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Policy option on Port Supply Chain Orientation as a Step to Improve the Performance of Nigeria's Industrial Sector

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Abstract.

The manufacturing sector in Nigeria is not performing to its full potential, as shown by the economic statistics that are now accessible, such as the annual contribution to gross domestic product (GDP), and manufacturing value added (MVA), during a period of nearly four decades (1982–2018). The goal of this study is to evaluate Apapa and Tin Can Ports' level of industrial sector orientation in order to enhance the efficiency of the supply chains for the food and beverage manufacturing industry in the industrial clusters of Lagos and Ogun.This study made use of secondary data. Data on container port throughput for the eight (8) years between 2014 and 2021 was obtained from the Nigerian Port Authority (NPA), which is in charge of managing and operating ports in Nigeria. Additionally, information on Manufacturing Production Values was obtained from the Manufacturers Association of Nigeria (MAN), the organization that represents all Nigerian manufacturers. The results of the multiple regression analyses show a significant and direct relationship between the manufacturing production value (MPV) of the food and beverage industry and the throughputs of the two ports, Apapa and Tin-can Island. Tin Can Port has more of an impact than Apapa. At the cluster level, Tin Can Port's throughput had no significant relationship with the MPV of the Apapa cluster, but Apapa Port's throughput had a direct and significant impact on it. According to findings on the Ikeja cluster, MPV is only positively and significantly impacted by Tin Can Island Port's throughput. The Throughputs of both ports have significant impacts on MPVs in the Ogun cluster. Apapa, however, has a greater effect than Tin Can Port. Therefore, it is important to take into account the connections between a particular port and industrial cluster while choosing an optimal approach.

Key words: *Port-supply-chain-orientation, industrial, cluster performance*

JEL code: *L95; L91; L98*

1. Introduction

The available economic statistics, such as the annual contribution to gross domestic product (GDP), and manufacturing value added (MVA), over a nearly four-decade period

(1982-2018), demonstrate that Nigeria's manufacturing sector is not operating at its full potential. According to estimates made by the Lagos Chamber of Commerce and Industry-LCCI in 2019, the manufacturing sector has only contributed an average of 7% to GDP over the past 20 years. A World Bank (2020) national accounts report revealed that over the course of nearly 40 years, from 1982 to 2018, there was no sign of consistent development in Nigeria's Manufacturing Value Added (MVA). The information indicates that in 1981, Nigeria's Manufacturing Value Added (MVA) was $33.3 billion. The value did not rise but rather decreased fairly abruptly till it reached $5.1 billion in 1993. It increased gradually till it reached $27.5 billion in 2008. After then, it decreased to $22.9 billion in 2009 before surging to an all-time high of $54.8 billion in 2014. It dropped to $46.6 billion in 2015, and since then, it has been going down. Surprisingly, the amount was $30.9 billion in 2018 (36 years later), which was the same with as it was sometime in 1982.Accordingly, the level of performance described here in the manufacturing sector will not be able to produce the global competitiveness and influence, improved living standards, efficient administration and governance, safety and security, and sustainable economic growth expected from an established and strong industrial sector (Ibrahim, 2011). If the manufacturing sector fails to thrive, the industrial sector's ability to serve as a growth engine by boosting the economy's export and production bases, reducing unemployment, reversing rural-urban migration, and contributing in the fight against poverty would also be hampered. Therefore, at this point, understanding the measures that should be executed to enhance the performance of Nigeria's industrial sector is essential.

Empirical studies have demonstrated that effective port systems play important roles in boosting a location's competitiveness through the provision of supply chain solutions (Host et al., 2018; Seethamsetty and Ogoti, 2020). The ability of a port to offer supply chain solutions actually has significant effects on how competitive it is.In the meantime, data on international trade published by the National Bureau of Statistics suggests that there is a logistical linkage that connects Nigeria's port infrastructure to its industrial sector. For instance, in 2020 Nigerian companies imported raw materials worth N570.6 billion. This amount increased to N710.2 billion in the third quarter and N715.7 billion in the fourth. The amount of raw materials that industrial enterprises imported decreased from N2.9 trillion in 2021 to N2.4 trillion in 2022 (The Punch investigator, 2023). Additionally, 89% of all foreign product trade traveled via ports in Lagos during the first quarter of 2023 (Vanguard Media Limited, 2023). The point being made here is that, in light of the facts mentioned above, it follows that the port's capacity to manage Nigeria's manufacturing supply chains may have an impact on the industrial sector's performance.

