Determinants of the intra-industry trade in cereal and miscellaneous edible preparations: the evidence for Nigeria and the ECOWAS partners

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Abstract: The trade liberalization processes of the Economic Community of West African States (ECOWAS) are implemented through such interventions like free international trade, common external tariff wall, the consolidation or freezing of custom duties and non-tariff barriers to the intra-trade among others. However, the extent to which these efforts have translated to the intra-industry trade in the prepared foodstuff products has not been investigated yet. The objectives of this study are to assess the intra-industry trade theory in cereal and miscellaneous edible preparations; to evaluate the growth rates of simultaneous exports and imports in these prepared foodstuff sub-sections; to evaluate the extent of the intra-industry trade in the sub sections, and to determine the effects of the Nigeria's and partners' characteristics on the intra-industry trade. The results revealed that the intra-industry trade in cereal preparations are positively and significantly influenced by the partners' gross national income (GNI) per capita and the partners' foreign direct investment (FDI), but they are negatively influenced by the Nigeria's household final consumption expenditure. Also, the intra-industry trade in miscellaneous edible preparations is influenced positively by the partners' GNI per capita and the partners' households' final consumption expenditures, while the Nigeria's foreign direct investment and the value added by manufacturing negatively influence the intra-industry trade in the product sub-sections within the ECOWAS sub-region. Both exports and imports growth rates of these products fluctuate, but more in the imports of miscellaneous edible preparations. Cost saving options in transportation, the use of efficient machines during the production, processing and packaging are recommended.

Key words: ECOWAS, intra-industry trade, prepared foodstuffs, cereal preparations, miscellaneous edible preparations

In this study, the prepared foodstuffs were defined as the groups comprising products from the Harmonized System (HS) sections IV. The sub-sections are specified as consisting of the HS sub-sections 16–24. These sub-sections include: (16) Preparation of meat, fish or crustaceans, molluscs etc; (17) Sugars and sugar confectionery; (18) Cocoa and cocoa preparations; (19) Preparations of cereals, flour, starch/milk, and pastry cooks' products; (20) Prepared vegetable, fruit, nuts or other parts of plant; (21) Miscellaneous edible preparations; (22) Beverages, spirits and vinegar; (23) Residues and wastes from the food industry, prepared animal fodder; (24) Tobacco and manufacture tobacco substitutes. The available annual data on the values of bilateral exports and imports of the sub-sections of the prepared foodstuffs (HS IV) were obtained from the Nigeria's National Bureau of Statistics (NBS). The intra-industry trade in this scenario refers to simultaneous exports and imports of Cereal preparations and miscellaneous edible preparations between Nigeria and the ECOWAS partners. According to Grubel and Lloyd (1975), Helpman and Krugman (1985), Davis (1999), Ruffin (1999), this trade is more beneficial than the inter-industry trade because it stimulates innovations and exploits the economies of scale.

Also, in spite of the implementation of the ECOWAS trade liberalization scheme, the evidence shows that the intra-ECOWAS trade as a percentage of the total ECOWAS trade was highly insignificant. Between 1999 and 2006, the total intra-ECOWAS trade was 12% of the total ECOWAS trade (intra and inter-ECOWAS trade) (ECOWAS Statistical Bulletin 2008); compared to the European intra-regional trade which is about 63.7% of the total trade (Eurostat 2013). While the ECOWAS total external trade was 45.7% of the regional GDP over the period 1999 to 2006, the intra-ECOWAS trade was 26.86% of the regional

GDP over the same period (ECOWAS Handbook of international trade 2008). This implies that not only is Europe more industrialized, but it produces more manufactures that are the prerequisites for both the vertical and horizontal intra-industry trade; as opposed to the ECOWAS intra-industry trade that is mainly horizontal at this stage. The ECOWAS member nations need to engage in more trade among them to ensure a sufficient intra-regional trade, to deepen the economic integration and to justify the need for a common currency. So, the question is which factors are responsible for the low intra-industry trade in Cereal preparations and miscellaneous edible preparations? What policy options should be offered to improve the intra-ECOWAS trade in these products? What are the implications for not improving and sustaining the intra-regional trade in the ECOWAS sub-region?

LITERATURE REVIEW

Stone (1997) maintained that the determinants of the intra-industry trade have two facets, namely, industrial based and regional characteristics. The regional characteristics are macroeconomic which, according to him, include the income level and the relative capital/labour ratio, as well as the similarity in per capita income, and the total income, among others. Industrial based characteristics include product differentiation, the scale of economies, industry specific cost structure and transportation costs. The intra-industry trade in the Cereal and miscellaneous edible preparations were expected to be intensively based on a number of sub-regional integration interventions already on the ground, and the traded goods involving relatively low adjustment costs that could build on that base. However, the effects of the Nigeria's and partners' characteristics, such as the nominal GDP, per capita income, population, household and government final consumption expenditures and foreign direct investment among other factors, on the intra-industry trade, are not known.

