



## **Appraisal of Post Concession Seaports in Nigeria with an Insight to Growth Forecast**

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### **Abstract**

*The Nigerian maritime industry contributes significantly to the national economy through revenue generation. Over the years, major policy changes that affect performance of the seaports have been undertaken by the government in a bid to ensure efficiency that translates to increased revenue output generation. This study analysed some performance growth indicators such as port cargo throughput (PCT), gross registered tonnage (GRT) and the total number of vessels (TV), for Nigerian seaports from the millennial era, marked by a transition to sustained democratic government administration and consequent port reform afterwards. From the results obtained it was observed that the general performance of cargo throughput was deemed marginal and inconsistent throughout the study period of the time series with 24.53% being the maximum growth rate recorded between the period 2006 to 2007 of the post-reform era after concessions. However, a maximum annual port cargo throughput figure of 84,951,927 metric tons was recorded in the year 2014. By establishing an average benchmark figure of 39,078,043 metric tons for PCT in the current democratic dispensation, forecast throughput data for 10 years (2020 to 2029) was computed using an arithmetic progressive sequence.*

**Keywords:** Throughput, Growth-rate, Reform, Efficiency, Forecast.

### **1. Introduction**

Seaports today play a very important role in being gateways for international trade in many countries, both developed and developing ones. They are also used in measuring the economic wealth of a nation (Ogunsiji & Ogunsiji, 2011). The performance of ports has considerable influence on the trade indices and the capacity for economic development of nations underdeveloped. In Nigeria, the greater percentage of international trade is routed through the sea, and given her huge population, it is believed that the Nigerian economy may account for about 70% of all seaborne trade in the West African sub-region (Fivestar Logistics, 2008). To promote the development of the national economy, Chen (2003) suggested that it is essential for seaports to provide reliable, highly efficient and competitive services for their customers. In other words, an inefficient seaport will increase the transport cost of seaborne cargo, which will discourage international trade and have a



detrimental effect on the growth of the national economy. The increase in world trade over the last half century has triggered a focus on seaports by national governments to maximize economic prosperity through performance accruing from overall service delivery. In the 1950s and 1960s, many nations introduced institutional changes in port business, to coordinate port development at national and regional levels and prevent over-investment in expensive port infrastructure. For example, the United Kingdom established its National Ports Council for this purpose (World Bank, 2007).

By the late 1990s, the Nigerian ports which were under government ownership and operation become inefficient and costly. Hence a radical and holistic approach was undertaken by the federal government to privatize the ports through concession contracts. This was done by changing the institutional structure of the port business and allowing greater involvement of the private sector in the exploitation and financing of port facilities, terminals and services (World Bank, 2007). The institutional structure of the port business adopted was the “landlord model” which according to Bouchartat, *et al.* (2011), encapsulates the mode of management that brings a close relationship between the public interests and the private sector. At least 88% of the largest container terminals in the world, apply this model. Concessionaires are required to develop and maintain the infrastructure and provide the superstructure and equipment required for port operations (Bouchartat, *et al.* 2011). The port authority plays the role of a regulator and a provider of basic infrastructure as well as a conducive business environment for the private companies to run operations and deliver quality service. In essence, the government owns the land and other critical infrastructure and dictates through policies, its operations. By the year 2006, 25 port terminals across Nigeria were conceded to private investors and operators to improve their capacity and output. Despite the involvement of the private sector in port operations and management, the government has retained a strong role in port development. Generally, in a market-oriented economy, the government continues to be responsible for subsidization and the development of public goods (goods that have social utility) since that cannot be provided by the private sector because of low or zero profitability. Moreover, another critical reason for the continuing government involvement in the port sector is the imperative responsibilities of the government in the areas of land use planning, environmental protection, job creation, and the economic stimulation of underdeveloped areas (World Bank, 2007). A paradigm shift from a system of ownership and administration which resulted in improved port performance, safety and annual turnover in the Nigerian Maritime industry.

Many literature reports have highlighted the economic benefits of port reforms to the Nigerian business sector notably, Nwanosike (2014) and Oghojafor *et al.* (2012). While a handful of other articles, Olaogbebikan *et al.* (2014) and Godfrey *et al.* (2018), have evaluated general port performances across various indices within the pre and or post-concession era with a view of general sustainability. Based on the background information provided, the objective of this research seeks to:



Table 1: Comparing Cargo throughput data Since the Inception of Seaport operations in Nigeria.

