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TRADE POTENTIAL OF THE FISHERY SECTOR: EVIDENCE FROM INDIA

Veena Renjini K K[1]

Abstract

The contribution of fisheries sector to Indian merchandise trade and to world fishery trade is substantial. The items traded have gained reputation over the years which will help to keep the momentum of growth in the future. However, the imposition of food safety standards may blur its performance especially in the case of developing countries including India. Thus the whole question of comparative cost advantage comes into the picture of this dynamic trading system. The items traded enter the market in some processed form and the comparative advantage may be taken as an indicator to see whether India could continue with export specialization in this sector. The paper tries to see the revealed comparative advantage of India of this sector with its competitors, the intense trade relationship with its partners and the direction of trade in the WTO framework. The analysis suggests that India is comparatively in an advantageous position compared to its competitors. Furthermore, the changing food standards for enhancing quality content have not affected its competitiveness. Undeniably, the industry has undergone a structural change which equipped the sector to maintain its consistency and competency in the global fishery trade.

Key words: Export-Import Ratio, Comparative cost advantage, Export Similarity Index, Trade Intensity Index, Gini-Hirschman's Concentration Coefficient
JEL: F11&F14

1. Introduction

As highlighted in the Human Development Report, 2013, one of the drivers of development transformation is the tapping of global markets. It is here that exports have a major role to play. In this new approach, the government is a necessary catalyst that pragmatically adjusts its policies and actions in line with new realities and the challenges of global markets. Though post-independence, India diversified trade towards non-agricultural commodities, agricultural sector continues to be a leading sector in terms of contribution to net foreign exchange (Metha, 1997). In the agricultural sector, the fishery sector exports happen to be the prime contributor (GOI, 2001-02). The share of fishery and aquaculture production (live weight equivalent) entering international trade as various food and feed products increased from 25 per cent in 1976 to 39 per cent in 2008, reflecting the sector's growing degree of openness and integration to international trade. In real terms (adjusted for inflation), fishery exports grow by 11 per cent in the period 2006-08 and by 50 per cent between 1998 and 2008 (FAO, 2010). Numerous policy reforms have been made in export sector in India to facilitate the brand and quality of the export commodities to create international awareness of the "Made in India" label in a globalised market place (Tripathi and Leitao, 2013). The emphasis on efforts to boost exports is an indicator of growing realization of the trade potential of fisheries sector. The Special Focus Initiative of the Foreign Trade Policy of the Government of India identified this sector as the sunrise sector (*htpp://dgft.gov.in*). The fishery sector exports from India are excluded with Most Favored Nation Tariff

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of agricultural commodities in the WTO[2]. Given this background, the paper tries to explore the question as to what forms the basis of trade and which product a country wish to export. It is this question that leads to the analysis of the concept of Comparative Advantage on a single product, for example, fishery sector exports, in which India is a net exporter.

As Adam Smith argued in his treatise, "An Inquiry into the Nature and Causes of the Wealth of Nations", (1776), the absolute advantage with trade is that it carries surplus commodities and brings in commodities which are in demand or scarce. It is this proposition of Adam Smith that provided the theoretical as well as historical perspective for global trade. But the credit goes to David Ricardo in explaining this crucial factor. It is their writings that charted the course for policy makers everywhere and even today, their influence is visible in the case of free trade[3] . Thus focusing on the production of goods having comparative advantage is a rehabilitation package for the economy to flourish. A dynamic view of comparative cost advantage enables inefficient industries unable to withstand foreign competition into drivers of export success once their economies become more open. But considering the other important internal factors like growing population within the country and growing domestic market, it is imperative or essentially obligatory to see whether any exportable item is potentially exportable or not. A survey of literature throws light on the fact that it is worthwhile to search for the potential exportability of fishery sector exports from India. The major items from this sector are fresh fish, live or dead, fish dried or salted, smoked fish cooked before or during smoking process, chilled and frozen items, ornamental fish, fish items mainly used to extract oil etc. Though the fishery exports trends record an increasing trend, the growth rate seems to be zero or negative in some years because of the rejection of consignments. The overall trade performance of any commodity depends basically on its potentiality to trade. To lend empirical support to this view, an analysis is given here to examine the 'potential exportable hypothesis' based on comparative cost advantage of fishery sector items, a major component in the export basket of agricultural sector in India. It is striking to note that though India is a major maritime state, it virtually imports fish and fish products from major trade partners. This shows integration of economies under the WTO and how to reap the benefits of economic geography. Dean and Robert (2005) developed a model which indicates that economic geography matters in trade both within and across countries. Contextually, with increasing integration and a free market, exports are fast moving into a dynamic and competitive world. Seasonal nature of fish products adds to the shortcomings of primary exports, though it becomes an advantage since it is a natural resource. But, it may be presumed that with the liberalization of world trade especially with respect to developing countries, India may gain by promoting exports in primary commodities of which fish is an important item. The trade potential is the largest for the BRICs (Brazil, Russia, India and China) and USA, especially in the sectors like minerals, fish, machinery and chemicals. India tries to take advantage of trade liberalization by importing fishery sector items that are being processed with value addition for export and re-export. To have an export potential, the exporter's should have capability in product

[2] As per WTO guidelines the fisheries sector exports falls in Non-Agricultural Market Access

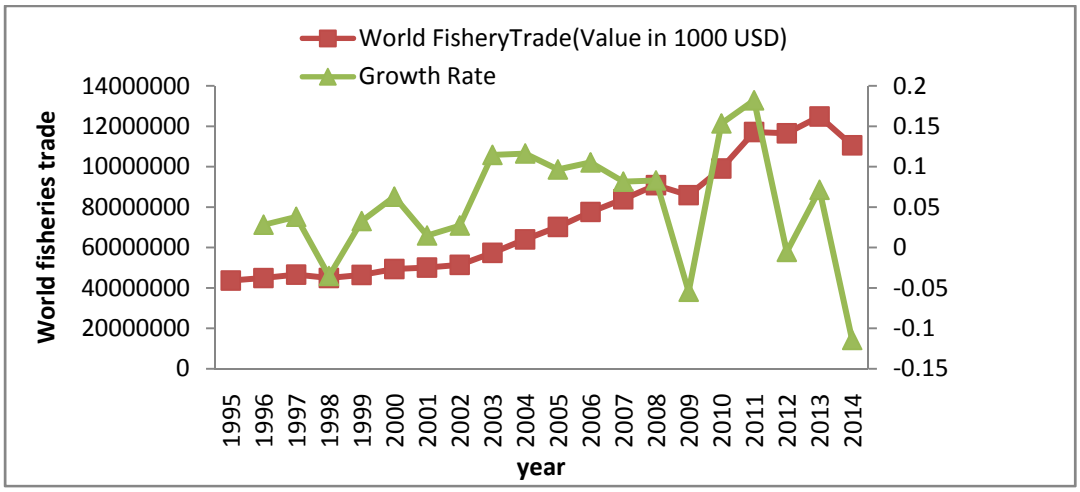
[3] The opening up of trade enables a country to exploit that good which has an absolute advantage. As a result of it the global production efficiency improves. It is this reasoning of Smith that persuaded the governments to dismantle inefficient barriers even after 100 years of "Wealth of Nations"

