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THE IMPACT OF OPERATIONAL FACTORS ON SEAPORT PERFORMANCE: A CASE STUDY OF LAGOS PORT COMPLEX, NIGERIA

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ABSTRACT

This study investigates the short-run determinants of port performance at Apapa Port, Nigeria, using an Autoregressive Distributed Lag (ARDL) model. The model examines the influence of key variables such as cargo throughput (CTP), ship turnaround time (STT), berth occupancy rate (BOR), and the number of vessels (NOV) to assess operational efficiency. Results reveal that all independent variables are positively associated with NOV; however, only the lagged NOV, CTP, and STT values are statistically significant at the 1%, 10%, and 5% levels, respectively. BOR was found to be insignificant, suggesting that delays in vessel clearance negatively impact port performance. The analysis further shows that past shipping activities, cargo throughput, and improved ship turnaround time significantly enhance vessel traffic and operational output at the port. The model demonstrates joint significance at the 5% level with an R-squared of 0.519, indicating that the selected variables explain 52% of the variations in vessel traffic. Diagnostic tests confirm the model's validity, showing no issues of autocorrelation or heteroskedasticity, while the CUSUM test confirms model stability. Overall, the findings underscore the importance of efficient cargo handling and reduced turnaround time in boosting port productivity.

Key Words: Throughput, Port Performance, Ship Turnaround Time (STT), Cargo Throughput (CTP), Berth Occupancy Rate (BOR), ARDL Model, Vessel Traffic

1.0 INTRODUCTION

Ports always play a strategic role in the development of domestic and international trade of a country whether it is a developing or developed country. However, in a globalized world where distances are becoming squeezed, ports play an active role in sustaining the economic growth of a country. In the modern world of a fast growing technological era, ports are playing the role of an industry, not just passive actor in transportation but also in complete supply chain management. This is why it is said that "ports are more than piers" that is, more than just infrastructure or a complex infrastructure (Prakash, 2005). Today in any context and in any country, it is essential that ports provide efficient, adequate and competitive services. If they fail, ship-owners who find them too costly or too slow will go elsewhere. Hence if ports do not provide cost-effective services, imports will cost more for consumers and exports will not be competitive on world markets, national revenue will decline as well the standard of living of all people. Nigeria has a total of eleven ports and eight oil terminals organized in three zones of Western, Central, and Eastern zones. The central zone with its headquarters in Warri and the Eastern zone with its Headquarters in Port Harcourt are predominantly oil terminals, although Warri, Sample, Koko, Port Harcourt, Calabar, and the Federal Ocean Terminal are important general cargoes. (Chioma, 2011).

Statement of the Problem

The performance of a port can be evaluated by observing both its utilization and the speed and reliability of movement of cargo and services through the port (UNCTAD, 2002). While there are several activities involved from entry to departure of a cargo into/out of the port, it is important to measure the performance of the ports or the total movement of cargo. This includes the throughput of the port, ship traffic, berth occupancy, ship turnaround time, etc.

The Nigerian Ports by the beginning of the 1990s had shown shallow levels of efficiency, which resulted in low turnaround times for ships and increased container dwell time (Leighland, 2007). Instead of the forty-eight-hour international standard as recommended by the International Maritime Organization (IMO) to unload and reload a ship, it took weeks or even months. The workforce was over-bloated, there were excessive port-related charges, and massive levels of cargo theft. The port infrastructure required considerable reconstruction and upgrade. That is entailed extensive external financial support, which the Federal Government was unwilling to provide due to dwindling public revenues and other competing general needs.

