THE IMPACT OF SELECTED PORT PERFORMANCE INDICATORS ON ECONOMIC GROWTH IN NIGERIA, FROM 1995-2022

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ABSTRACT

The impact of selected port performance indicators on economic growth in Nigeria. Data sourced from Nigeria Ports Authority's(NPA) operational bulletin were analyzed using multiple regression model. It was observed that among CTP, GRT, STT and NOB, GRT and STT were found to have negative impact on Nigerian economy while CTP and NOB has positive impact on Nigerian economy. The study suggests that since vessel GRT has a positive impact on Nigeria's economy, it should serve as the foundation for determining port dues.

Keywords: GDP, cargo throughput, terminal, port authorities, port reform and turnaround time

INTRODUCTION

Delivery has long been thought to be one of the best ways to accelerate socioeconomic development. According to Smith (1776), a business that operates in a small city with no ties to the outside world would never reach high levels of efficiency because the market is too small to allow for specialization. When you take into account the ancient times, shipping has been at the forefront of opening up the world for exchange and has become an important driver of the globalization process since it is one of the most cost-effective and efficient methods of long-distance transportation. Trade has a spectacular, consistent, and substantial effect on revenue (Frankel, 1999). Transportation fees have become less important as a trade item as a result of recent alternate liberalization that has decreased tariff and nontariff barriers (Amjadi, 1995). It is evident that the elimination of artificial borders has led to a situation where the exceptional security offered by transportation charges has exceeded that provided by tariffs (Clark et al, 2004). Rising transportation costs raise the cost of capital and

intermediate goods, which raises domestic production costs and reduces exports and commerce.

Empirical studies indicate that a doubling of transportation costs should cause a minimum eighty percent loss in business (Limao, 2001). Increased transportation costs lead to a decline in foreign investment, a reduction in access to research and information, a decline in the savings ratio, a weakening of exports, and the loss of jobs. The rate of economic growth slows down by more than half of a percentage point when transportation costs double (Radelet, 1998). Limao (2001) states that a 10% increase in transportation costs results in a 20% or more decrease in exchange volumes, while inadequate infrastructure accounts for almost 40% of anticipated transportation expenses. According to Radelet (1998), shipping costs slow down the growth of GDP per capita and manufactured exports. As the most important hub for maritime transit, a seaport bears a significant portion of the expense of shipping. It can operate at a high level of efficiency to save costs associated with transportation and boost the economy.

According to Sjafrizal (2008), the quantity and availability of the manufacturing inputs utilized in an economic exercise define the amount of output (goods and services) that is generated. Furthermore, he found a strong link between the financial expansion of archipelagic regions and the infrastructure of maritime transportation. As a result, a causal association between the seaport's development and financial extent were previously established. The physical form of transportation and the physical structure of the financial device must be coherent, and their characteristics must work together. The vessel's hold capacity, or useless weight tonnage (DWT), and the frequency of ship movements determine the throughput volume of products (Call). The ship's daily dimensions (LOA) are influenced by the DWT, and the berth size (LB) is affected by the ship's proximity to its LOA. Similarly, Essoh (2013) found that the right actions increased fiscal income and sped up monetary expansion in his research. Improvements to the transportation system are thought to be driven by reaching certain budgetary targets (Pangihutan, 2008).

The shipping industry has evolved throughout time from a business that was formerly primarily global in scope to a truly global organization with transoceanic routes that carry finished goods, spare parts, and raw materials. A key role that maritime transportation plays in both domestic and foreign trade and economic expansion. More than 90% of all global trade occurs via marine transport. Port operations, including the scheduling of arriving vessels, the assignment of wharf space and cranes to service the vessels, the loading and unloading of cargo, yard operations, and gate operations, are made possible by the exceptional port infrastructure that surrounds them. As a result, the sub-region must prioritize studying port operations. Nigeria was named the best reformer in Sub-Saharan Africa by the World Bank's African infrastructure diagnostics study of ports (Vagliasindi, 2009). According to a World Bank (2008) report, the total funding for non-public areas in ports located in Sub-Saharan Africa was $1.3 billion, of which 62% was related to container

terminals, 32% to multipurpose terminals, and very little to bulk cargo facilities. Half of the sub-region's non-public quarter funding comes from Nigeria, with Apapa Container Terminal in Lagos, Nigeria, representing the largest single agreement. As a result, it is imperative to ascertain the impact of the program that drew in such a large amount of funds in the sub-region and to validate the economic benefits of such an investment.

