Liner Shipping and Container Terminal Performance of Apapa and Onne Ports in Nigeria

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Abstract: This study investigated the relationship between liner shipping and container terminal performance of Apapa and Onne ports, Nigeria. Liner shipping served as the independent variable or predictor variable. Also, container terminal performance served as the key dependent variable or criterion variable under which the measures such as cargo throughputs and vessel turnaround time have been appraised. The population of the study consisted of the staff in the two ports (Apapa,636 and Onne, 277), that is 913 staff and the study sampled 279 respondents out of which 222 of them were found useful and valid for the study analysis. The study collected data with the help of a structured questionnaire. The study used Pearson Products Moment Correlation Coefficient (r) to test the hypotheses with the aid of SPSS 22.0. The reliability of the research instrument was tested using the Cronbach alpha to ascertain the reliability of the instrument. The study found that liner is very instrumental to effective shipping operations. Conclusively liner shipping has a positive and significant relationship with cargo throughputs of Apapa and Onne Ports and liner shipping has a positive and significant relationship with vessel turnaround time of Apapa and Onne Ports. Therefore, the study recommends that port operators' performance should be appraised constantly in order to ensure that the maritime sector is positioned to achieve the stakeholders' objectives in Nigerian ports.
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Introduction

Shipping is a global service industry that by general acknowledgement provides the lifeline of international trade. Suffice it to say that, due to the morphology of our planet, 90% of international trade takes place by sea. Technological developments in ship design and construction, and the ensuing economies of scale of larger ships, have also promoted trade – particularly those of developing countries – by making economical the transportation of goods over long distances. This has expanded markets for raw materials and final products and has facilitated the industrialization of many countries around the world. Often, international ocean transportation and information and communication technologies are referred to as the two basic ingredients of globalization (Okeudo, 2013).

Traditionally, the shipping industry is categorized in two major sectors (markets): the bulk shipping sector – engaged mainly in the transportation of raw materials such as oil, coal, iron ore and grains – and the liner shipping sector (involved in the transportation of final and semi-final products such as computers, textiles and a miscellany of manufacturing output). From a market structure point of view, the two sectors are as different as they could be bulk shipping uses large and unsophisticated ships, such as tankers and bulk-carriers, to transport goods in bulk on a contract basis. The service requires minimal infrastructure, and in this respect, it resembles a taxi service whereby the contractual relation between passenger and driver (cargo owner and ship owner) expires upon the completion of the trip. The industry is highly competitive with prices (freight rates) fluctuating wildly even in the course of a single week (Nyama, 2014).

Consequently, many maritime nations involved in international seaborne trade constantly evolve strategies and invest significant resources to improve performance in port terminals. In most developing countries, port improvement efforts have been hampered by lack of public finance and managerial resources. These challenges have been exacerbated in the environment of globalization of production and distribution, technological changes in ship design, and cargo handling methods, which have induced considerable demand on port resources. Thus, to provide funding and management philosophy needed to reposition ports in line with the new challenges, the port administration of most countries opted for reforms in the port sector. The focus of these reforms was on identification of optimal financing and managerial models for public ports based on national peculiarities and reform objectives ((Nyama, 2014).

However, comparatively, it is still obvious that there is no competitiveness among the ports. Some ports are still performing below expectation in spite the concession of the ports. The research is focused on comparative analysis of the effect of shipping operations on container terminal performance in Nigerian ports using eastern port (Onne port) and western port (Apapa port) as model ports for the comparison.

The purpose of the study is to evaluate the effect of liner shipping on container terminal performance of Apapa and Onne Ports. In line with above, the study seeks to achieve the following specific objectives: (i). Determine the extent to which tramp shipping affects the container terminal performance of Apapa and Onne Ports, (ii) Ascertain the extent to which liner shipping relates to the container terminal performance of Apapa and Onne Ports. The following research questions shall be answered in this study: (i) To what extent to does tramp shipping affect the container terminal performance of Apapa and Onne Ports? (ii) to what extent does Liner shipping relate to the container terminal performance of Apapa and Onne Ports?

Also, theses hypotheses have been tested in this study: Ho_1: There is no significant relationship between liner shipping and cargo throughputs of Apapa and Onne Ports. Ho_2: There is no significant relationship between liner shipping and vessel turnaround time of Apapa and Onne Ports.

Literature Review

This section has been used to review the literature relevant to the study. To achieve the literature review objective, the study critically examined the theoretical foundation of the study based on queuing theory and general system theory. Also, the literature review has captured concepts like- liner shipping, container terminal performance in Nigeria, cargo throughputs, vessel turnaround time and empirical studies.

Theoretical Framework

This study examines the effect of port operations on container terminal performance of Apapa and Onne Ports in Nigeria. In this section, the theoretical framework underpinning the study has been explored. Theories such as: Birth-and-Death Process Theory, General System Theory and Port Simulation Model have been x-rayed in this section.

Queuing Theory on Port Congestion (Birth-and-Death Process Theory)

In the context of queuing theory (Ogunsiji, 2011), the term birth refers to the arrival of a new customer into the queuing system, and death refers to the departure of a served customer. Only one birth or death may occur at a time: therefore, transitions always occur to the “next higher” or “next lower” state. The rates at which births and deaths occur are prescribed precisely by the parameters of the exponential distributions that describe the arrival and service patterns (Yap & Lam, 2013). The state of the system at time t (t≥0), denoted by N (t), is the number of customers in the queuing system at time t. The birth-and-death process describes probabilistically how N (t) changes as t increases. More precisely, according to Yusuf (2017) the assumptions of the birth-and-death process are the followings:

Assumption 1. Given N (t) = n, the current probability distribution of the remaining time until next birth (arrival) is exponential with parameter λ_n (n = 0, 1, 2…).

Assumption 2. Given N (t) = n, the current probability distribution of the remaining time until the next death (service completion) is exponential with parameter (n = 1, 2,…).

Assumption 3. The random variable of assumption 1 (the remaining time until the next birth) and random variable of assumption 2 (the remaining time until the next death) are mutually dependent. Furthermore, an arrival causes a transition from state n into sate n+1, and the completion of a service changes the system’s state from n to n-1. No other transitions are considered possible. This birth-and-death process illustration as shown in the figure 1 leads directly to the formulae that measure the performance of this queuing system.