Hence, port operators and users were left dissatisfied. The Nigerian Ports, as was the case with many other public corporations, were also believed to have a complex institutional management structure with stiff bureaucratic bottlenecks. In a bid to address the challenges militating against free performance at the port, the Federal Government opted for private sector management and operations to bring in needed technical expertise, managerial capacity, and financial resources in the area of port operations as practiced elsewhere. The concession is a process whereby the concession grantor gives the right to operate a facility and deliver a service of public interest to a merchant concessionaire, against the commitment assumed by the concessionaire to build and manage the subject of the concession or to manage the delivery of service at the concessionaire's own risk (Tsvyetkov, 2010). Port technology has to change at a faster rate to keep pace with the pace of technological changes in shipping, for instance, from handling of bulk palletized cargo to containerization. Ships and ports have never been so technically advanced, never been so sophisticated, never been more immense, never carried/contained so much cargo, never been safer, and never been as environmentally friendly as they are today. In order to support the global and regional trade development, Nigerian ports have increasingly been under pressure to improve on

efficiency and productivity by ensuring that port services are provided on an internationally competitive basis. The major problems bedeviling the port performance and inefficiency of the Lagos complex seaport such as poor and unsophisticated cargo handling plants and equipment, unskilled manpower availability, Insecurity, port congestion. Bad roads connected to the hinterland, lack of infrastructure development and poor dredging of port channels etc. Some of these challenges mentioned above will be solved in this research work.

Aims and Objectives

This work aims to assess the seaport performance in Nigeria (a case study Lagos port complex). The specific objectives are as follows:

1. To analyze the cargo throughput at the seaport in the study area.
2. To assess the average time spent at berth by ships at the seaport in the study area.
3. To determine the number of vessels calling at the seaport in the study area.
4. To assess the turnaround time of ships at the port of call in the study area.
5. To assess the berth occupancy rate at the seaport in the study area.

Hypotheses

H01: There is no significant statistical relationship between average time spent by ships at berth and cargo throughput in the study area.

H02: There is no significant statistical relationship between number of vessels and cargo throughput in the study area.

H03: There is no significant statistical relationship between average turnaround time of a ship and cargo throughput in the study area.

HO4: There is no significant statistical relationship between berth occupancy rate and cargo throughput in the study area.

2.0 LITERATURE REVIEW

2.1 Conceptual Review

The activities of the Nigerian Ports were commercialized in 1992 under the name, “Nigerian Ports Plc”. However, considering the fact that the government still wholly owns the company, it reverted to its former name, Nigerian Ports Authority in October 1996. This reversion is however, not in conflict with commercialization efforts and commitment to improved services. The general argument is that if market demand grows, capacity utilization will rise. If demand weakens, capacity utilization will slacken. When utilization rises above somewhere between 82% and 85%, price inflation will increase. Excess capacity means that insufficient demand exists to warrant expansion of output (Harrer, 2002) In general, business would feel most comfortable at something between 80% to 90% capacity utilization because fixed costs per unit are relatively low and there is some scope to meet new orders or carry out maintenance and training. A firm that has just invested in major new facilities in anticipation of major growth could take some time before reaching a good level of utilization (Garrat, 2004).

Capacity utilization, therefore, is the ideal measure to show the proportion of seaport productive capacity currently utilized from the available maximum port capacity. This is a good indicator to determine the future expansion of seaport facilities without creating the problem of over-capacity (Essoh 2013,). Often the excess demand for the seaport services may lead to expansion of seaport facilities without proper assessment of the utilization of the available capacity. Therefore, before expansion of the existing seaport facilities, it is preferable to carry-out a capacity utilization analysis (Baniela 2010).

Port Performance Measurement

At is regarded as an infrastructure serving the international and domestic trade as well as the entire economy of the country. But European Sea Port Organization defines it as an "area of land and water including facilities destined mainly for receiving vessels, loading, unloading and storing cargoes, receiving and delivering the cargoes from/to land transport means; they may also include activities linked to the sea-borne trade". Whichever may apply logistical platform is important to be associated. Proper planning, management, co-ordination and control are the basic elements that

inhibit or enhance the performance of the port. On the other hand, performance of 19 the port, in addition to the economic growth of a country and inland transport system determines the port of call by ships. Hence, the commercial viability of a port is always a point of emphasis by shipping companies. It becomes therefore imperative for ports to ameliorate performance or efficiency by reducing the maritime cost in the form of time in port and quality of service that occur in ports.