A port-supply chains approach presupposes that the emphasis should shift from port efficiency as a standalone entity to supply chain network efficiency (Chen et al., 2009 and Norman, 1991). The emphasis on port supply chains should be evident in how the port system and enterprises match their objectives, structures, and activities. These alignments should lead to improved performance because systems and processes will ensure that the plan is successfully implemented (Norman, 1991; Chen et al., 2009). Port supply chain orientation should therefore eliminate any delays, wastes, duplication of effort, overlap of duties, lack of process standardization, and other issues that may result from stakeholder independence and conflict of interest. Nevertheless, businesses' experiences at Nigerian seaports show that they lack the amount of orientation that should be offered to companies using Nigerian seaports (Delloitte, 2017; Cotecna, 2021). This demonstrates that additional investigation may be required to obviate any potential problems with the connection between ports and supply chains.

The relationship between seaports and the supply chain for manufacturing has been studied by a number of scholars.The study of Lee and Kim (2009) examined the causal relationships between port supply chain orientation and port performance from the view point of shipping companies. Four constructs, which are relationship with users (RWU), value-added services (VAS), inter-connecting inter-modal infrastructure (ITM) and channel integration practices (CIP), were used. Findings shows that supply chain orientation have limited effect on customer satisfaction and port competitiveness, which might has been caused by some implemental and practical issues.

In Addition, Han (2018) investigated the impact of port supply chain integration on port performance by using factor analysis and regression method in the case of Busan container ports. Study considers both supplier and customer of port supply chain explicitly. The empirical results show that customer integration has an important effect on quality performance. Furthermore, cost performance has a positive impact on both ship calls and cargo throughout .Host et al (2018) also investigated the importance of port integration in the supply chains overall. It also analyzed how North Adriatic Ports are integrated into the supply chains. The assumption was that if the business cycle of all firms (classes) included in the port supply chain is correlated, it can indicate that the port is integrated in the supply chain. The results of analyzed data were ambiguous, in that the correlation was found to rather negative than positive

Similarly, Kim, et al (2020) examined the link between logistics integration and supply chain performance focusing only on shipping companies. The study collected data from 250 South Korean manufacturers for analysis. Study showed that building a strategic relationship for logistics services helps the manufacturing firms improve their business and operations performances in their supply chain. Furthermore, Parka and Dossanib, (2020) analyzed the role of port infrastructure in supply chain integration of the South Asian apparel industry through a case study of Colombo Port. It was found that Colombo Port transshipment hub and its multi-country consolidation services have played a role in improving supply chain integration in these key factors. Nevertheless, there is a need to improve internal logistics and to improve matching port and logistics infrastructure in the rest of South Asia.

Despite the purported logistical connection between the port system and industrial sector, it is plainly clear from the literature examined above that no attempt has been made to study the relationship between port supply orientation and firms' supply networks that use Nigerian ports. The majority of earlier studies have concentrated on the effects of port supply orientation on terminal and corporate efficiency without making an effort to examine the effects of public policies at the industry level, despite the fact that endogenous growth theory and empirical evidence have shown that choosing the best policies can have an impact on manufacturing growth. Since both organizational and industrial performance are considered in the literature, it is critical to consider the consequences of public policy perspectives with regard to port supply chain orientation in order to develop a sound, inclusive, resilient, and innovative industrial sector. This study's goal is to ascertain how potential public policies may affect the port supply chain orientation in the Nigerian states of Lagos and Ogun. The paper is divided into five sections. Following the introduction is the second section, which evaluates studies that link port supply chain orientation to manufacturing supply chain or business performance. Section three provides a description of the methodology. Section four presents the findings and related debates. The findings and recommendations are reported in section five.

2. Literature Review

2.1 Port Supply Chain Orientation and industrial Performance

Studies on supply networks have argued that seaports are logistics hubs and, hence, essential components of supply chains. Ports link worldwide supply chains and world industry networks. In order to provide benefits like smooth and effective communication, elimination of delays, wastes, redundancies, overlapping of jobs, and cost reduction in operations, ports must be linked into the supply chain. Based on this idea, Sayareh and Lewarn (2006) observed that ports provide a quick, secure, and affordable entry to the market when their operations are integrated with wider logistics activities of others, such as supply chains. By functioning in this fashion, ports have evolved into hubs for overseeing the transportation of freight from point of origin to point of destination, so improving the effectiveness of freight operations. From the standpoint of port competitiveness strategy, Notteboom (2008) observed that ports have evolved beyond being a facility to handle ships to become significant connections in global supply chains.

