POTENTIALS OF STRATEGIC ALIGNMENT BETWEEN THE NIGERIAN MARITIME AND INDUSTRIAL SECTORS IN LIGHT OF THE AFRICAN CONTINENTAL MARKET

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Abstract

This paper explores the strategic alignment between Nigeria's maritime and industrial sectors, focusing on seaport efficiency, industrial utilization capacity, production value, and industrial zones. The study utilized secondary data from 2014 to 2021.The study utilized multiple linear regression. The study found a positive correlation between seaport efficiency and industrial utilization capacity, with a 0.08% increase in Apapa Seaport and a 34.4% increase in Tin-Can Island port efficiency. At the zonal levels of Apapa, Ikeja, and Ogun, the results indicate a positive and direct relationship between seaport efficiency and industrial production value. For example, a unit increase in seaport efficiency in Apapa results in a 9.63 unit increase in the industrial production value for the Apapa zone, while Tin-can Island port efficiency remains constant. Furthermore, the Apapa zone's production value is positively correlated with Tin-can Island Seaport, with an increase in seaport efficiency resulting in a 0.65 unit increase in the zone's industrial production value. The study reveals that enhancing Tin-can Island port efficiency leads to a 5.23 unit increase in industrial production value, while Apapa port efficiency has no significant impact on Ikeja zone industrial production value. The industrial output value in the Ogun zone increases by 2.16 units with an increase in port efficiency of Apapa and 1.43 units with an increase in port efficiency of Tin-can Island. The paper proposes a strategic partnership between Tin Can Island Seaport and the food and beverages industry to leverage the advantages of the African Continental Market Free Trade Agreement.

Key words: Alignment, strategic relationship, maritime, industrial, economic benefits

JEL. Classification: L95; L91; L98

1.0 Introduction

The African Continental Free Trade Agreement (AfCFTA) has the potential to promote regional integration and greatly boost the African economy. Based on a World Bank (2020) analysis, the complete implementation of the AfCFTA could culminate in a real income gain of around $450 billion by 2035, or 7%. It is anticipated that the overall export volume will increase by 29% by 2035, with intra-continental trade surpassing 81% and exports from African nations increasing by 19%. AfCFTA aims to alleviate extreme poverty in 30 million

Africans and increase the incomes of 68 million others living on less than $5.50 a day (World Bank, 2020). The benefits for Nigeria include, among other things, a 15%–50% increase in intra-African trade, a GDP growth of approximately 10%–15%, the creation of 1.4 million new jobs, and economic diversification. The challenge is that input capacity will determine a nation's gains. As pointed out in the World Bank reports above, real income growth can range from 2% to 14% in some countries. As a result, the projections should provide sufficient incentives for Nigeria to successfully execute the AfCFTA.

Nigeria's maritime transportation sector, accounting for 99.23% of exports, may successfully execute the African Continental Free Trade Agreement (AfCFTA) for potential income gains and advantages. Nigeria's 2020 maritime profile showed a valued merchandise trade of 91,024 million US dollars, with a container port throughput of 1,528,520 TEU. The country had a total of 4534 ships, with the highest number of seafarer supplies in Nigeria (Nigerian Shippers Council, 2021). In 2023, UNCTAD reported Nigeria as the largest ship-owing country in Africa, with 291 vessels weighing 7.94 million dead weight tons. Nigeria's industrial sector can leverage its maritime resources to maximize AfCFTA benefits, but strategic alignment between maritime and industrial sectors is crucial in the African Continential Market. Therefore, understanding the strategic alignment of Nigerian maritime and industrial sectors with the African Continential Market is crucial.

Nigeria's 2020 export structure analysis indicates that its potential for intra-African trade growth is limited to serving as a market, not a player, according to World Bank projections. Table 1 indicates the necessity for strategic alliances because the manufacturing sector's utilization of the maritme sector's potential is below expectations.

