Customs Logistics and Intermodal Hinterland Transportation and Shippers' Business Performance in Nigeria

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Abstract

This article investigated the effects of customs logistics and intermodal hinterland transport on shippers' business performance in Nigeria. The article utilized both primary and secondary data. Primary data were acquired by means of a questionnaire survey, and secondary data were taken from the annual reports of the sampled firms. The study's population consists of 43 manufacturing firms listed on the Nigerian Stock Exchange for over ten years, regularly importing goods via Lagos Seaports. Structured questionnaires were administered to the 43 firms, but only 23 were actually filled out and returned. The Vector Error Correction Model reveals that custom duties assessment and Form M processing negatively impact turnover, cost of sales, and profit, with 10% variations causing 0.15%, 0.17%, and 0.095% impacts respectively. Custom duty assessment duration negatively impacts business performance indicators, with adjustments of 10% affecting turnover, cost of sales, and profit by 0.23%, 0.25%, and 0.25%, respectively. The study reveals a negative correlation between profit and intermodal hinterland transport costs, affecting company profitability. Profit decline by 1.34% as a result of a 10% increase in hinterland transport costs, which also caused an increase in turnover and cost of sales by 1.97% and 3.49%, respectively. The study reveals that customs logistics and intermodal hinterland transport variables jointly account for 71.03, 67.49%, and 64.78% total variations in turnover, cost of sales, and profit respectively.

Keywords: Industrial, transformation, trade facilitation, customs.

Introduction

Global shippers, particularly manufacturers, manage flexible, geographically dispersed supply chain networks. A new spatial division of labor was created as a result of manufacturers being able to relocate their assembly and production facilities to economies where they could operate more profitably (Jacobs, 2009). According to Jacobs (2009), development economists, economic geographers, and transport economists have all used the concepts of global supply chains to explain the geographic spread and growth of manufacturing. Regardless of how it is framed, the fact remains that the phenomenon of economic globalization has caused the demand for services associated with international transportation to rise dramatically. Thus, international shipping services are crucial for Nigerian shippers and multinational manufacturers. A total of

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N8,374.4 billion was traded in goods in Nigeria during the third quarter of 2020 (National Bureau of Statistics (NBS, 2020). The import component increased by 33.77% and 38.02%, respectively, to reach N5,381.4 billion in the third quarter of 2020 compared to the second and third quarters of 2020 and 2019 respectively. Import values increased to the greatest level since 2017 thereby supporting the argument that Nigeria's manufacturing sector is actually heavily dependent on imports (Ekpo 2018; Manufacturers Association of Nigeria (MAN, 2020).

The shipper is defined by the United Nations (1978) as any individual who enters into a contract with a shipping line for the transportation of cargoes by sea, or whose name or on whose behalf the cargoes are actually delivered to the shipping line in connection with the contract for the carriage of goods by sea. The party most impacted by the delivery of the cargo is the shipper, who is also the true owner of it. The maritime logistics process is usually started by the cargo shipper and the producer through a business contract. In order to ensure that the cargo is transported from the country of supply to the country of demand, the shipper makes arrangements for its transportation with the carrier. The legal importance of the agreement between the cargo shipper and carrier in maritime transportation was highlighted by Grime (1978). Shipper's cargo functions as both input and output of the maritime transport system without undergoing physical transformation (Martinez & Eguren, 2013). According to Akintayo (2010), the need for cargo is what drives the demand for maritime transportation. As a result, the logistics network for maritime transport is built to meet shippers' commercial requirements. Thus, a link has been established between shippers' business performance and maritime transport logistics.

Economic data spanning the years 2018 to 2022 demonstrated that, as measured by manufacturing value added and annual GDP, Nigeria's manufacturing sector is not performing to its full capacity. According to the NBS, (2022), the manufacturing sector's share of the GDP in the second quarter of 2022 was 8.65%, down from 8.69% in the same period in 2021. The manufacturing sector's share of Nigeria's GDP in 2021 was 8.69%, down from 10.20% in the first quarter of 2022, suggesting a lack of annual growth. Similarly, the International Standard Industrial Classification (ISIC, 2023) indicates that Nigerian manufacturing value added did not show any significant increase between 2018 and 2022. Nigeria's manufacturing value added in 2022 increased by 0.75% to $64.89 billion from the year before. With a value of $64.41 billion in 2021, it increased 17.67% from the year before. In 2020, Nigeria's manufacturing value added rose by 0.13% to $54.75 billion. Value added increased 34.36% from 2018 to $54.68 billion in 2019. The review shows that over the given years, there has not been a consistent increase in the value added of manufacturing.