Statement of the Problem

Nigeria's ability to achieve long-term economic growth and development is undoubtedly a result of its abundant and diverse primary resources. Regretfully, since 1960, the public's investment returns in Nigeria have been much lower than 0.5% annually, even with the country's substantial investments. Therefore, in order to address the underwhelming performance of state companies, the federal authority is reexamining the privatization ideology, which is predicated on reforms, in addition to the port concession. If done properly, these actions might have a significant impact on Nigeria's economic system. Nigerian ports confirmed extremely low levels of efficiency in the 1990s, which prolonged vessel lead times and prolonged container residence times. Instead of the forty-eight hours that are seen as large in other regions, like Asia, it often took weeks to empty and reload a ship. Additionally, the workforce used to be quickly bloated and ineffective, the cargo was positioned at extremely high flight altitudes, and port costs were exorbitant. Perhaps to cap it all, the port base needed serious refurbishment and rehabilitation, which would have required significant outside funds that the Federal Government (FG) had previously been hesitant to provide due to the industry's current operational inefficiencies. Under the terms of the 2006 concession deal with the Federal Government, Apapa Port Terminal, which handles more than 90% of imports from the United States of America, is run with the assistance of three main operators: AP Moller, Dangote, and Sunflower. Despite this, it still seems that the Nigerian ports are not operating up to par due to poor ship turnaround times, congestion, and cargo lengthening.

REVIEW OF LITERATURE

Conceptual Review

Port Development in Nigeria

Nigeria's maritime reforms have a long history and have not recently evolved. However, the complexity, popularity, and expansion of shipping and cargo activities in the marine sector are to blame for the recent degree of interest sparked by maritime reform efforts. 1906 held significant importance in the development of shipping reforms in Nigeria, as noted by Afolayan (1994) and Badejo (1998). The Nigerian Marines were established in that year. The so-called "marine" was the first shipping reform to take root and instill some sanity in the nation's port administration (NPA, 1996). When it was first established, control and management of Nigeria's ports and terminals were to be its responsibilities. Thus, before changing into Nigerian Ports Authority (NPA) in 1954, The Marine ruled the scene for almost 48 years (Badejo, 2001; Badejo, 2012). as opposed to the circumstances before 1960's

independence. Large international firms like John Holt, CFAO, Elder Dempster, and UAC dominated the national and shipping economies throughout the British colonial era and made considerable use of the country's ports and terminals (Badejo, 2009; Obed and Ndikom, 2013).

Ports Authority

The Nigerian Ports Authority (NPA) is a government agency that provides input to the government's coverage chamber and issues directives in reaction to external stimuli. The Federal Ministry of Transport oversees the Nigerian Ports Authority (NPA), a government-owned company. Its duties include fuel and water delivery to boats at anchorage or mooring buoys, vessel repairs and maintenance, dredging and contract dredging of waterways for the nation's marine industry, and providing and operating cargo handling and quays facilities.

Seaports Administration

Seaport administration is defined as the management of seaports by a body that has been legally recognized by FG to be responsible for transferring specialized ports and harbor services for the nation's maritime industry. This would assist FG in realizing that establishing seaports in Nigeria is its goal. The expense of managing Nigeria's seaports falls on NPA.

Reasons for the Establishment of the Nigerian Ports Authority (NPA)

Like its counterparts in other countries, NPA is responsible for ensuring that the foreign alternate goals of FG are met. In order to achieve this, this body is responsible for the following: - Supporting the nation's varying needs in the export and import of goods and services; - Providing for the maritime trade in the sub-region to meet objectives; - Increasing the seaports' capacity to handle cargo in order to comply with international standards. Moreover, among other goals, to improve the effectiveness of international purchasing and selling procedures.

List of Major Ports in Nigeria

1. Lagos Port Complex
2. Tin-Can Island Port
3. Port Harcourt Port Complex
4. Delta/Warri Port Complex
5. Onne Port Complex
6. Calabar Port Complex

Empirical Review

Njoku (2020) used a co-integration regression method to analyze data from 1981 to 2016 for their paper titled “Appraisal of Shipping Trade Influence on Economic Growth in Nigeria”.

They found a statistically significant relationship (p-value of 0.0190) between the shipping enterprise and economic growth.

Richard et al. (2020) evaluated the Nigerian Ports Authority (NPA) Performance closely in order to determine the impact of the port's revenue performance on Nigeria's economic growth. The Engle-Granger co-integration and OLS regression were used. The results demonstrated that GRT's overall revenue had a noteworthy and favourable impact on economic growth.