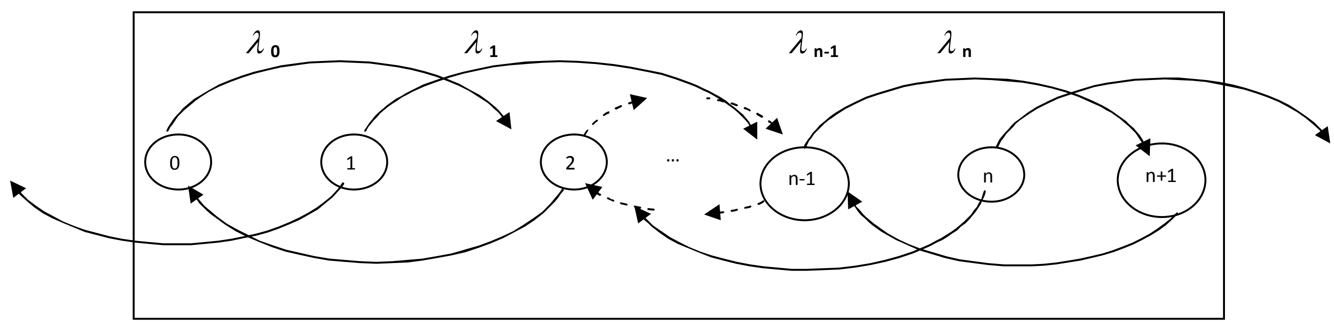

Figure 1: Rate Diagram for the Birth-and-Death Process

Source: Yeo, G., Pak, J. & Yang, Z. (2013). Analysis of dynamic effects on seaports adopting port security policy. *Transportation Research Part A: Policy and Practice*, 49, 285-301

A fundamental flaw in the birth-and-death process structure is a reliance on equilibrium between birth and death rates. This assumes the overall population shall remain constant at long run (Yeo, Pak. & Yang, 2013). The approach is based on the rate-equality principle (Yang, 2010) or balanced population model.

Rate-Equality Principle states that the rate at which a process enters a state n **(≥0)** equals the rate which the process leaves that state n. In other words, the rate of entering and the rate of leaving a particular state are the same for every state.

Rate in = rate out principle (Tongzon, Chang & Lee, 2009)**.** This principle implies that for any state of the system can be expressed by an equation which is called the balance equation for state n (n = 0, 1, 2…), and mean entering rate = mean leaving rate.

Onyema, Ahmodu and Emeghara (2015) article pointed out the application of Queuing theory to curb port congestion problem at Tin Can Island Port in Nigeria. Okorigba (2008) observes that there are many queuing models that can be formulated and used to analyze problems of port congestion. The port management was using queuing model to handling the vessels berth on the modality of First Come First Serve (FCFC) which helps to reduce dwell time, and ship turnaround time. It was advised the model to be tailored with computer systems and information technology in assigning vessels, berths and cranes.

Conceptual framework

From the literature, we have examined the constructs being investigated in this study. The two main variables are liner shipping and container terminal performance, which are the independent and depended variables respectively. The dimension or the predictor variable is liner shipping. The dependent variable has its measures as cargo throughputs and vessel turnaround time. The conceptual framework is diagrammatically displayed below:

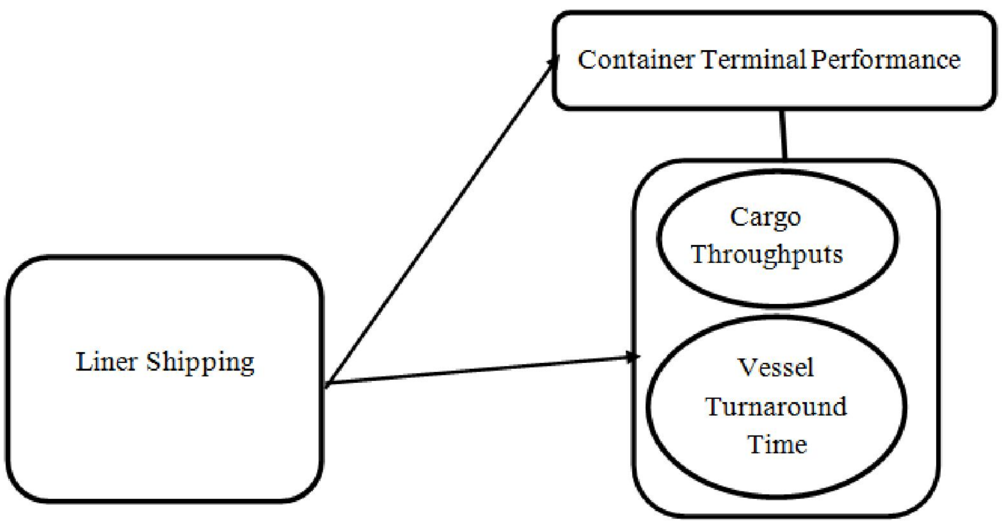

Figure 2: Conceptual Framework of Liner Shipping and Container Terminal Performance of Apapa and Onne Ports in Nigeria

Source: Onyema, H. K, Ahmodu K and Emeghara, G. C. (2015). Comparative Analysis of Port Performance in Nigeria: A Study of Ports in Rivers State International Journal of Business and Management (pg 100-107). Retrieved from www.theijbm.com. on March. 24, 2019

Liner Shipping

Liner shipping involves the transport of cargo, chiefly by container, on a regular basis, to ports on a particular geographic route, generally known as a "trade". The timetables and sailing dates for liner shipping are advertised in advance and the services are available to any user. Liner shipping networks are developed to meet the growing demand in global supply chains in terms of frequency, direct accessibility and transit times. Expansion of traffic has to be covered either by increasing the number of strings operated, or by vessel upsizing, or both. As such, increased cargo availability has triggered changes in vessel size, liner service schedules and in the structure of liner shipping.

When designing their networks, shipping lines implicitly have to make a trade-off between the requirements of the customers and operational cost considerations. A higher demand for service segmentation adds to the growing complexity of the networks. Shippers demand direct services between their preferred ports of loading and discharge. The demand side thus exerts a strong pressure on the service schedules, port rotations and feeder linkages.

Shipping lines, however, have to design their liner services and networks in order to optimize ship utilization and benefit the most from scale economies in vessel size. Their objective is to optimize their shipping networks by rationalizing coverage of ports, shipping routes and transit time (Onwuegbuchulam, 2012). Shipping lines may direct flows along paths that are optimal for the system, with the lowest cost for the entire network being achieved by indirect routing via hubs and the amalgamation of flows. However, the more efficient the network from the carrier's point of view, the less convenient that network could be for shippers' needs (Yang, 2010).

a) Line bundling service (symmetric and asymmetric)

The objective of *bundling within an individual liner service* is to collect container cargo by calling at various ports along the route instead of focusing on an end-to-end service. Such a line bundling service is conceived as a set of x roundtrips of y vessels each with a similar calling pattern in terms of the order of port calls and time intervals (i.e. frequency) between two consecutive port calls. By the overlay of these x roundtrips, shipping lines can offer a desired calling frequency in each of the ports of call of the loop (Onwuegbuchulam, 2012). Line bundling operations can be symmetric (i.e. same ports of call for both sailing directions) or asymmetric (i.e. different ports of call on the way back), see Figure 1. Most liner services are line bundling itineraries connecting between two and five ports of call scheduled in each of the main markets. The Europe–Far East trade provides a good example. Most mainline operators and alliances running services from the Far East to North Europe stick to line bundling itineraries with direct calls scheduled in each of the main markets. Notwithstanding diversity in calling patterns on the observed routes, carriers select up to five regional ports of call per loop. Shipping lines have significantly increased average vessel sizes deployed on the route from around 4500 TEU in 2000 to over 8000 TEU in early 2011. These scale increases in vessel size have put a downward pressure on the average number of European port calls per loop on the Far East–North Europe trade: 4.9 ports of call in 1989, 3.84 in 1998, 3.77 in October 2000, 3.68 in February 2006, and 3.35 in December 2009. Two extreme forms of line bundling are round-the-world services and pendulum services.