development, distribution, communication and pricing with its various advantages like positional advantages, low-cost advantage and branding advantage along with its performance in the export market over the years (Zou *et al*, 2003). Based on the background, it would of much significance to observe the performance and contribution of fishery sector exports in the world fishery trade scenario and in India's merchandise trade.

1.1. India's Share in World Trade

World exports of fish and fish products are on the increase with an annual growth rate of 5.7 per cent per annum. Over the span of 15 years since WTO, except for 1997, 2008, 2012 and 2014, world exports of fishery sector products keep on increasing and even touched double digits. The figure (1) below shows world demand for fish and fish products increasing and subsequently the growth rate. The negative growth rate recorded during those periods may be because of world economic turmoil.

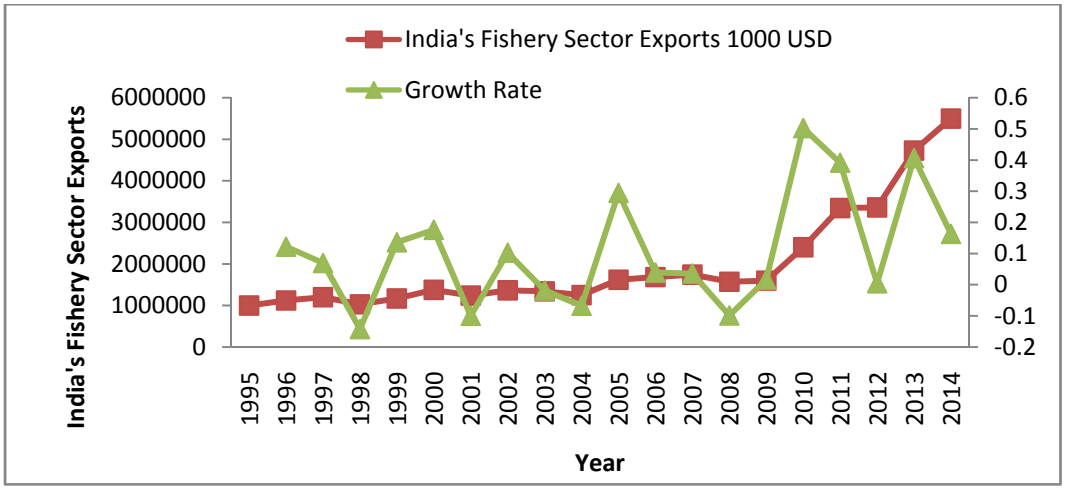
Figure 1: World Fishery Trade & Growth Rate



There are complementarities in supply and marketing of fresh and processed fish. There is considerable value addition attached to the trade of this food item with the availability of modern packaging and fish treatment technologies ensuring food safety standards. Hence, each country that trades in the global market is forced keep up and maintain the international standard. It is a matter of contention for all the developing countries to cope with the international sea food safety standard. Hence it gains space to see the trends in exports and its annual growth rate from India.

Here is the diagrammatic representation of the trends in exports and annual growth rate of fishery sector exports in India over the period 1995 to 2010. In the primary axis, India's total fishery sector exports to the world has been plotted whereas the secondary axis depicts the growth rate. It is to be noticed that though India's fishery sector exports to the world keeps on increasing, the growth rate recorded negative levels especially for the years 1998, 2001, 2003, 2004 and 2008. But it witnessed 50% growth rate in the year 2010 promising future prospects for exports.

Figure 2: Graph Showing India's Fishery Sector Exports to the World and its Growth Rate



A comparative study of world fishery and Indian fishery trade shows there is a parallel trend and therefore can be inferred that it keeps pace with world demand.

The table 1 furnished below glances on the contribution made by the fishery sector in India towards India's merchandise and world fishery trade. The quick inference is that the contribution of this sector remains stable over a decade and if further necessary steps are taken, its potential will be fully realised in the coming years. With reference to fishery sector's contribution in India's merchandise trade, it may be observed from the table1 that its average share keep declining from 3 per cent during 1995-2010 to 1 per cent very recently. The international trade of food products is increasingly being dominated by concerns of quality to safeguard human health. It mandates Indian exporters to improve their processing and packaging facilities to meet international quality standards (GOI, 1998-99). Despite that, marine products have emerged as the single largest contributor of agricultural exports from the country accounting for one fifth of the total agricultural exports (GOI, 2001-02 & 2013-14).

Table 1: Fishery Sector Contribution to India's Merchandise Trade & World Fishery Sector Trade (in US $ = 1000)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Fishery Sector's contribution to India's Merchandise Trade	3.16	3.35	3.45	3.1	3.19	3.25	2.83	2.73	2.26	1.65	1.61	1.39	1.2	0.86	0.9	1.09
India's Fishery Sector's contribution to World Fishery Sector Trade	2.32	2.53	2.62	2.32	2.55	2.82	2.5	2.69	2.37	1.98	2.33	2.18	2.09	1.76	1.88	2.46

Source: Author's

1.2. Thesis of Trade Theories: A Concise Survey

The propositions that we discuss under the different schools of thought in trade economics can be broadly analyzed under the umbrella of either supply or demand-driven discourse. The most distinctive theory of international trade addressing free trade is based on the Ricardian principles of comparative advantage, which in turn is based on neo classical reasoning is supply driven hypothesis. It underlines the significance of interregional differences in endowments of the factors of production ultimately driving inter industry trade between countries (Dean and Robert, 2005). Trade theories are indebted to Mill's notion of "Reciprocal Demand" and Alfred Marshall's construct of "offer curve" for incorporating a demand oriented approach. But the credit goes to Austrian School for their notion of opportunity cost that balanced the forces of demand and supply which provided the base for Heckscher - Ohlin theory. Linder's theory of 'overlapping demand' focuses on to quote

"….. to produce and to trade, representative demand in the respective countries needs to have an overlapping zone in terms of the range of goods that are produced and consumed in common….."