Godfrey et al. (2018) investigated Onne Seaport Nigeria's post-concession performance. The gathered data was examined using trend analysis and forecasted using the moving average approach. It was discovered that the port's post-concession performance trend and seaport performance are inconsistent.

Jamoh (2017) examines how macroeconomic factors affect Nigeria's maritime industry's performance from 1981 to 2016. Information for the publication was gathered from the CBN's statistical bulletin. Exchange rates and foreign reserves have a negative impact on the performance of the maritime industry, according to the results of using the OLS model with the HAC Newey-West technique.

Adeleye (2015) examined the impact of global change on Nigeria's monetary growth using net export (i.e., total export less total import) and the balance of payments as stand-ins for international commerce and the GDP as a gauge of monetary growth. Regression analysis employing co-integration and error correction modeling techniques was utilized to ascertain the long-term link between economic performance and global commerce.

Omoke (2015) used pre- and post-privatization data to analyze the impact of privatization on the performance of Nigerian seaports. Average berth occupancy and average turn-around time, two key indicators of port operations, were the subjects of secondary data analysis using the Mann-Whitney Wilcoxon (MWW) test. The analysis's conclusion indicated that, on average, the turn-around time and berth occupancy increased from 8.18 days to 4.83 days and 51.35% to 72.47%, respectively.

Olaogbebikan (2014), examined the operation of the ports in Nigeria between 1956 and 2005 (the pre-concession era) and between 2006 and 2012 (the post-concession era). ARDL approach was used in the study. The findings showed that there was variation in the flow of cargo between 1956 and 2005, but the CTP increased steadily between 2006 and 2012.

Usman and Ibrahim (2010) investigated how changes in Nigeria's foreign reserve holdings affected trade rates, inflation, and domestic investment. It was discovered that changes in the nation's external reserves only slightly affect foreign direct investment (FDI) and exchange rates, with little effect on domestic investment or inflation rates. This was discovered using a combination of regular least rectangular (OLS) and vector error correction (VEC) techniques.

METHODOLOGY

The research design adopted for this study is the expo-facto research design. The researcher takes sample of the dependent variable (GDP) and independent variables (STT, CTP, GRT,

and NOB) from 1995-2022 in Nigeria. The study is based on time series data sourced from several publications, journal articles, textbooks, seminar papers, online reports, newspapers, Central Bank of Nigeria statistical bulletin, Nigeria Port Authorities annual bulleting etc.

Model Specification

The multiple OLS regression framework was employed. Thus, the regression model for the relationship being investigated is expressed as:

$$GDP = f(CTP, STT, GRT, NOB) \quad (1)$$

$$GDP_t = \beta_o + \beta_1 CTP_t + \beta_2 STT_t + \beta_3 GRT_t + \beta_4 NoB_t + e_t \quad (2)$$

Where:

GDP = GDP

STT = Ship Turnaround Time

CTP = Cargo throughput

GRT = Gross registered tonnage

NoB = Number of berths

β_0 = Intercept, t = Annual time series

β_1, β_2, β_3 and β_4 = Parameters of the coefficients

e = Error or Disturbance Term

$\beta 1, \beta 2, \beta 3 < 0$

DATA ANALYSIS

Descriptive Statistics

Table 1: Descriptive Statistics

	GDP	CTP	GRT	STT	NOB
Mean	52173.88	66466214	1.34E+08	5.855385	4380.231
Median	37315.08	56354064	1.32E+08	5.615000	4423.000
Maximum	154252.3	3.08E+08	1.91E+08	11.34000	5369.000
Minimum	3100.235	13273053	78838624	3.750000	3023.000
Std. Dev.	48073.17	61936934	29941853	1.704031	594.6498
Observations	28	28	28	28	28

The result of the descriptive statistics shown in table 1 above shows that the average value of GDP from 1995 - 2022 is 52173.88 billion, the average value of CTP is 66466214 tonnes that of GRT is 134000000tonnes, the average value of STT is 5.855385 while that of NOB is

4380.231. The variable with the highest maximum value is GRT with 191000000 tonnes, while the lowest maximum value is STT with 11.3400. In terms of minimum value, STT has the least minimum value with 3.750000, while GRT has the highest minimum value with 78838624. Furthermore, the variables showed varying degrees of spread from their mean values according to their S.D values. For instance, CTP has the most degree of spread from its mean with a value of 61936934, followed by GRT with 29941853, GDP with 48073.17, NOB with 594.6498, while the variable with the least degree of spread from its mean is STT with 1.704031.