Table 1: Nigerian Export Structure by Product Group in 2020

PRODUCT	**PERCENT (%)**
All food Items	4
Fuels	90
Manufactured Goods	4
Other	3

Source: Nigerian Shippers Council, (2021) Studies show a negative correlation between the maritime sector and Nigeria's economic growth and industrialization, though not significant, (Igberi and Ogunniyi, 2013). Omoke et al. (2018) examined the impact of port operations on Nigeria's economy, focusing on Apapa port. They found that vessel gross registered tonnage significantly influences the country's GDP, suggesting it should be used for port dues assessment. Previous studies have primarily examined the direct impact of the maritime sector on GDP, neglecting its indirect effects. Igberi and Ogunniyi (2013) and Ogoun (2022), suggest that the maritime sector can indirectly boost economic growth through maritime transport, maritime auxiliary services, and port services. The maritime sector's strong interconnections with other sectors could significantly contribute to the overall economic expansion and growth. The study examines the impact of seaport efficiency on industrial utilization capacity, production value, and production value in three industrial zones: Apapa, Ikeja, and Ogun.The paper emphasizes the importance of strategic alignment between the maritime and industrial sectors for the successful implementation of the AfCFTA in Nigeria.

There are five sections in the paper. The introduction section provides the background and motivation for the paper. The second section, reviews research on the relationship between maritime and industrial sectors. The methodology is described in section three. The conclusions and relevant discussions are presented in Section four. Section five reports the conclusions and recommendations.

2. Literature Review

Research has improved our understanding of the relationship between seaports and industrial development. Research by Zhang, Lam, and Huang, (2014), Zhand et al. (2015), Omoke et al. (2016), Munim and Schramm (2018), Sun and Yu (2019), Ogoun (2022), and Oni and Oluwakoya (2023), are examples of these studies. Zhand et al's (2015) study reveals that the relocation of manufacturing to Western Guangdong benefits Hong Kong Port, while other relocation destinations make it less attractive or irrelevant. Similarly, Omoke et al, (2016) analyzed the impact of port operations on Nigerian economy. They found that gross registered tonnage of the vessel has significantly influence on Nigerian gross domestic product. Munim and Schramm, (2018) investigates impacts of port infrastructure quality and logistics performance on economic growth. They found that port infrastructure contributes to better logistics performance, leading to higher seaborne trade, yielding higher economic growth.

Furthermore, Sun and Yu (2019) found a long-term equilibrium link between variables when they examined the connection between port logistics and regional economic growth.

Additionally, they discovered a two-way causal relationship between cargo and container throughput, which are aspects of port operations. Additionally, there is a unidirectional causal relationship between cargo throughput and economic growth. Similar to this, Ogoun (2022) used and embraced the qualitative research method, specifically the desk-review approach, to evaluate and list maritime transportation as a tool of Nigeria's economic growth. The study discovered that maritime transportation positively impacts Nigeria's GDP, which is a key factor in determining a country's rate of economic growth, and that it facilitates other economic sectors as a significant component of value chains, allowing those other sectors to contribute to the economy, suggesting that it is also a tool of Nigeria's economic growth.

Oni and Oluwakoya's (2023) study assessed Apapa and Tin Can Ports' industrial sector orientation in order to assess the food and beverage supply chain in Ogun and Lagos states and offer ways to improve it. The study discovered that different seaports have varying degrees of industrial sector orientation, with Tin Can Port PT having a bigger influence than Apapa PT. According to the study, the best port-supply chain integration policy should be determined by how much a port influences industrial development.

The literature on the connection between the port industry and regional economic growth appears to be biased, emphasizing the port's advantages while ignoring the industrial side. Furthermore, little is known about how Nigeria's industrial and maritime sectors strategically link with the African Continental Market, particularly with regard to the manufacturing sector. This paper explores the strategic alignment between Nigeria's maritime and industrial sectors, focusing on seaport efficiency, industrial utilization capacity, production value, and industrial zones.

3. Methodology

3.1 Theoretical Framework

This study is based on the Multiplier Effects Theory (MET). The multiplier, which is frequently used in macroeconomics—the study of the economy as a whole—was first introduced by Keynes in 1936. It is a factor in economics that, when applied, proportionally increases related variables.The theory posits that expenditure by the government, in any form, has the potential to generate economic prosperity and job growth, ultimately driving GDP growth to equilibrium. The Multiplier Effects Theory (MET) suggests that seaports can facilitate industrial growth in various ways, such as drawing in companies, industries, and investment by boosting regional economies. Others include infrastructural development, which boosts economic activity and GDP growth; industrial development and diversification, which gives access to global markets; and the facilitation of raw material imports and manufactured goods exports. Igberi and Ogunniyi's (2013) study examined how Nigeria's maritime industry affected the country's GDP, proving that the multiplier theory could be used to examine technological advancement, foreign direct investment, and gross capital formation. This can also be used to analyze how seaport throughput affects production value and the use of manufacturing capacity. Therefore, the multiplier effect can be used to study the relationship between Nigeria's industrial development and the maritime or seaport sector.