Here it is the demand that acts as the basis to explain trade. Helpman's (1987) argument favors the complimentarily of new trade and factor endowment theories as they advocates the components of world trade and therefore can be reconciled under a single conceptual framework. The merit of comparative advantage doctrine is that it is a synthesis of factor endowment, a country specific characteristic and factor intensity, a product or industry specific characteristics. Thus the theory of comparative advantage falls in normative economics by providing guidelines for government policies on better resource allocation of tradable items. However, factor endowment theory seems to be better encompass geographical variations – both physical and economic – within countries, and so it provides a workable framework in which to address the effects of international trade on their internal production and trade patterns (Venables and Limao, 1999). But neoclassical trade theory has continued to have a special appeal to economists championing the cause of free trade on the grounds of optimization at a global level, of productive efficiency and the automatic utilization of factors of production at full capacity (Sen, 2010). Internal supply factors like export taxes, high population growth etc., may be highlighted as factors that inhibit trade and cause stagnation for exports of primary commodities (Piermartini, 2004). Though there are shortcomings, especially in primary sector exports, the natural resource advantage forms the basis of exports mainly from fisheries sector. It is to be noticed that though the share of agricultural sector in exports declined over time, the contribution of fishery sector items has been increasing (GOI, 2013-14). These trade theories strongly support the exploitation of the comparative advantage and act as the contributing factor for exploiting trade potentiality.

1.2.1. A Related Literature:

The trade literature encompasses the concept of comparative cost advantage based on which the entire neoclassical theory rests which reflects on the specialization and gains from trade. In fact, it also predicts the direction and terms of trade. It was David Ricardo's notion of free trade and optimization of global welfare that each country tends to specialize in the production of those commodities in which it has a comparative advantage and imports those goods for which it possesses a comparative

disadvantage. Heckscher and Ohlin pointed out that for trade to take place there should be endowment of factors of production leading to comparative cost differences. Ricardo placed much importance on physical and natural influences over competitiveness, technological and human factors which were given importance by later economists (Goldin and Brown, 1992). Tracing historically, from free trade to protection now, we are in the era of trade agreements and customs unions. It is a matter of contention that the policy distortions arising in the form of interventions in the domestic and global markets can alter comparative advantage to the extent that the potential comparative advantage is not realized. But still comparative advantage is expected to play a dominant role in the era of trade liberalization in production and direction of trade.

Conceptual compromise is required to quantify comparative advantage as economic theory specifies the concept in terms of pre-trade relative prices in a distortion less world where market functions perfectly. As the researchers are left with post-trade data, the credit goes to Liesner (1958) to quantify the comparative advantage between Britain and its European competitors for a single commodity. Balassa (1965) first coined the term comparative advantage, using Liesner's methodology in his attempt to identify the enduring effects of trade liberalization resulting from the Kennedy Round of GATT. Vollrath (1987; 1989 cited by Vollrath 1991) analysed the trends of international competitiveness in agriculture using the concept of revealed competitive advantage. He calls them Relative Trade Advantage, Relative Export Advantage and Revealed competitiveness. Balassa's methodology (1965) has been extensively used in most pioneering studies like UNIDO (1982) to see the "revealed" comparative advantage in trade.

Lee (1986) traced the historical changes in the structure of exports and comparative advantage in Korea, Taiwan and Japan devising the Revealed Advantage Index (RCA) of Balassa (1965) which is rendered on the basis of actual export performance of individual countries. Panchamukhi (1973) estimated India's trade with the countries of the ECAFE region. His argument favors that the trade flows we observe in practice, constitute the 'ideal' pattern of comparative advantage based on resource endowment structure and the distortions that arise in the form of trade policies such as controls both tariffs and non tariff restrictions etc. It provides guidelines for the policy makers to adjust the pattern of trade provided the contributing factors were brought out. Hossain (2006) identified strengths and weakness of Bangladesh's fisheries sector using Simpson index, RCA, RSCA etc. for the period 1984-2000. RCA index, as suggested by Balassa (1965), is used to estimate the degree of comparative advantage in the context of different multilateral agreements such as SPS and TBT posing challenges to the export of fish and fish products.

Kumar (2004) analysed the comparative advantage of fishery products in the international markets by the share of fisheries in India's total exports (Sij) relative to the fisheries share in the total world exports (Siw) RCA = Sij/Siw, as suggested by Baassa (1965) for the period 1981 to 2000. Ascribing credit for the sector's better performance under the liberalisation policies, the study calls for efforts to ensure international hygiene standards for fisheries products to boost its performance. Sachdev (1993) argues that studies availing the methodology of comparative advantage concentrated more on developed countries where the share of primary products is less. He analysed India's comparative advantage of trade in agricultural products which uses more of natural resources and thus

the resource endowment of the country with regard to diary items, fruits and vegetables and marine products and concludes that India enjoys fairly large potential for these items with varied climates, temperature and having one of the largest coastlines in the world. Gopal *et al* (2009) analysed the export performance and the revealed comparative advantage of finfish exports from India for the period 2001 to 2005 by taking the benefit of Balassa's (1965) index of Revealed Comparative Advantage. Though India has comparative disadvantages as far as finfish is concerned, the quantity exported increased considerably over the years. Based on this background, an attempt has been made using the methodology of Balassa (1995) and Volrath (1991) to understand and compare the competency of India with its competitors in terms of comparative advantage which explains an industry's trade pattern.

1.3. Data Source & Methodology

For the purpose of this study, the data series mainly depended on secondary sources. As the focus of the paper is to see comparative advantage in the post-WTO period, the choice of the data period is obviously from 1994-2014. The data on exports and imports for the study period is from DGCI&S Export Import data, UN Commodity Trade Statistics (UN Comtrade) database downloaded through WITS and International Monetary Fund, Direction of Trade Statistics data base. The entire analysis rests with the broad framework of the Ricardian Analysis of Comparative advantage in trade thesis developed by Balassa (1965) and the indices Revealed Trade Advantage, Revealed Competitiveness formulated by Vollrath (1991). Moreover, the study avails other trade indicators like Export-similarity Index, Trade Intensity Index, Gini-Hirschman's Concentration Coefficient etc.