Grubel and Lloyd (1975) succeeded in finding an index of the intra-industry trade, but they could not predict how the Nigeria's and/or partners' characteristics influenced intra-industry trade in the Cereal and miscellaneous edible preparations among trading partners. In the same way, Ani (2006) evaluated the extent of the intra-industry trade in many products. He used aggregated trade indices only to study an economy-wide trend on the intra-industry trade. His study was faulted by the fact that he used 3-year data point which may be marred by the problem of the limited degree of freedom capable of giving misleading results. More so, the study could not make a policy prescription on the factors that influence the intra-industry trade among trading partners within the sub-region.

So far, it transpires that at the current stage of research analyses of the intra-industry trade, none of the studies carried out sought to explore the impact of Nigeria's and partners' characteristics on intra-industry trade among trading partners within the ECOWAS, especially in the cereal and miscellaneous edible preparations. This gap is what the study aimed at filling. The study used the disaggregated trade data to evaluate the trade indices to study prepared foodstuffs section specific trend of the intra-industry trade between Nigeria and its ECOWAS major trading partners (Onogwu 2011), using 30 years time series data.

The intra-industry trade represents the international trade within industries rather than between industries (Caves 1981). The intra-industry trade was first discussed by Balassa, but it did not draw enough attention until its multipurpose index was developed by Grubel and Lloyd (1975). The most obvious explanation for the occurrence of the intra-industry trade is the product differentiation (Krugman 1979; Lancaster 1980). It is the two-way exchange of international trade in goods (Greenaway and Milner 2003). They reiterated that the intra-industry trade occurred horizontally when the industries produced different varieties of a given good which were close substitutes in consumption and production, while the vertical intra-industry trade occurred when different qualities of a given variety were produced. The intra-industry trade is therefore conceptualized as a pattern of trade influenced by similarity in factor endowment, economic structure and preferences.

METHODOLOGY

The study area is the Economic Community of West African States (ECOWAS).It is located between the latitudes 0˚26' and 20˚31' North; and the longitudes 10˚36' East and 20˚19' West. The Economic Community of West African States was formed in the year 1975 by the countries in West Africa (ECOWAS 1975). The purpose of formation was for economic integration and development. The study focused on the instances of intra-industry trade in preparations of cereals and miscellaneous edible preparations

between Nigeria and its partner nations within the ECOWAS. The choice of the Economic Community of West African States was motivated by the relative factor endowment prevalent among the nations, as well as the relatively low market adjustment costs within the agricultural sector, especially the prepared foodstuffs section; in addition to the current emphasis on the need for regional integration for economic growth. Finally, the choice of the study area was guided by similarities in the tastes and fashions within the sub-region, as well as the availability of data from the National Bureau of Statistics (NBS), ECOWAS Handbook on International Trade and the ECOWAS Statistical Bulletin, among others.

A careful examination of the economies and population of the ECOWAS Member States shows that the ECOWAS is a good model of regional economic integration in which the strong and the weak coexist to foster the socio-economic development on a large scale. Nigeria is the dominant economy in the region accounting for 62% of the regional GDP in 2007(ECOWAS Statistical Bulletin 2008). Given the size of the Nigerian economy in relation to its neighbours, it is expected that Nigeria will continue to play its leadership role, within the framework of solidarity, in fostering the sustainable regional economic development. With respect to the structure of the regional economy, agriculture remained the mainstay of the ECOWAS economy. The agricultural sector, comprising crop production, livestock farming, forestry and fishing, contributed by about 40.0% in average to the entire value added of the region. Between 2002 and 2007, agriculture consistently contributed by around 40% to the whole ECOWAS real value added.

The countries covered were Benin, Cote d'Ivoire, Ghana, Nigeria, and Togo. And for convenience, two product sub-sections considered include the cereal preparations and the miscellaneous edible preparations. These countries and products were purposively selected for the study for the evidence of the simultaneous export and import flows (FOS, 1981–87, and NBS, 1988–2010).