3.2. Data and Variable Description

The study focuses on Nigeria's food and beverage sector as well as the country's two largest seaports, Apapa and Tincan Island Seaport. The food and beverage sector is the largest subsector of Nigerian manufacturing, accounting for 5% of the country's GDP in 2019. The study utilized both aggregated and sub-industrial data from three zones: Apapa, Ikeja, and Ogun. According to the Manufacturing Association of Nigeria (MAN, 2021), Apapa, Ikeja, and Ogun zones accounted for more than 75% of Nigeria's industrial investments from 2014 to 2017. Again, the research focuses on Apapa and Tincan Island Ports because greater than 70% of all containers imported into Nigeria pass via these ports.

The paper measured two set of data: the independent variable and dependent variables. The maritime sector acts as the independent variable while industrial sector acts as the dependent variables. The maritime sector was measured by port efficiency in terms of total number of containers handled within the period of study (2008-2014). Industrial sector was measured by industrial capacity utilization (ICU) and industrial Production Value (IPV, Ekpo 2018; and Afolabi and Laseinde 2019). Data on port efficiency were collected from the Nigerian Port Authority between 2014 and 2021 while data on the foods and beverages industry’s capacity utilization and production value were sourced from Manufacturers Association of Nigeria (MAN) for the specified period.

3.3 Model Specifications

Two empirical models were specified in this paper. A multiple linear regression model was used to specify the relationship among the core variables in sections 4.2 and 4.3.

3.3.1 Multiple Linear Regression Model

A multiple linear regression model was used to study the effect of port efficiency (Apapa and Tin-can Island ports) on industrial utilization capacity of the food and beverages industry. The functional relationshipis presented in model 1;

$$ICU = \beta_0 + \beta_1 PE_1 + \beta_2 PE_2 + e \quad (1)$$

where ICU stands for the industry's Industrial Capacity Utilization , PE1 and PE2 for the Apapa and Tin-Can Island ports, respectively, β0 for constant or intercept, β1 and β2 for regression coefficients, and e for error term. Similarly, the impact of port efficiency on the production value of the food and beverage industry, followed by the three industrial zones (Apapa, Ikeja, and Ogun), was determined using a multiple linear regression.
The functional relationship is shown in models 2a to 2d;

$$IPV_S = \beta_0 + \beta_1 PE_1 + \beta_2 PE_2 + e \quad (2a)$$

$$IPV_A = \beta_0 + \beta_1 PE_1 + \beta_2 PE_2 + e \quad (2b)$$

$$IPV_I = \beta_0 + \beta_1 PE_1 + \beta_2 PE_2 + e \quad (2c)$$

$$IPV_O = \beta_0 + \beta_1 PE_1 + \beta_2 PE_2 + e \quad (2d)$$

Where IPVi represents the industrial production value at the industry level, IPVA the Apapa industrial zone, IPVI the Ikeja industrial zone, and IPVO the Ogun industrial zone, A constant or intercept is denoted by β0, regression coefficients by β1 and β2, error term by e, and port efficiency for Apapa and Tin-Can Island ports by PE1 and PE2, respectively. The Ordinary Least Squares (OLS) technique was used to estimate the parameters of regression models (1, 2a, 2b, 2c, and 2d) with the help of the E-view 9 software because of their linearity and independence from the others. This is to determine the extent of (if there is) the significant relationship between the dependent and independent variables.

4. Results and Discussion

4.1 Descriptive Analysis

The summary statistics of the time series data for the explanatory variables in the multiple regression models are presented in Table 4.1. The data for the Industrial Utilization Capacity (ICU) is presented in percentages, while the data for the Industrial Production Values (IPV_S, IPV_A, IPV_I & IPV_O) and the Port Efficiency (PE_1& PE_2) are in their log form. The statistical tools for the descriptive analysis include the mean, median, maximum value, minimum value, standard deviation, skewness, kurtosis, and the Jarque-bera.