Pearson Correlation Test

Table 2: Correlation Results

Correlation Probability	GDP	CTP	GRT	STT	NOB
GDP	1.000000				

CTP	0.783689	1.000000			
	0.0000	-----			
GRT	0.258183	0.227423	1.000000		
	0.2029	0.2639	-----		
STT	-0.689271	-0.464922	-0.301694	1.000000	
	0.0001	0.0167	0.1342	-----	
NOB	0.317176	0.177118	0.752268	-0.273319	1.000000
	0.1144	0.3867	0.0000	0.1767	-----

From the above table 2, there is a positive linear relationship between GDP and CTP with correlation value of 0.783689, also standing as strongest positive correlation value. The weakest positive correlation is between CTP and NOB with a value of 0.177118. Also the table disclose a negative relationship between GDP and STT with the value of -0.689271. The weakest negative correlation coefficient in the table is between STT and NOB with a

correlation coefficient of -0.273319 while the strongest negative correlation value is between GDP and STT with the value of -0.689271.

Multicollinearity Te**st**

Table 3: Multicollinearity Test Results

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.37E+09	98.38985	NA
CTP	8.44E-09	2.835610	1.290282
GRT	6.65E-08	51.98806	2.376453
STT	11688994	17.97172	1.353319
NOB	164.3840	133.1017	2.317662

From the test for multicollinearity in table 3 above, the centered variance inflation factors are used and the decision rule is that if the centered VIF is lower than 10, there is no multicollinearity. From the above results, the centered VIFs are below 10, so we can conclude that there is no correlation between the independent variables employed in the study.

Augmented Dickey-Fuller (ADF) test

The test results are summarized in the table below (Full results in Appendix III).

Table 4: Augmented Dickey-Fuller Test Results

Unit Root Test at Levels			
Variable	**ADF Test Statistic**	**P-Value**	**Remark |**
GDP	6.803009	1.0000	Not stationary
CTP	-1.376589	0.5764	Not stationary
GRT	-2.294361	0.1813	Not stationary
STT	-1.902089	0.0.3260	Not stationary
NoB	-2.432364	0.1435	Not stationary
Unit Root Test at 1st Difference			
Variable	**ADF Test Statistic**	**P-Value**	**Remark**
GDP	-1.917059	0.3193	Not stationary
CTP	-7.074686	0.0000	Stationary At (1)
GRT	-5.263220	0.0003	Stationary at (1)
STT	-5.465015	0.0002	Stationary At (1)
NoB	-4.701035	0.0011	Stationary At (1)
Unit Root Test At 2nd Difference			
Variable	**ADF Test Statistic**	**P-Value**	**Remark**
GDP	-4.196881	0.0050	Stationary At (2)
CTP	-4.358092	0.0033	Stationary At (2)
GRT	-5.464279	0.0003	Stationary at (2)
STT	-4.791895	0.0004	Stationary At (2)
NoB	-7.133224	0.0000	Stationary At (2)

Table 4 presents the results of the ADF test in levels, first difference and second difference taking into consideration the trend of the variables. From the above result, all the variables are not stationary at level, so we do not reject the null hypothesis of the ADF unit root test which states that **"the variable has a unit root".** At first difference, all other variables become stationary except GDP because the p-value of its unit root test is 0.3193 which is greater than 5%, so, the null hypothesis cannot be rejected. Moving forward, we take the second differences of the variables and perform the unit root test on each of the resultant time series. The result of the unit root test on the second difference of these variables shows that

their p-values are less than the 5% level of significance. Hence, the variables have different levels of integration.

Co-Integration Analysis

Table 5: Cointegration Test Results

Date: 1/28/24 Time: 14:48

Sample (adjusted): 1997 2022

Included observations: 26 after adjustments

Trend assumption: Linear deterministic trend

Series: GDP CTP GRT STT NOB

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.806498	73.65370	69.81889	0.0239
At most 1	0.458243	34.23454	47.85613	0.4890
At most 2	0.344036	19.52404	29.79707	0.4557
At most 3	0.230218	9.404451	15.49471	0.3293
At most 4	0.122084	3.124915	3.841466	0.0771

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.806498	39.41917	33.87687	0.0098
At most 1	0.458243	14.71049	27.58434	0.7707
At most 2	0.344036	10.11959	21.13162	0.7334
At most 3	0.230218	6.279537	14.26460	0.5776
At most 4	0.122084	3.124915	3.841466	0.0771

Table 6: Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.029654	Prob. F(2,19)	0.1589
Obs*R-squared	4.576981	Prob. Chi-Square(2)	0.1014

From the above result, it can be seen that the p-value of the F-statistic is 15.9% which is above the 5% level of significance, thus we cannot reject the Breusch-Godfrey test null hypothesis which states that “there is no serial correlation”. This further affirms the absence of serial correlation.