	Time Period	Total (metric tons)	Percentage (%)
Cumulative throughput data for a seaport in Nigeria	Pre-democratic/concession era, 1956 – 1999	489,071,426	29.43
	Post-democratic/concession era, 2000 – till date*	1,172,880,603	70.57

Source: Adapted from Olaogbebikan et al and Nigerian Port Authority.

Appraise the impact, port reforms have had on the performance of Nigerian seaports within the democratic dispensation (2000 – till date) amidst some lingering challenges such as congestion, turnaround delays and infrastructure inadequacies bedevilling the maritime sector within the period. Assessment of the growth pattern after the privatization of the seaport complexes based on a 20-year evaluation time series and the development of a 10-year forecast pattern for cargo throughput of seaports in Nigeria between year, 2020 to 2029 using an arithmetic sequence have been undertaken.

## 2. Nigerian Seaports Post-Reform

The “Landlord port model” adopted in Nigeria, took a centre stage in the year 2006. As a result, six main seaports comprising 25 port terminals have been operational. They include, the Apapa and Tin Can ports in Lagos State, Port Harcourt and Onne port in Rivers State, and the Warri and Calabar Ports in Delta and Cross River State respectively. This has led to an increase in productivity and increase in cargo throughput as well. As a result, access to international shipping lines has improved. This positive experience has led the Nigerian Government to consider further port developments (UNCTAD, 2011). The timeline taken for the various initiatives developed by the government in the transformation of these seaports is highlighted below.

Table 2: Timeline showing port reform in Nigeria

Year	Development Recorded
2000	Creation of the National Council on Privatisation (NCP) and the Bureau of Public Enterprises (BPE) by Privatisation and Commercialisation Act No.28/1999.
2001	Formation of the Transport Sector Reform Committee (TSRC) an arm of the NCP.
2002	Commissioning of Ports Modernisation study project by the BPE with funds from the World Bank
2003	Contracting of third-party transaction advisors by the BPE to perform due diligence, prepare bidding documents and advise on negotiations.
2004	Initiation of the first four bidding and negotiation rounds.
2005	The effective date of the first concession.
2006	Transfer of terminals from the NPA to concessionaires

Source: Adapted from Pallis, (2012).

The bureau of public enterprise (BPE) spearheaded the reform exercise placing concessionaires to be in charge of the day-to-day running of the ports, especially cargo handling, while the management of the Nigerian Port Authority (NPA), remained as the



“landlord”. Table 3 shows the details of the port terminals (post-concession) and their handover dates.

Table 3: Details of Port terminals (post-concession)

Terminal	CompanyName	LTY	HandoverDate
ApapaTerminalA	ApapaBulkTerminalLtd.	25	3rdApril 2006
ApapaTerminalB	ApapaBulkTerminalLtd.	25	3rdApril 2006
ApapaTerminalC	ENLConsortium	10	3rdApril 2006
ApapaTerminalD	ENLConsortium	10	3rdApril 2006
ApapaTerminalE	GreenviewDev.Nig.Ltd.	25	3rdApril 2006
ApapaContainer Terminal	APMTerminalsLtd.	25	3rdApril 2006
Ijora Container Depot	LilypondContainer DepotNig.Ltd.	10	3rdApril 2006
TCIPTerminalA	JosepdamPortsServicesLtd.	10	10thMay2006
TCIPTerminalB	Tin CanIsland Container Ltd.	15	10thMay2006
TCIPTerminalC	Ports & Cargo Handling Serv.Ltd	10	10thMay2006
TCIP RoroTerminal	Five Star LogisticsLtd.	15	10thMay2006
PortHarcourtTerminalA	Ports&Terminal OperatorsNig.Ltd.	15	23rdJune2006
PortHarcourtTerminalB	BUAPorts&TerminalsLtd.	25	23rdJune2006
OnneFOTA	IntelsNigeriaLtd.	25	21stJune2006
Onne FLTA	Brawal Oil ServicesLtd.	25	21stJune2006
Onne FLTB	IntelsNigeriaLtd.	25	21stJune2006
Jetty FOT Onne	Atlas CementCo.Ltd.	25	21stJune2006
Calabar NewPortTerminalA	IntelsNigeriaLtd.	25	23rdJune2006
Calabar NewPortTerminalB	Ecomarine Nig.Ltd.	10	1stAugust 2007
Calabar TerminalC (oldport)	Addax LogisticsNig.Ltd	25	26thMay2007
WarriOldPort	TerminalA IntelsNigeriaLtd.	25	23rdJune2006
WarriOldPortTerminalB	Associated Maritime ServicesLtd.	10	12th June2007
WarriNewPortTerminalB	IntelsNigeriaLtd.	25	23rdJune2006
WarriNewPortTerminalC	JuliusBerger PLC	25	4th May2007
KokoTerminal	GreenleighLimited	10	12th June 2007