Table 4.1 – Statistics of Core Variables

Statistics	ICU	IPV_S	IPV_A	IPV_I	IPV_O	PE_1	PE_2
Mean	0.575794	11.87776	11.11600	11.92886	11.89780	5.741060	5.842279
Median	0.562000	12.11142	11.54098	12.25183	12.02926	5.746386	5.866342
Maximum	0.721000	12.55205	11.93759	12.54344	12.38917	5.839217	5.967808
Minimum	0.498000	10.91676	8.534026	10.32869	10.77238	5.550000	5.619266
Std. Dev.	0.060467	0.506842	1.057839	0.676926	0.444836	0.078695	0.094042
Skewness	0.766052	-0.80287	-1.83909	-1.16966	-1.04442	-0.77964	-0.71323
Kurtosis	2.958363	2.179266	4.931628	3.038055	3.454915	3.182541	2.964764
Jarque-Bera	1.566050	2.167997	11.50684	3.649254	3.046819	1.643115	1.357333
Probability	0.457022	0.338240	0.003172	0.161278	0.217967	0.439746	0.507293
Observations	16	16	16	16	16	16	16

Source: Outputs from E-View 9 (2023)

Table 4.1 shows an average manufacturing utilization capacity (ICU) of 57.6%, with a standard deviation of 6%. This suggests a stable ICU in the industry across the periods. The mean Manufacturing Production Value (IPV_i) for the food and beverage industry is 11.88 (N750billions) with a standard deviation of 50.7%. This implies that the IPV_i varies slightly during the $period_s$ in consideration. Similarly, the means of the Industrial Production Value for the three industrial zones (Apapa-IPV_A, Ikeja-IPV_I & Ogun-IPV_O) are respectively 11.12 (N132billions), 11.93 (N850billions) and 11.90 (N800billions). However, the standard deviations (105.8%, 67.7% & 44.5%) suggest that the values vary across the zones, during the periods. Furthermore, the average values of the port efficiency for the specified ports (Apapa-PE_1& Tin-can Island-PE_2) are respectively 5.74 (N550,000) and 5.84 (N690,000). The standard deviations are however very low (7.9% & 9.4%) indicating that the throughputs are stable in the two ports, during the periods.

In addition, Table 4.1 shows the normality of the distribution of the time series data representing the core variables. The skewness and the kurtosis statistics of the distribution of the ICU data is tailed to the right and approximatelymesokurtic (0.8 & 2.9 respectively); the distribution of the IPV_i data is tailed to the left and approximately mesokurtic (-0.8 & 2.2 respectively); the distribution of the IPV_A data is skewed to the left and leptokurtic(-1.8 & 4.9 respectively); the distribution of the IPV_I data is skewed to the left and mesokurtic (-1.2&3.0 respectively); the distribution of the IPV_O data is skewed to the left and approximately mesokurtic (-1.0 & 3.5 respectively); the distribution of the PE_1 data is skewed to the left and approximately mesokurtic (-0.8 & 3.2 respectively) and the distribution of the PE_2 data is also skewed to the left and mesokurtic (-0.7 & 3.0 respectively). The summary of the result of the skewness and kurtosis for the all variables suggests normality of the respective data.

The Jarque-bera statistics further establish the normality of thetime series data, with the results indicating that ICU (1.6), IPV_i(2.2), IPV_I (3.6), IPV_O (3.0), PE_1 (1.6) and PE_2 (1.4) have non-significant p-values ($p > 0.05$), at the 5% significance level. These results suggest normal distribution for the data. However, the same cannot be said of IPV_A (11.5), whose value is significantat the specified 5% level ($p = 0.003<0.05$).

4.2. The Impact of Port Efficiency on Industrial Capacity Utilization.

A multiple linear regression model was used to examine the impact of port throughput on manufacturing capacity utilization. The result of the econometric analysis of the model is presented in Table 4.2.