Studies have shown a significant correlation between firms' activities and the customs environment, suggesting that the customs environment significantly impacts their performance. Customs logistics involves all cargo clearance processes for imported cargo at seaports, facilitating cross-border movement and ensuring national security through government-imposed regulations (Oni *et al*., 2023). Customs regulations may impede the unloading, transportation, examination, and clearance of imports from other countries upon arrival at the destination seaport, leading to potential delays and increased costs (Carballo *et al*., 2014). Complex customs procedures have caused 10% of UK small businesses to stop doing business abroad in the last five years (National

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Federation of Self Employed & Small Businesses Limited, 2023). In Nigeria, manufacturers that use Lagos seaports pay more than 80% of all seaport costs just for customs clearance charges (Delloitte, (2017). Cotecna (2021) discovered that, in contrast to the 48-hour UN standard, the seaport customs clearance times in Lagos are two to three weeks, which results in extra costs. Accordingly, an efficient customs environment can have a significant effect on Nigeria's manufacturing sector (Ibrahim, 2011).

Growing along with the customs environment is the importance of intermodal hinterland transportation. A region linked to the port by associated goods flows is known as the hinterland (Rodrigue and Notteboom, 2010). Typically, these connections are made via a range of transportation methods, such as road, rail, and barge. Shippers utilize intermodal hinterland transportation to transport their imported and exported goods to and from the seaport, establishing a connection between the two. Studies have indicated that intermodal hinterland transport, which occurs both before and after the cargo reaches the exporting port, accounts for 40–

80% of the total costs related to shipping containers internationally (Behdani *et al*., 2020; Beresford *et al*., 2012). Globalization, technology, population growth, and freight transportation advancements are affecting market dynamics, making it crucial for providers to offer efficient customs services and intermodal hinterland transportation (Al-Muhaisen, 2005; Jacobs, 2009).

Nigeria's cross-border trade performance, ranking 138 out of 178 in 2008 and 154 out of 185 in 2013, indicates potential impact of lowering logistics costs and intermodal hinterland transport (World Bank, 2008-2013). Table 1 illustrates the 2008 export and import times and costs, which were 26 days and 1026 USD per TEU and 46 days and 1047 USD per TEU, respectively. Longer export and import delays, resulting from inefficient customs processing, can lead to increased production and logistics costs, subsequently raising finished goods prices. Lower production costs due to reduced logistical costs will positively impact shippers' business performance in Nigeria by decreasing product prices and increasing demand for those products (Delfim *et al*., 2021; Hoang & Nguyen, 2019).

Table 1:   Nigeria's Performance in Cross-Border Trade 2008-2013.

Year	Ranking in trade across border	Time to export in (days)	Time to export in (days)	Cost to export (USD per TEU)	Cost to import (USD per TEU)
2008	138 out of 178	26	46	1026	1047
2009	138 out of 181	25	42	1179	1306
2010	146 out of 183	25	41	1263	1440
2011	146 out of 183	24	39	1263	1440
2012	149 out of 183	24	39	1263	1440
2013	154 out of 185	24	39	1380	1540

Source: World Bank and IFC co-publication (2008, 2009, 2010, 2011, 2012, 2013) TEU, Twenty-Foot Equivalent Unit.

Researchers have explored the correlation between the customs environment, intermodal hinterland transport, and the performance of firms. Holzner and Peci's (2009) study in Kosovo

found a positive correlation between customs instruments and small- and medium-sized businesses' economics, but the study was qualitative, cross-sectional, and focused on turnover. Hornok and Koren (2015) found

that a 50% decrease in per-shipment costs leads to a 9% decrease in tariffs, based on Spanish shipment-level export data from 2006-2012. Dhakal and Jha (2020) found that freight transport delays at Birgunj customs areas in Nepal are more common between processes than in actual units, primarily due to owner failure and an unseen syndicate with ulterior motives. Oni *et al*. (2023) found that container clearance process delays in Lagos' Apapa and Tin Can Ports are influenced by business type, with consumer goods containers experiencing fewer delays (42.9%), and industrial and healthcare goods containers experiencing more delays.

The literature lacks extensive research on the combined effects of customs logistics and intermodal hinterland transport on firm performance. This article explores the impact of customs logistics and intermodal hinterland transport on shipper business performance in Lagos and Ogun States, Nigeria, filling a literature gap.

Methodology
Theoretical framework
Transportation system Theory

Martinez & Eguren (2013); and Ofobrukweta (2017) understood maritime trade logistics as a system comprising of various sub-systems or elements. The maritime trade logistics system connects customers, raw material suppliers, distribution centers/warehouses, and supply chain partners in global production systems through spatial links. Trade logistics is a crucial cost element in the manufacturing supply chain, as multinational firms often operate in different countries, necessitating the movement of goods between subsidiaries. Raw materials transportation is crucial in trade logistics chains, especially when local supplies are insufficient, as customs environment and intermodal hinterland transport are essential stages (Ibrahim, 2011; Oni *et al*., 2023). This places these key logistics areas in the core of the production, and inefficient customs processes and intermodal hinterland transportation can greatly raise the cost of production and logistics, ultimately pushing up the price of finished goods (Ibrahim, 2011). Chopra & Meindl (2007) suggest that efficient supply chain management can enhance the performance of shippers' businesses, including Nigerian businesses, improving service level and cost-effectiveness.