B) **Hub/feeder (hub-and-spoke) network**

The second possibility is to *bundle container cargo by combining/linking two or more liner services.* The three main bundling options in this category include a hub-and-spoke network (hub/feeder), interlining and relay (Figure 2.4). The establishment of global networks has given rise to hub port development at the crossing points of trade lanes. Intermediate hubs emerged since the mid-1990s within many global port systems: Freeport (Bahamas), Salalah (Oman), Tanjung Pelepas (Malaysia), Gioia Tauro, Algeciras, Taranto, Cagliari, Damietta and Malta in the Mediterranean, to name but a few. The role of intermediate hubs in maritime hub-and-spoke systems has been discussed extensively in recent literature (Onwuegbuchulam, 2012).

The hubs have a range of common characteristics in terms of nautical accessibility, proximity to main shipping lanes and ownership, in whole or in part, by carriers or multinational terminal operators. Most of these intermediate hubs are located along the global beltway or equatorial round-the-world route (i.e. the Caribbean, Southeast and East Asia, the Middle East and the Mediterranean). These nodes multiply shipping options and improve connectivity within the network through their pivotal role in regional hub-and-spoke networks and in cargo relay and interlining operations between the carriers' east-west services and other inter- and intra-regional services. Container ports in Northern Europe, North America and mainland China mainly act as gateways to the respective hinterlands.

Two developments undermine the position of pure transhipment/interlining hubs (Yang, 2010). First of all, the insertion of hubs often represents a temporary phase in connecting a region to global shipping networks. Hub-and-spoke networks would allow considerable economies of scale of equipment, but the cost efficiency of larger ships might be not sufficient to offset the extra feeder costs and container lift charges involved. Once traffic volumes for the gateway ports are sufficient, hubs are bypassed and become redundant (Onyema, Ahmodu & Emeghara, 2015). Secondly, transhipment cargo can easily be moved to new hub terminals that emerge along the long-distance shipping lanes. The combination of these factors makes that seaports which are able to combine a transhipment function with gateway cargo obtain a less vulnerable and thus more sustainable position in shipping networks.

In channelling gateway and transhipment flows through their shipping networks, container carriers aim for control over key terminals in the network. Decisions on the desired port hierarchy are guided by strategic, commercial and operational considerations. Shipping lines rarely opt for the same port hierarchy in the sense that a terminal can be a regional hub for one shipping line and a secondary feeder port for another operator. For example, Antwerp in Belgium and Valencia in Spain are some of the main European hubs for Mediterranean Shipping Company (MSC) while they receive only few vessels from Maersk Line. Zeebrugge and Algeciras are among the primary

European ports of call in the service network of Maersk Line while these container ports are rather insignificant in the network of MSC.

The liner service configurations in Figures 1 and 2 are often combined to form complex multi-layer networks. The advantages of complex bundling are higher load factors and/or the use of larger vessels in terms of TEU capacity and/or higher frequencies and/or more destinations served. Container service operators have to make a trade-off between frequency and volume on the trunk lines: smaller vessels allow meeting the shippers' demand for high frequencies and lower transit times, while larger units will allow operators to benefit from economies of vessel scale. The main disadvantages of complex bundling networks are the need for extra container handling at intermediate terminals and longer transport times and distances. Both elements incur additional costs and as such could counterbalance the cost advantages linked to higher load factors or the use of larger unit capacities. Some have suggested that the most efficient east/west pattern is the equatorial round-the-world, following the beltway of the world (Onwuegbuchulam, 2012). This service pattern focuses on a hub-and-spoke system of ports that allows shipping lines to provide a global grid of east/west, north/south and regional services. The large ships on the east/west routes will call mainly at transhipment hubs where containers will be shifted to multi-layered feeder subsystems serving north/south, diagonal and regional routes. Some boxes in such a system would undergo as many as four transhipments before reaching the final port of discharge. The global grid would allow shipping lines to cope with the changes of trade flows as it combines all different routes in a network.

Existing liner shipping networks feature a great diversity in types of liner services and a great complexity in the way end-to-end services, line bundling services and transhipment/relay/ interlining operations are connected to form extensive shipping networks. Maersk Line, MSC and CMA-CGM operate truly global liner service networks, with a strong presence also on secondary routes.

Before an operator can start with the actual design of a regular container service, he will have to analyse the targeted trade route (s). The analysis should include elements related to the supply, demand and market profile of the trade route. Key considerations on the supply side include vessel capacity deployment and utilization, vessel size distribution, the configuration of existing liner services, the existing market structure and the port call patterns of existing operators. At the demand side, container lines focus on the characteristics of the market to be served, the geographical cargo distribution, seasonality and cargo imbalances (Onwuegbuchulam, 2012). The interaction between demand and supply on the trade route considered results in specific freight rate fluctuations and the overall earning potential on the trade.

The ultimate goal of the market analysis is not only to estimate the potential cargo demand for a new liner service, but also to estimate the volatility, geographical dispersion and seasonality of such demand. These factors will eventually affect the earning potential of the new service. Once the market potential for a new service has been determined, the service planners need to take decisions on several inter-related core design variables. These design variables are indicated in dark grey/shaded boxes in Figure 2.5 and mainly concern (1) the liner service type, (2) the number and order of port calls in combination with the actual port selection process, (3) vessel speed, (4) frequency and (5) vessel size and fleet mix.

Liner shipping networks are developed to meet the growing demand in global supply chains in terms of frequency, direct accessibility and transit times. Expansion of traffic has to be covered either by increasing the number of strings operated, or by vessel upsizing, or both. As such, increased cargo availability has triggered changes in vessel size, liner service schedules and in the structure of liner shipping.