In his paper, Woo (2010) focused on the connections between port supply chain integration (PSCI) strategies of seaport terminals along the supply chain, port supply chain orientation (PSCO) strategies, and port performance (PP). Data from 127 terminal operating firms, shipping companies, and freight forwarders in South Korea were used in the study. The results demonstrate that PSCO, PSCI, and PP as constructs were successfully validated using the elements found in the literature research and interview data. As a result, it can be inferred that the three constructs are multidimensional ideas. The study also demonstrated a substantial correlation between PSCO and PSCI. Additionally, the findings indicate that PSCI significantly and favorably affects PP.

Zhang and Lam, (2014) studied port strategy from a supply chain perspective considering the case of Hong Kong. Analysis shows that the status of Hong Kong Port as free port and world-class customs clearance offer the port a sustainable and considerable advantage to shorten transit time. These strategies(free port and world-class customs clearance) make the port strategically fit for the shipping of high value and time-sensitive cargoes. With an agile strategy, the Port will be good for a responsive supply chain. Again, Zhand et al (2015) investigates impacts of the emerging global manufacturing trends on Hong Kong Port development. The study found that relocation of manufacturing activities to Western Guangdong contributes to Hong Kong Port development, while other relocation destinations do not contribute to the port's development but rather make Hong Kong Port less attractive or even irrelevant. Similarly, Han (2018) examined the impact of port supply chain integration on the performance of Busan Container Ports. The study that used factor analysis and regression method considered explicitly both supplier and customer of port supply chains. The results show that customer integration has a significant effect on quality performance. Furthermore, cost performance was found to have a positive impact on both ship calls and cargo throughput. The study of Kim, et al (2020) used data from 250 South Korean manufacturers (with a focus on shipping companies) to examine the link between logistics integration and supply chain performance. Study's findings showed that building a strategic relationship for logistics services helps the manufacturing firms improve their business and operations performances in their supply chain.

Furthermore, Parka and Dossani, (2020) focused on South Asian apparel industry and Colombo Port to analyzed the role of port infrastructure in supply chain integration. It was found that Colombo Port transshipment hub and its multi-country consolidation services have played a role in improving supply chain integration. Nevertheless, there is a need to improve internal logistics and to improve matching port and logistics infrastructure in the rest of South Asia.

The literature discussed above has a number of gaps that can be found. First off, there hasn't been any research that contrasts two or more ports in a specific area to demonstrate the potential for variances in the way ports affect supply chains of different industrial clusters in Nigeria. If the manufacturing industry wants to overcome the difficulties the port system presents, the best policy must be selected in accordance with the needs of the industry. In terms of operations and management, no two ports are exactly alike. The degree of industrial orienting by ports should lead policy adoption because seaports in Nigeria are public infrastructure where governments can directly invest through best practices. Thus, the Nigerian government must select the best policy in relation to ports' influence on supply chains if it is to establish a sound, inclusive, sustained, and innovative industrial sector. Therefore, the goal of this study is to examine the implications of incorporating Nigeria's two major ports, Apapa and Tin Can, into the industrial policy of the Apapa, Ikeja, and Ogun industrial regions.

3. Study Area and Methodology

3.1. Theoretical Framework and Model Specification

3.1.1. The Logistics Value Chain Model.

This study hinges on the Logistics Value Chain Model used by business organizations to design and plan the value-added activities in the logistics process (Zhou, 2013 andChopra and Meindl, 2007). It is one part of the enterprise's value chain, which includes such external logistics activities as delivery of raw materials and finished goods, and also involves such internal logistics activities as production and selling.Logistics value chain exists in the relationship of logistics process, from upstream to downstream(Zhou, 2013). From the standpoint of the logistics value chain for marine transport, port operations, comprising administrative, handling, storage, transportation, and IT logistics, are a part of a number of intrinsic logistics value-added activities. Considering the aforementioned, the Logistics Value Chain Model shows cargo handling, storage, administration, and transportation at seaports as supply chains value-added activities in the import/maritime logistics process. The argument made here is that there is a meaningful connection between port-supply chain orientation and the success of manufacturing clusters, based on the perceived relationship as seen above.

3.2. Data and Variable Description

This study was carried out in Lagos and Ogun industrial clusters. These comprise of Apapa, Ikeja and Ogun industrial clusters. These industrial clusters account for over 75 percent of manufacturing investments in Nigeria (Field Services, Manufacturer Association of Nigeria-MAN, 2020). Data from MAN show that Ogun zone alone has over 70% share of manufacturing investments in the country between 2014 and 2017 (Business Day, 2018).