Following the theoretical framework, the hypothetical link between customs logistics, intermodal hinterland and shippers' business performance is functionally stated as:

$$sbp_{i,t} = \delta_0 + \gamma_1 htc_{i,t} + \gamma_2 tccc_{i,t} + \gamma_3 dfp_{i,t} + \gamma_4 fm_{i,t} + \gamma_5 paar_{i,t} + \gamma_6 acd_{i,t} + \gamma_7 pcd_{i,t} + \gamma_8 ex_{i,t}$$
$$+ \gamma_9 cr_{i,t} + \gamma_{10} dlv_{i,t} + e_{i,t} \tag{1}$$

Where: sbp denotes a vector of shippers' business performance measured by turnover, cost of sales and profits; htc denotes hinterland transport cost, tccc is total cost of container, dfp represents distance from port, fm is Form M processing, paar denotes PAAR processing, acd is assessment of custom duty, pcd denotes payment of custom duty, ex represents container examination, cr is custom release, dlv denotes container delivery, δ_0 is a constant, γ_{1-10} are parameters, i is surveyed companies; t is time; and e is disturbance term. Incorporating the measures of shippers' business performance into equation (1), it becomes:

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$$tover_{i,t} = \delta_1 + \gamma_{1,1}htc_{i,t} + \gamma_{1,2}tccc_{i,t} + \gamma_{1,3}dfp_{i,t} + \gamma_{1,4}fm_{i,t} + \gamma_{1,5}paar_{i,t} + \gamma_{1,6}acd_{i,t} + \gamma_{1,7}pcd_{i,t}$$
$$+ \gamma_{1,8}ex_{i,t} + \gamma_{1,9}cr_{i,t} + \gamma_{1,10}dlv_{i,t} + e_{1i,t} \quad (2)$$

$$csales_{i,t} = \delta_2 + \gamma_{2,1}htc_{i,t} + \gamma_{2,2}tccc_{i,t} + \gamma_{2,3}dfp_{i,t} + \gamma_{2,4}fm_{i,t} + \gamma_{2,5}paar_{i,t} + \gamma_{2,6}acd_{i,t} + \gamma_{2,7}pcd_{i,t}$$
$$+ \gamma_{2,8}ex_{i,t} + \gamma_{2,9}cr_{i,t} + \gamma_{2,10}dlv_{i,t} + e_{2i,t} \quad (3)$$

$$profit_{i,t} = \delta_3 + \gamma_{3,1}htc_{i,t} + \gamma_{3,2}tccc_{i,t} + \gamma_{3,3}dfp_{i,t} + \gamma_{3,4}fm_{i,t} + \gamma_{3,5}paar_{i,t} + \gamma_{3,6}acd_{i,t} + \gamma_{3,7}pcd_{i,t}$$
$$+ \gamma_{3,8}ex_{i,t} + \gamma_{3,9}cr_{i,t} + \gamma_{3,10}dlv_{i,t} + e_{3i,t} \quad (4)$$

Data and Variable description

This article focuses on shippers (manufacturers) in Lagos and Ogun states. Lagos and Ogun States account for more than 75% of all manufacturing investments made in Nigeria (Manufacturer Associations of Nigeria (MAN, 2020). These companies are located in the main industrial estates of Lagos and Ogun States, Ilupeju, Oregun, Ikeja, Apapa, Agbara, Ota and Ikorodu/Shagamu Industrial estates. The article utilized both primary and secondary data, utilizing a questionnaire survey for primary data and annual reports from 2010-2019 for secondary data. Data on customs procedures, imported containers, clearance costs, delays, agencies, documents, and operations were collected through questionnaires while firms' turnover, cost of sales, and profit were sourced from annual reports of sampled firms. The questionnaire comprises both open-ended and closed-ended questions. It was organized down into four sections, starting with the demographic information: respondents' age, educational level, areas of operations, and job experience; their mode of transportation; their location; and their proximity to seaports. Other sections cover data on customs procedures, imported containers, container clearance costs, and delays, focusing on steps, agencies, documents, and modes of operations, as well as expected and actual clearance times and causes. The study analyzed 43 Nigerian manufacturing firms listed on the Nigerian Stock Exchange, focusing on their imports via Lagos Seaports.

The study utilized a total population sampling technique, involving all members of a well-defined, small, and less than 100-member population of 43 firms as a sample (Darpito, 2022). Most firms hesitated to disclose their operations due to fear of uncertainty, while some agreed after signing a legal document. Out of the 43 firms, only 23 completed questionnaires, accounting for 53% of the sample size.