When designing their networks, shipping lines implicitly have to make a trade-off between the requirements of the customers and operational cost considerations. A higher demand for service segmentation adds to the growing complexity of the networks. Shippers demand direct services between their preferred ports of loading and discharge. The demand side thus exerts a strong pressure on the service schedules, port rotations and feeder linkages. Shipping lines, however, have to design their liner services and networks in order to optimize ship utilization and benefit the most from scale economies in vessel size. Their objective is to optimize their shipping networks by rationalizing coverage of ports, shipping routes and transit time (Njoku, 2009). Shipping lines may direct flows along paths that are optimal for the system, with the lowest cost for the entire network being achieved by indirect routing via hubs and the amalgamation of flows. However, the more efficient the network from the carrier's point of view, the less convenient that network could be for shippers' needs (Okeudo 2013).

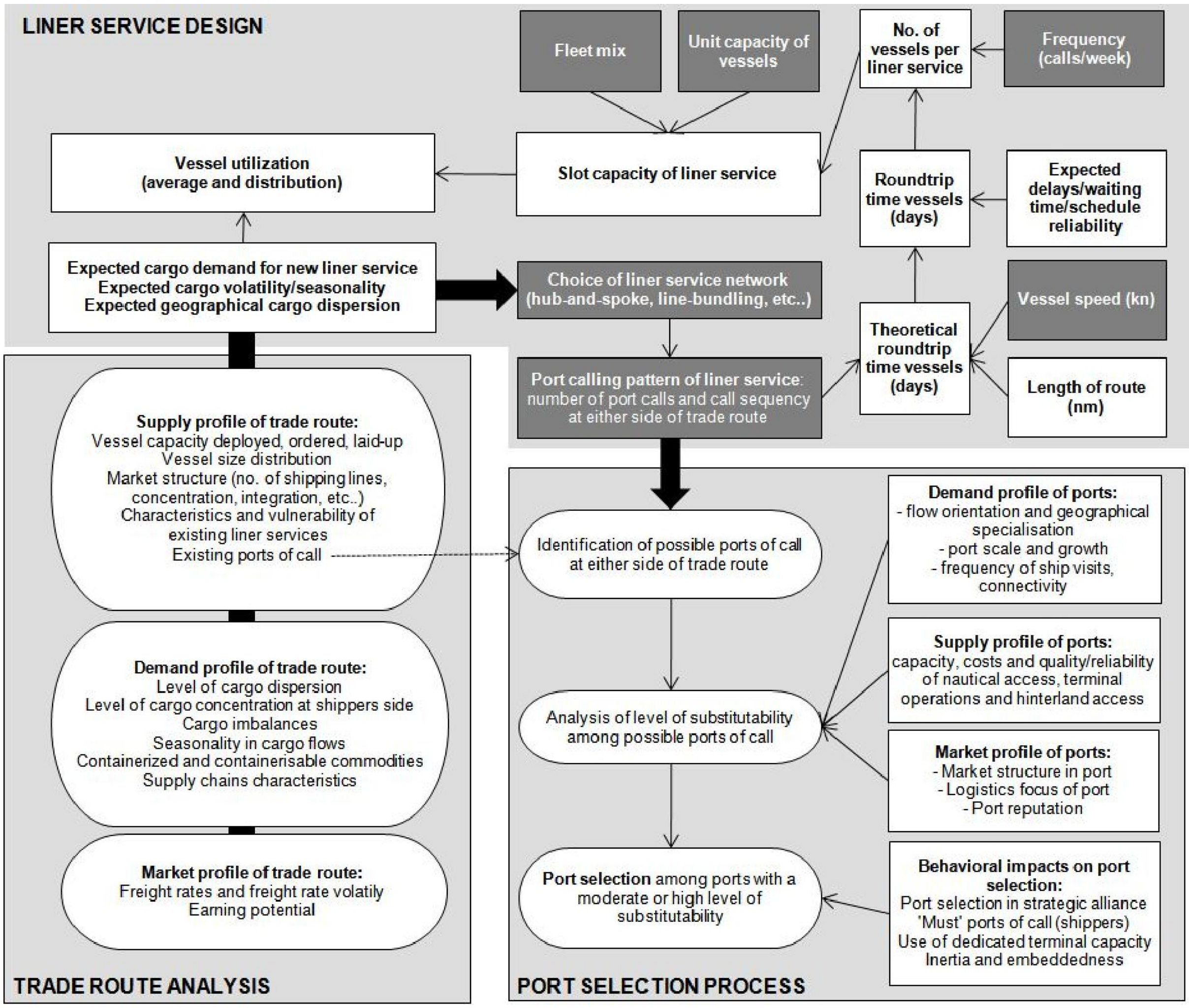

Figure 3: The process of liner service design
Source: Maloni, Paul & Gligor, (2013)
Note: Dark grey/shaded areas are decision variables in liner service design

Container Terminal Performance in Nigeria

That transport is central to development and civilization does not appear to have been appreciated in Nigeria as much it has been in many advanced nations. In concrete terms, transport is the ingredient for the socio-economic and political development of any nation. Development and transport are synonymous hence transport is the landmark of a developed nation. Man, is the center of universal activities and is always in constant movement in order to organize other activities and sustain his life needs. Based on this, man has directly or indirectly moved products, materials and services from points of less demand to areas of higher demand. This has resulted in the expansion of national and world trades (Eniola, 2014). These unaccomplished goals of man had always led him to search for solace outside his environment. This ultimate search or unfulfilled goals and the burning desire to improve on his well-being as a man, had indeed led to the development of maritime operations. This in turn, has enhanced international trade between widely separated nations, involving an exchange of goods and money transfer in the process (Chioma, 2011).

Comparatively, available cost figures have shown that maritime transport is the cheapest mode, for the transportation of bulk cargo, James and Gylfi (2007), in a study of transportation of same by sea offered British steel the cheapest modal cost on freighting. Indeed, for a third world: country's port [as in Nigeria], the port helps to achieve greater functionalities and efficiency in operation, and that imports and exports passing through it benefit from cheap and economically competitive port charges (Kim & Park, 2004)), since the maritime transport services have strong relative connection's with port activities, it is pertinent to state that the degree of economic development in maritime industry depends wholly or partly on the average wailing time of vessels and the berth occupancy rate (Kaisar, Pathomsiri & Haghani, 2006)

To achieve this measure of success, there is need for the presence of geophysical facilities, available technology and back up human resources (Levinson, 2006). These geophysical attributes should come as a policy frame work, supported by clear objectives and goals. These include safe channel and port policies etc. Apart from the physical conditions of available technology to provide safe port, it is equally important that the management of port should be trained personnel and provide adequate facilities to ensure quick turn round time of ships. These could be achieved through availability of general cargo handling equipment. Adequate berthing space for generality of trade handled by the port, adequate communication systems, and the development of good inter model interface for the movement of goods i.e. Evaluation and forwarding of consignments. In addition, specialized infrastructural facilities are very necessary to cope with the emergence (Chioma, 2011).