Data sources

Data for this study were collected mainly from secondary sources. All available simultaneous exports and imports of the product subsections were collected from the Federal Office of Statistics, now the National Bureau of Statistics (FOS 1981–1987, NBS 1988–2010) publications, respectively. The data on the Nigeria's and partners' characteristics such as the nominal GDP, income per capita, population, foreign direct investment, FDI, value added by manufacturing, agriculture value added, household final consumption expenditure, and government final consumption expenditure were obtained from the United Nations Statistics Division as well as from the ECOWAS Statistical Bulletin, the ECOWAS and the National Accounts of the ECOWAS (2008).

The objectives of this study are to: (i) assess the intra-industry trade theory in view of the existing literature on the cereal preparations and the miscellaneous edible preparations; (ii) assess the simultaneous exports and imports in the prepared foodstuff sub-sections; (iii) evaluate the extent of the intra-industry trade in the cereal preparations and miscellaneous edible preparations sub-sections, and (iv) determine the effects of the Nigeria's and partners' characteristics on the intra-industry trade.

Data analysis techniques

Descriptive statistics were used to achieve the objectives (i) and (ii). While the study employed the Grubel-Lloyd approach of measuring the intra-industry trade in goods (Grubel and Lloyd 1975) as modified by Lovely, 1999, in achieving the objective (iii), the objective (iv) was achieved using the binary logistic analytical technique. The selections of the independent variables were the step by step inclusion of the characteristics identified in literature as the determinants, and those that have no influence on the trade indices were eliminated.

Model specification

The average annual growth rates were evaluated by dividing the simple growth rate by the number of years within the intervals, thus:

$$\frac{(\mathrm{Pr}V - PaV)\big/ PaV}{N} \times 100 \quad (1)$$

where:
PrV = present value of export or import
PaV = past value of export or import
N = number of years in the given period (5 year in each case)

The intra-industry trade values were estimated for the preparations of cereals and miscellaneous ed-

ible preparations by employing the Grubel-Lloyd's, 1975 model as modified by (Lovely 1999), specified as follows:

$$G_j = \frac{IIT}{TT_j} = 1 - \frac{X_j + M_j - |X_j - M_j|}{X_j + M_j} \quad (2)$$

where:

G_j = measures the intra-industry trade as a share of the total trade in the preparations of cereals or miscellaneous edible preparations

IIT = intra-industry trade in the preparations of cereals or miscellaneous edible preparations (referred to as product j in either case)

TT_j = total trade in the preparations of cereals or miscellaneous edible preparations, (product j)

X_j = exports of product j

M_j = imports of product j

$|X_j - M_j|$ = net trade in product j

Since the Grubel-Lloyd index measures the intra-industry trade as the share in the total trade in the commodity j, it takes values between 0 (all trade is the intra-industry trade) and 1 (all trade is inter-industry trade) (Lovely 1999). Hence,

$$IIT = 1 - \frac{X_j - M_j}{X_j + M_j} \quad (3)$$

Description of the logistic model

The Grubel-Lloyd index alone neither offered the policy prescription on what should be done as an alternative at any given period, such as increasing or decreasing the Nigeria's or partners' exports or imports, nor could it isolate the Nigeria's/partners' characteristics that influenced the intra-regional trade flows in order to prescribe the measures to improve the level of the regional trade. The index would have a policy implication when analyzed using the binary logistic model to determine the factors that promote the intra-industry trade within the region. The Nigeria's and partner's characteristics formed the independent variables, while the evaluated Grubel Lloyd indices (intra industry trade values), formed the dependent variables for a 30 year period, (1981–2010). The dependent variable of the function is a dummy variable, which lies within the range (0, 1) depending on the magnitude of the intra-industry trade index. In that case, the dependent variable is dichotomous. In such functions, the disturbance term would be heteroscedastic, so that the method of the ordinary least squares is not appropriate (Koutsoyiannis 2001). To ensure that the predicted values were also limited to the interval, a logistic function was employed and the non-linear least squares technique that permitted inclusion of zero values was used for the estimation (Balassa 1986; Balassa and Bauwens 1987, Musonda 1994).

Model specification for the intra-industry trade in the preparations of cereals

The evaluated Grubel Lloyd indices formed the dependent variable, while the independent variables were the average partners' GNI per capita, the average partners' FDI, and the Nigeria's household final consumption expenditures, the Nigeria's final consumption expenditure and the average partners' final consumption expenditures .These variables were included to assess the intra-industry trade theory in the view of the existing literature (Stone 1997) on the determinants of the intra-industry trade. The implicit form for of the model is as shown below:

$$G_j^* = f(X_1, X_2, \ldots, X_5 + \mu_i) \quad (4)$$

where:

X_1 = average partners' GNI ($)

X_2 = average partners' FDI ($)

X_3 = Nigeria's household final consumption expenditure ($)

