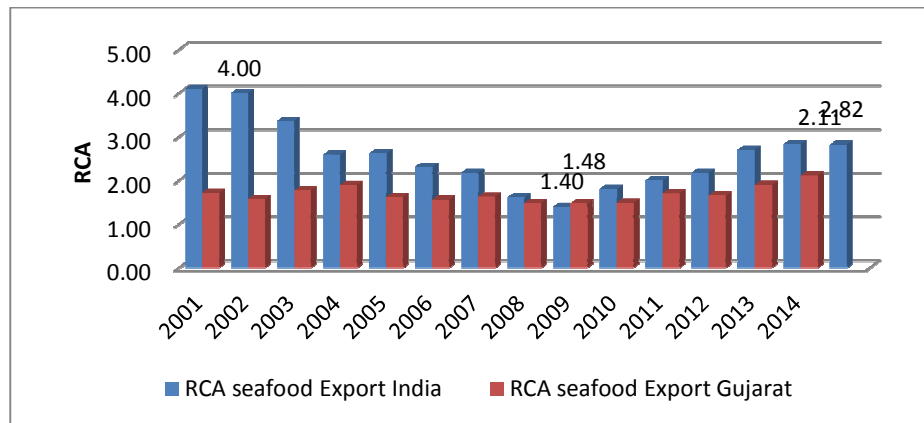

Fig. 7. Revealed Comparative Advantage for Gujarat and India 2001-2015

declined to 1.61 during 2008 and to 1.40 during 2009, because of decline in export. RCA is the most common measure to estimate the competitiveness. Shyam Salim [35], P. Rani et al. [26], Nikita Gopal [31], Jayasekhar Somasekharan et al. [34] are some of the authors used RCA to measure competitiveness in fisheries and get the related result as this study.

5.6 Relative Trade Advantage

The relative trade advantage (RTA) in Table 1. Reflects the real competitiveness and efficiency of trade of a country as it incorporates both exports and imports. India has positive trade advantage in export of fish and fish products but it was the highest (4.07) in 2001 and noticed lowest in 2009 with RTA (1.37). As can be seen from this table, for total fish and fish product the RCA was greater than unity and In (RXA) was positive for the fifteen-year period

under study, indicating that India has a comparative advantage in export of fish and fish product. It was also indicating the positive competitiveness of the India's export through RC as it was >1 during the study period. India has down fall in RTA during 2009-10 which gradually increased then after and reached 2.82 during 2014. India has a very negligible import advantage revealing that it has been gaining competitiveness and the pace of growth was fast too. India has the RTA 2.79 in 2015 indicating the trade advantage and efficiency of India to compete with other nations of the world in the export of fish and fish product.

According to the table presented below 2009 was the year when RXA (1.4), RCA (0.02), RTA (1.37) were found lowest due to the decline in export. P. Rani et al. [26] and Nikita Gopal [31] also found the similar results in their studies expressing the trade advantage of India in export.

Table 1. RTA of India's total fish export during 2001-2015

Year	RCA(>1)	RMA	RTA(>0)	ln RXA(>0)	ln RMA	RC(>0)
2001-02	4.10	0.02	4.07	1.41	-3.77	5.18
2002-03	4.00	0.02	3.99	1.39	-3.95	5.34
2003-04	3.36	0.02	3.34	1.21	-3.93	5.14
2004-05	2.60	0.02	2.57	0.95	-3.70	4.65
2005-06	2.62	0.02	2.60	0.96	-3.75	4.71
2006-07	2.32	0.02	2.29	0.84	-3.74	4.58
2007-08	2.18	0.02	2.16	0.78	-3.88	4.66
2008-09	1.61	0.04	1.58	0.48	-3.32	3.80
2009-10	1.40	0.02	1.37	0.34	-3.73	4.07
2010-11	1.81	0.03	1.78	0.59	-3.54	4.13
2011-12	2.00	0.04	1.96	0.69	-3.12	3.81
2012-13	2.18	0.03	2.15	0.78	-3.63	4.41
2013-14	2.70	0.02	2.69	0.99	-3.99	4.99
2014-15	2.84	0.02	2.82	1.04	-3.81	4.86
2015-16	2.82	0.03	2.79	1.04	-3.61	4.65

6. CONCLUSION

The present study focuses on explaining the competitiveness of seafood trade of Gujarat state and its efficiency and relative advantage in Indian market. These results have clearly shown that Gujarat does have comparative advantage in exporting seafood products. The primary market for these products is the developing countries having a preference for low-value fishes in contrast to the preference of developed countries for high-value products like shrimp and cephalopods. Gujarat is realising positive of XCI (>1), hence it founds competitive in the export of marine fish. Frozen fish is major item exported with 65.67 per cent of marine fish product exported from Gujarat. The countries namely South East Asia, China, EU, and Japan were Gujarat's top four export destinations which accounted for nearly 80 percent of the total export of marine fish and fish product from Gujarat. RCA value of India and Gujarat seafood export showed a fluctuating trend which may be due to the high dependency on wild capture rather than culture for the export. RCA value for Gujarat export was noticed >1 most of the study period which reached 2.11 in 2014 showed the state has the comparative advantage in export. India has less import and increasing export thus leading to positive trade advantage (RTA) and is progressing consistently. India reflects the strong competitive power in the export of seafood as it was greater than 1 to a large extent. RTA has estimated for Indian export experienced the value >1 during 2001-2015-16, which become possible due to the high RXA and fewer IMA from India made its trade advantage and growth positive and faster. There is still need for further improvement which may encourage more trade, rural development and foreign exchange in near future.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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