Demand for sea transport services is necessitation by a variety of geographical and economic factors, which result in raw materials to be moored from their resources to manufacturing sites spread around the globe. World trade, as it affects shipping operations, is therefore likely to average four percent growth per annum in the medium term (Eniola, 2014). Ideally, the capacity utilization for our port could be estimated in 85% but currently, it operates at 55% due to government policy inconstancy on our ports, (Chioma, 2011). Meanwhile, Bichou (2011), said that, ship building capacity is under pressure, as owners clamour for new vessels to meet the said demand.

Specifically, the essence of maritime transportation is principally to facilitate the shipping activities by providing avenue through which large quantity of goods can be transferred from one place to another, with the help of water/mode. In order to realize the principal motive for the use of maritime transportation four important elements are necessary and these elements actually constitute transport system (Huynh, 2009). A system can be described as a group of interrelated objects interacting to form a complete whole. In order words, it constitutes discreet components known as subsystems.

Ndikom (2010) stated that many port premises and quay aprons had fallen to disuse and failed road sections inside the ports made movement of goods within port grounds cumbersome and very slow. Following the seaport congestion, complaints of untraceable or missing cargoes were being regularly lodged against the NPA, all to no avail. Security inside Nigerian seaports was compromised by the relentless ingress of multitudes of all shades of persons into the seaports. As a result, miscreants called wharf rats easily gained access into the ports and pilfered goods in storage or vehicle parts. In fact, security within port grounds was at the mercy of an elusive racket.

James and Gylfi (2007) were of the view that the Sub-Saharan (SSA) Africa has been slower than some other regions to embrace private participation. By the late 1990s, only 10 percent of SSA's ninety main ports involved private participation beyond stevedoring services. By 2006, that situation had begun to change with concessions concluded for container and general cargo terminals in Tanzania, Cameroon, Madagascar, Mozambique, and other SSA countries.

Cargo Throughputs

It is worthy of note that average cargo throughput from 1956 to 2005 is 14,467,024 metric tons while the average cargo throughput from 2006 to 2012 is 67,240,231.86 metric tons. The yearly average cargo throughput of 67,240,231.86 metric tons of cargo from 2006 to 2012 over the yearly average of 14,467,024 metric tons from 1956 to 2005 shows a percentage increase of 456.69%. This shows the remarkable progress made in our port developmental efforts since the port concession era. In a nutshell, the pattern in Nigerian port traffic during the pre-concession era is sinusoidal while the post concession experienced a sharp progressive rise. The statistics on Table 2 shows that the cargo throughput increased from 46,150,518 metric tons in 2006 to 77,104,738 metric tons in 2012. This means that between 2006 and 2017, cargo throughput at the nation's ports increased by over 67 per cent. This was as a result of the landlord model of port management which was adopted in 2006 that led to the concession of sections of the ports to private terminal operators, otherwise called concessionaires, and has led to the consistent improvement in cargo throughput (Bakshi, Flynn & Gans, 2011).

Table 1 shows the inward cargo trend from 1961 to 2017. It follows the same pattern like the cargo throughput trend. The trend of cargo throughput follows the same pattern as import trend. It means then that the trend of cargo throughput is greatly determined by the trend of import or inward cargo movement. In a nutshell, the pattern in Nigerian port traffic during the pre-concession era is sinusoidal while the post concession experienced a stable and continuous growth as indicated with the blue line. The trend concurs with that witnessed in total cargo throughput which is clear evidence that the pattern of Nigeria's port traffic is controlled by imports. During the period 1961-2017 import traffic overwhelmed exports. Table 1 also, shows the outward cargo trend from 1961-2017 the export trend was analogous which means there was no improvement in export activities. However, small improvement was recorded from

1971-1974 with a slight upward tilt of the trend line. The situation reversed to the parallel trend from 1975-1987. This means that there was a downward tilt of the trend line. The period 1988-1999 witnessed a slight improvement in export activities with a slight upward tilt of the trend line while the trend line experienced a sharp upward movement from 2000-2017.

Table 1: Cargo Throughput at Nigerian Ports (Pre- & Post Concession)

YEAR	INWARD	OUTWARD	THROUGHPUT
1961	1,386,480	1,356,480	2,742,960
1962	1,620,195	1,552,752	3,172,947
1963	1,680,222	1,419,552	3,099,774
1964	1,823,506	1,720,356	3,543,862
1965	2,110,440	1,482,901	3,593,341
1966	2,256,453	1,374,263	3,630,716
1967	2,350,087	1,664,431	4,014,518
1968	2,387,446	1,631,560	4,019,006
1969	2,527,730	1,830,576	4,358,306
1970	2,640,672	2,037,828	4,678,500
1971	2,853,627	1,997,834	4,851,461
1972	2,428,106	1,753,800	4,181,906
1973	2,272,681	1,562,887	3,835,568
1974	2,177,611	1,661,517	3,839,128
1975	2,719,518	1,507,964	4,227,482
1976	4,492,152	2,816,851	7,309,003
1977	5,281,466	2,831,638	8,113,104
1978	4,459,164	3,103,075	7,562,239
1979	5,256,724	3,218,696	8,475,420
1980	5,979,492	2,461,934	8,441,426
1981	8,481,284	2,518,241	10,999,525
1982	11,853,063	2,552,183	14,405,246
1983	15,694,964	2,419,808	18,114,772
1984	17,395,286	2,679,951	20,075,237
1985	15,600,380	2,356,815	17,957,195
1986	20,728,974	2,913,742	23,642,716
1987	20,073,797	2,537,432	22,611,229
1988	16,394,509	2,346,700	18,741,209
1989	12,372,417	2,278,685	14,651,102
1990	13,453,939	2,947,740	16,401,679
1991	9,851,059	2,423,520	12,274,579
1992	9,288,006	2,249,584	11,537,590
1993	7,773,258	3,402,088	11,175,346
1994	8,759,961	4,616,226	13,376,187
1995	9,338,801	6,830,356	16,169,157
1996	11,021,521	6,819,380	17,840,901
1997	13,414,501	5,487,925	18,902,426
1998	12,897,955	5,739,047	18,637,002
1999	9,579,969	4,281,879	13,861,848
2000	9,289,971	3,983,082	13,273,053
2001	10,224,300	5,251,001	15,475,301
2002	11,213,624	5,369,181	16,582,805
2003	14,286,864	5,038,854	19,325,718
2004	15,751,331	6,481,605	22,232,936
2005	19,230,496	9,702,384	28,932,880
2006	24,668,791	11,271,901	35,940,692
2007	35,544,965	35,544,965	57,473,350
2008	41,195,616	23,177,133	64,372,749
2009	45,757,149	20,018,360	65,775,509
2010	46,928,848	29,815,879	76,744,727
2011	52,022,105	31,439,592	83,461,697
2012	46,222,127	30,870,498	77,092,625
2013	50,005,603	28,276,031	78,281,634
2014	53,771,183	31,180,744	84,951,927
2015	48,111,361	29,276,277	77,387,638
2016	43,470,646	26,894,390	70,365,036
2017	43,099,088	28,436,548	71,535,636
TOTAL	913,471,484	468,416,622	1,368,271,526