X_4 = Nigeria's final consumption expenditure ($)

X_5 = partners' final consumption expenditure ($)

μ_i = stochastic error term

Model specification for intra-industry trade in miscellaneous edible preparations

The independent variables of this function are the partners' GNI, the Nigeria's FDI, and the Nigeria's value added by manufacturing, and the partners' household final consumption expenditure, while the Grubel Lloyd indices formed the dependent variable. The implicit form of the model is:

$$G_j^* = f(X_1, X_2, \ldots, X_4 + \mu_i) \quad (5)$$

where:

X_1 = partners' GNI ($)

X_2 = Nigeria's foreign direct investment ($)

X_3 = Nigeria's value added by manufacturing ($)

X_4 = partners' household final consumption expenditure ($)

μ_i = stochastic error term

Hypotheses testing

The tests of significance for the null hypotheses of the study were conducted as shown below:

Null hypotheses ($H_0$1)

(i) H_0: $b = 0$ (the Nigeria's and partners' characteristics do not significantly influence the intra-industry trade in the cereals preparations)

Against the alternative hypothesis:

H_A: $b \neq 0$ (the Nigeria's and partners' characteristics have a significant influence on the intra-industry trade in the cereal preparations within the ECOWAS region.

(ii) H_0: b = 0 (the Nigeria's and partners' characteristics do not significantly influence the intra-industry trade in miscellaneous edible preparations)

Against the alternative hypothesis:

H_A: $b \neq 0$ (the Nigeria's and partners' characteristics have a significant influence on the intra-industry trade in miscellaneous edible preparations within the ECOWAS region. The logistic model Chi-square was used for testing the overall significance of the model. The logistic output provided the omnibus test of model coefficients by way of the chi-square, degree of freedom of the variables in the equation, and the significant levels.

RESULTS AND DISCUSSIONS

Exports of prepared foodstuffs (HS IV)

The data were obtained in the disaggregated form (sub-sections) and were used to assess the intra-industry trade in cereal and miscellaneous edible preparations. Generally, the Table 1 presents the Nigeria's total export values of prepared foodstuffs and the products sub-sections to trade partners within the ECOWAS. The sub-sections of the section IV products, where the simultaneous exports and imports took place, include the cereal preparations, miscellaneous preparations, beverages, residue from mill industry, and tobacco. The product sub-sections of the cereal preparations, where the export trade occurred, include malt extract; food preparation of flour etc. not elsewhere specified or included; pasta, such as spaghetti, macaroni, noodles, etc. and bread, pastry, cakes etc., communion wafers, rice paper. Besides, the products of miscellaneous edible preparations exported include the sauces and sauce preparations, mixed condiments and seasoning, and food preparations not elsewhere specified or included. Other product subsections, where the intra-industry trade did not take place, are sugar and sugar confectionary, cocoa and cocoa preparations, and the preparation of vegetable, fruit and nut. It shows that the export values of this section increased steadily from 1986 through the end of 2000, when the exports dwindled. This implies a substantial increase in the market share of the section and gains in the revenue, thus improved the regional trade.

There were no exports of cereal preparations between 1981 and 1995. However, there were exports in 1996 and these reached a record height between 2001 and 2005, before it slumped to $71 670 between 2006 and 2010. The exports of miscellaneous preparations started in 1986, reached a record height between 1996 and 2000, before declining between 2001 and 2005. Comparatively, the export trade in miscellaneous edible preparations is higher than that of cereal preparations. This implies a better gain in the market grip and more revenue for the country from this sector.

Table 1. Exports of prepared foodstuffs (HS IV) to the ECOWAS (1 $ = ₦147.9 within the period)

	Sub-sections					Total exports of Section IV	
	cereal preparations	miscellaneous preparations	beverages	residues from industry	tobacco	to ECOWAS	products
1981–1985	0.0	0.0	6.76	81.14	0.0	26 301.56	1 655 172.4
1986–1990	0.0	130 358.35	878.97	202.84	67.61	178296.15	4 604 462.5
1991–1995	0.0	391 007.44	473.29	0.0	1 757.94	435 902.64	15 129 817.44
1996–2000	405.68	1 149 560.5	2028.40	0.0	44 286.68	2 013 184.6	33 921 568.63
2001–2005	435 091.28	109 668.7	473.29	0.0	202.84	59258.24	23 768 762.68
2006–2010	71 670.05	403 042.6	232 860.04	620 283.98	617 647.06	8 956 930.36	22 377 552.40

Source: FOS (1981–1987) and NBS Foreign Trade Data (1988–2010)

