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Analysis of international trade performance of Nigerian fisheries: trend, specialization and competitiveness

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ABSTRACT

This study analysed the international trade performance of Nigerian fish market with the aim of examining Nigeria's trend of trade specialization and levels of market share at global fish market. The study utilized secondary data within 1976-2015, emanating from the Food and Agriculture Organisation Statistics (FAOSTAT) and World Bank data. Balassa index, market share index (MSI) and growth models were applied to analyze the data. Results of the study revealed that there was low level of specialization in exportation of Nigerian fisheries and high level of specialisation in importation of foreign fishery resources over the study period. The export market share result indicated that though Nigeria was not competitive at global market, however, price can be an incentive for Nigerian fish export commodities. The import market share indicated possibility of dumping in Nigerian fish importation as the obtained market share indices indicated importation of low value fish commodities. There was acceleration in the growth rate of fish import but deceleration for fish export growth rate. The study suggests allocation of more resources to export section of Nigerian fisheries and introduction of counter dumping policies in import section so as to ensure a balanced trade of Nigerian fisheries.

Keywords: International Trade, Performance, Competitiveness, Specialization

1. INTRODUCTION

The role of international trade in economic development has been widely acknowledged. This is simply because the structure of export and import flows generated as a result of the existing comparative advantages in international trade serves as an indicator of the economic system development, reflecting the country's international specialization and position in the world markets. Fish and fishery products are among the most traded food commodities globally. In the fishery industries of many developing nations, including Nigeria, trade plays a major role in employment creation, supply of food, income generation, and contribution to economic growth and development. Maureen *et al.* (2002) posited that in an ideal situation, trade activities stimulate growth in a number of ways including production and demand linkages, economies of scale due to larger international markets, increased efficiency,

adoption of superior technologies embodied in foreign-produced capital goods, learning effects and improvement of human resources.

Like many other internationally traded commodities, fishery products are characterized by high degree of heterogeneity reflecting a wild range of species and processing techniques. In 2014, 41% (60.2 million tonnes) of the world fish production was marketed in live or chilled forms, 46% (68.1 million tonnes) was processed into frozen or cured forms for direct human consumption, and 14% was destined to non-food uses (FAO, 2015). In the same report, World fish and fishery products trade has expanded significantly by more than 245 % from 1976 to 2014 with the estimated total world fish imports put at US$141 billion and that of exports placed at US$148 billion in 2014. Since 2002, China has been by far the world leading fish exporter, contributing about 12% world exports of fish and fishery products, followed by Norway, Vietnam and Thailand whose contribution were 7.2%, 5.4% and 4.4% respectively. United State of America (USA) took the lead of fish importation claiming about 14.6%, followed by Japan, China and Spain with share of 10.6%, 6.1% and 5.1% respectively.

Nigeria is among the few African countries that play dual role of fish exportation and importation in the global fish market. Though her share in the market is low compared to some of the developed nations like China, USA, Thailand among others, but she is still rated as the second largest African fish trader after Egypt (FAO, 2015). However, In spite of her rich fishery resource endowment, Nigeria's fish trade is grossly unbalanced. This is simply because the import value of frozen fish outrageously surpasses the export value of fishery products such as shrimps, ornamental fish, frozen fillet, cuttlefish among others. For instance in 2013, the value of Nigerian fish export was US$284 million while that of import was US$1.2 billion leaving a huge deficit trade balance of US$931.2 million (IFAD & FAO, 2015). Higher import value has been attributed to increasing population as well as improved level of awareness of nutritional education that has led to increased demand for fish and fishery products. On the other hand, low foreign earnings from Nigerian fish export has been linked to many factors which include under exploration of fishery resources, over dependence on oil sector as well as activities of the sea pirates which has recently led to a drastic reduction in the number of fishing fleet of export- oriented companies from about 230 vessels to only 119 vessels with only few companies in operation (Akinwumi, 2014). Hence there is great concern about the current performance of Nigerian fish trade at global market. Thus, this study specifically examined the trend of competitiveness, specialisation as well as the growth pattern of Nigerian fish trade over the period of 1976 to 2015.