Table 4.2 – Parameter Estimates of Model 1
Dependent Variable – ICU

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.54131	1.062942	-1.45005	0.0171
PT_1	0.007671	0.222115	0.034535	0.0197
PT_2	0.354839	0.185867	1.909107	0.0286
R-squared	0.311331		F-statistic	2.938493
Adjusted R-squared	0.205382		Prob(F-statistic)	0.008852
			Durbin-Watson stat	2.499426

Source: Outputs from E-View 9 (2022)

$$ICU = -1.541 + 0.008PT_1 + 0.355PT_2 \quad (1)$$

Table 4.2 shows the results of the parameters of model 1, involving industrial utilization capacity (ICU) and port efficiencies (PE_1& PE_2). The result indicates a positive regression coefficient (β=0.008) for PE_1. This implies that a percentage change in Apapa port efficiency only results in 0.08 percent increase in industrial utilization capacity, while the Tin-can Island port efficiency remains constant. The t-statistic of the regression coefficient (t=0.034) is also significant at the 5% statistical level ($p<0.05$). This implies a direct and significant relationship between industrial utilization capacity and Apapa port efficiency.

Similarly, there exist a positive relationship between ICU and PE_2 (β=0.354), where a unit change in Tin-can Island port efficiency results in 35.4 percent increase in industrial utilization capacity. Furthermore, the t-statistic of the regression coefficient (t=1.91) is also significant at the 5% level ($p<0.05$), indicating a positive and significant relationship between industrial utilization capacity and Tin-can Island port efficiency.

The model summary in Table 4.2 reveals a good model fit. The R-squared value of 0.31implies that the explanatory variables explain 31percent of the total variations in the exploratory variables. The F-statistic (F=2.94) is significant with a p-value of 0.008 ($p<0.05$). In addition, the Durbin-Watson statistics of 2.4 falls within the acceptable threshold of 1.5 to 2.5, suggesting the absence of serial correlation among the variables.

4.3 The Impact of Port Efficiency on Industrial Production Value.

A multiple linear regression model was used to examine the impact of port efficiency on industrial production values at the industry level and across three industrial zones (Apapa, Ikeja & Ogun). The result of the econometric analysis of the model is presented in Tables 4.3 to 4.6.

Table 4.3 – Parameter Estimates of Model 2a
Dependent Variable – IPV_i

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-17.6586	6.79778	-2.5977	0.0221
PT_1	2.735692	1.420484	1.925887	0.0076
PT_2	2.367331	1.188663	1.991591	0.0068
R-squared	0.599122		F-statistic	9.714426
Adjusted R-squared	0.537449		Prob(F-statistic)	0.002628
			Durbin-Watson stat	1.613615

Source: Outputs from E-View 9 (2023)

$$IPV_i = \beta_0 + \beta_1 PT_1 + \beta_2 PT_2 + e \quad (2a)$$

Table 4.3 reveals the results of the parameter estimates of the model involving the industrial production value (IPV_i) at the industry level and the two port efficiencies (PE_1& PE_2). The result shows a positive regression coefficient (β=2.73) for PE_1. This implies a direct relationship where a unit increase in Apapa port efficiency results in 2.73units increase in the industry's level production value, with the Tin-can Island port efficiency remaining constant. The t-statistic of this coefficient (t=1.93) is significant at the 5% level ($p<0.05$), indicating a significant relationship between the industrial production value of the food and beverage industry and the efficiency from Apapa port.

Furthermore, there exist a positive relationship between IPV_i and PE_2 (β=2.37), where a unit increase in efficiency from Tin-can Island port leads to 2.37 units increase in production value at the industry level. Also, the t-statistic of the coefficient (t=1.99) is significant at the 5% level ($p<0.05$), implying a direct and significant relationship between the production value of the food and beverage industry and Tin-can Island port throughput.

In addition, Table 4.3 shows the model summary. The R-squared value of 0.60 indicates that the port efficiency variables explain 60 percent of the total variations in the industrial production value of the food and beverage sector. The F-statistic (F=9.71) is also significant at the 5% level ($p<0.05$). The Durbin-Watson statistics of 1.6further suggests the absence of serial correlation among the variables. These results imply a good model fit.