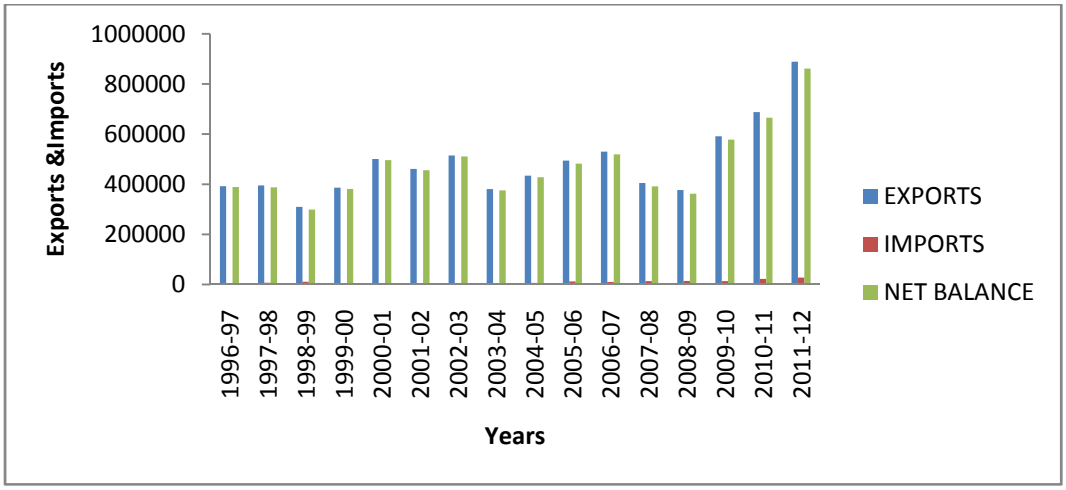
The rest of the paper is organized in two sections. Section II explains the net trade balance of the fisheries sector, export import ratio, the revealed comparative advantage, export similarity index, trade intensity index etc. Section III tries to see the market diversification with the help of Gini Hirschman's coefficient. The fourth section concludes the entire paper with a discussion.

Section II

2.1. Net Trade Balance of Fishery Sector

A look into the various issues of Economic Survey, Ministry of Finance, Government of India, reflects upon the fact that the share of agricultural exports as well as imports in quantity over the years shows a declining trend and there has been considerable decrease in agricultural exports in most of the commodities leading to negative trade balance. Liberalization of world trade in agricultural commodities has opened new vistas of growth. India has a competitive advantage in several commodities for agricultural exports because of near self-sufficiency of inputs, relatively low labour costs and diverse agro-climatic conditions. These factors have enabled export of several agricultural commodities over the years such as marine products, cereals, cashew, tea, coffee, spices, oil meals, fruits, vegetables etc. The high international standards for quality and the need to harmonize domestic standards to international standards pose a challenge to tap global market. But it is fascinating to note that with regard to fisheries sector, exports (as shown in the figure below) keep on increasing while imports rise at a slower pace leaving net balance all positive over the years.

Figure 3: Total Fishery Sector Exports, Imports and Net Balance in Quantity (in tonne)



Source: Figure Plotted based on DGCI&S data

It so happened that India's advantage is the gift of distinct geographical location. The land is so blessed with the resource and therefore it requires a critical study to examine the factors influencing the unstable export growth performance. Although it is understood that the net balance from this sector is positive, the export-import ratio provides the competence or potentiality in exports over the years.

2.2. Export Import Ratio of India's Fishery Sector

Let Ixk and Imk denote Indian exports (to all countries) and Indian imports (from all countries) of the groupk k: exports of fish and fish products during a year (measured in current US dollars), then export import ratio for commodity k as EIK= Ixk/Imk. A coefficient of export and import between zero and one implies that India's imports are greater than exports and if the coefficient is greater than one, it indicates India exports more than what it imports. Hence the export-import ratio with regard to the Fishery sector has been calculated and is furnished in the table 2 below. It is now understood that the trade in fishery sector is strong with the lion's share being in export basket and validates the trade potential of the sector.

Table 2: Export Import Ratio of India's Fishery Sector

Year	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Export Import Ratio	135	55	28	72	112	85	143	81	67	41	50	30	26	44	**3**

Source: Author's calculation.

International trade brings international division of labour and captures market for those commodities thus ensuring comparative advantage for the commodity which is being traded. From table 2 it may be inferred that since export import ratio being greater than one exhibits a revealed comparative advantage in the international market. Therefore next section attempts to figure out the comparative advantage of fisheries sector exports through some indices.

2.3. The Comparative Advantage of India's Fisheries Sector Exports with its Competitors: Some Indices

The productive resource of one country differs from the other, which exhibits difference in comparative advantage. The owners of the productive resource constitute human labour and skills, capital, land and other resources. Thus it may be presumed that the removal of tariff barriers under the aegis of WTO might have lead to improvement of the export performance ratio of the member countries. Here is an analysis of the export performance ratio of top fishery sector exporting countries which are members of WTO and also our potential competitors. It is comparative advantage which is considered both necessary, as well as sufficient condition, to ensure mutually gainful trade across nations (Sen, 2010). To analyze the export-performance ratio, revealed comparative indices are calculated for the period 1995-2014.

2.3.1. Revealed Comparative Advantage:

Revealed Comparative Advantage[4] Index of Balassa (1965) has been used with some modifications. In the Balassa Index, a specific commodity in a particular country/ world is compared with the total export in the country/world. It is assumed that the commodity pattern of trade reflects the inter-country differences in relative costs as well as in non-price factors. Thus it meticulously reveals the comparative advantage of the trading partners with respect to the particular commodity. The main economic factors that contribute to movements in RCA are: structural change, improved world demand and trade specialization. Thus the RCA is calculated using the following equation

$$RCA = (X_{ij} / X_{wj}) / (X_i / X_w) \quad \text{.....(1)}$$

X_{ij} ith country's exports of commodity j

X_{wj} World exports of commodity j

X_i Total exports of country i

X_w Total World exports

It would be a unique exercise to estimate the comparative advantage of fishery sector products exporting countries in the world. Given the similarity of the product, the economic geography led factor endowment it is assumed that an analysis of comparative advantage would explain the hold in the world market of these competitors. Thus the pattern of comparative advantage is estimated for the inter-temporal variation over the post WTO period 1995-2014. The analysis of comparative advantage has been undertaken using equation (1) of revealed comparative advantage for the 2 digit level availing comtrade data SITC Rev 3 and is exhibited in the table3 below.