Two sets of data were gathered in order to conduct a study on the connection between port-supply orientation and industrial performance. Data on port-supply orientation made up the first set of data, which is an independent variable, while data on industrial clusters made up the second set of data, which is a collection of dependent variables. Manufacturing ProductionValues (MPV) was used to measure the performance of industrial clusters, while Port Throughput (PT) was used to measure the orientation of port-supply chains. Port throughput, defined in Twenty Equivalent Units (TEUs), is the total number of containers handled by Lagos Seaports throughout the study period. Based on the reality that companies choose ports based on their ability to offer supply chain solutions(Host et al., 2018; Seethamsetty and Ogoti, 2020). The level of container traffic attracted by the port therefore is based on how advantageous such ports are to the manufacturers. Manufacturing Production Values define the worth of production made in a particular period based on industrial clusters.

In this investigation, secondary data were employed. These time series statistics on container port throughput were obtained from the Nigerian Port Authority (NPA), which oversees port administration and operations in Nigeria. These statistics covers the eight (8) years from 2014 to 2021. The Manufacturers Association of Nigeria (MAN) was also used to gather information on manufacturing production values. Nigerian manufacturers are represented by MAN. The top two ports in Nigeria, Apapa Port and Tin Can Island, were chosen as the two seaports. They are sometimes referred to as the country's gateways because they manage more than 70% of all freight traffic entering or departing the nation. The two primary container terminals in Nigeria, AP Moller Terminal at Apapa Port and the Lagos Seaports, are both located there.

3.3. Estimation Techniques

A multiple linear regression was used to determine the effect of port throughput on the manufacturing production value of the food and beverages sub-sector and then the three industrial clusters (Apapa, Ikeja and Ogun). The functional relationship is shown in models 2a to 2d;

$MPV_S = â_0 + â_1PT_1 + â_2PT_2 + e$ (2a)

$MPV_A = â_0 + â_1PT_1 + â_2PT_2 + e$ (2b)

$MPV_I = â_0 + â_1PT_1 + â_2PT_2 + e$ (2c)

$MPV_O = â_0 + â_1PT_1 + â_2PT_2 + e$ (2d)

Where, MPVS = Manufacturing Production Value of the sub-sector

MPV_A = Manufacturing Production Value of the Apapa industrial cluster

MPV_I = Manufacturing Production Value of the Ikeja industrial cluster

MPV_O = Manufacturing Production Value of the Ogun industrial cluster

PT_1 = Port Throughput for Apapa port

PT_2 = Port Throughput for Tin-Can Island port

$â_0$ = constant or intercept

$â_1$ & $â_2$ = regression coefficients

e = error term

The parameters of regression models (1, 2a, 2b, 2c & 2d) were estimated using the Ordinary Least Squares (OLS) technique, with the aid of the E-view 9 software. This is to determine the extent of (if there is) the significant relationship between the dependent and independent variables. Theoutcomes provided the basis for testing the stated hypotheses.

4. Results

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 1. The data for the Manufacturing Utilization Capacity (MCU) is presented in percentages, while the data for the Manufacturing Production Values (MPV_S, MPV_A, MPV_I & MPV_O) and the Port Throughput (PT_1 & PT_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 1: Statistics of Core Variables

Statistics	MPV_S	MPV_A	MPV_I	MPV_O	PT_1	PT_2
Mean	11.87776	11.11600	11.92886	11.89780	5.741060	5.842279
Median	12.11142	11.54098	12.25183	12.02926	5.746386	5.866342
Maximum	12.55205	11.93759	12.54344	12.38917	5.839217	5.967808
Minimum	10.91676	8.534026	10.32869	10.77238	5.550000	5.619266
Std. Dev.	0.506842	1.057839	0.676926	0.444836	0.078695	0.094042
Skewness	-0.80287	-1.83909	-1.16966	-1.04442	-0.77964	-0.71323
Kurtosis	2.179266	4.931628	3.038055	3.454915	3.182541	2.964764
Jarque-Bera	2.167997	11.50684	3.649254	3.046819	1.643115	1.357333
Probability	0.338240	0.003172	0.161278	0.217967	0.439746	0.507293
Observations	16	16	16	16	16	16

Source: *Outputs from E-View 9 (2022)*

Table1 shows the mean of the Manufacturing Production Value (MPV_S) for the food and beverage subsector as 11.88 (N750billions) with a standard deviation of 50.7%. This implies that the MPV_S varies slightly during the $period_S$ in consideration. Similarly, the means of the Manufacturing Production Value for the three industrial zones (Apapa-MPV_A, Ikeja- MPV_I&Ogun-MPV_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 throughput for the specified ports (Apapa-PT_1& Tin-can Island-PT_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 1 shows the normality of the distribution of the time series data representing the core variables. The distribution of the MPV_S value is significant at the specified 5% level (p = 0.003<0.05).