As reported by De Monie (2007), the measurement of port productivity has been greatly impeded by the following factors:

(a) The sheer number of parameters involved.

(b) The lack of up-to-date, factual and reliable data, collected in an accepted manner and available for dissemination.

(c) The absence of generally agreed and acceptable definition.

(d) The profound influence of local factors on the data obtained.

(e) The divergent interpretation given by various interests to identical results. Port operations are increasingly specialized and processed in dedicated terminals but many flows of goods are still handled at general purpose berth; as in the case of Port Harcourt port and Onne ports. For instance, both ports in reference handles General cargoes, bulk, containers, refined petroleum products, oil exploration equipment and so on; hence there is no homogeneity of products/terminals for comparison. Depending on the case, port performance should be assessed for a homogenous set of berths or terminals. It is usually expressed as the average number of calls and the average flow-volume or weight of goods over a standard period of time, number of calls per berth and per year, volume or weight of cargo handled per hour, per call or per day, per gang or per crane or based on the new port performance indicators (PPI). In addition, other criteria can be used to see how existing capacity and performance meet the requirements of

(a) the shipper or the ship owner: mainly average waiting time of ship, dwelling time of cargo and data related to quality (value).

(b) Port Authority/concessionaire: basically, berth occupancy rate and global traffic and so on.

Operational Performance Indicators (Productivity).

Primary measures of vessel performance are the ship turn-round time and the tonnage handled per ship day in port.

Ship Turnaround Time

The ship turn-round time is the duration of the vessel's stay in port and is calculated from the time of arrival of the vessel to its departure as earlier explained in the tables. As a productivity indicator, ship turn-round time is a function of the following:

(a) The volume of cargo

(b) The facilities available at the port for cargo handling

(c) The composition or nature of cargo. Hence from the above, it's necessary that the port differentiate the basic ship-turn round time for the different vessels like tankers, bulk carriers, container vessels and general cargoes vessels in relation to the ports or berth allocated to them, as such is not fully considered in the ports of Onne and Rivers Ports, excepting those of crude oil terminals.

There is also the need to sub-divide these vessels into domestic trade, regional trade and ocean-going vessels.

(A) Volume of Cargo The tonnage handled per day or hour for a vessel in port is a more useful measure of a vessel performance based on the fact that a vessel's stay in port is influenced by the volume of cargo that it works.

(B) Cargo Handling Facilities. Also, the cargo handling facilities or gang output/tonne/hour or the crane moves per hour, are also relevant in determining the performance. These are the factor productivity indicators of the ports.

The major ones are:

(a) Labour output: Labour/tonne/hour or gang/hour or tonne/berth/day or hour or ton/ship day, etc., and

(b) Crane productivity relating to the number of cranes available and the moves they make per hour between the ship and shore and also if (TEU) loaded or empty.

The tonnage handled per ship day (hour) is a measure of the volume of cargo handled per unit of the time of the vessel in port hence productivity in port is generally measured in terms of tonnage of cargo handled per unit work station per hour. General cargo work station is the gang while container is the crane or hook. Productivity is measured in terms of:

(a) Tonnes per gang hour for general cargo

(b) Tonnes per pump hour for liquid cargo while pump is the work station and

(c) TEUs per crane or hook hour. The size of the gang is a material factor hence the larger the gang size, the greater its output.

(d) The Composition or Nature of Cargo The composition or nature of cargo and the size or quantity has an influence on the performance of the workstation or gang.

Cargo Dwell Time in Port

This is another port performance indicator based on importer/exporter point of view and it is basic as the only indicator of interests to them. A high cargo dwell time is generally an indication that all is not well with the port; cargo dwell time in Onne and Rivers ports is mostly attributed to the customs procedure, non-utilization of EDI (Electronic Data Interchange) and e-payments, etc.

Port Organizations

Although port major aims are identical in reality the tasks and functions are organized and distributed differently in different countries, sometimes in different ports of the same country. Basically, these dissimilarities are a necessity of differing degree of cargo handling.