Table 2. Imports of prepared foodstuffs (HS IV) (1 $ = ₦147.9 within the period)

	Sub-sections					Total imports of section IV	
	cereal prepared	miscellaneous prepared	beverages	residues from industry	tobacco	from ECOWAS	products
1981–1985	101.42	2028.40	135.23	202.84	135.23	7 910.75	340 3651.1
1986–1990	676.13	946.59	338.07	67.61	5 138.61	8 248.82	4 046 653.1
1991–1995	1 419.88	2 366.46	4 327.25	202.84	79 986.48	117 579.45	34 239 350.91
1996–2000	26 774.85	32 251.52	34 617.99	4 732.93	221 230.56	787 288.71	109 685 598.38
2001–2005	755 713.32	6 626.10	875 050.71	39 756.59	1 179 986.5	6 629 276.5	414 254 225.83
2006–2010	2 617 511.8	2 782 826.2	2 231 778.2	385 733.6	2 025 084.5	13 776 200.14	769 095 334.69

Source: computed from FOS (1979–1987) and NBS Foreign Trade Data (1988–2010)

Imports of prepared foodstuffs (HS IV)

All import values of the prepared foodstuffs sub-sections were accessed from the Nigeria's Federal Office of Statistics, now the National Bureau of Statistics (FOS 1981–1987; and 1988–2010, respectively), assessed and presented in the Table 2. A closer look at the Table 2 shows that the Nigeria's total imports of prepared foodstuffs (HS IV) from the ECOWAS were on the increase from 1981 to 2010, ranging from $7910.75 between 1981 and 1985, to about $13.78 million between 2006 and 2010. The table reveals that the total mean import values of this sector from the world ranges from about $3.4million between 1981 and 1985 to about $769.09 million between 2006 and 2010. This is evident of the intra-trade between the Nigeria's and partner nations within the ECOWAS. A continued increase in the intra-ECOWAS trade in this way would encourage the deepening of the regional integration.

The imports of cereal preparations ranged from $101.42 between 1986 and 1990 to about $2.62 million between 2006 and 2010. On the other hand, the imports of miscellaneous edible preparations rose from $946.59 between 1981 and 1985 to about $2.78 million between 2006 and 2010. These imply that the Nigeria's exports of both products to the ECOWAS partner nations were on the increase within the period under review.

Average annual growth rates of exports & imports of the cereal and miscellaneous edible preparations

These represent the rates of change in exports and imports over a period of time and are quantified as the change in the volume of either export or import trade of the products by Nigeria. These were evaluated by dividing the simple growth rate by the number of years within the 5-year intervals. The Table 3 presents

Table 3. Average annual growth rates of exports & imports of cereal and miscellaneous edible preparations

	Export				Import			
	cereal prepared	growth rate	miscellaneous prepared	growth rate	cereal prepared	growth rate	miscellaneous prepared	growth rate
1981–1985	0.0	0	0.0	0	101.42	0	2 028.40	0
1986–1990	0.0	0	130 358.35	0	676.13	113.33	946.59	–10.67
1991–1995	0.0	0	391 007.44	13.33	1 419.88	22.0	2 366.46	29.99
1996–2000	405.68	0	1 149 560.5	38.8	26 774.85	357.14	32 251.52	252.57
2001–2005	435 091.28	21 430	109 668.7	–18.09	755 713.32	544.49	6 626.10	–15.89
2006–2010	71 670.05	–16.71	403 042.6	53.50	2 617 511.8	49.27	2 782 826.2	8 379.5

Source: Author's computation using export and import Data (FOS 1981–87; NBS 1988–2010), and model specified in Equation 1

clearly the trade flows in cereals and miscellaneous edible preparations, as well as the annual growth rates of the exports and imports trade.

Historically, the Nigeria's average annual export growth rate to the ECOWAS partners in both cereal and miscellaneous edible preparations showed fluctuations within the study period. Between 2006 and 2010, cereal preparations exports dropped by 16.71%, while the exports of miscellaneous edible preparations dropped by 18.09% each year, between 2001 and 2005. On the other hand, the Nigeria's annual imports growth rate in miscellaneous preparations showed many fluctuations between 1986 to 1990, and 2001–2005, when there were reductions in imports by 10.67% and 15.89%, respectively. These periods coincide with the Nigeria's structural adjustment era (1986–1993) and partly with the campaign for major elections era (2002–2003). The imports of cereal preparations remained positive throughout the period, implying the Nigeria's self insufficiency in cereal production or the improved production and packaging of cereal preparations by the ECOWAS partners. When the volume of import trade outweighs the volume of exports, it reduces foreign reserves. Besides, a closer look at the Nigeria's average annual export and import growth rate in miscellaneous edible preparations shows that the trade was favourable between 1981 to 1995, during which the exports were higher than the imports, as opposed to the trade conditions between 1996 to 2010, when the imports outweighed the exports, culminating to the unfavourable trade balance between Nigeria and its ECOWAS trading partners.