2. THEORETICAL FRAMEWORK

The starting point of classical international trade theorization is the theory of comparative advantage propounded by Richardo (1817) to explain the underpinning principles of international trade. According to the richardian theory, "comparative" rather than "absolute" advantages provide the basis for international trade. This implies that it is not the absolute but the comparative differences in costs that determine trade relationship between two countries. The theory maintained that due to differences in climate, natural resources, geographical situation and efficiency of labour, a country can produce one commodity at lower cost than the other. Therefore, when a country enters into trade with some other countries it will export those commodities in which its comparative production costs are less, and will import those commodities in which its comparative production cost are high. The richardian theory among other things, assumes the involvement of only two countries in international transaction, production of homogeneous two commodities by the two participating countries, similarity of taste in both countries, labour as the only factor of production, the constant supply of labour, homogeneity of unit of labour as well as perfect mobility of factors of production. However, some of these assumptions have received a barrage of criticism while others have been modified by modern economists (Haberler, 1950; Heckscher & Ohlin, 1991). Haberlers (1950) refuted the assumption of only two goods being traded by two countries and extended the theory to include a number of goods. By implication, a country enjoys a comparative advantage over the other in all its exported commodities relatively to all its imported commodities.

Heckscher & Ohlin (H-O) (1991) advanced the richardian theory by attributing the comparative advantage to differences in factor endowment and cost differences in factor prices across countries. H-O theory maintained that countries that are rich in capital will export capital-intensive goods and countries that have much labour will export labour – intensive goods. Thus by this theory, the main cause of trade between regions is the difference in prices of commodities based on relative factor endowments and factor prices.

Accordingly, Leung and Cai (2005) proposed that comparative advantage can be alternatively obtained either through an increase in benefit gained by the production activity or a reduction in its opportunity cost. By implication, comparative advantage is determined by both consumer preference (demand-side factors) and factor endowment and technologies (supply-side factors).

Given this theoretical backdrop, evidence from the available literature shows that there are two approaches to empirical analysis of comparative advantage, viz: the domestic resource cost (DRC) approach and the revealed comparative advantage (RCA) approach (Leung and Cai, 2005; Cai et al., 2009; Isaac, 2010). The DRC approach uses social profitability to determine comparative advantage of a country while the RCA approach employs *ex post* trade patterns to determine the sectors in which a country has a comparative advantage. However, the DRC approach is more rigorous and more data demanding than the RCA approach. Hence, as an indicator of trade performance, this study employed the RCA approach.

3. METHODOLOGY

The study was conducted in Nigeria located in the tropical zone of West Africa between latitudes 4°N and 14°N and longitudes 2°2'E and 14°30'E and has a total area of 923 770 km^2 out of which 910,768 is land and 13,000 is water. The country is a coastal state with adequate resources potential for fisheries development. It has numerous freshwater lakes, rivers, reservoirs, dams, oceans and floodplains covering about 15 million hectares which are available for fish production (FDF, 2012).

Time series data obtained from Food and Agriculture Organization Statistics (FAOSTAT) and World development indicator of World Bank were used for the analysis. The data spanned from 1976 – 2015 and aggregated on annual bases.

Data Analysis and Model Specification

Trade Specialisation: Revealed comparative advantage (RCA) model which is also known as Balassa Index was used to analyse the Nigeria's pattern of specialization in fish trading at international market. The index is expressed as:

$$RCA_{jf} = \frac{\frac{Xjf}{Xj}}{\frac{Xwf}{Xw}} \quad \ldots.(1)$$

Where:

RCAjf = revealed comparative advantage index of country j in exporting fishery products,

Xjf = country *j's* export value of fishery products,

Xj = total export value of country *j*,
Xwf = total world's export value of fishery products,
Xw = total world's export value.