To determine the effects of customs logistics and intermodal hinterland transport on shippers' business performance, two sets of variables, namely; the dependent and independent variables were measured. Customs logistics and intermodal hinterland transport are independent variables, and shippers' business performance is the dependent variable. Customs procedures such as the processing of Form M, the Pre-Arrival Assessment Report (PAAR), the assessment and payment of custom duty, the examination, the release of the container from customs, the delivery of the container, and the total cost of container clearance were utilized for evaluating the effectiveness of customs logistics. The hinterland transport cost and distance from the seaport were used to measure intermodal hinterland transport.

The study employed firms' turnover, cost of sales, and profit as performance indicators for shippers' businesses (Holzner & Peci, 2009).

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Results

Empirical results of the joint effects of customs logistics and intermodal hinterland transport variables on shippers' business performance.

This section of the article presents the estimation results of the joint effects of the customs logistics and intermodal hinterland transport variables on shippers' business performance in Lagos and Ogun states, Nigeria. Prior to the estimation findings of short- run and long-run estimates, the study presented the results of descriptive statistics and correlation analysis accordingly.

Summary Statistics

In this sub-section, the descriptive statistics of the indicators of customs logistics, intermodal hinterland transport variables and shippers' business performance are presented in Table 2. The joint explanatory variables analyzed in this section for intermodal hinterland transport variables are hinterland transport cost, total cost of container clearance, and distance from the seaport. In contrast, the variables of customs logistics are, processing of Form M, processing of PAAR, assessment of custom duty, payment of custom duty, examination, customs release, and delivery of container respectively. The result outcomes in the table are mean, maximum, minimum, standard deviation, Kurtosis and skewness values of variables understudied. As regards the averages of shippers' business performance variables, the mean value of turnover, cost of sales and profit are ₦62,359,843,188, ₦41,821,513,216 and ₦20,431,789,321 respectively. It is noted that the average profit of the sampled firms over the periods understudied shows an improved performance in the business activities of the manufacturing industry. However, there is high variation among the series of the variables as their respective standard deviation is greater than the mean values.

Also, the three indices of shippers' business performance are rightly skewed seeing that the skewness values are positive. As for Kurtosis, none of the series is normally distributed as profit is leptokurtic while turnover and cost of sales are platykurtic respectively.

Concerning the indicators of intermodal hinterland transport variables, the average hinterland transport cost, total container clearance cost and hinterland distance relative Lagos seaports are ₦342,200,217.4, ₦516,027,695.7, and 85.846 kilometers respectively. The variation between the series is high as the standard deviation values of the variable are relatively high as reported in Table 4.37. The skewness values show that hinterland transport cost and total container clearance cost are rightly skewed while hinterland distance relative Lagos port is negatively slewed. As for the Kurtosis values, the series are not normally distributed. Specifically, hinterland transport cost is leptokutic while total container clearance cost and hinterland distance relative Lagos port are platykurtic.

As for the variables measuring customs logistics, the average timing hours of processing Form M, PAAR, assessment of custom duty, payment of custom duty, container examination, customs release and container delivery are 80.35, 108.52, 67.83, 60.52, 106.44, 107.48 and 96 respectively. Their maximum hours are 144, 192, 120, 120, 192, 264 and 192 whereas the minimum hours are 24, 48, 24, 24, 24, 24, and 24 correspondingly. In addition, the maximum and minimum values show that there is large variation between the series of customs logistics which is further indicated in standard deviation values. The data is not normally distributed owing to the fact that the Kurtosis values are less than 3. Thus, the variables are platykurtic. Equally, all the series are positively skewed while only

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assessment of custom duty is leftward skewed.

Correlation Matrix

Table 3 shows the partial correlation coefficients of the relationship between customs procedures, intermodal hinterland transport variables and shippers' business performance. The correlation result shows that shippers' business performance indicators (cost of sales, turnover and profit) are negatively related with hinterland transport cost and total container clearance cost but positively associated with

hinterland distance relative to Lagos seaports. As for the variables of customs logistics, Form M processing and container examination are negatively correlated with shippers' business performance of 23 selected manufacturing firms in Lagos and Ogun states, Nigeria. However, the study found that PAAR processing, custom duty assessment, custom duty payment, customs release and container delivery are negatively associated with shippers' business performance of the sampled firms.

Table 2: Descriptive Statistics

Signs	Variable Description	Mean	Std Dev.	Maximum	Minimum	Kurtosis	Skewness	Obs.
Tover	Turnover	62359843188	70248911210	2.84E+11	1460728000	1.749	1.541	230
Csales	Cost of sales	41821513216	46656350909	2.004E+11	604670000	1.795	1.500	230
Profit	Profit	20431789321	25497368514	1.281E+11	684666000	3.859	1.963	230
Htc	Hinterland transport cost	342200217.4	696017204.8	4.2E+09	4320000	11.029	3.283	230
Tccc	Total Cost of Container Clearance	516027695.7	946358887.4	5.4E+09	4860000	8.844	2.948	230
Dfp	Distance from port(KM)	85.846	32.359	140	50	-0.780	0.752	130
Fm	Processing of Form M	80.348	30.596	144	24	0.051	0.344	230
Paar	Processing of PAAR	108.522	34.652	192	48	0.000	0.615	230
Acd	Assessment of Custom Duty	67.826	31.442	120	24	-1.284	-0.380	230
Pcd	Payment of Custom Duty	60.522	31.616	120	24	-1.406	0.126	230
Ex	Examination	106.435	45.319	192	24	-1.004	0.102	230
Cr	Customs Release	107.478	56.238	264	24	0.754	0.726	230
Dv	Delivery	96	41.9607	192	24	0.405	0.890	230

Note: Std Dev. – standard deviation; Obs. – observation.
Source: Author's computation (2022).