Service Port

The port authority develops, owns and maintains the infrastructures - quays, sheds, warehouses, channels, aids to navigation, roads, railways, docks, locks, land and superstructures - cranes of various types, forklifts etc., including related services. It is responsible for the entire operation of the port as well as management of it, hence, referred to as operating port.

Tool Port

The basic characteristic of a tool port is the provision of heavy but essential infrastructure and superstructure (offshore cranes - gantries, cranes, warehouses and equipment, sheds etc.) at the disposal of private operators. Put differently, besides the administration and development of land the Port Authority creates the tools and rents them to various port operators.

Landlord Port

The landlord port pattern may be regarded as the provision and transfer of basic port infrastructure and services to private companies by means of some sort of leasing arrangement or contractual agreement to provide cargo-handling services. The contractual arrangement may be on short term or long term basis. Besides, the port authority provides the operators with land areas for storage and other activities to protect the interest of the port.

Theoretical Review

Systems Theory

Proponent: Ludwig von Bertalanffy (1950s)

Relevance to Study: Systems theory views an organization (or port) as a system of interrelated parts. In the context of a seaport, operational areas such as cargo handling, security, customs, workforce, and management are subsystems that must work efficiently together. If one component fails (e.g., inefficient labor or poor infrastructure), the overall performance suffers. This theory supports the idea that seaport performance depends on the synergy of multiple internal and external variables.

Resource-Based View (RBV) Theory

Proponents: Wernerfelt (1984), Barney (1991)

Relevance to Study: RBV argues that organizations gain competitive advantage from the effective use of their internal resources — both tangible (e.g., cranes, ICT, vessels, labor) and intangible (e.g., skilled labor, leadership, and logistics systems). Applied to port operations, the theory suggests that seaports with better resources (modern infrastructure, trained workers, advanced ICT) will perform better and attract more maritime business.

Port Performance Theory

Proponents: Bichou and Gray (2005)

Relevance to Study: This theory offers a framework to evaluate port performance using both operational measures (e.g., turnaround time, berth occupancy) and financial measures (e.g., revenue generation). It recognizes that performance is multidimensional and influenced by internal efficiency and external competitiveness. This aligns with your research focus on operational efficiency, management practices, and labor factors.

Empirical Review

Alaba and Adebayo (2021) on the Impact of Port Infrastructure on Trade Facilitation in West Africa. Found a strong correlation between improved port infrastructure and increased trade volumes in ports across Nigeria, Ghana, and Côte d'Ivoire. World Bank (2020) on Doing Business: Trading Across Borders. The report ranked Nigeria poorly in port-related indicators due to customs delays, infrastructure limitations, and regulatory bottlenecks.

Akinyemi and Ighalo (2019) in their study on Port Performance and Efficiency in Nigeria: A Comparative Study of Lagos and Port Harcourt Ports found that the Lagos Port Complex performs better than Port Harcourt Port in terms of cargo throughput and turnaround time, largely due to

better infrastructure and private sector participation. Onwuegbuchunam et al. (2018) on Determinants of Seaport Efficiency: Evidence from Nigerian Ports. Using regression analysis, this study showed that labor availability, equipment handling capacity, and managerial competency significantly influence port efficiency. Okeudo (2013) who measured the efficiency level of Nigerian ports after the implementation of policy reforms with a focus on the Onne and Rivers ports.

Omoke, Diugwu, Nwaogbe, Ibe, and Ekpe (2015) conducted a study on infrastructure financing measuring the results of terminal privatization in Nigeria. The study examined the effect of privatization on the performance of Nigerian seaports, using pre- and post-privatization data. A Mann-Whitney Wilcoxon (MWW) test was applied to data (secondary) on two major indices of port operation (average berth occupancy and average turn-around time). The result of the analysis showed that on average, the berth occupancy and turn-around time improved from 51.35% to 72.47% and 8.18 days to 4.83 days respectively. It was also found that at a 0.05 level of significance, the concession of Nigerian ports has significantly improved average berth occupancy and average turnaround time of the vessels calling at Nigerian ports. The study emphasizes the need to provide enabling environment through the formulation and implementation of effective policies as a way of ensuring optimal performance of the concession model.