In this study, *f* = Aggregate fish and fishery products.

Here, the decision rule is that if RCA is greater than one, it implies that the country in question has comparative advantage with regards to exporting a particular product; hence such country has higher level of specialization in exporting the product. Likewise, if the value of RCA is less than one, it means that the concerned country is comparatively disadvantaged in exporting the product. However, RCA should be adjusted for its asymmetric and to ensure this the normalized form of Balassa RCA model otherwise known as revealed symmetric comparative advantage (RSCA) was adopted. Following Laursen (1998), the index is given as.

$$\text{RSCA} = \frac{RCAjf-1}{RCAjf+1} \quad \ldots(2)$$

In equation (2) a country is said to have comparative advantage in a particular sector, if 0 < RSCA < +1, while it has comparative disadvantage if -1 < RSCA < 0.

Furthermore, to capture import in the trade specialization analysis, Vollrath relative import advantage (RMA) Index was estimated as shown in equation (3):

$$RMA_{fi} = \frac{\frac{Mjf}{Mj}}{\frac{Mwf}{Mw}} \quad \ldots.(3)$$

Where:

M_{jf} = country *j's* import value of fishery products

M_j = total import value of country *j*,

M_{wf} = total world's import value of fishery products,

M_w = total world's import value.

To analyse the Relative trade advantage (RTA), Vollrath RTA index was employed and calculated as the difference between relative export advantage (RXA) and relative import advantage (RMA). This is expressed in mathematical form as follows:

$$RTA = RXA - RMA \quad \ldots(4)$$

Market Share Index (MSI): This index was used to analyze Nigeria's level of competitiveness at the international market. The index measures the ability of an exporting/importing country to increase its market share in the target market with respect to other countries exporting/importing the same product to the same target market. The index is estimated by the following formula:

For export market share, the model is given as

$$MSxj_f = X_{jf} / M_f * 100 \quad \ldots(5)$$

MSx_{jf} = market share of fish export *by* country *j* in the global market

X_{jf} = total export of fish by country j to the global market

M_f = total fish import to the global market

Similarly for import, the market share equation is stated as:

$$MSm_{ji} = M_{ji} / X_i * 100 \quad \ldots(6)$$

Where:

MSm_{ji} = market share of the imported fish by country *j* in the global market

M_{ji} = the total imported fish by country *j* from the global market

X_i = the total exported fish to the global market

Trade Growth Analysis: To estimate the trend of aggregate export and import growth rate, a trend analysis was estimated. The linear trend equation for estimating growth as specified by Ghosh (2010) and Oyinbo *et al*. (2013) is given as:

$EXPQ_x = \beta_o + \beta_1 t + e_{it}$ ....(7)

$IMPQ_m = \gamma_o + \gamma_1 t + e_{it}$ ...(8)

Where

$EXPQ_{xt}$ = annual quantity of aggregate fish export at period t (1976 - 2015)

β_o = constants in the export trend regression line

β_1 = estimate of the absolute increase of export commodity

e_{it} = error term

$IMPQ_{mt}$ = annual quantity of total import at period t

γ_o = constants in the import trend regression line

γ_1 = estimate of the absolute increase of import commodity

e_i = error term

Moreover, to measure the acceleration and deceleration in the export/ import growth rate, log quadratic trend equations was used as specified by Oyinbo *et al*. (2013).

$LnEXPQ_{xt} = \beta_o + \beta_1 t + \beta_2 t^2 + e_i$ ...(9)

$LnIMPQ_{mt} = \gamma_o + \gamma_1 t + \gamma_2 t^2 + e_i$ …. (10)

Where

$LnEXPQ_{xt}$ = logarithm of the annual quantity of the total export at period t

$LnIMPQ_{mt}$ = logarithm of the annual quantity of total import at period t

Other variables as previously defined.