Source: Nigerian Ports Authority (1961-2017)

Table 1 shows the volume of cargo throughput handled at the Nigerian ports from 1956 to 2012. Cargo throughput is the sum of both the inward and the outward cargo processed by the ports in the given period. There was a slow growth in cargo traffic from 1956 to 1974; and the fall noticeable in-between 1966 and 1970, as a result of the civil war, was not enough to utterly obscure the growth trend. The rise in traffic between 1975 and 1979 was significant although the rise began in 1970. The abrupt rise was not preceded by port development sufficient enough to handle the traffic. The result was the 1975-1978 congestion problems which stemmed from the massive importation of cement called 'cement armada' and other construction material for the rehabilitation of infrastructure destroyed by the civil war. Traffic dropped from 20,075,237 metric tons in 1979 to 17,957,195 metric tons in 1980, peaked again in 1981 and then suffered serious decline that coincided with the global economic recession. This downward trend can be ascribed to the austerity measures introduced by the then government with the view to revamping the ailing economy. The downward trend continued for about nine years with the total cargo throughput in 1989 falling to 13,376,187metric tons. The traffic picked up again in 1990 only for a brief period as it fell during the county's political uncertainty of 1992 and 1993. Since 1996 there has been a rapid rise in cargo throughput culminating in an unprecedented volume in 2016 with a slight decline in 2017.

Vessel Turnaround Time

Turnaround times directly impacts port container performance from both economic and operational point of view (Maduka, 2004). The higher the turnaround time the lower the container performance and the higher the port congestion. In this case, the salient feature of any port is to optimize its throughput and eventually to decrease the turnaround times of vessels or ships.

The vessel or ship turn-around time is an accumulation of the two critical times, ship service time at berth and waiting time or the time the ship spends in port from its arrival within the limits of the port up to its departure (Guan & Yang, 2010). Based on statistics provided by KTO for the last two and a half years, 1999-2001, ships' turn-around time was equivalent to the ships' service time at berth as there was no waiting time. This indicator is one of the most common measurements of port performance in the world because the survival of ports totally depends upon the satisfaction of the ship-owner its primary customer. The shortest ship turn-around time is the most advantageous for the ship-owners because their profits are highly influenced by the time spent in port. Thus, the shorter the staying time of ships in ports the higher the profit. Based on Emeghara, Theophilus and Nwoloziri (2018) time in port is 35 approximately 18% of distribution of port expenses. Ship turnaround time however includes waiting time, manoeuvring time between the entrances to the berth or mooring point, ship service time at berth, shifting time between berths and manoeuvring time to leave the port.

Radmilović and Jovanović (2006) describe that vessel turnaround time is the average time the unit (vessel) spends in the system. The single waiting line model is modified to suite the container terminal system by adding the average berthing time and average un-berthing time is given by the equation 1:-

$$VTT = W_q + S + T_{ber} + T_{unber} \qquad (1)$$

where

W_q = *average waiting time*

$S = \frac{1}{\mu}$ = *average service time*

T_{ber} = *average berthing time* (=1.0 *hour per ship according to International practice*)

T_{unber} = *average unberthing time* (=1.0 *hour per ship according to International practice*)

Empirical Studies (Shipping Operations and container terminal performance)

Nyema (2014) in his study of factor influencing container terminals efficiency at Mombasa Port; it revealed that factors such as inadequate quay/gantry crane equipment, reducing berth times and delays of container ships, dwell time, container cargo and truck turnaround time, custom clearance, limited storage capacity, poor multi-modal connections to hinterland and infrastructure directly influencing container terminal inefficiency/port congestion. Data were analyzed by using the Statistical Package for Social Sciences (SPSS) and Microsoft Excel 2013. It was revealed the same problems facing Dares Salaam Port which needs comprehensive strategic plan to alleviate. Refas and Canteen's (2011) in their World Bank research report on "Why Does Cargo Spends Weeks in Africa Ports" the case study of Douala, Cameroun pointed out that, the ports efficiency is attributed by improving berths operations, clearance procedures, timely handling of ships, truck operations, gates operations and behavioral change of the players.

This improvement would necessitate the reduction in dwell times leading to the smooth movement of cargo within and outside the port area. The study also proposed that for the port congestion to be alleviated there should be modernization of customs administration. But in Dares Salaam port the situation is still the unconformity persist due to the unilateral planning and operations at the port.

Arvis (2010), in the study of long duration of container stays in the port using the study of different ports in Africa it identified the unpredictability of cargo dwell time as a major contributor to trade costs because shippers need to be compensated for the uncertainty by raising their inventory levels. Laine and Vepsalainen (1994) in their report pointed out that it is possible to organize containers at the port to allow very high traffic rates, but there are several problems involved in the optimization of service facilities and scheduling of congested queuing networks. This situation causes low utilization of large ships and of port and land transportation facilities while occasionally leading to thousands of containers congested at the port.

The result was differed by Esmer (2008) in his study on performance measurements of container terminal operations in Turkey who's emphasized on the role played by the gates operations. Gates operations involve the two operations which are export delivery by the freight forwarders and import receiving from the yard. Gates operations depend solely on the gates utilization which aims at facilitating the smooth outgoing and incoming to and from the port. Proper gates utilization leads to efficient terminal operations.

Acciaro and Serra (2013) found that port capacity is all about 'velocity'. The faster the freight moves, the more the port facilities can handle on a fixed resource base. By making a better use of existing facilities, ports could avoid time consuming and difficult new development. This approach is obvious, however, ports like Dares Salaam cargo outlet facilities such as railways operated far below the expected performance and hence called for more space to keep containers either in the port or in Inland Container Deports (ICDs). Velocity is simply distance over time Wards farther said, "at sea container freight moves at 25 knots. For example, to cover a distance of 6300 miles from Hong Kong to Los Angeles can take 11 to 12 days. But this is not the final destination, because of some constraint; this velocity will be reduced when it comes to inland transport. All the while that the container is moving at low speed, it is consuming valuable port and urban resources which are berths, terminal yards, urban roads and regional high ways. The slower it moves the more it consumes time". Therefore, we have to attack the velocity problem at all points simultaneously so that each element of the transport chain is capable of taking up the strain as neighboring links are improved (Emeghara, Theophilus & Nwoloziri, 2018).