Further, the findings of the correlation coefficients among the indicators of customs logistics and intermodal hinterland transport variables are reported in Table 3. Among the variables of intermodal hinterland transport, a positive level of association exists among hinterland transport cost, total container clearance cost and hinterland distance relative to Lagos ports. As for the indices of customs logistics, the correlation results show positive and negative level of association among the variables with

varying magnitudes. Although, the direct correlation among shippers' business performance indicators is strong, the chances of running into multicollinearity are avoided as the variables are not estimated in the same regression equation. Thus, the problem of multicollinearity is avoided in the empirical analysis. All the same, the estimation results of the correlation analysis are just preliminary analyses that are being put through confirmation in subsequent section after considering the other

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determinants of container clearance timing jointly.

Short-Run and Long-Run Estimates

In this section, the article provides the empirical estimates of the joint effects of customs logistics and intermodal hinterland transport variables on shippers' business performance in Lagos and Ogun state, Nigeria using the error correction model (ECM) estimation approach. With reference to the optimal lag lengths selection, the lag length of the variables were selected using the Akaike Information Criterion (AIC) after setting it at three in order to ensure sufficient degree of freedom. More so, the estimated results of short-run and long-run parameters are presented in Tables 4 and 5 respectively.

In Table 4, the parameter estimates of the error correction terms are negative all the models of shippers' business performance indicators. In magnitude terms, the coefficients of the error correction terms of turnover, cost of sales and profit models in the short run are -0.0963, -0.0517 and -0.4021 respectively. The probability value of the error correction term is less than 5% level for turnover, cost of sales and profit models. Following the results of the error correction term values, it implies that the empirical models of shippers' business performance in terms of turnover, cost of sales and profit correct its short-run disequilibrium by at 9.63%, 5.17% and 40.21%Nigeria. Thus, it confirmed that the models' equilibrium nature is valid in the long run.

Concerning the short-run coefficients in Table 4, the result shows that the joint effects of intermodal hinterland transport variables have no significant impact on the shippers' business performance at 5% significance level. However, it was found that hinterland distance relative to Lagos seaport negatively and significantly impacted

on turnover at 10% level. As for the joint effects of customs logistics indicators, it was discovered that Form M processing, PAAR processing, custom duty assessment, custom duty payment, container examination, and customs release have no significant effects on firms' turnover and cost of sales in the short run. As for the firms' profit, it was discovered that PAAR processing and assessment of custom duty have no significant impact on the business profit of the selected firms. However, the negative influence of Form M processing, container examination and customs release on profit was significant statistically at 5% level while the significant impact of payment of custom duty on profit was positive. In size, 10% changes in Form M processing, payment of custom duty, container examination and customs release will lead a change in business profit by -0.029%, 0.062%, -0.074% and -0.039% respectively. As regards container delivery, the result shows that its negative impact on cost of sales and profit was significant at 5% level but adversely impacted on turnover at 10% level. In magnitude, the results show that with 10% changes in container delivery, there will be a decrease in turnover, cost of sales and profit changes by 0.96%, 0.52% and 4.02% respectively.

Table 5 reports the long-run estimates of the joint effects of cargo customs logistics and intermodal hinterland transport variables on shippers' business performance of 23 manufacturing firms in Lagos and Ogun state, Nigeria for the periods of 2010-2019. Concerning the intermodal hinterland transport variables. Table 5 reveals that hinterland transportation cost positively impacted on turnover and cost of sales of the sampled 23 manufacturing firms within the periods 2010-2019. However, a negative relationship was found between hinterland transport cost and profit for the periods understudied. This means that the

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contribution of hinterland transportation cost on cost of sales affect the profitability of the firms' business despite the direct relationship between hinterland transport cost and turnover.

Thus, the respective 1.97% and 3.49% rise in turnover and cost of sales due to 10% increase on hinterland transport cost resulted to about 1.34% decline in the business profit of 23 selected manufacturing companies in Lagos and Ogun states, Nigeria. On the other hand, hinterland distance relative to Lagos ports was found to significantly impact business performance variables positively for understudied periods. However, the result shows that despite the insignificant impact of hinterland transport cost on turnover and cost of sales, its direct effect on profit was statistically significant at 5% level. This shows that the sampled firms plan their strategies in ensuring that the hinterland distance relative to Lagos ports did not affect the profitability of their business activities over the sampled periods.