Table 7: Heteroscedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.739496	Prob. F(4,21)	0.5756
Obs*R-squared	3.210101	Prob. Chi-Square(4)	0.5233
Scaled explained SS	2.856075	Prob. Chi-Square(4)	0.5822

From the above result, it can be seen that both the p-values of the F-statistic and scaled explained sum of squares (SS) are 52.5% and 58.2% respectively which are well above the 5% level of significance, thus we cannot reject the test’s null hypothesis. This implies that the error variances are equal which means there is no heteroskedasticity.

Table 8: Multiple Regression Results

Dependent Variable: GDP

Method: Least Squares

Date: 1/28/24 Time: 14:52

Sample: 1995 2022

Included observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	42767.41	48710.72	0.877988	0.3899
CTP	0.000462	9.18E-05	5.031343	0.0001
GRT	-0.000278	0.000258	-1.076410	0.2940
STT	-11317.83	3418.917	-3.310355	0.0033
NOB	18.76486	12.82123	1.463577	0.1581

R-squared	0.772099	Mean dependent var	52173.88
Adjusted R-squared	0.728690	S.D. dependent var	48073.17
S.E. of regression	25040.10	Akaike info criterion	23.26539
Sum squared resid	1.32E+10	Schwarz criterion	23.50733
Log likelihood	-297.4500	Hannan-Quinn criter.	23.33506
F-statistic	17.78634	Durbin-Watson stat	1.394471
Prob(F-statistic)	0.000002		

From table 8 above, the model has good explanatory and predictive power as suggested by the R-squared and the adjusted R-squared values respectively. The R-squared value of 0.772099 suggests that about 77.2% of the systematic variation in GDP can be explained by CTP, GRT, STT and NOB, while the remaining 22.8% is taken care of by the stochastic error term. The F-statistics which is 17.78634 with a p-value of 0.00002 showing that all the explanatory variables taken together are statistically significant.

Additionally, from the result, CTP disclose has a positive relationship with GDP. The estimated coefficient implies a unit rise in CTP will lead to increase in GDP by 0.000462 units. In terms of statistical significance, CTP pass the test of significance since it's p-value is less than 0.05 significance level. Hence we conclude that CTP has positive and significance relationship with GDP. On the contrary, GRT report a negative coefficient, which implies a negative relationship with GDP. The estimated coefficient implies that a unit rise in GRT will lead to decrease in GDP by -0.000278 units. However, it fails the test of significance as it's p-value is greater than 0.05 level of significance. In conclusion GRT has a negative but statistically insignificant relationship with GDP. Similarly, STT recorded a negative

relationship with GDP with negative coefficient. The estimated coefficient shows that a unit rise in STT will lead to a decrease in GDP by -11317.83 units. Further, STT passed the test of significance by recording a p-value less than 0.05 level of significance. STT therefore, has negative and significant relationship with GDP. Lastly, NOB disclose a positive relationship with GDP as it reported a positive coefficient value. The estimated coefficient implies that a unit rise in NOB will lead to an increase in GDP by 18.76486 units. NOB passed the test of significance by recording a lower p-value than 0.05 level of significance. The intercept value of 42767.41 implies that without all the independent variables used in this model or if they are held constant, then GDP will have a value of 45767.41. The test of individual significance of each of the independent variables was done using the t-test and their respective p-values. The t-ratios reveal that the coefficients of the intercept, CTP and STT are statistically significant while GRT and NOB are not statistically significant as their p-values are greater than 5% significant level. From the Pearson correlation test it is revealed that there is a positive and significant relationship between CTP and GDP. NOB also reveals a positive and significant relationship with GDP.

CONCLUSION AND RECOMMENDATION

The study examined impacts of selected port performance indicators on economic growth in Nigeria from 1995-2022. It was established that among CTP, GRT, STT, and NOB, GRT and STT were found to have negative impact on Nigerian economy while CTP and NOB have a positive impact on Nigerian economy. Therefore, an improvement in the performance of Nigerian ports through development of port infrastructure will boost the economy. Hence the study recommends Nigerian government to expand the nation's inland port infrastructure, including rail, road, and inland waterways; that the number and capacity of cargo handling equipment should be improved to enhance port operations, vessel turnaround time, berth occupancy, and that because CTP has a major beneficial influence on the Nigerian economy, it should be the foundation for determining port dues. This will not only allow for speedy freight transfers from the ports to the hinterland but also greatly improve port performance by reducing traffic at the ports and on the roadways.

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