[4] The RCA index greater than 1 reveals the comparative advantage of a country with respect to the particular commodity.

Table 3: Revealed Comparative Advantage of India and Top Fishery Sector Products Exporting Countries

Year	India	China	Norway	Thailand	Denmark	Vietnam	USA	Chile	Canada	Spain
1995	3.47	2.11	8.02	8.66	4.94	NA	0.62	7.1	1.32	1.44
1996	3.8	2.14	7.68	8.37	4.92	NA	0.56	7.7	1.28	1.59
1997	3.92	1.82	7.75	8.21	4.87	1.68	0.45	8.3	1.2	1.64
1998	3.63	1.69	10.18	8.79	5.16	1.7	0.39	9.8	1.23	1.64
1999	3.74	1.78	9.4	8.22	4.94	1.66	0.48	10.5	1.29	1.77
2000	4.1	1.85	7.23	7.92	4.8	1.65	0.48	10.7	1.28	1.82
2001	3.39	1.8	6.66	7.45	4.74	1.57	0.53	10.4	1.28	1.92
2002	3.35	1.69	7.1	6.57	4.56	1.44	0.56	10.9	1.49	1.89
2003	2.91	1.54	6.65	6.25	4.65	1.34	0.58	10.7	1.55	1.87
2004	2.3	1.56	6.83	5.83	4.6	1.27	0.64	9.1	1.53	1.97
2005	2.32	1.41	6.68	5.78	4.68	1.24	0.65	8.6	1.43	1.91
2006	2.1	1.39	6.64	5.98	4.75	1.26	0.62	7.7	1.41	1.98
2007	1.91	1.21	7.11	5.81	4.77	1.22	0.59	7.3	1.39	2.04
2008	1.49	1.21	6.66	6.31	4.78	1.32	0.57	9	1.38	2.13
2009	1.27	1.2	8.47	5.71	4.05	1.41	0.53	7.6	1.43	1.95
2010	1.62	1.24	9.84	5.31	4.2	1.26	0.52	5.9	1.46	1.95
2011	1.60	1.29	8.34	5.11	3.87	NA	0.58	6.99	1.38	1.89
2012	1.66	1.26	7.75	5.01	3.87	NA	0.54	6.96	1.31	1.88
2013	1.93	1.20	9.06	4.16	4.08	NA	0.52	7.99	1.29	1.67
2014	2.23	1.14	9.57	3.63	3.93	NA	0.49	8.90	1.22	1.57

Source: Author's own calculation

From the above table 3, it may be inferred that India is more advantageously placed than China, Vietnam, Canada and Spain. Though Denmark and India are equally advantageously placed, Denmark indices remain stable when compared to India. Despite of the fact that USA is a potential exporter of fisheries sector products placed at 6th position in world ranking, the RCA index is below 1revealing a comparatively disadvantageous position with respect to its competitors. Though Vietnam and Thailand show signs of advantage compared to its counterparts, India's position is commendable and this explicates India's trade potential in this sector. Nevertheless it is a matter of concern that the RCA index is coming down overtime, though it slowly picked up since 2010. India needs to adopt policies to strengthen the sector in this dynamic trade scenario. The export advantage position draws attention to evaluate the trade advantage and hence Revealed Trade Advantage is elicited using the methodology formulated by Vollrath (1991).

2.3.2. Relative Trade Advantage (RTA): The items of fishery sector products exported are always a demand-driven market and it is important to look at the export competitiveness of the product which can be used as a proxy to measure the export potential. The export competitiveness of fishery

sector in terms of value inputs may be calculated using the indices of competitiveness formulated by Vollrath (1991). The index takes imports also in addition to exports as in Balassa's index. The index named Relative Trade Advantage (RTA) includes both exports and imports and is the difference between Relative Export Advantage (RXA) and Relative Import Advantage (RMA)[5]. The RXA is the same as in RCA Balassa's index. A positive value of RTA indicates a comparative advantage. RTA= RXA-RMA , Where RXA= RCA (Balassa's Index)

$$RMA = (M_{ij} / M_{wj}) / (M_i / M_w) \quad \text{..... (2)}$$

Table 4: Revealed Trade Advantage of India and its Competitors in Fishery Sector (1995-2014)

Year	India	China	Norway	Thailand	Denmark	Vietnam	USA	Chile	Canada	Spain
1995	3.45	1.68	7.04	7.74	2.30	NA	-0.23	6.8	0.76	-1.07
1996	3.79	1.72	6.61	7.45	2.14	NA	-0.27	7.5	0.65	-0.85
1997	3.89	1.43	6.71	6.91	2.28	1.61	-0.46	8.1	0.65	-0.94
1998	3.60	1.20	8.86	6.84	2.45	1.64	-0.53	9.6	0.65	-1.07
1999	3.73	1.24	8.07	6.65	2.22	1.52	-0.42	10.4	0.68	-0.56
2000	4.09	1.24	5.81	6.61	1.88	1.43	-0.45	10.5	0.65	-0.66
2001	3.37	1.22	5.10	5.84	1.79	1.32	-0.42	10.3	0.65	-0.78
2002	3.34	1.11	5.73	4.87	1.83	0.93	-0.41	10.7	0.86	-0.75
2003	2.89	1.01	5.68	4.61	1.74	0.84	-0.45	10.5	0.89	-0.90
2004	2.28	1.02	5.77	4.17	1.82	0.59	-0.37	8.9	0.83	-0.67
2005	2.30	0.83	5.74	4.18	1.75	0.51	-0.32	8.4	0.74	-0.74
2006	2.08	0.83	5.68	4.33	1.80	0.62	-0.40	7.5	0.72	-0.75
2007	1.89	0.67	6.07	4.09	1.92	0.64	-0.46	7.0	0.65	-0.62
2008	1.46	0.70	5.67	4.21	1.87	0.73	-0.51	8.8	0.65	-0.56
2009	1.25	0.72	7.50	3.82	1.42	0.88	-0.59	7.3	0.65	-0.73
2010	1.59	0.79	8.92	3.65	1.09	0.69	-0.60	5.6	0.69	-0.97
2011	1.56	0.77	7.27	3.38	0.77	NA	-0.53	8.38	0.58	NA
2012	1.63	0.76	6.71	3.18	0.82	NA	-0.55	6.75	0.52	NA
2013	1.92	0.71	8.21	2.24	0.84	NA	-0.64	6.15	0.46	NA
2014	2.21	0.64	8.65	2.02	0.63	NA	-0.69	NA	0.40	NA

Source: Author's calculation.