For the customs logistics series, it was discovered that the hours used in processing of Form M has negative impact on business performance in terms of turnover, cost of sales and profit. The rate at which Form M processing affect turnover, cost of sales and profit are 0.15%, 0.17% and 0.095% respectively owing to 10% changes in Form M processing. Similarly, the time taken for custom duty assessment adversely affects the firms' business performance indicators. Statistically, due to 10% changes in custom duty assessment, turnover, cost of sales and profit are affected by 0.23%, 0.25%, and 0.25% correspondingly.

Just like the Form M processing and custom duty assessment, the study found that container examination and customs release have an indirect impact on the firms' business performance over the periods considered. In magnitude terms, custom examination affects turnover, cost of sales and profit by 0.34%, 0.37% and 0.25% respectively. In that order, customs release affects turnover, cost of sales and profit by 0.083%, 0.11% and 0.041%. Regarding the time for processing PAAR, the study found that its significant influence on cost of sales is positive, whereas the PAAR processing on profit was found to be negative and significant statistically at 5% level. However, the direct impact on turnover was insignificant at the conventional level. The economic implication is that the insignificance influence of PAAR processing on turnover coupled with the high cost on sales resultantly affects the firms' profit negatively for the periods understudied. However, following the payment of custom duty as an indicator of custom clearance processing, it was discovered that custom duty payment had a direct link with turnover, cost of sales and profit. This implies that timely payment of custom duty ensures improvement in the business performance of sampled firms over the periods understudied. Statistically, turnover, sales' cost and profit are affected by 0.54%, 0.61%, and 0.43% as firms' timely payment of custom duty is taken as upmost priority. Meanwhile, container delivery has no significant impact on turnover and cost of sales but its direct effect on profit is significant statistically at the conventional level. Thus, the influence of timely container delivery affects profit by 0.033% if 10% improvement in hours of container delivery is ensured. To conclude, the adjusted R-squared shows that the joint effects of customs logistics and intermodal hinterland transport variables explain about 71.03, 67.49% and 64.78% total variations in turnover, cost of sales and profit correspondingly. As well, the F-statistics show that there is overall significance of customs logistics and intermodal hinterland transport variables on shippers' business performance attained at 5% level.

Table 3: Correlation Matrix

	Turnover	Cost	Profit	3	4	5	6	7	8	9	10	11
Turnover	1											
Cost of sales (1)	0.886	1										
Profit (2)	0.854	0.790	1									
Hinterland transport cost (3)	-0.123	-0.136	-0.109	1								
Total Cost of Container Clearance (4)	-0.096	-0.110	-0.082	0.514	1							
Distance from port (4)	0.558	0.583	0.458	0.002	0.105	1						
Processing of Form M (6)	-0.080	-0.069	-0.090	-0.102	-0.013	-0.182	1					
Processing of PAAR (7)	0.253	0.299	0.154	-0.055	0.035	0.073	0.589	1				
Assessment of Custom Duty (8)	0.388	0.415	0.316	-0.199	-0.170	0.259	-0.016	0.348	1			
Payment of Custom Duty (9)	0.457	0.475	0.395	-0.334	-0.402	-0.065	-0.291	0.017	0.711	1		
Examination (10)	-0.070	-0.069	-0.069	0.228	0.068	0.030	-0.698	-0.516	-0.111	0.207	1	
Customs Release (11)	0.363	0.389	0.293	-0.269	-0.140	0.283	0.207	0.675	0.539	0.301	-0.551	1
Delivery (12)	0.098	0.084	0.119	0.229	0.325	0.184	0.372	0.450	0.362	-0.171	-0.225	0.107

Source: Author's computation (2022).

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Table 4: Short-Run Estimates

Variables	Dependent Variables: Shippers' Business Performance		
	Δ(log(turnover))	Δ(log(cost of sales))	Δ(log(profit))
Δ(Hinterland Transportation Cost)	-0.0004(0.0589)	0.0073(0.0440)	0.0603(0.0495)
Δ(Total Cost of Container Clearance)	0.0124(0.0585)	0.0224(0.0482)	0.0541(0.0558)
Δ(Distance from Port)	-0.1336*(0.0767)	-0.0560(0.0869)	0.0562(0.1059)
Δ(Processing of Form M)	-0.0001(0.0009)	-0.0009(0.0010)	-0.0029**(0.0014)
Δ(Processing of PAAR)	0.0007(0.0011)	0.0009(0.0011)	0.0002(0.0014)
Δ(Assessment of Custom Duty)	0.0016(0.0012)	0.0019(0.0012)	-0.0004(0.0019)
Δ(Payment of Custom Duty)	-0.0013(0.0011)	0.0006(0.0018)	0.0062***(0.0021)
Δ(Examination)	-0.0004(0.0009)	-0.0025(0.0015)	-0.0074***(0.0020)
Δ(Customs Release)	-0.0006(0.0008)	-0.0018(0.0012)	-0.0039**(0.0016)
Δ(Delivery)	-0.0013*(0.0007)	-0.0019**(0.0008)	-0.0027**(0.0012)
Error Correction Term(-1)	-0.0963**(0.0467)	-0.0517***(0.0042)	-0.4021***(0.0592)
Constant	0.6420(0.3747)	0.0489(0.5150)	-1.1061*(0.6276)
Adjusted R-squared	0.1706	0.1297	0.3055
F-Statistics	1.8011	1.3231	5.6389
Prob.(F-Stat)	(0.0628)	(0.2220)	(0.0000)

Note: Standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.10$.
Source: Author's computation (2022).