Table 4.4 – Parameter Estimates of Model 2b
Dependent Variable – MPV_A

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-48.0076	14.74174	-3.25657	0.0062
PE_1	9.628361	3.080477	3.125607	0.0080
PE_2	0.658399	2.577748	0.255416	0.8024
R-squared	0.567206	F-statistic		8.518686
Adjusted R-squared	0.500622	Prob(F-statistic)		0.004323
		Durbin-Watson stat		1.475675

Source: Outputs from E-View 9 (2023)

$$IPV_A = -48.01 + 9.63PE_1 + 0.66PE_2 \qquad (2b)$$

The parameter estimates of the model involving the industrial production value for Apapa industrial zone (IPV_A) and the port efficiencies (PE_1& PE_2) is shown in Table 4.4. The result indicates a positive regression coefficient (β=9.63) for PE_1, which implies a direct relationship where a unit increase in Apapa port efficiency results in 9.63 units increase in the industrial production value for the zone, with efficiency from Tin-can Island port remaining constant. The t-statistic of the coefficient (t=3.13) is significant at the 5% level ($p<0.05$), indicating a direct and significant relationship between the industrial production value of the Apapa industrial zone and the efficiency from Apapa port.

Furthermore, there is a positive relationship between IPV_A and PE_2 (β=0.66), where a unit increase in Tin-can Island port efficiency only implies 0.65units increase in industrial production value of the zone. The t-statistic of the coefficient (t=0.26) is not significant at the 5% level ($p=0.80>0.05$). This implies that Tin-can Island port efficiency does not significantly influence the industrial production value of theApapa industrial zone.

The model summary results show a R-squared value of 0.57. This suggests that the port efficiency variables explain 57 percent of the total variations in the manufacturing production value of the zone. The F-statistic (F=8.52) is also significant at the 5% level ($p<0.05$). The Durbin-Watson statistics of 1.5further suggests the absence of serial correlation among the variables. In all, the result of the model summary implies a good model fit.

Table 4.5 – Parameter Estimates of Model 2c
Dependent Variable – IPV_I

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-19.5849	9.664078	-2.02657	0.0637
PE_1	0.162569	2.019435	0.080502	0.9371
PE_2	5.234338	1.689866	3.097488	0.0085
R-squared	0.545784		F-statistic	7.810387
Adjusted R-squared	0.475905		Prob(F-statistic)	0.005918
			Durbin-Watson stat	1.637589

Source: Outputs from E-View 9 (2023)

$$IPV_I = -19.58 + 0.16PE_1 + 5.23PE_2 \qquad (2c)$$

Table 4.5 reveals the estimates of the model involving the industrial production value for Ikeja industrial zone (IPV_I) and the port efficiencies (PE_1& PE_2). The regression coefficient for PE_1 is positive (β=0.16), which suggest a direct relationship where a unit increase in Apapa port throughput only leads to 0.16units increase in the industrial production value for the zone, while Tin-can Island port efficiency remains constant. The t-statistic (t=0.08) is however not significant at the 5% level ($p>0.05$). This implies that Apapa port efficiency does not significantly influence the industrial production value of the Ikeja industrial zone.

Similarly, the regression coefficient for PE_2 is a positive (β=5.23), suggesting a direct relationship where a unit increase in Tin-can Island port efficiency results in 5.23units increase in industrial production value of the zone. The t-statistic of this coefficient (t=3.10) is significant at the 5% level ($p<0.05$). This implies that Tin-can Island port efficiency significantly influences the industrial production value of the Ikeja industrial zone.

Furthermore, the model summary results reveal a R-squared value of 0.55, implying that the port efficiency variables account for 55percent of the total variations in the industrial production value of the Ikeja zone. The F-statistic (F=7.81) is also significant at the 5% level ($p<0.05$). The Durbin-Watson statistics of 1.6is within the acceptable threshold of 1.5 – 2.5, indicating the absence of serial correlation among the variables. The results of the model summary imply a good model fit.