3.3.2. Examine the impact of Port Throughput on Manufacturing Production Value.

A multiple linear regression model was used to examine the impact of port throughput on manufacturing production values at the sectoral level and across three industrial zones (Apapa, Ikeja&Ogun). The result of the econometric analysis of the model is presented in Tables 2 to 5.

Table 2: *Parameter Estimates of Model*Dependent Variable-MPVS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-17.6586	6.79778	-2.5977	0.0221
PT1	2.735692	1.420484	1.925887	0.0076
PT2	2.367331	1.188663	1.991591	0.0068
R-squared	0.599122	F-statistic		9.714426
AdjustedR-squared	0.537449	Prob(F-statistic)		0.002628
		Durbin-Watson stat		1.613615

Source: *Outputs from E-View 9 (2022*

data is tailed to the left and approximately mesokurtic (-0.8 & 2.2 respectively); the

$$MPV_S = \hat{a}_0 + \hat{a}_1 PT_1 + \hat{a}_2 PT_2 + e \quad (2a)$$

Distribution of the MPV_A data is skewed to the left and leptokurtic (-1.8 & 4.9 respectively); the distribution of the MPV_I data is skewed to the left and mesokurtic (-1.2 & 3.0 respectively); the distribution of the MPV_O data is skewed to the left and approximately mesokurtic (-1.0 & 3.5 respectively); the distribution of the PT_1 data is skewed to the left and approximately mesokurtic (-0.8 & 3.2 respectively) and the distribution of the PT_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 the time series data, with the results indicating that MPV_S (2.2), MPV_I (3.6), MPV_O (3.0), PT_1 (1.6) and PT_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 MPV_A (11.5), whose Table 2 reveals the results of the parameter estimates of the model involving the sectoral manufacturing production value (MPV_S) and the two port throughputs (PT_1& PT_2). The result shows a positive regression coefficient (â=2.73) for PT_1. This implies a direct relationship where a unit increase in Apapa port throughput results in 2.73units increase in the sectoral manufacturing production value, with the Tin-can Island port throughput 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 manufacturing production value of the food and beverage sector and the throughput from Apapa port.

Furthermore, there exist a positive relationship between MPV_S and PT_2 (â=2.37), where a unit increase in throughput from Tin-can Island port leads to 2.37units increase in manufacturing production value of the sub-sector. Also, the t- statistic of the coefficient (t=1.99) is significant at the 5% level ($p<0.05$), implying a direct and significantrelationship between manufacturing production value of the food and beverage sub-sector and Tin-can Island port throughput.

In addition, Table 2 shows the model summary. The R-squared value of 0.60 indicates that the port throughput variables explain 60percent of the total variations in the manufacturing 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 1.6 further suggests the absence of serial correlation among the variable.

These results imply a good model fit.

Table 3:
Parameter Estimates of Model 2b
Dependent Variable – MPVA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-48.0076	14.74174	-3.25657	0.0062
PT_1	9.628361	3.080477	3.125607	0.0080
PT_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 (2022)

$$MPV_A = -48.01 + 9.63PT_1 + 0.66PT_2 \quad (2b)$$

The parameter estimates of the model involving the manufacturing production value for Apapa industrial zone (MPV_A) and the port throughputs (PT_1& PT_2) is shown in Table 3. The result indicates a positive regression coefficient (â=9.63) for PT_1, which implies a direct relationship where a unit increase in Apapa port throughput results in 9.63units increase in the manufacturing production value for the zone, with throughput 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 manufacturing production value of the Apapa industrial zone and the throughput from Apapa port.

Furthermore, there is a positive relationship between MPV_A and PT_2 (â=0.66), where a unit increase in Tin-can Island port throughput only implies 0.65units increase in manufacturing 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 throughput does not significantly influence the manufacturing production value of the Apapa industrial zone.

The model summary results show a R-squared value of 0.57. This suggests that the port throughput variables explain 57percent 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 1.5 further suggests the absence of serial correlation among the variables. In all, the result of the model summary implies a good model fit.