A closer look into the above table shows that the RTA is moving against USA and Spain and more in favor of Norway, Thailand, and Chile. China, Denmark and Canada exhibits its revealed trade advantage below unity especially since 2009 and Canada, though with comparative advantage, shows trade disadvantage all through the years. India is ranked fourth ensuring that its performance is better when compared to its trade partners. On the other hand, the healthier signs need to be channelized for further improving the trade advantage. This holds up the trade potential of this sector for India. The

[5] The M in equation 2 substitutes imports as it is with exports in equation 1

restructuring of an economy towards comparative and trade advantage might have ensured the competitiveness of a product and an empirical exercise carried out below discloses it.

2.3.3. Revealed Competitiveness:

The Revealed Competitiveness (RC) is the log difference drawn from the equations 1&2 which is mentioned below in equation 3. Positive values of Vollrath's RC reveal competitive advantage of the country in the particular commodity exports. The advantage of expressing the index in logarithmic form is that it becomes symmetric through the origin.

RC = In RXA – In RMA ..... (3)

Table 5: Revealed Competitiveness of India and its Competitors in Fishery Sector

Year	India	China	Norway	Thailand	Denmark	Vietnam	USA	Chile	Canada	Spain
1995	5.12	1.59	2.11	2.25	1.65	NA	-0.32	3.2	0.86	-0.55
1996	5.78	1.64	1.97	2.21	1.56	NA	-0.40	3.6	0.72	-0.43
1997	4.93	1.54	2.01	1.85	1.66	4.83	-0.70	3.8	0.78	-0.45
1998	4.62	1.24	2.04	1.50	1.65	5.07	-0.86	4.0	0.76	-0.50
1999	5.45	1.19	1.95	1.65	1.59	4.21	-0.62	4.0	0.75	-0.28
2000	6.03	1.12	1.63	1.80	1.46	4.06	-0.67	4.1	0.71	-0.31
2001	5.19	1.12	1.45	1.53	1.44	4.03	-0.58	4.1	0.70	-0.34
2002	5.36	1.07	1.65	1.35	1.51	3.36	-0.55	4.1	0.85	-0.34
2003	5.20	1.07	1.92	1.34	1.44	3.33	-0.58	4.1	0.85	-0.39
2004	4.73	1.06	1.86	1.26	1.49	2.93	-0.46	3.7	0.79	-0.29
2005	4.77	0.88	1.96	1.29	1.44	2.82	-0.40	3.7	0.73	-0.33
2006	4.66	0.91	1.94	1.29	1.44	2.98	-0.50	3.6	0.71	-0.32
2007	4.71	0.82	1.92	1.22	1.49	3.06	-0.57	3.5	0.63	-0.26
2008	3.94	0.86	1.90	1.10	1.47	3.03	-0.64	3.6	0.63	-0.23
2009	4.18	0.93	2.17	1.11	1.45	2.98	-0.75	3.5	0.61	-0.32
2010	4.22	1.01	2.37	1.17	1.27	2.90	-0.77	3.1	0.64	-0.40
2011	3.79	0.91	2.78	4.56	0.22	2.52	-0.64	2.89	1.60	NA
2012	4.38	0.94	2.75	4.41	0.23	2.20	-0.69	3.00	1.54	NA
2013	5.21	0.89	2.90	3.57	0.24	2.17	-0.79	3.00	1.48	NA
2014	4.85	0.82	2.90	3.16	0.18	NA	-0.87	3.14	1.42	NA

Source: Author's own calculation

The above table demonstrates the revealed competitiveness of top fishery sector exporters in the world. Although USA and Spain are among the top fishery sector exporters in the world, the competitiveness in their fishery products is not promising. It may be observed that India's fishery sector products are highly competitive in nature and can take on others in the world market. Hence contextually the argument goes in favor of India's trade potential to be tapped for further exports.

Having seen the comparative advantage and export competitiveness using the indices like RCA, RTA and RC, it would otherwise be a lacuna if the intense trade relationship with our trading partners and

the export similarity of India with its competitors have not been examined. The exporters are forced to adopt global benchmark standards as per WTO instructions or else they have to flee from the market. Underlining the importance that an index measuring the similarity of the exports of any two competitors and direction of trade does have a significant role to explain the competency of fishery sector exports, Export Similarity Index and Trade Intensity Index needs to be calculated to assess whether it is more trade diverging or creating.

2.4. Export Similarity Index: The table 6 below shows the changes in the post-WTO period in the similarity of exports between India and its competitors like China, Canada, Thailand, Norway and Vietnam to the markets of EU, USA and Japan. The proposed index of export similarity[6] (Finger and Kreinin, 1979) is defined

$$S(xy, z) = \{\sum_i \text{Minimum } [\gamma_i(xz), \gamma_i(yz)]\}100 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

[6] 'x' and 'y' refer to the export patterns of two countries to a common market 'z'. $\gamma_i(xz)$ is the share of commodity i in x's exports to 'z'. Here i refers to all the product groups at 4 digit level namely HS code 0301,0302, 0303,0304,0305 and 0306.