Here, a positive significant value of β_2 and γ_2 indicates acceleration in the growth rate of export and import respectively while a negative significant value implies a deceleration in export and import growth rate respectively. A non significant value shows stagnation in the growth process.

Further analysis of trade growth rate involves the estimation of compound or annual exponential growth rate using Euler's exponential model, given as

$r = (e^b - 1) \times 100$ …(11)

Where

r = compound growth rate

e = Euler's exponential constant

b = trend coefficient

Moreover, the doubling time for the annual exponential growth rate is given as

$DR_t = 52/r$ ...(12)

Where:

DR_t = the doubling time.

4. RESULTS AND DISCUSSION

Nigeria's Trade Specializations at International Market

The results of trade specialization in terms of degree of comparative advantage of Nigeria in international fish market are presented as follows.

Table 1: Results of Comparative Advantage Analysis of Nigerian Fish Trade

Years	Export RCA	Export RSCA	RMA	RTA
1976-1980	0.02	-0.96	2.52	-2.50
1981-1985	0.05	-0.91	2.31	-2.26
1986-1990	0.09	-0.84	1.90	-1,80
1991-1995	0.14	-0.76	1.39	-1.25
1996-2000	0.23	-0.63	2.66	-2.43
2001-2005	0.24	-0.61	3.83	-3.59
2006-2010	0.19	-0.68	2.53	-2.33
2011-2015	0.23	-0.62	3.08	-2.85

Source: Computed from FAO, and WTO (2016)

Table 1 presents the indices of trade specialization which include the Revealed Comparative Advantage (RCAs), Revealed Symmetric Comparative Advantage (RSCAs), Relative Import Advantage (RMA) and Relative Trade Advantage (RTA) of Nigerian fish trade. The analyses were done for 5 years interval in order to allow inter - temporal comparison of the values obtained. Given the dichotomous interpretation of RCA, it can be observed from the results that Nigeria was comparatively disadvantaged in exporting fishery products to the world market as the values obtained were less than unity (1) throughout the study period. In other words, there was low level of trade specialization in Nigerian fish export at international market. The negative values of RSCA also confirm the level of comparative disadvantage of Nigerian fish export. These indicate trade inefficiency in Nigerian fish export and may be attributed to the dominance of low level of fish exploration that is characterized by the use of low technology fishing and shrimping equipment. However, from the inter-temporal comparison of the results, it can be observed that both the RCAs and RSCAs exhibit an increasing trend over the reviewed period. While the RCA gradually increases from 0.02 in 1980 to 0.23 in 2015, RSCA increases from -0.96 in 1980 to -0.62 in 2015. This implies that Nigeria still have potential to improve her fish export if her fishery resources are optimally utilized. This finding concurred with that of Anjani (2004) whose study on export performance of Indian fisheries recorded an average value of 0.52 RCA for export of smoked and dried fish in Indian.

On the other hand, the analysis of RMA index (import RCA) periodically reflects a mixed trend. Over the period 1980 – 1995, the RMA made a steady decrease from 2.52 in 1980 to 1.39 in 1995 after which there was alternation of increment and decrement of the indeces between the period of

2000 and 2015. This occurrence may be attributed to change in government policies on fish importation in Nigeria over the years. On the general note, all the estimated values of RMA were greater than one throughout the study period indicating high degree of specialization in fish import. This implies over dependence on foreign fishery resources rather than the indigenous one.

The estimated values of RTA give insight of the nature of trade relative performance since the estimation takes both export and import into consideration. The analysis shows that Nigeria has a negative relative trade advantage throughout the reviewed period though there was steady level of improvement from 1976- 1995 after which the trend tends to be unstable. This implies that Nigerian fish trade has not been relatively advantaged at international market. The finding disagrees with that of Isaac (2010) who reported positive relative trade advantage on his study on performance of performance of Ghanaian canned tuna export to EU market.