Table 4:
Parameter Estimates of Model 2c
Dependent Variable – MPVI

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-19.5849	9.664078	-2.02657	0.0637
PT1	0.162569	2.019435	0.080502	0.9371
PT2	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 (2022)

$$MPV_I = -19.58 + 0.16PT_1 + 5.23PT_2 \quad (2c)$$

Table 4 reveals the estimates of the model involving the manufacturing production value for Ikeja industrial zone (MPV_I) and the port throughputs (PT_1& PT_2). The regression coefficient for PT_1 is positive (â=0.16), which suggest a direct relationship where a unit increase in Apapa port throughput only leads to 0.16units increase in the manufacturing production value for the zone, while Tin-can Island port throughput remains constant. The t- statistic (t=0.08) is however not significant at the 5% level (p>0.05). This implies that Apapa port throughput does not significantly influence the manufacturing production value of the Ikeja industrial zone.

Similarly, the regression coefficient for PT_2 is a positive (â=5.23), suggesting a direct relationship where a unit increase in Tin-can Island port throughput results in 5.23units increase in manufacturing 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 throughput significantly influences the manufacturing production value of the Ikeja industrial zone.

Furthermore, the model summary results reveal a R-squared value of 0.55, implying that the port throughput variables account for 55percent of the total variations in the manufacturing 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 1.6 is 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 5: *Parameter Estimates of Model 2d*

Dependent Variable – MPVO

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.83441	7.441608	-1.18716	0.2564
PT1	2.15941	1.555021	1.38867	0.0188
PT2	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 (2022)

$$MPV_O = -8.83 + 2.16PT_1 + 1.43PT_2 \quad (2d)$$

The parameters in Table 3.5 show a positive relationship between manufacturing production value for Ogun industrial zone (MPV_O) and the port throughputs (PT_1& PT_2).

The regression coefficient for PT_1 (â=2.16), implies that a unit increase in Apapa port throughput results in 2.16units increase in the manufacturing production value for the Ogun zone, while Tin-can Island portthroughput remains constant. The t-statistic (t=1.39) also significant at the 5% level (p<0.05). This implies that Apapa port throughput significantly influences the manufacturing production value of the Ogun industrial zone.

Similarly, the regression coefficient for PT_2 is a positive (â=1.43), suggesting a direct relationship where a unit increase in Tin-can Island port throughput results in 1.43units increase in manufacturing 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 throughput significantly influences the manufacturing 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 manufacturing 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. Discussion and Recommendations

Parka and Dossani (2020), and Kim et al. (2020), this submission distinguishes the current study from those earlier studies.

6. Conclusion and Recommendations

This study found that the manufacturing production values of the industrial clusters in Apapa, Ikeja, and Ogun are significantly influenced by the throughputs of the Apapa and Tin Can Island Ports. However, industrial clusters and seaports have different effects. While some effects are more pronounced in Tin Can and less pronounced in Apapa, others are more pronounced in Tin Can and less pronounced in Apapa. Variations in how the two ports affect industrial performance at the cluster level may have been significantly influenced by the degree of supply chain orientations by the two ports.

Additional justifications for the relationships between ports and manufacturing clusters include inter-firm partnerships inside a given cluster, port-manufacturing cluster interdependency, and the level of cooperation between a port and a given industrial cluster. The inter-firm collaboration within a certain cluster may help the group secure outside alliances, such those with ports. The degree of port-cluster interdependency may vary from cluster to cluster due to the collaborative nature of clusters, which may have an impact on how a port influences a specific cluster. Concessions and waivers may be more advantageous for a group of industries that frequently use the port than for a group that uses the port's infrastructure less frequently. A port's ability to affect a particular industrial cluster may depend on the extent of collaboration that exists between the two parties. From cluster to cluster, varying amounts of production are produced. This could affect how a port influences a certain cluster. Additional research could determine the specific impact of each factor influencing how the port- industrial cluster in Lagos and Ogun States interact. In light of the study's conclusions, the following suggestions are made:

(i) It is important to promote effective collaboration within industrial clusters. Such cross- f i rm cooperation fosters coherence, which can help the port's supply chain get oriented.

(ii) Port-supply chains should be seen from an industrial cluster perspective rather than from the perspective of a single enterprise.

(iii) Therefore, it is important to take into account the connections between a particular port and industrial cluster while choosing an optimal approach.

(iv) The two seaports in Lagos will compete more on the basis of supply chain capabilities. Port should therefore focus more on supply chain orientation.

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