Classification of the intra-industry trade in the preparations of cereals

The classification of the intra- industry trade in preparations of cereals shows that 33.3% of our intra-industry observations (value = 0), and 96.3% of our inter-industry trade observations (value = 1) were correctly classified, yielding the total correct classification of 64.8%. The model distinguished successfully between the intra-industry trade and the inter-industry trade given the logistic predicted values and the cut values.

Determinants of the intra-industry trade in cereal preparations

According to (Stone 1997), one facet of the determinants of the intra-industry trade is the regional characteristics. Some of these regional characteristics that influence the intra-industry trade in cereal preparations are discussed below. The selections of these variables were on the step by step basis and any variable that does not influence this trade is dropped out. Other variables that produced insignificant results include national household final consumption expenditures X_3, and the national final consumption expenditures X_4 (Table 4).

Table 4. Determinants of intra-industry trade in cereal preparations

Step 1(a)	B	S.E.	Wald	df	Exp(B)
X_1	0.033	0.017	3.768	1	1.034
X_2	–0.017	0.010		1	0.983
X_3	–0.152	0.219	0.482	1	0.859
X_4	0.229	0.222	1.064	1	1.257
X_5	–0.197	0.124	2.524	1	0.821

Variable(s) entered on step 1: X_1, X_2, X_3, X_4, X_5
B = logistic coefficient, SE = standard error, Wald = Wald statistic, df = degree of freedom, Exp(B) = chances of intra-industry trade

X_1 = **Partners' gross national income per capita**

For this variable, the coefficient is 0.033, while the standard error is 0.017. The Wald statistic is 3.768, which is significant at 1% level. The positive logistic coefficient value indicates that this variable increases the odds of reporting. In this scenario, we concluded that, as the partners' gross national income per capita increases, the chances of the intra-industry trade in cereal preparation would increase by 1.034. This means that the partners' gross national income per capita increases the opportunities of the intra-industry trade in cereal preparation by 1.034 among the trading partners within the ECOWAS sub-region. Since the model p = 0.0001, the model is significant beyond 0.0001, which means that not all *b's* are zero. Therefore, the null hypothesis is rejected; hence the partners' GNI and the partner's FDI are significant, at 5%, and 10%, respectively. We inferred that the partners' GNI and FDI very significantly influenced the intra-industry trade in cereal preparations among the trading partners within the ECOWAS sub-region

X_2 = **partners' FDI**

The logistic coefficient is negative –0.017 and the standard error is 0.010. The Wald statistic of 2.890

is significant at 1% level. The negative logistic coefficient value indicates that the variable decreases the odds of reporting. Therefore, it is inferred based on Polit (1996) that since the Wald test is significant, and then the parameters associated with these variables are not zero, so that the variables should be included in the model. Hence the partners' FDI decreases the chances of the intra-industry trade in cereal preparations decreases by 0.983.

The summary of the relationship between dependent and independent variables

The Cox & Snell R^2 is 0.628, while the Nagelkerke R^2 is 0.837, yielding an average R^2 of 73.25. This indicates that about 73.3% of the variations in the intra-industry trade values were explained by the variables included in the model.

The test of the significance of the coefficients of the determinants of the intra-industry trade in cereal preparations

Null Hypothesis H_0: $b_1 = 0$, $b_1 = 0$ (The Nigeria's and partners' characteristic do not significantly influence the intra-industry trade in cereal preparations)

Against the alternative hypothesis H_1: $b_1 \neq 0$, $b_1 \neq 0$ (The Nigeria's and partners' characteristics have a significant influence on the intra-industry trade in cereal preparations). The Wald test, described by Polit (1996), is one of a number of ways of testing whether the parameters associated with a group of explanatory variables are zero. If for a particular explanatory variable, or group of explanatory variables, the Wald test is significant, then it would be concluded that the parameters associated with these variables are not zero, so that the variables should be included in the model. From the model chi-square, it can be seen that the model is adequate, with ($p = 0.0001$). This was concluded from the following, that the model ($p = 0.0001$) means the model is significant beyond ($p = 0.0001$).