Note: *LTY is LeaseTermsin Years*

Source: *Nigerian Port Authority Brand Manual (2005).*

The major policy changes highlighted, contributed to making the ports more user-friendly with the concessionaires embarking on several measures to attract clients to their terminals. Since adopting the port reform, NPA has continued to discharge its multiple responsibilities of the landlord and technical regulator apart from its official maritime administrative functions. Realising the benefits of the progress that had occurred in the maritime sector and the economy, the Federal Government has however continued to take necessary measures to ensure that the benefits gained are in progress at all times (African Development Bank Report, 2010 and Oghojafor, *et al.*, 2012). Given ensuring policy adjustments, planning and forecasting for the future, it is imperative to analyse performance over post-reforms to give an insight into the level of gains recorded by the wholesome terminal concession (Nwokedi, 2019).



**3. Methodology**

To effectively assess the performance of the seaport complexes under study, a quantitative research methodology was adopted. The desk study approach was undertaken as a yardstick to verify whether the port reform programs adopted in Nigeria had resulted in the expected outcomes highlighted in previous literature by Olaogbebikan *et al.* (2014) and Nwokedi *et al.*, (2019) for all examined ports in view. The desk research included a review and analysis of the existing data from various secondary sources, such as the reports and studies undertaken by academic researchers including Nwokedi *et al.* (2019) and Nwanosike, (2014), with the sole objective of evaluating changes in the Nigerian port industry concerning port operational structure as well as technical efficiency of cargo handling. A secondary source of data was obtained from the Nigerian Port Authority (NPA) for analyses as well as independently sourced data from relevant research and internet publications. These included cargo throughput data for the Ports, notably, Lagos Port Complex (Apapa and Tin Can), Port Harcourt Port Complex, Onne Port Complex, Warri Port Complex and Calabar Port Complex from year 2000, indicating the democratic period of pre-reform era to year 2005, through to the transition (concession) period in the year 2006 and the current post-reform era (2019); cumulatively, a time series of 20 years based on the availability and reliability of the currently sourced data. Collated data relating to port cargo throughput, gross registered tonnage and a total number of vessels from the Nigerian Port Authority (NPA) and National Bureau of Statistics, through a 20-year time series (2000-2019) was been evaluated using charts and arithmetic analytical method. For forecasting, the average PCT within the period of the millennial and pre-concession era was determined and used to establish a minimum threshold for the performance of the ports (post-concession) under study. In essence, obtaining the average cargo throughput figures from year 2000 to 2006 (within the concession phase) was crucial to establishing a minimum threshold performance and determining forecast trends for years to come.

The regression line method and moving average method are both suitable methods for time series analysis (Olaogbebikan *et al.*, 2014). For data analysis, a simple moving average which is based on the concept of arithmetic mean was used to determine the base port cargo performance index, denoted by  $X_{base} = \sum_{i=1}^n \frac{x_i}{n}$  where  $x_i$  and  $n$ , denote the individual port cargo throughputs (PCT) values and number of years (2000 to 2006) respectively. Using this method offered a direct and simplistic approach to obtain the average cargo throughput within the democratic pre-concession period. The arithmetic difference obtained from the previous year is given by the variation,  $V = X_n - X_p$  for each year in view, where  $X_n$  and  $X_p$  represents PCT values for the present and immediate previous years respectively. This analysis assumes an arithmetic sequence at and beyond the base year for improved throughput performance levels (Nwokedi *et al.*, 2019). Therefore, the sequence adopted was of the form shown below in line with Nwokedi *et al.*, (2019).

$$T = a, a + d, a + 2d, \dots, a + (n - 1)d \dots\dots\dots 1$$



Where  $T$  = cargo throughput series,  $a$  = first or base term of the sequence and  $d$  = the common difference of the sequence.