Table 6: Export Similarity Index (ESI) of India with its competitors in the USA, Japan and EU markets at 4-digit Level

YEAR	ESI of India China in USA Market	ESI of India China in Japanese Market	ESI of India China in EU Market	ESI of India Canada in USA Market	ESI of India Canada in Japanese Market	ESI of India Canada in EU Market	ESI of India Thailand in USA Market	ESI of India Thailand in Japanese Market	ESI of India Thailand in EU Market	ESI of India Norway in USA Market	ESI of India Norway in Japanese Market	ESI of India Norway in EU Market	ESI of India Vietnam in USA Market	ESI of India Vietnam in Japanese Market	ESI of India Vietnam in EU Market
1996	28.06	34.65	42.00	65.66	51.08	77.99	Na	na	na	12.82	8.81	12.66	na	Na	Na
1997	36.66	30.81	54.06	34.49	52.66	86.87	Na	na	na	10.71	7.99	20.03	na	Na	Na
1998	23.30	32.28	32.75	36.08	51.18	81.47	Na	na	na	10.20	5.03	14.99	na	Na	Na
1999	26.80	30.32	39.81	43.42	59.08	80.85	92.30	66.44	86.07	7.78	5.33	13.68	na	Na	Na
2000	30.94	35.88	35.45	49.05	58.34	80.97	90.13	66.59	82.95	10.45	8.38	13.60	90.83	94.22	83.40
2001	32.19	31.47	27.64	49.87	50.03	82.00	93.48	63.18	78.14	7.51	9.83	16.90	91.72	94.23	85.66
2002	26.25	35.48	4.90	50.08	65.71	85.54	93.91	53.29	44.70	8.29	11.15	15.60	85.31	94.36	77.99
2003	32.31	38.44	5.94	55.45	63.30	86.65	94.08	53.21	31.71	3.93	15.10	13.02	83.94	94.18	70.18
2004	20.45	30.38	6.32	57.13	54.45	75.11	92.21	54.20	41.56	5.99	8.19	11.28	78.29	93.42	50.32
2005	12.14	27.71	12.83	55.34	53.64	79.14	92.85	51.04	43.98	9.29	12.99	13.42	83.16	92.18	47.33
2006	12.36	20.85	12.49	52.95	51.80	76.89	93.98	56.74	51.13	7.38	10.56	14.59	77.47	92.34	36.71
2007	10.45	26.60	17.83	56.97	61.72	86.10	86.50	59.12	67.30	16.81	15.31	16.42	82.31	88.18	32.05
2008	7.75	23.68	16.79	56.94	52.41	77.74	91.34	48.83	64.36	12.19	19.59	12.53	76.83	81.38	27.29
2009	14.13	27.51	19.77	55.28	44.87	80.17	90.71	59.39	75.22	6.59	12.62	11.21	64.52	87.05	32.03
2010	13.92	30.51	22.49	52.65	40.19	88.85	93.91	62.98	90.93	4.94	15.39	12.48	62.42	86.36	37.71
2011	11.02	35.36	18.86	57.35	59.53	84.65	94.08	67.37	90.38	5.55	17.61	10.48	46.91	85.71	37.24
2012	8.29	39.00	18.51	56.33	60.10	88.25	88.55	73.96	82.93	4.43	21.88	9.56	37.91	86.76	32.24
2013	5.34	35.93	15.83	58.27	52.20	86.97	91.03	65.95	79.51	3.60	17.98	7.18	49.35	88.03	38.74
2014	5.01	32.51	14.85	61.98	55.02	84.92	87.19	55.56	80.89	1.61	16.68	6.43	54.81	83.17	50.81

Source: Author's calculation

The export similarity index of China and India in EU, USA and Japanese market obviously show a declining trend which implies that the degree of competition is easing whereas the trade competitiveness is increasing to a certain extent between India and Canada, Thailand. There is not much competition exists between India and Norway in these markets. Though the trade competitiveness declines with respect to India and Vietnam in the USA and EU market, it is a matter of apprehension that it records a bit high in the Japanese market.

2.5. Trade Intensity Index

The trade intensity index[7] takes values between 0 and $+\alpha$. If the trade intensity index takes values more than 1, then it explains that there is intense trade between the trade partners. The statistic tells us whether or not a region exports more (as a percentage) to a given destination than the world does on an average. To observe the trade behaviour in the fishery sector exports of India with its partners, TII has been calculated with its top trade partners over a span of nineteen years from 1995 to 2014 using the following formula

$$\text{Trade Intensity Index} = \frac{Xsd/Xsw}{Xwd/Xwy} \qquad \text{..... (5)}$$

Where "s" is the country in the source, d is the destination, w and y represent countries in the world, and X is the bilateral flow of total exports. In other words, the numerator is the export share of the source region to the destination; the denominator is the export share of the world to the destination.

[7] It does not suffer from any 'size' bias, so we can compare the statistic across regions, and overtime when exports grow rapidly.

Table 7: Trade Intensity Index of India with its Partners in Fishery Sector Exports (1995-2014)

Year	China	UAE	Canada	Norway	Japan	Thailand	USA	Vietnam	Denmark	Spain	UK
1995	0.78	31.87	0.12	0.60	1.48	1.74	0.70	0.56	0.09	0.9	1.56
1996	2.85	27.84	0.24	0.13	1.61	1.68	0.71	1.16	0.04	0.5	1.21
1997	3.34	29.91	0.29	0.03	1.94	1.69	0.75	5.90	0.03	0.4	0.48
1998	1.94	28.69	0.39	0.11	2.42	2.23	0.87	2.25	0.06	0.5	0.74
1999	2.90	23.44	0.53	0.05	1.87	2.44	0.90	14.23	0.04	0.6	0.90
2000	2.68	21.02	0.58	0.12	1.68	2.96	0.97	15.39	0.02	0.5	1.11
2001	2.60	20.58	0.49	0.07	1.53	2.95	1.13	10.78	0.04	0.8	1.07
2002	2.65	13.13	0.60	0.06	1.18	3.34	1.48	12.18	0.04	0.9	1.24
2003	2.46	12.26	0.93	0.00	1.08	2.80	1.64	10.74	0.07	0.8	1.29
2004	1.77	15.30	1.19	0.03	1.08	1.68	1.73	12.94	0.07	0.9	1.30
2005	2.32	13.16	1.12	0.09	1.17	1.89	1.48	4.39	0.08	1.0	1.26
2006	2.83	11.55	1.33	0.16	1.20	2.10	1.12	4.14	0.10	1.1	1.26
2007	2.48	12.05	1.32	0.14	1.30	2.00	0.97	2.56	0.13	1.2	1.09
2008	2.07	11.68	0.99	0.12	1.33	2.27	0.90	2.70	0.14	1.1	1.03
2009	1.68	12.47	1.21	0.18	1.07	3.61	0.89	3.94	0.10	1.2	1.22
2010	2.24	6.89	0.87	0.06	1.16	3.69	1.08	5.67	0.10	1.1	0.96
2011	1.33	7.03	1.14	0.05	1.06	2.59	1.34	9.22	0.07	0.97	0.94
2012	1.03	8.26	1.03	0.13	0.85	1.78	1.54	7.60	0.09	1.10	0.86
2013	0.88	4.92	1.40	0.03	0.84	1.58	1.76	7.68	0.14	0.69	0.87
2014	0.57	7.5	1.38	0.03	0.96	1.25	1.99	5.15	0.16	0.80	0.88

Source: Author's own Calculation

An evaluation of the trade intensity index of India's fishery sector exports with its trade partners exhibits that UAE and Vietnam enjoy greater market share by endorsing an intense relationship. The trade partners like China, Japan, Thailand and U K keep up the intensity by maintaining the index stable overtime. It is to be discerned that the index does not show signs of turning downwards and is getting better with all its partners in recent years.