Nwanosike, Tipi, and Warnock-Smith (2016) studied on Productivity Change in Nigerian Seaports after Reform: employed Malmquist indexes to benchmark pre-and post-reform total factor productivity growth in Nigerian ports. The results indicate that the source of pre-concession period productivity growth was technological progress while the change in productivity of the post-concession period is geared towards increases in scale efficiency (SE).

Wanke, Nwaogbe and Chen (2017) studied on Efficiency in Nigerian ports, handling imprecise data with a two-stage fuzzy approach. The study focused on assessing the efficiency of six major Nigerian ports from 2007 to 2013 by applying a two-stage fuzzy-based methodology adequate to handle imprecise data. Fuzzy data envelopment analysis models for traditional assumptions with respect to scale returns are employed to assess the productivity of Nigerian ports over the course of time. In the second stage, fuzzy regressions based on different rule-based systems are used to predict the relationship of a set of contextual variables on port efficiency. These contextual variables are related to different aspects of port service level, berth utilization, accessibility, cargo type and operator type. The results reveal the impact of operator and cargo type on efficiency levels. Policy implications for Nigerian ports are derived.

Omoke, Aturu, Nwaogbe, Ajiboye, and Diugwu. (2017) studied on competitiveness analysis of selected seaports in West African coast region using Analytical Hierarchical Process (AHP). The study analysed the competitiveness of selected ports in West Africa Coast region with respect to vessel traffic, cargo throughput, and container traffic. The result reveals the percentage competition of each port during the study, it shows that Apapa port with (26.36%), is the most competitive port among the selected ports. It is 1.21 times more competitive than Tema port (21.41%), 1.48 times more competitive than the Tin-Can Island port (17.85%), 2.05 times better more competitive than Cotonou port (12.86%), 2.10 times better than Lome port (12.56%) and 2.94 times more competitive than Takoradi port (8.96%). The order of overall port competitiveness is Takoradi <Lome< Cotonou < Tin-Can <Tema<Apapa

Nwaogbe, Pius, Balogun, Ikeogu, and Omoke (2017) studied on analysis of impact of port operations on Nigerian economy, with a focus on Apapa port to determine the impact of gross

registered tonnage of vessels on Nigerian gross domestic product, ascertain the influence of cargo throughput on Nigerian gross domestic product, as well as determine whether ship traffic significantly influences Nigerian gross domestic product. Data sourced from Nigeria Ports Authority‟s operational bulletin were analysed using the multiple regression model. It was found that gross registered tonnage of the vessel is significantly contributing to the Nigerian gross domestic product (GDP) at 0.05 significant level, and that cargo throughput and vessel traffic have positive impact on the economy but are not significantly influencing the Nigerian gross domestic product at 0.05 significant level. The paper recommends that vessel gross registered tonnage should be used as the basis for assessing port dues since it bears positive significance on Nigerian economy.

Nwaogbe et al (2020) studied on port operations performance in Nigeria focusing on Calabar port. The research used multiple regression model to analyze the data using SPSS software package version 23.0. The regression model variables used were Y (cargo throughput) as dependent variable on X1, X2, and X3 as (number of vessels, turnaround time, number of employees); all explanatory variables were explained for a period of seven years. The result shows the output summary of Calabar port R square as 99%, which is very good. It means that the port„s operational performance is at the high level. From the test of hypothesis, the overall result shows that P-value calculated is equal to 0.003 which is less than the tabulated alpha value of 0.05, therefore alternative hypothesis is accepted, which means that there is a statistical significant relationship between cargo throughput and number of vessel traffic, turnaround time and number of employees of the Calabar port. Policy implications were made on how those factors can be improved.

Okorigba (2018) observed that the efficiency improved at the ports after the reforms of 2006, as cargo dwell time and turnaround time of vessels reduced to an average of 2.45days as compared to an average of 6.85days and 10.43days before the reforms. He equally found out that infrastructural modernization and equipment enhancement reduced delays of cargo discharge at the ports thus increasing efficiency of the ports.