The sum of the arithmetic series given by the formula in equation (2) below was used to compute the common difference,  $d$  which was observed to be unidentical from the cargo throughput data across the various years.

$$\sum T_n = \frac{n}{2} [2a + (n - 1)d] \dots\dots\dots 2$$

The above formula was used to compute  $d$ , for forecasting. Analysis of variance was used to determine whether or not there was significant variance for the three (3) variables analysed.

**4. Results**

Table 4: Annual Gross Registered Tonnage, Port Cargo Throughput and Vessels Recorded for Seaports in Nigeria between the Year 2000 and 2019

Year	Gross Registered Tonnage (GRT) (metric tonnes)	Annual percentage change in GRT	Port Cargo Throughput (PCT) (metric tonnes)	Annual percentage change in (PCT)	Number of vessels (No.V)	Annual percentage change in No. of vessels
2000	44,432,370		28,932,880		4087	
2001	56,106,345	26.27	35,940,692	24.22	4473	9.44
2002	53,267,921	-5.06	36,987,241	2.91	4143	-7.37
2003	60,622,666	13.81	39,765,945	7.51	4315	4.15
2004	61,384,221	1.26	40,816,947	2.64	4553	5.51
2005	60,541,810	-1.37	44,952,078	10.13	4586	0.72
2006	63,267,047	4.50	46,150,518	2.67	4800	4.67
2007	84,806,792	34.05	57,473,350	24.53	4849	1.02
2008	89,505,702	5.54	64,372,749	12.00	4623	-4.66
2009	90,603,611	1.23	65,775,509	2.18	4721	2.12
2010	108,621,872	19.89	76,774,727	16.72	4881	3.39
2011	122,614,716	12.88	83,461,697	8.71	5232	7.19
2012	120,818,683	-1.46	77,104,738	-7.62	4837	-7.55
2013	130,628,057	8.12	78,281,634	1.53	5369	10.10
2014	148,323,065	13.55	84,951,927	8.52	5333	-6.33
2015	141,250,703	-4.77	77,387,638	-8.90	5014	-5.98
2016	134,066,547	-5.09	70,365,036	-9.07	4373	-12.78
2017	130,357,357	-2.77	71,535,636	1.66	4292	-1.85
2018	128,671,805	-1.29	73,175,127	2.29	4009	-6.59
2019	32,974,368	-74.34	18,674,534	-74.48	1045	-73.93

Source: Authors Compilation



Table 5: Computation of Variance for GRT, PCT and No.V for Seaports in Nigeria between the Year 2000 and 2019 (Anova: Single Factor)

Groups	Count	Sum	Average	Variance
GRT (2000 - 2019)	20	1.86	93143283	1.37
PCT (2000 -2019)	20	1.17	58644030	4.1
No.V (2000 -2019)	20	89535	4476.75	808075.6

Source of Variation	SS	Df	MS	F	P-value	F crit
Between Groups	8.87	2	4.43	74.73361	1.17	3.158843
Within Groups	3.38	57	5.93			
Total	1.23	59				

Source: Authors Computation

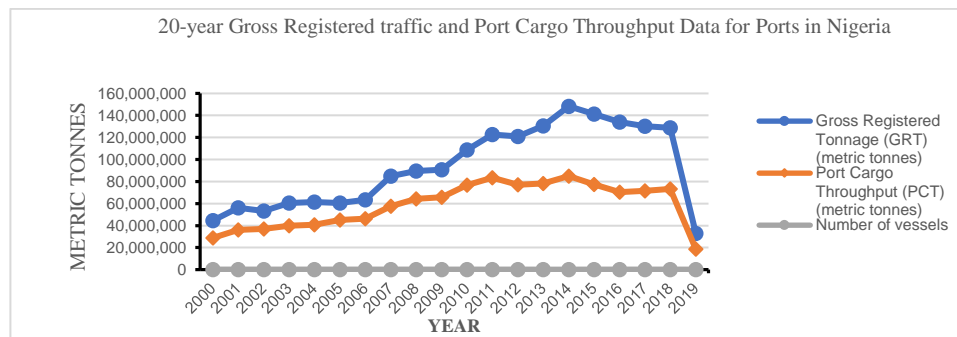


Figure 1: Gross Registered Tonnage and Port Cargo Throughput between 2000 and 2019