In this background, there is possibility of culling or reaching out to new markets. Gini-Hirschman's Geographical Concentration Coefficients would be one of the tools by which the trends in direction of exports may be explained.

Section III

3.1. Trends in the Direction of Indian Export of Fishery Sector Items: Gini-Hirschman's Geographical Concentration Coefficients

As mentioned before, our major trade partners are China, UAE, Japan, Thailand, Indonesia and European Union countries. In order to examine clearly the trend of market diversification of Indian

Export of fishery sector items over periods, Gini-Hirschman's geographical concentration coefficients[8] are worked out using the following formula for the period 1995-2014 by taking nineteen major trade partners – China, UAE, Canada, Germany, Denmark, Spain, France, UK, Indonesia, Italy, Japan, Sri Lanka, Netherlands, Norway, New Zealand, Singapore, Thailand, USA and Vietnam.

$$Gjx = 100\sqrt{\sum_s \left(\frac{Xsj}{Xj}\right)^2} \quad \text{..... (6)}$$

Where 'Xsj' stands for the export of country 'j' to 's' and 'Xj' is the total export of country 'j

Table 8: Gini-Hirschman's Geographical Concentration Coefficients: Trends in the Direction of Indian Export of Fishery Sector Items

Year	Coefficients	Year	Coefficients	Year	Coefficients
1995	44.95	2002	37.81	2008	24.65
1996	45.5	2003	36.57	2009	22.9
1997	43.56	2004	35.46	2010	25.95
1998	50.78	2004	35.46	2011	28.95
1999	45.97	2005	32.3	2012	28.86
2000	43.11	2006	28.44	2013	34.5
2001	38.5	2007	26.1	2014	35.15

Source: Author's own calculation

The analysis of the geographic concentration of fishery sector exports from India using Gini-Hirschman Index is shown in table 8. It is significant that during the post WTO period, the widening of the number of destinations/markets has reduced geographical concentration in the range of 50.78 in 1998 to 22.9 in 2009. This may be because of impact of WTO with its market access policies especially with regard to developing countries exports. Market access liberalization has influenced product specific growth of exports (Mayer, 2004). It is a healthy sign that instead of depending on a few products and countries, the potential of fishery sector trade may be increasingly extended to a sizeable lot of new products and partners. But care has to be taken that there should not be a favour towards less market diversification.

The discussions in section I, II and III clearly pictures India's trade potential with regard to fishery sector exports and our major trade partners being developed countries. Kavis (1970) supported the trade engine hypothesis and argued that trade impulses was believed to transmit growth impulses from developed to developing countries. Taking the case of fishery sector exports from India our major markets rests mainly with USA, Japan, European Union and China. It is evident that our export market is mainly developed countries and with export capability, competence and potential fully understood, the question now arises as to how to take it up to the optimum level.

[8] According to Gini-Hirschman coefficient of geographical concentration, the lower the coefficient, larger is the number countries to which goods are exported and vice versa. The highest possible coefficient is 100, where all exports are directed to one country. In the estimation of the geographical concentration, Indian export of fishery sector items to 18 countries are considered.

Section IV: Conclusion

The credits go to Adam Smith's Wealth of Nations (1776) and David Ricardo's Principles of Economics (1951) in developing the standard theory of international trade based on the concept of comparative advantage as a route to achieve production efficiency at a global level. As per the WTO Agreement on Agriculture (AOA), with the dismantling of quantitative restrictions on imports, one remaining challenge is to raise the level of productivity and quality standards to internationally-competitive level. For several commodities, our national productivity is below world average. Thus the issue of competitiveness is region specific. Comparative advantage is in itself a relative concept and it depends upon the relative changes in the international market (GOI, 2001-02). The paper is an attempt to understand and compare the comparative advantage of India in fishery sector exports with its competitors in the era of stringent sea food safety standards. Neoclassical trade theories support the comparative advantage hypothesis as the contributing factor for exploiting trade potential. The Indian sea food industry is undergoing a drastic structural change in recent years with product diversification and processing standardized products catering to the demands of overseas market. There are technical issues which in reality act as constraints in materializing the trade advantage of this natural endowment. But the trade choice made congruent with past experience, resources and expertise available in the country etc is an added advantage. In the effort to quantify the trade potential of the fishery sector exports, Revealed Comparative Advantage, Revealed trade Advantage, Revealed Competitiveness, Trade Intensity Indices etc were estimated and constituted as the benchmark against which the realism of export potential could be assessed. The RCA indices have been calculated for India and also top exporters of the product, which are India's potential competitors. The RCA index if ranked reveals that India is the third advantageously placed country after Norway and Thailand and this promulgates the trade potential of the sector. The RTA index also favors India keeping its position fourth among the competitors. The RC index is the highest for India which shows that the products are competitive in nature when compared to competitors in the world market and calls for India's trade potential to be tapped for further exports. The Export Similarity Index cautions the possibility of trade diversion as the industrial structure is similar with most of its competitors. The Trade Intensity Index exhibits intense trade relationship with UAE, Vietnam and with other partners also it remains positive and stable over the period assuring future markets. The Gini-Hirschman's geographical concentration coefficients examined the trend of market diversification of fishery sector exports which keeps on declining in the post-WTO period showing the scope for further market diversification. Among the major fish producing and exporting countries, India retained the export dynamism during the study period from 1995-2014. Vietnam registered the highest rate of growth followed by China and we are facing stiff competition from these countries.

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