3.0 METHODOLOGY

Research Design

Research design means the structuring or investigation aimed at identifying variables and their relationship to one another. For this study, an ex-post facto, descriptive survey design was used for the study. The method is considered adequate and most appropriate because it helped the study to describe, examine, record, and interpret the variables that exist in this study.

In an ex post facto survey, events are observed to have taken place already. It is a strict sense, no experimental design because there is no experiment involved, and there can be none. Ex post facto design, however, is also known as a single-case design. This design assumes the form of an experimental design where an existing case is observed for some time to study or evaluate it.

Due to the nature of the data used for this research work i.e., secondary data and not primary data was used for analysis, it would be ideal to use an ex post facto design for the research design of this study.

This research set out to examine the Assessment of seaport performance on Nigeria (case study Lagos port complex). This relationship is designed on a ARDL model assuming a linear relationship between the variables include the model is given as:

$$CTP = \beta 0 + \beta 1ATSB + \beta 2NOV + \beta 3TTS + \beta 4BOR + ut$$

Where:

CTP=Cargo Throughput

ATSB= Average Time Spent at Berth by ships

NOV= Number of Vessels

TTS= Turnaround Time of Ships

BOR= Berth Occupancy Rate

Y = CTP for the period of Study

Bo=Constant

B1= is the coefficient of the independent variable, ATSB

B2=is the coefficient of the independent variable, NOV

B3=is the coefficient to the independent variable, TTS

B4=is the coefficient to the independent variable, BOR

$\beta 1 - \beta 4$ are the slope coefficients for the independent variables;

Dependent variable Y= CargoThroughPut

Independent variable X_1= Average Time Spent at Berth by ships

Independent variable X_2 = Number of Vessels

Independent variable X_3 = = Turnaround Time of Ships

Independent variable X 4= Berth Occupancy Rate

U=Stochastic error term

Bo is the base line while B1, B2, B3, B4 are the coefficients of the regression parameters to be estimated. The values of the coefficients will be obtained using the ordinary least square method.

Technique of Data Analysis

The techniques for the data analysis that will be used in this study; included Ordinary least square of multiple regression, descriptive statistics, unit root test, co-integration test, Autoregressive distributed lag model and stability test in E-view version 10 statistical tool.

4.0 RESULT AND DISCUSIONS

Table 1: Data For the Study

Years	Number of vessels (NOV)	CTP	STT	BOR
2002	1251	15,940,692	3.58	17.5
2003	1474	16,987,241	4.63	18.6
2004	1531	19,765,945	4.85	21.4
2006	1697	10,816,947	5.35	25.1
2007	1723	14,952,078	6.48	21.3
2008	1703	19173324	5.31	22.8
2009	1438	17,473,350	3.75	25.8
2010	1301	14,372,749	4.59	69.8
2011	1036	15,775,509	6.55	15.7
2012	1461	22,232,000	5.38	15.9
2013	1514	25,410,900	5.48	18.1
2014	1589	24,723,000	5.75	38.5
2015	1621	22,580,000	4.91	33.5
2016	1679	21,700,000	4.3	30.7
2017	1623	22,400,000	4.2	28.1
2018	1794	23,404,000	3.9	48.6
2019	1598	24,408,000	4.7	11.6
2020	1708	25,560,000	4.3	17.52
2021	1820	26,484,000	4.00	23.3
2022	1837	28,528,520	4.50	33.8

Source: *NPA and NBS bulletin*

Table 1 above contains the data used for the study. It covers data set for the dependent and independent variables for a period of twenty-two (22) years from 2002 through 2022 gotten from NBS Statistical bulletin and NPA Annual Report.

Data Analysis

The results of the above data analysis presented below.

Unit Root Test

It is important to carry out unit root test since we are applying time series data set for the study in order to check for stationarity of the data because the use of non-stationary data can result in spurious regression.