From Table 4, 5 and Figure 1 above, annual data on three (3) variables, Gross Registered Tonnage (GRT), Port Cargo Throughput (PCT) and Total number of Vessels (No.V) were been analysed over 20 years (2000-2019). The time series selected for the observation was apt, deliberate and historic as it highlighted glimpses of trade progress at a nascent stage, recorded in the era of the democratic dispensation. As shown in Table 4, the post-democratic era preceding the concession period (2000-2005), showed a marginal but steady increase, peaking at 44,952,078 metric tonnes for port cargo throughput figures. The post-concession period (2006 till date) immediately marked an impressive growth (24.53%) in port cargo throughput (PCT) performance between (2006-2007) followed by a period of sustained growth between (2008-2011). Years 2012, 2015 and 2016 marked periods of negative growths -7.62%, -8.90% and -9.07% respectively, although they were observed not to fall below the PCT threshold of the pre-concession era. A visible dip in the growth of PCT for the year, 2019 (-74.48%) was attributed to the COVID-19 pandemic that resulted in a global lockdown which adversely truncated economic activities, hence variable data obtained within this period only included the time frame before the lockdown. Table 5



highlights the level of significance in variance between GRT, PCT and No.V at the 95% confidence interval for fisher’s distribution. Since the F value (74.73361) was observed to be greater than the F critical (3.158843), it can be inferred that a significant difference exists between the variance of the three variables. This further explains that port reforms through concession agreements have had an influence on performance within the period under observation.

Figure 1 depicts that, for most of the 20 years, an upward but unsteady trend was observed with occasional dips indicating underlying challenges with growth sustainability. These issues could be attributed to lack of significant improvement among other unmeasured variables such as berth occupancy time, turnaround time, port capacity and speed of service delivery (Olaogbebikan *et al.*, 2014).

Table 6: Throughput Data for Seaports in Nigeria between the period 2000 and 2019

Year	Port Cargo Throughput (PCT) (metric tons)	Variation $V = X_n - X_p$ (metric tons)
2000	28,932,880	-
2001	35,940,692	7,007,812
2002	36,987,241	1,046,549
2003	39,765,945	2,778,704
2004	40,816,947	1,051,002
2005	44,952,078	4,135,131
2006	46,150,518	1,198,440
2007	57,473,350	11,322,832
2008	64,372,749	6,899,399
2009	65,775,509	1,402,760
2010	76,774,727	10,999,218
2011	83,461,697	6,686,970
2012	77,104,738	-6,356,959
2013	78,281,634	1,176,896
2014	84,951,927	6,670,293
2015	77,387,638	-7,564,289
2016	70,365,036	-7,022,602
2017	71,535,636	1,170,600
2018	73,175,127	1,639,491
2019	18,674,534	-54,500,593
$\Sigma T_{2000-2019} = 1,172,880,603$		

Source: Authors Computation

A common sentiment shared by previous studies (Nwanosike, 2014) is the fact that the change to civilian rule ushered in economic progress and reposed confidence from the international community thus improving trade relations. However, from the time series data aggregation highlighted above, it was deduced that all three variables performed averagely or marginally in terms of sustained positive growth as seen in the relatively inconsistent nature of their increase over the years. For the performance assessment, port cargo





throughput (inbound and outbound) was deemed a critical variable for growth index performance since revenue earnings depended on it.