Table 5: Long-Run Estimates

Variables	Dependent Variables: Shippers' Business Performance		
	log(turnover)	log(cost of sales)	log(profit)
Hinterland Transportation Cost	0.1965**(0.0798)	0.3492***(0.0953)	-0.1314*(0.0712)
Total Cost of Container Clearance	0.0489(0.0855)	-0.0391(0.1017)	0.3071***(0.0768)
Distance from Port	2.4604***(0.1406)	2.7746***(0.1636)	2.1752***(0.1339)
Processing of Form M	-0.0152***(0.0016)	-0.0173***(0.0020)	-0.0095***(0.0024)
Processing of PAAR	0.0007(0.002)	0.0046**(0.002)	-0.0058***(0.002)
Assessment of Custom Duty	-0.0232***(0.0022)	-0.0245***(0.0028)	-0.0246***(0.0029)
Payment of Custom Duty	0.0537***(0.0027)	0.0605***(0.0033)	0.0434***(0.0030)
Examination	-0.0341***(0.0025)	-0.0374***(0.0031)	-0.0249***(0.0026)
Customs Release	-0.0083***(0.0021)	-0.0105***(0.0024)	-0.0041*(0.0021)
Delivery	-0.0016(0.0016)	-0.0024(0.0021)	0.0033**(0.0015)
Constant	13.427***(0.8487)	10.485***(0.9884)	13.880***(0.7385)
Adjusted R-squared	0.7103	0.6749	0.6478
F-Statistics	131.856	91.1818	72.837
Prob.(F-Stat)	(0.0000)	(0.0000)	(0.0000)

Note: Standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.10$.
Source: Author's computation (2022).

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Conclusion and Recommendations

This article investigates the effects of customs logistics and intermodal hinterland transport on shippers' business performance in Nigeria. Findings reveal that custom duties assessment and Form M processing negatively impact turnover, cost of sales, and profit, with 10% variations causing 0.15%, 0.17%, and 0.095% impacts respectively. Custom duty assessment duration negatively impacts business performance indicators, with adjustments of 10% affecting turnover, cost of sales, and profit by 0.23%, 0.25%, and 0.25%, respectively. The study reveals a negative correlation between profit and intermodal hinterland transport costs, affecting company profitability. Profit decline by 1.34% as a result of a 10% increase in hinterland transport costs, which also caused an increase in turnover and cost of sales by 1.97% and 3.49%, respectively. The study reveals that customs logistics and intermodal hinterland transport variables jointly account for 71.03, 67.49%, and 64.78% total variations in turnover, cost of sales, and profit respectively. The current study confirms the findings of Beresford *et al.* (2012) and Behdani *et al.* (2020), who discovered that 40–80% of the costs associated with the global maritime supply chain are covered by hinterland transport.

The study advances the field by demonstrating the overall importance of customs logistics and intermodal hinterland transport variables on shippers' business performance. It was also noted how shippers' business performance in Lagos and Ogun States was impacted by the combined effects of customs logistics and intermodal hinterland transport. This suggests that effective management of customs logistics and intermodal hinterland transportation can be used as strategies to boost the output of manufacturing companies in Lagos and Ogun States. Given the findings, the article makes the following recommendations:

(i) Customs administration policy ought to priotize production and manufacturing.
(ii) Policy makers ought to prioritize streamlining and standardizing customs procedures in order to minimize costs, delays, and other consequences stemming from task duplication or overlap.
(iii) Manufacturers should arrange their business plans to minimize the negative impact of intermodal transportation on their profits.

References

Akintayo S. B. (2010). Transport Economics, Asekome & Co. Zaria, 45-52.

Al-Muhaisen, S. (2005). Overview of trends in multimodal, IZMIR International Conference, 22nd April.

Behdani B., Wiegmans B., Roso V., & Haralambides H., (2020) Port-hinterland transport and logistics: emerging trends and frontier research, *Maritime Economics & Logistics*, 22 (1), 1–25

Beresford, A., S. Pettit, Q. Xu, & S. Williams, (2012). A study of dry port development in China. *Maritime Economics & Logistics*, 14 (1), 73-98.