Table 2: ADF Unit Root Test Result

Variables	ADF Test Statistics	Critical Values	Order of Integration	Level of Significance	Remark
NOV	-3.176526	-3.012363	I(0)	5%	Stationary
STT	-4.929063	-3.752946	I(1)	1%	Stationary
BOR	-4.399661	-3.737853	I(1)	1%	Stationary
CTP	-4.588196	-3.737853	I(1)	1%	Stationary

Source: Author's Computation

It can be observed from table 2 above that the variables used in the study are integrated at order one and zero. While CTP, STT and BOR are integrated at order one, NOV is integrated at order zero. While CTP, STT and BOR are significant at the 1% level, NOV is significant at the 5% level. The outcome from the unit root test makes the ARDL approach the best technique for analysis, this is so since there's mixed order of integration. The next step is to check for the existence of long run relationship among the variables.

Cointegration Test

The ARDL-bound test approach to cointegration will be applied, because the Johassen cointegration cannot be applied in this case, due to the mixed order of integration. The bound test approach makes it possible to test for the existence of long run relationship among the variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables. The first step which is the ARDL estimated equation is presented in the appendices. The outcome of the cointegration test is presented below.

Discussion of Findings

From table 4 above, the ARDL (short run) model's coefficient is presented. All the independent variables are positively related to the dependent variables though only the lagged value of the dependent variable (NOV), lagged value of CTP and STT were statistically significant at the 1%, 10% and 5% respectively. Only the BOR was found to be insignificant. The positive and significant value of the lagged value of the dependent variable implies that a 1% rise in NOV in the previous period will lead to 90% increase in the current period. Ship turnaround time (STT) as well as its lagged value which was used in the study as the proxy for port performance increases the NOV of the country. Cargo throughput was also found to increase the number of vessels. It can also be observed from the Prob (F-statistics) that there exists a joint significance of the variables used in the study at the 5% level. Also, from table 4 the R-squared of 0.519450 means that the variables of the study explained about 52%.

The BOR not been significant indicates that delay in vessel clearance reduces the port performance and that the berth occupancy rate is mainly used for shipping activities hence it reduces the ship

traffic or number of vessels call at Apapa port. Conversely, cargo throughput, the ship turnaround time at the port as well as past shipping activities increase Apapa port operational performance.

The Durbin-Watson Statistics of 1.33 falls within the gray area hence necessitating further test. This is further strengthened by the result from the Breusch-Godfrey Serial Correlation LM Test in table 5 which shows that the model does not suffer from autocorrelation based on the probability value of 0.1899. The Breusch-Pagan-Godfrey Heteroskedasticity Test shows that the model does not suffer from heteroscedasticity, hence we can infer that the model is homoscedastic.

The cumulative sum of recursive residuals (CUSUM) test presented in Figure 1 shows that the ARDL short-run model adopted in the study is stable since the plot lies within the 5% significance boundary, hence, there is productivity in the operations of the port and its throughput. This is essentially so when the port is utilized, depicted by the Ship Turnaround Time (STT) at the port.

5.0 Conclusion

The importance of the Lagos port complex performance to the maritime sector growth in Nigeria cannot be overemphasized, especially for a developing economy like Nigerian economy. The study, which assessed the port performance of Apapa port, revealed that the variables that were used as a proxy for port performance were found to be positive and significant at the 5% level. This shows that port performance therefore plays significant role on the maritime sector and shipping activities affect ship traffic at the port, that the berth occupancy rate is mainly used for shipping activities hence it reduces the port throughput and productivity of Apapa seaport. Conversely, cargo throughput, the ship turnaround time at the port as well as past shipping business

activities increases the vessel traffic. The port authorities should therefore take into consideration the implications of port performance when formulating policies for the maritime sector.

Recommendations

The study therefore recommends, among other things, that:

1. There is need for policies that ensure that ports in Nigeria are more utilized and decongested.

2. Enhance the export base of the country since it has a significant impact on the maritime sector and economy growth at large through the berth occupancy rate and the cargo throughput.

3. There's also need to construct and develop the infrastructures and facilities of the port to reduce port congestion at apapa port and enhance it's operations effectively.

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