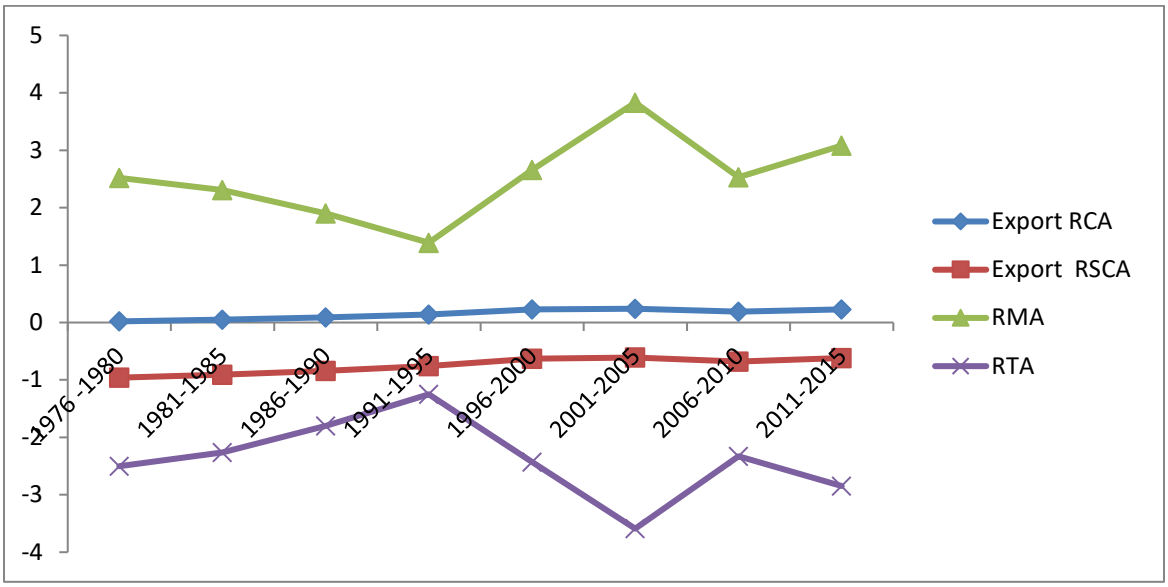


Figure 1: Comparative Advantage of Nigerian International Fish Trade

Market Share in International Fish Trade

The Nigerian trade competitiveness measured by the market share quantity and value is presented in Table 2.

Table 2: Market Share (MS) Indices of Nigerian International Fish Trade

	Export				Import			
Years	**MSQ**	**% Δ**	**MSV**	**% Δ**	**MSQ**	**% Δ**	**MSV**	**% Δ**
1976 -1980	0.007	-	0.021	-	4.34	-	2.11	-

1981-1985	0.009	28.57	0.034	61.91	4.78	9.97	1.78	-15.42
1986-1990	0.027	200.00	0.028	-20.59	2.27	-52.46	0.41	-76.75
1991-1995	0.024	-11.11	0.032	18.52	1.63	-28.03	0.44	7.088
1996-2000	0.014	-41.68	0.021	-34.38	1.64	0.39	0.36	-18.05
2001-2005	0.015	7.14	0.032	52.38	2.36	43.90	0.71	96.18
2006-2010	0.059	293.33	0.031	-3.13	3.61	52.84	0.83	15.76
2011-2015	0.069	16.95	0.024	-22.58	3.50	-2.86	1.19	44.31

MSQ = market share quantity, MSV= market share value, %Δ= percentage change in market share

For the export, the market share in quantity terms has been on increase from 1976 - 1990 by about 200% after which it declined by 42% between 1991- 2000 and later exhibited an impressive increase of 293% between 2006 - 2010. In value terms, similar trend of undulating market share was also observed with the peak percentage increase of 62% recorded between 1981- 1985 and the highest marginal decrease of 34% observed from 1996-2000. Comparatively analyzing the export market share values and quantities, it could be observed that the obtained market share values were higher than the market share quantities from 1976-2005. This indicates that Nigerian fishery products commands a better price at international market and as such had a relative competitive advantage in terms of export value than export quantity during this period. By implication, price could be an incentive for Nigerian fish exporters in the international market during this period. However from 2006 – 2015, the pattern of trend tends to be positively skewed towards market share quantity and this may probably be explained by the fall in world price of fish during this period.