Carballo, J., Graziano, A., Schaur, G., & Volpe-Martincus, (2014). The heterogeneous costs of port- of-enrtry delays. Inter- American Development Bank. Retrieved from http://www.iadb,org. on 10/29/2019

Chopra, S., & Meindl P., (2007). Supply chain management, strategy, planning & operations. New Jersey, Pearson Education Inc.

Cotecna, (2021). How to get Nigerian Customs to clear your goods faster. Retrieved from exports-to-nigeria.com on 5/21/2022

Darpito, S. H. (2022). The effect of flash sale on purchase decision moderated by

Oni *et al*

product knowledge. *International Journal of Business Ecosystem & Strategy* 4 (1), 37-41.

Delfim, L. M., Silva, P. H. M., Silva, J. F., & Leite, M. S. A. (2021). Analysis of activities that generate logistical costs in an operation in Brazil to import a containerized cargo: a case study. Retrieved from Production, 31, e20200027 on 7/22/2022,https://doi.org/10.1590/0103-6513.20210027.

Delloitte, (2017). Public private partnership as an anchor for diversifying the Nigeria economy Lagos Container Terminals Concession as a Case Study. Retrieved from https://www2delloitte.com on 9/11/2020

Dhakal, A., & Jha. A. (2020). Custom clearance processing time analysis and factors affecting clearance time for goods in Birgunj Nepal. Journal of Advanced Research in Civil and Environmental Engineering, 7(3&4), 27-37.

Ekpo, U. N., (2018) Rekindling Nigeria's manufacturing sector performance for economic growth and development, *International Journal of Latest Research in Humanities and Social Science (IJLRHSS)*, 2 (1), 10-24.

Grime R. P. (1978). Shipping law. London, Sweet & Maxwell.

Hoang Van Hai & Nguyen Truong Son (2019). The effect of logistics service on firm financial performance in textile industry: Evidence from Da Nang City, Vietnam. MATEC Web Conference. Retrieved from https//:doi.org/10.1051/mactecconf/2019 25904002 on 2/2/2023

Holzer, M. & Peci, F. (2009). The impact of customs procedures on business performance: evidence from Kosoro. *World Customs Journal*, 6 (1), 17-30, Retrieved from Downloads Holzner-Peci.pdf.on 12/06/2023

Hornok C. & Koren M., (2015). Administrative barrier to trade, *Journal of International Economics*, 96 (1), S110-S122

Ibrahim, B., (2011). Trade facilitation: A panacea for rapid economic growth and development of Nigeria. A Master Degree thesis Presented to the Faculty of Social Sciences, University of Lagos, Akoka, Lagos, Nigeria.

International Finance Corporation/Worldbank, 2008–2013, Doing business, Co-published with the World Bank, Washinton DC, USA.

Jacobs, W. (2009). The role of port infrastructure and logistics in global network. Retrieved from Jacobs_WEB.pdf. on 9/24/2015

MAN, (2020). Manufacturers Association of Nigeria. MAN advocates for appropriate policy to foster growth of the manufacturing sector in Nigeria, MAN News January-June

Manufacturing Association of Nigeria, (2020). Field services, MAN house, Ikeja, Lagos.

Martinez, J. E. M., & Eguren, M. de L., (2013). Maritime transport: A theoretical analysis under system's approach. *Journal of Maritime Research*, 10 (3), 61-68.

National Bureau of Statistics (NBS, (2020). Foreign Trade in Goods Statistics (Q3 2020). Retrieved from https://www.nigeriaianstat.gov.ng

National Bureau of Statistics (NBS, 2022). Nigerian Gross Domestic Product Report Q2_word_Fin.pdf

National Federation of Self Employed & Small Businesses Limited, (2023). FSB's Customs Clearance report highlights challenges faced by small firms.

Oni *et al*

Retrieved from www.fsb.org.uk on 30th June, 2023.

Ofobrukweta M. U. (2017). Freight Forwarding in Global Logistics & Supply Chain, Lagos, Uniship Publishing & Consulting Limited.

Oni, B. G. Ojekunle J. A., & Adesanya A. (2023). Nexus between nature of business and delays experienced in cargo clearance process in Lagos seaports. *Journal of Economics and Allied Research*, 8 (2), 120-130.

Oni, B. G., (2023). Potential of trade facilitation as a key factor in achieving sustainable Nigeria's industrial transformation within the African continental free trade area (AFCFTA). *Dutse Journal of Economics and Development Studies,* 11 (0), 141-155

Rodrigue, J. & Notteboom, T. (2010). Foreland-based regionalization: Integrating intermediate hubs with port hinterlands. *Research in Transportation Economics*, 27 (1), 19-29

The International Standard Industrial Classification (ISIC), (2023). Nigerian manufacturing output. Retrieved from www.macrotrends.net.

The Punch investigator (2023, August 23). Naira slump: Manufacturers' raw material imports hit N8 trillion. Retrieved from www.google.com

United Nations Convention on the Carriage of Goods by Sea (1978). Retrieved from https://untacd.org>convention.

Oni *et al*