Classification of the intra-industry trade in miscellaneous edible preparations

The classification table for the intra industry trade in miscellaneous edible preparations shows that 95.0% of our intra-industry observations (value = 0), and 90.0% of our inter-industry trade observations (value = 1) were correctly classified, yielding the total correct classification of 92.5%. The model distinguished successfully between the intra-industry trade and the inter-industry trade in miscellaneous edible preparations given the logistic predicted values and the cut values.

Determinants of the intra-industry trade in miscellaneous edible preparations

Judging from Polit (1996) and Agresti (1990), the Wald test is significant for some variables and it was concluded that the parameters associated with these variables are not zero, and the variables were included in the model. In this case, the variables that yielded highly significant results are discussed below. However, other variables which do not significantly influence the intra-industry trade in miscellaneous edible preparations include the national foreign direct investment and the national value added by manufacturing, X_2, X_3 respectively (Table 5)

X_1 = **Partners' gross national income per capita**

The coefficient is 0.102, while the standard error is 0.068. The Wald statistic is 2.25, which is significant at 1% level, meaning that the parameter associated with this variable is not zero, so the variable should be included in the model. The positive logistic coefficient value of 2.25 means that as the partners' gross national income per capita increases, the chances of the intra-industry trade in miscellaneous edible preparations increase by 1.107 margins.

X_4 = **Partners' household final consumption expenditures**

The coefficient is –0.782 and the standard error is 0.461. The Wald statistic is 2.877, which is significant at 1% level. This negative logistic coefficient value produced means that as the partners' household final consumption expenditure decreases, the chances of the intra-industry trade in miscellaneous edible preparation decrease by 0.458 within the ECOWAS sub-region.

Table 5. Determinants of intra-industry trade in miscellaneous edible preparations

Step 1(a)	B	S.E.	Wald	df	Exp(B)
X_1	0.102	0.068	2.25	1	1.107
X_2	0.003	0.004	0.563	1	1.003
X_3	0.001	0.001	1.000	1	1.001
X_4	–0.782	0.461	2.877	1	0.458

Variable(s) entered on step 1: X_1, X_2, X_3, X_4

The summary of the relationship between dependent and independent variables

The Cox & Snell R^2 is 0.693, while the Nagelkerke R^2 is 0.924, culminating to an average R^2 of 0.8085, indicating that about 80.85% of the variations in the trade values were explained by the variables included.

Test of the significance of the coefficients of the determinants of the intra-industry trade in miscellaneous edible preparation

Null Hypothesis: H_0: $b_1 = 0$, $b_1 = 0$ (The Nigeria's and partners' characteristic do not significantly influence the intra-industry trade in miscellaneous edible preparations).

Against the alternative hypothesis: H_0: $b_1 \neq 0$ (The Nigeria's and partners' characteristic have a significant influence on the intra-industry trade in miscellaneous edible preparations).There are explanatory variables that yielded a significant Wald test and the parameters associated with these variables are not zero (Polit 1996; Agresti 1990), and they are included in the model. From the model χ^2, the model is adequate at ($p = 0.0001$), meaning that the model is significant beyond $p = 0.0001$. This means that not all *b's* are zero. Therefore, the null hypothesis is rejected; hence both the partners' gross national income per capita and the partners' household final consumption expenditure are significant, at 1% each. It was inferred that the partners' GNI per capita and the partners' household final consumption expenditures significantly influence the intra-industry trade in miscellaneous edible preparation among the trading partners within the ECOWAS sub-region.

RECOMMENDATIONS

Based on the findings, the following recommendations were made:

(1) The improvement in the volume of foreign direct investments should be sought by trading partners from donor nations to increase the output of cereal preparations thereby promoting the intra- industry trade in these products among the trading partners within the sub-region.

(2) Both private and public enterprises should put hands on deck to increase the GDP, and GNI per capita of the partner nations given the positive influence these variables have on the miscellaneous edible preparations trade. Moreover, in view of the negative effect of the partners' household final consumption expenditure, it is recommended that the national operators should reduce the cost per unit of good through the adoption of cost saving options through the use of efficient machines to improve the production, processing and packaging of miscellaneous edible preparations. This will reduce the final consumption expenditures (when the economy of scale is maintained during the production) in terms of price that an average person in the partner nation would pay to satisfy and sustain the consumption that will improve the intra-regional trade.

(3) The intra-industry trade and regional markets in cereal and miscellaneous edible preparations should be sustained by regarding them as sensitive products that could help to deepen the ECOWAS regional integration through trade.