Table 4.6 – Parameter Estimates of Model 2d
Dependent Variable – IPV_O

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.83441	7.441608	-1.18716	0.2564
PE_1	2.15941	1.555021	1.38867	0.0188
PE_2	1.426652	1.301244	1.096376	0.0293
R-squared	0.376326		F-statistic	3.922103
Adjusted R-squared	0.280376		Prob(F-statistic)	0.046476
			Durbin-Watson stat	1.70647

Source: Outputs from E-View 9 (2023)

$$IPV_O = -8.83 + 2.16PE_1 + 1.43PE_2 \quad (2d)$$

The parameters in Table 4.6 show a positive relationship between industrial production value for Ogun industrial zone (IPV_O) and the port efficiency (PE_1& PE_2). The regression coefficient for PE_1 ($\beta=2.16$), implies that a unit increase in Apapa port efficiency results in 2.16units increase in the industrial production value for the Ogun zone, while Tin-can Island port efficiency remains constant. The t-statistic ($t=1.39$) also significant at the 5% level ($p<0.05$). This implies that Apapa port efficiency significantly influences the industrial production value of the Ogun industrial zone.

Similarly, the regression coefficient for PE_2 is a positive ($\beta=1.43$), suggesting a direct relationship where a unit increase in Tin-can Island port efficiency results in 1.43units increase in industrial production value of the Ogun zone. The t-statistic of this coefficient ($t=1.10$) is also significant at the 5% level ($p<0.05$). This implies that Tin-can Island port efficiency significantly influences the industrial production value of the Ogun industrial zone.

In addition, the model summary results reveal a R-squared value of 0.38, suggesting that the port throughput variables only account for 38percent of the total variations in the industrial production value of the Ogun industrial zone. The F-statistic ($F=3.92$) is also significant at the 5% level ($p<0.05$). Furthermore, the Durbin-Watson statistics of 1.7 indicates the absence of serial correlation among the variables. In all, the model summary results suggest a good model fit.

5. Conclusion and Recommendations

5.1 Conclusion

This paper examines the potential of strategic alignment between Nigeria's maritime and industrial sectors, focusing on seaport efficiency, industrial utilization capacity, production value, and industrial zones.The study reveals a positive correlation between seaport efficiency and industrial utilization capacity. For Apapa Seaport, a percentage change results in a 0.08 percent increase in industrial utilization capacity, whereas a unit change in Tin-Can Island port efficiency results in a 35.4 percent increase in industrial utilization capacity. The paper reveals a direct relationship between seaport efficiency and industrial production value at the industry level, with a unit increase in Apapa port efficiency resulting in a 2.73-unit increase in the industry, while maintaining constant efficiency at Tin-can Island. Furthermore, the study reveals a positive correlation between industrial production value (at the industry level) and Tin-can Island Seaport, with a unit increase in efficiency from Tin-can Island Seaport resulting in a 2.37 unit increase in industry production value.

As for the relationship between seaport efficiency and industrial production value at the zonal levels of Apapa, Ikeja, and Ogun, the results show a positive and direct relationship, with a unit increase in seaport efficiency in Apapa leading to a 9.63 unit increase in the industrial production value for the Apapa zone, while efficiency from Tin-can Island port remains constant. Additionally, Tin-can Island Seaport has a positive relationship with the production value of the Apapa zone, with a unit increase in seaport efficiency only implying a 0.65 unit increase in the zone's industrial production-value. The paper reveals that Apapa port efficiency does not significantly impact Ikeja Zone's industrial production value, but a unit increase in Tin-can Island port efficiency leads to a 5.23unit increase.

Furthermore, the paper showed a positive relationship between industrial production value for Ogun industrial zone and the port efficiency (Apapa and Tincan Island Seaports). A unit increase in Apapa port efficiency results in 2.16units increase in the industrial production value for the Ogun zone, while Tin-can Island port efficiency remains constant whereas a direct relationship where a unit increase in Tin-can Island port efficiency results in 1.43units increase in industrial production value of the Ogun zone.

5.2 Recommendations

This paper suggests strategic alignment between Tin Can Island Seaport and the food and beverages industry to capitalize on the benefits of the African Continential Market Free Trade Agreement. Based on this conclusion, the paper suggests the following recommendations.

i. The study indicates that the government should establish interconnections between port and manufacturing policies in terms of infrastructure and facilities.

ii. The Apapa and Tin Can ports should establish a mechanism for aligning strategies and structures between the ports and manufacturing firms using them.

iii. Ports should prioritize supply chain solutions to boost cargo throughput, as firms choose ports based on their advantages.

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