Acciaro and Serra (2013), in the study of long duration of container stays in the port using the study of different ports in Africa identified the unpredictability of cargo dwell time as a major contributor to trade costs because shippers need to compensate for the uncertainty by raising their inventory levels. In other words, delay is not the only issue of importance when considering the impact of dwell time on the performance of trade; predictability and reliability of cargo dwell times are equally important because they have major impact on the total costs of trade logistics. Yeo, Pak and Yang (2013), in their study 'analysis of dynamic effects on seaports adopting port security policy found port authority itself can not comply with all issues such as the process of unloading or loading containers from and to the vessels, store it and conduct all procedure of clearing the containers exit at the port. They also need to allow other private firms to assist them with clearance of cargo at the port so as to increase the speed of cargo clearance to avoid congestion at the port. Government Port Decongesting Committee Report (2008) also analyzed the effects of port congestion and gave some suggestions to curb velocity problem such as extended gate hours, off- dock container yard, fast rail shuttle, integrated maritime and rail movement, and high-speed gates. However, none of the above approaches is sufficient by itself to relieve ports from congestion in a significant way.

Okeudo, (2013) found that Ports around the world play strategic roles in the development of domestic and international trade of any country whether it is a developing or developed country. Furthermore, that in a globalized world where distances are becoming squeezed, ports play an active role in sustaining the economic growth of any maritime nation.

Research Methodology

The research design applied in this study is the case study research design. The obtained data will be treated in a logical and statistical way. The case study method emphasizes quantitative analysis whereby data is collected through questionnaire, interviews, or from existing documents for example. The case study approach gives a 'compact scenario' of a particular situation at a certain point in time. Hence, the research is conducted at one specific moment in time which means it can be qualified as a cross-sectional study. This type of time horizon is will used because of the time limit of this study.

The population of the study consists of a complete group of entities sharing some common characteristics. The population of the study consists of all the staff in the two ports (Apapa,636 and Onne, 277). Therefore, the population of the study is 913 staff, distributed as follows:

Lagos Port Complex (Apapa)	= 636
Onne Port	= 277
Total	**= 913**

Source: NPA, (2018)

The sampling technique to be used in this study is the simple random technique. The choice of this method is predicated on the fact that every element in the study shall have equal chance of being studied. The sample elements of the study shall be drawn from the Sipping Managers, Operation Managers, Accountants, Supervisors and Billing Officers. The procedure for sample selection shall first involve the objective selection of the ports' workers active dealing with port operations and terminal activities in the two selected port. The study shall use Prof. Taro Yamane's Sample Size Formula to determine the sample size as follows: $n = N/1+ (e)^2$

Where:

n = Sample Size

N = Population of the Study

e = Level of Significance selected at 5%

Accordingly; the sample size (n) for the study is calculated thus:

$n = 913/1+913(0.05)^2 = 278.1416603198781$ i.e. 279

Sample Size = 279 staff

Data collection is the process of gathering data from either the primary or secondary sources for the purpose of the study analysis. The primary sources consist of first-hand information or raw data obtained by the researcher himself through the administration of research instruments. The secondary sources are existing data obtained from relevant materials such; books, journals, magazines and so on an unpublished work of others as well as valuable documents available to the researcher. Questionnaire was used to elicit data from respondents on whom they will be administered to. In all, the study utilized triangulations approach in the data collection.

In this study, percentages, ratios, frequency distribution, scaling, ranking and other statistical tools were used to analyse and achieve research objectives. Also, Pearson Product Moment Correlation Coefficient (r) and t- test would be used to test the hypotheses formulated in the study. All these analyses shall be computed by using statistical package for social sciences (SPSS) version 22.0.

Results And Discussions

In order to ascertain the extent to which liner shipping as a dimension or component of shipping operations affect container terminal performance, the study used 5 question items on the 5-point scale as shown in Table 2.

Table 2: Liner shipping as a Dimension of Shipping operations

S/N	Question Items on Liner shipping	N	$\bar{X}$	SD
1	To what extent does liner shipping offer veritable opportunities for shipping operations in your port?	222	3.256	1.042
2	To what extent does quality of your staff inputs in auditing engender the liner shipping of your port?	222	2.810	1.037
3	To what extent does passing information in the Liner shipping lead to the achievement of the expected auditing results in your port?	222	2.981	.9221
4	To what extent does your port give rooms for staff to suggest new ways or approach to liner shipping of your port?	222	3.054	1.156
5	To what extent does liner shipping become everybody's business in your port?	222	2.882	1.123

Source: Survey Data, 2019, and IBM SPSS Statistics 22 Window Output

Keys: VLGE = very large extent, LGE = large extent, MDE= moderate extent, LWE = low extent, VLWE: very low extent, S.D: standard deviation.

As shown in Table 2 above, the responses of the respondents have indicated the mean and standard deviation scores of 3.256±1.042, showing that the respondents collectively specified that to a moderate extent liner shipping offer veritable opportunities for shipping operations in port. Also, with the mean and standard deviation scores of 2.811±1.037 it is quite obvious that the respondents indicated on the aggregate that to moderate extent quality of your staff inputs in auditing engender the liner shipping in port. As to the extent to which passing information in liner shipping leads to the achievement of the expected results in port, the mean and standard deviation scores of 2.858±0.9221 indicate aggregate agreement. The data additionally revealed that the respondents agreed that to moderate extent ports give rooms for staff to suggest new ways or approach to liner shipping; this is shown by mean and standard deviation scores of 3.054±1.1561. Finally, the mean and standard deviation scores of 2.882±1.123 indicate that the respondents agreed that liner shipping becomes everybody's business in ports.

Cargo throughputs as a Measure of Container terminal performance

Table 3 shows the descriptive statistical results on cargo throughputs which is measured with five question items on the 5-point scale. The response distribution as shown by the results is indicative that cargo throughputs will enhance container terminal performance

Table 3: Cargo throughputs as a Measure of Container terminal performance

S/N	Question Items on Cargo throughputs	N	$\bar{X}$	SD
1	To what extent does effective shipping operations boost the container terminal performance of shipping activities?	222	3.396	0.972
2	To what extent are you always involved in important shipping activities that improve container terminal performance?	222	3.427	1.114
3	To what extent does your supervisor consider the opinion of others before making important decision that affects cargo throughputs?	222	3.117	1.099
4	To what extent do senior shipping staff discuss issues concerning the increase of cargo throughputs in your port?	222	3.333	1.103
5	To what extent is cargo throughputs often used as a key performance index (KPI) to review the effectiveness and efficiency in your port?	222	3.211	0.991

Source: Survey Data, 2019, and IBM SPSS Statistics 22 Window Output

Keys: VLGE = very large extent, LGE = large extent, MDE= moderate extent, LWE = low extent, VLWE: very low extent, S.D: standard deviation.