Similarly in relation to import, Nigeria experienced unstable trend of market share within the investigating period both in quantity and value terms. Over the period 1976 - 1985, the market share index made a stride increase in quantity terms from 4.342 in 1976 to 4.775 in 1985. Thereafter, it suffered a decline till 1995. From 1996 -2015, the share of Nigerian import quantity in the world market continue to be marginally increasing even though it was unable to regain the initial 1981- 1985 market share of 4.78. In comparative, the estimated market share values were lower than the estimated market share quantities throughout the reviewed period. This implies that the fish imported to Nigeria from the world market were of lower price suggesting that there is possibility of dumping in Nigerian fish import.

On the general notes, judging by the operational definition of trade competitiveness as the ability of a country to achieve and maintain a certain market share over a given period, Nigerian fish trade sector was not competitive in absolute sense both in terms of fish export and import, even though the import sub-sector recorded higher values of market share than the export sub-sector.

Trend of Quantity and Value of Nigerian Fish Trade

The analysis of linear, quadratic and exponential trend of the quantity, value and price of Nigerian fish trade at international market are presented as follows:

Table 3: Estimated Linear Trend Equation of Nigerian Fish Export and Import

Endogenous Variable	β_0	β_1	R^2	Adj. R^2	F- Stat.
Trend of Quantity Traded					
LEXPQ	6.25 (29.71)***	0.11 (12.13)***	0.79	0.79	14.70***
LIMPQ	12.48 (98.59)***	0.03 (5.38)***	0.43	0.42	28.89***
Trend of Value of Trade					
LEXPV	7.35 (50.08)***	0.123 (19.22)***	0.91	0.91	36.96***
LIMPV	11.63 (54.47)***	0.05 (5.24)***	0.42	0.40	27.43***
Trend of Price of Trade					
LEXPP	8.04 (41.22)***	0.01 (1.49)	0.06	0.03	2.23
LIMPP	6.054 (54.14)***	0.02 (3.91)***	0.29	0.27	15.32***

***** = significant at 1%. Source: FAO, 2016**

Table 3 shows the estimated linear trend equation for the quantity, value and price for Nigerian export and import of fishery products. The quantity of export and import for the period under study (1976 - 2015) exhibits a significant growth rate as the coefficient of time trend for the two components (0.11 for EXPQ and 0.03 for IMPQ) was positive and statistically significant at 1% level of probability. Similarly for the trade value, the coefficient of time variable recorded a significant value of 0.12 and 0.05 for the export value and import value respectively at 1% level of significant. However, the estimated trend of trade price revealed import price as the only significant variable with trend coefficient of 0.019 while export price was not significant.

Table 4: Estimated quadratic trend equation for Nigerian Fish Export and Import

Endogenous variable	β_0	β_1	β_2	R^2	Adj. R^2	F- stat
Trend in trade Qtt						
L EXPQ	5.84 (18.35)***	0.167 (4.66)***	-0.001 (-1.68) ***	0.81	0.80	78.47***
L IMPQ	12.96 (76.49)***	-0.04 (-2.09)**	0.002 (3.73)***	0.59	0.57	26.27***
Trend in trade Value						
L EXPV	7.270 (31.61)***	0.14 (5.20)***	-0.001 (-0.47)***	0.91	0.90	181.01***
L IMPV	12.81 (58.72)***	0.12 (4.94)***	0.004 (7.09)***	0.75	0,74	56.67***
Trend in Trade Price						
L EXPP	8.326 (27.79)***	-0.030 (-0.866)	0.001 (1.272)	0.09	0.047	1.944
L IMPP	6.753 (74.886)***	0.081	0.002 (10.16)***	0.81	0.80	79.82***