As shown in Tables 6 and 7, the sum of port cargo throughput (PCT) was computed to be 1,172,880,603 metric tons within the 20 years evaluated (2000 - 2019). To establish a minimum growth threshold for futuristic planning purposes, the average PCT from the millennial pre-concession era was aggregated and manipulated as an independent variable with the established common difference for each year. The result from the forecast analysis is highlighted in Table 8. The forecast prediction pattern based on the arithmetic sequence was streamlined in a manner to skew growth patterns for PCT above the established benchmark of the pre-concession period. In essence, a good performance indicator over 10 years, is predicated on the fact that administrators and concessionaires must workhands on deck to ensure PCT values fall within acceptable values of the threshold. Therefore,  $X_{base} + (n - 1)d \geq 39,078,043$  metric tons for PCT figures.

Table 7: Determination of Minimum Cargo Throughput Threshold and Common Difference for Forecast Computation

Cumulative PCT (20-year period) = $\sum T_n$	Base performance benchmark (2000-2006) $X_{base} \equiv \sum_{i=1}^n \frac{x_i}{n}$	Difference, $d$
1,172,880,603	39,078,043	2,059,578

Source: Authors Computation

Table 8: 10-year Forecast Pattern for Cargo Throughput Tonnage of Seaports in Nigeria

Forecast Year in View	Successive Term	Port Cargo Throughput Benchmark Sequence $X_{base} + (n - 1)d$	Forecast Estimates for Port Cargo Throughput (metric tonnes)
2020	21 <sup>st</sup> Term	$X_{base} + 20d$	80,269,603
2021	22 <sup>nd</sup> Term	$X_{base} + 21d$	82,239,181
2022	23 <sup>rd</sup> Term	$X_{base} + 22d$	84,388,759
2023	24 <sup>th</sup> Term	$X_{base} + 23d$	86,448,337
2024	25 <sup>th</sup> Term	$X_{base} + 24d$	88,507,915
2025	26 <sup>th</sup> Term	$X_{base} + 25d$	90,567,493
2026	27 <sup>th</sup> Term	$X_{base} + 26d$	92,627,071
2027	28 <sup>th</sup> Term	$X_{base} + 27d$	94,686,649
2028	29 <sup>th</sup> Term	$X_{base} + 28d$	96,746,227
2029	30 <sup>th</sup> Term	$X_{base} + 29d$	98,805,805

Source: Authors Computation

## 5. Conclusion and Recommendations

Based on this study, three important indicators (port cargo throughput, gross registered tonnage and total number of vessels) were highlighted to assess the seaport performance in the post-democratic and post-concession era in Nigeria. The port cargo throughput (PCT) was the critical variable used to depict seaport performance over the years. From the



analysis, it was deduced that the seaport in Nigeria performed marginally in terms of productivity under the democratic dispensation, before the concession period (2000–2005). Their performances showed further initial relative improvement as highlighted by the 24.53% growth immediately recorded between (2006–2007), after the concession period. However, the gains recorded as a result of the government policy changes have been inconsistent thus depicting dwindling figures, with the highest PCT figures (84,951,927 metric tons) recorded in the year 2014. The reasons, as buttressed by olaogbebikan *et al.* (2014) that were further attributed to the dwindling performances over the years despite policy reforms in the maritime sector include, the lingering operation inefficiencies (congestion, low port capacity), infrastructural deficit and corruption which has long been endemic in both the pre-concession and post-concession era. Administrative policy changes such as import ban on certain consumer goods as part of the government's effort to curb the country's internal trade deficit and encourage local production have also had their impact. External border factors (insecurity) as well as the fall in currency valuation in recent times have remained one of the key reasons for declined port usage in Nigeria.

Developing a forecast pattern is a necessary tool required for performance investigation and planning with a view to set targets for individual significant variables to achieve sustained growth.

To ensure improved and sustained performance of the Nigerian seaports, concessionaires must improve port capacity across the various port terminal while the government undertakes drastic measures of improving highway infrastructure, especially around the port terminal to alleviate the problems associated with congestion. Robust engagements by the government in the aspect of public-private partnership should be embarked upon to facilitate the construction of new port terminals (Ondo and Baro ports) which would consequently divert cargo traffic from the major ports (Apapa and Tin Can) to generally improve efficiency. The complete dredging of the Niger River is a massive step toward direct maritime investment that should be undertaken by the government at the federal level to enable deep sea vessels to ply their trade across the Nigerian seaports located on the river tributaries thus, increasing revenue and output generation.

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