CONCLUSION

The ECOWAS liberalization policy has translated into the intra-industry trade within the sub-region as it is the evident in the growth rates of the simultaneous exports and imports of cereal and miscellaneous edible preparations. The extent of the intra-industry trade in this regard was influenced by the Nigeria's and partners' characteristics that can be modified through the policy options to improve the intra-ECOWAS trade and deepen the regional integration. The need for the ECOWAS policy makers to continue making concerted efforts to ensure the effective implementation of the ECOWAS trade liberalization scheme is to stimulate the private sector to promote the value addition in all other prepared foodstuffs sections and the cereal and miscellaneous edible preparations in particular. This could sustain and improve the horizontal and vertical differentiations of all prepared foodstuffs products sub-sections which are the prerequisites for the intra-industry trade. Therefore, the partner nations' efforts aimed at the trade development should be intensified through the increase in foreign direct investments that would improve local productions and the intra-community trade expansion.

REFERENCES

Agresti A. (1990): Categorical Data Analysis. John Wiley and Sons, New York.

Ani E.C. (2006): An assessment of the extent and determinants of Intra-industry Trade in the Economic Community of West African States (ECOWAS). [An unpublished Ph.D thesis.] Department of Economics, University of Nigeria Nssuka.

Balassa B. (1960): Tariff reduction and trade in manufactures among industrial countries. American Economic Review, *56*: 466–473.

Balassa B. (1986): The determinants of intra-industry specialization in US trade. Oxford Economics Papers, *38*: 220–233.

Balassa B., Bauwens L. (1987): Intra-industry specialization in a multi-country and multi-industry framework. Economic Review Journal, *97*: 923–939.

Caves R.E. (1981): Intra-industry trade and market structure in the industrial countries. Oxford Economic Papers, New Series, 33: 203–223

Davis H. (1999): Regional economic impact analysis and project evaluation. Eastern African Economic Review, vol. *16*.

ECOWAS (1975): Treaty of the Economic Community of West African States. ECOWAS Secretariat, Lagos.

ECOWAS Handbook on international Trade (2008): A Publication of The Executive Secretariat. Abuja, Nigeria.

ECOWAS Statistical Bulletin (2008): A Publication of the Executive Secretariat. Abuja, Nigeria.

Eurostat (2013): Intra EU share of EU-27 trade in goods. Available at http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-SF-12-003

FOS (1981, 1986): Review of External Trade. Federal Office of Statistics, Lagos, Nigeria.

Greenaway D., Milner R.C. (2003): What have we learned from a Generation's Research on Intra-industry Trade? Research Paper Series 2003/44, Leverhulme Centre for Research on Globalisation and Economic Policy, The University of Nottingham.

Grubel H.G., Lloyd P.J. (1975): Intra-industry Trade: The Theory and Measurement of International Trade in Differentiated Products. Wiley, New York.

Helpman E., Krugman P.R. (1985): Market Structure and Foreign Trade Wheat Sheet Bonds: MIT Press, Cambridge.

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/

Koutsoyiannis A. (2001): Theory of Econometrics: an Exposition of Econometric Method. 2nd ed. Pal Grave Publishers, pp. 283–284.

Krugman P.R. (1979): Increasing returns monopolistic competition and international trade. Journal of International Economics, *9*: 464–479.

Lancaster K. (1980): Intra-industry trade under perfect competition. Journal of International Economics, *10*: 151–175

Lovely M. (1999): Trade and Labour Market Adjustment Center for Research on Globalization and Labor Markets. School of Economics, University of Nottingham.

Maddala G.S. (1983): Limited-Dependent and Qualitative Variables in Econometrics. Cambridge University Press, London.

Musonda F.M. (1994): Intra-Industry Trade between Members of PTA/COMESA Regional Trading Agreement. AERC Research paper 64, Nairobi, Kenya.

NBS (2007): Review of External Trade. National Bureau of Statistics, Abuja, pp. 42–281.

NBS (2010): Nigeria Foreign Trade Summary. National Bureau of Statistics, Abuja, pp. 15–30.

Onogwu G.O. (2011): An Analysis of Intra-industry Trade in Agricultural Products between Nigeria and Partner Nations within the Economic Community of West African States (ECOWS). [Unpublished Ph.D. Thesis.] Department of Agricultural Economics, University of Nigeria, Nsukka.

Polit D. (1996): Data Analysis and Statistics for Nursing Research. Appleton & Lange, Stamford.

Ruffin R. (1999): Protection and real wages. The neoclassical ambiguity. Journal of Economics Theory, *14*: 337–348.

Stone L.L (1997): The Growth of Intra-Industry Trade. Garland Publishers, New York.

United Nations Statistics Division (1981–2010): National Accounts of ECOWAS member Nations. UNSD, ECOWAS, Abuja.

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