	(8.016)**
	*

***and ** = significant at 1% and 5% respectively**

Table 4 presents the estimate of quadratic trend model fitted to examine the direction of growth of the quantity, value and price of the Nigerian fish trade. The analysis revealed a negative significant value of -0.001 for the coefficient of export quantity and a positive significant value of 0.002 for the coefficient of import quantity. The respective negative and positive significant value of time trend for export and import quantity indicates that the quantity of export increases at decreasing rate while that of import quantity increases at increasing rate and this implies deceleration in the growth of export quantity and acceleration for the import quantity growth rate. In terms of value of trade, similar trend of growth rate was also observed for export value and import value, implying deceleration and acceleration in the growth rates of fish export value and import value respectively. Further analysis from the table shows that over the study period, export price exhibits a stagnant growth pattern while import price reveals an accelerated growth rate.

Table 5: Annual growth Rate for Nigerian Fish Export and Import

Dependent Variables	Growth parameter (β_1)	Compound Growth Rates (%)
Trade Quantity		
EXPQ	0.10	11.45
IMPQ	0.03	2.93
Trade Value		
EXPV	0.12	13.90
IMPV	0.05	4.87
Trade Price		
EXPP	0.02	1.50
IMPP	0.01	1.88

Source: Computed from FAO, 2016

The calculated annual exponential growth rates for the quantity, value and price of fish export and import are presented in Table 5. The analysis shows that the export section of the Nigerian fish trade recorded a higher exponential growth rate than import section in terms of quantity and value. The annual growth of the quantity and value of fish trade in the export section was higher than import section by 8.52% (in quantity) and 9.03% (in value) annually. In term of price, the compound growth rate of export price was less than import price growth rate by 0.38%.

Table 6: Doubling time for the Trade Annual Exponential Growth Rate in Years

Trade components	Trade Quantity	Trade Value	Trade Price
EXPORT	6.10	5.04	46.67

IMPORT	23.90	14.37	37.20

Source: Computed from FAO, 2016

Table 6 shows the estimated doubling time for the annual exponential growth rates of the quantity, value and price of Nigerian fish export and import. The result of analysis revealed that while it takes approximately 6 years to double the annual rate of growth of fish export quantity, it takes about 24 years to double the rate of growth of fish import quantity. Also in value terms, it takes at least 5 years to double the rate of growth of export value and about 14 years to double the rate of growth of import value. The trade prices exhibit the highest doubling time value of approximately 47 years and 37 years for export and import price respectively. The shorter doubling time recorded for export quantity and value implies that the annual quantity and values of Nigerian fish export trade were lower than that of fish import trade and therefore doubling the current export value and quantity requires shorter time than doubling the current import value and quantity.

5. CONCLUSSION AND RECOMMENDATIONS

This study examined the international trade performance of Nigerian fisheries. The result revealed that Nigeria exhibits low level of specialization in exportation of fishery resources over the study period though her performance scores showed an increasing trend over the period, implying greater potential of Nigerian fish export if fishery resources are efficiently utilized. However, in relation to fish import, the trade specialization index measured by relative import advantage (RMA) reflects a high level of dependence on foreign fishery resources and unstable trend over the study period. It is evident from the export market share analysis that price can be of incentive for Nigerian fish export commodities given the fact that the export shares in value terms were higher than the export quantity shares. Analysis of import market share indicated possibility of dumping in Nigerian fish importation as the obtained market share indices indicated importation of low price fish commodities. Over the study period, there was acceleration in the growth pattern of the quantity, price and value of import but deceleration in the growth rate of export quantity and value. The study thus recommends allocation of more resources to export section of Nigerian fisheries and introduction of counter dumping policies in the import section so as to ensure a balance of trade in Nigerian fisheries.

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