Table 3 shows the mean and standard deviation scores of 3.39640±0.972 indicating that the consensus opinion of the respondents revealed an agreement that to a moderate extent effective shipping operations boost the container terminal performance of shipping activities. Also, the mean and standard deviation scores of 3.427±1.114 imply the respondents agreed that to a moderate extent staff are always involved in important shipping activities that improve container terminal performance. The statistical result of 3.117±1.099 (mean and standard deviation scores) show that the respondents agreed that to a large extent supervisors consider the opinion of others before making important decision that affects cargo throughput. Table 3 also reveals the mean and standard deviation scores of 3.333±1.103 implying that the respondents agreed that to a moderate extent senior shipping staff discuss issues concerning the increase of cargo throughputs in ports. Finally, the mean and standard deviation scores of 3.211±0.991 show that the respondents agreed that to a moderate extent cargo throughputs are often used as a key performance index (KPI) to review the effectiveness and efficiency in ports.

Vessel turnaround time as a Measure of Container terminal performance

Table 4 shows how vessel turnaround time as a measure of container terminal performance was examined and empirically expressed through the raising descriptive statistical analysis of 5 question items.

As shown in Table 4 above, the responses of the respondents have indicated the mean and standard deviation scores of 3.288±1.045 showing that to a moderate extent shipping companies value giving satisfactory services to customers in order to engage them for patronage leading to vessel turnaround time. Also, the mean and standard deviation scores of 3.391±1.004 imply that the respondents agreed that to a moderate extent vessel turnaround time level is often used as a key performance index (KPI) to review the effectiveness and efficiency of shipping companies.

With the mean and standard deviation scores of 2.995±1.044, the respondents have indicated that to a moderate extent port give rooms for staff to engage customers for the vessel turnaround time. Table 4 shows the mean and standard deviation scores of 3.009±0.983 proving that the respondents indicated that to a moderate extent ports allow customers to make variety of choices through appropriate service engagements that elicit vessel turnaround time. Finally, the data revealed the mean and standard deviation scores of 3.211±1.123 indicating that to a moderate extent ships have the requisite skills to engage customers for the increased vessel turnaround time in ports.

Table 4: Vessel turnaround time as a Measure of Container terminal performance

S/N	Question Items on Allocative Efficiency	N	$\bar{X}$	SD
1	To what extent does your shipping company value giving satisfactory services to customers in order to engage them for patronage leading to vessel turnaround time?	222	3.288	1.045
2	To what extent is vessel turnaround time level often used as a key performance index (KPI) to review the effectiveness and efficiency in your shipping company?	222	3.391	1.004
3	To what extent does your port give rooms for staff to engage customers for the vessel turnaround time	222	2.995	1.044
4	To what extent does your port allow customers to make variety of choices through appropriate service engagements that elicit vessel turnaround time	222	3.009	0.983
5	To what extent do staff in your ship have the requisite skills to engage customers for the increased vessel turnaround time of the of the port	222	3.211	1.123

Source: Survey Data, 2019, and IBM SPSS Statistics 22 Window Output

Keys: VLGE = very large extent, LGE = large extent, MDE= moderate extent, LWE = low extent, VLWE: very low extent, S.D: standard deviation.

Statistical Test of Hypotheses and their Interpretations

Ho_1: There is no significant relationship between liner shipping and cargo throughputs of Apapa and Onne Ports

Ho_2: There is no significant relationship between liner shipping and vessel turnaround time of Apapa and Onne Ports.

Table 5: Results of Shipping Operation (SO) and Container Terminal Performance (CTP)

Statistics	HO_1	HO_2
	LS (CT)	LS (VTT)
Pearson correlation Sig (2-tailed) N	0.719** .000 222	0.885** .000 222

**correlation is significant at the 0.05 level (2-tailed)

Source: *Research Data 2019, and SPSS Window Output, Version 22.0*

Keys; LS = Liner Shipping; CT = Cargo Throughputs; VTT = Vessel Turnaround Time

Table 5 above shows the results of the test of hypothesized statements, Ho_1 and Ho_2. The results of the hypotheses tested showed positive relationships. For tramp shipping and cargo throughputs In respect to H_{O1} liner shipping and cargo throughputs, the r outcome of 0.719 @ p0.000 <0.05 mean that there is a strong positive relationship between H_{O1} liner shipping and cargo throughputs and it also significant; which also means that the null hypothesis as stated is rejected and the alternate is accepted. The examined relationship between liner shipping and vessel turnaround time which is our Ho_4 also showed a positive and significant relationship with rho = 0.885 @ p0.000<0.05. It also implies rejection of the null hypothesis earlier stated. From the inferential analysis so far, it can be stated that:

1. Liner shipping as a dimension of shipping operation has a positive and significant relationship with cargo throughputs as a measure of container terminal performance.
2. Liner shipping as a dimension of shipping operation has a positive and significant relationship with vessel turnaround time as a measure of container terminal performance.

Summary of quantitative findings

Table 6 has revealed in summary that the study rejected hypotheses: Ho_1 - Liner shipping has significant relationship with cargo throughputs; H_{02}: Liner shipping has significant relationship with vessel turnaround time.

Table 6: Summary of the Results on Test of the Research Hypotheses

Research Hypotheses	rho- value	Significant/Probability Value	Result	Decision
Ho_1: Liner shipping has a significant effect on cargo throughputs	0.719	0.000	Positive and Significant relationship	Reject
Ho_2: Liner shipping has significant effect on vessel turnaround time	0.885	0.000	Positive and Significant relationship	Reject

Source: Research Data 2019, and IBM SPSS Statistics 22 Window Output

Discussion of Findings

The study found a positive and significant relationship between liner shipping and cargo throughputs as well as vessel turnaround time and this points to the fact that, liner shipping is one of the key resourceful devices under which shipping operation could be perfected to impact on vessel turnaround time. A diagnostic examination of the findings reveals that the relationship between of liner shipping and cargo throughputs was positive and significant; the relationship between liner shipping and vessel turnaround time was positive and significant indicating (rho-value = 0.719 and rho-value = 0.885). This means that the ports and ship operators have fully embraced the liner shipping which according to Onwuegbuchulam (2012), is a marine transport channel that involves the transport of cargo, chiefly by container, on a regular basis, to ports on a particular geographic route, generally known as a "trade". The results of this study agree with the works of Yap and Lam (2013). who noted that shipping lines implicitly make a trade-off between the requirements of the customers and operational cost considerations. A higher demand for service segmentation adds to the growing complexity of the networks. Shippers demand direct services between their preferred ports of loading and discharge. The demand side thus exerts a strong pressure on the service schedules, port rotations and feeder linkages.

Shipping as one of the world's most international industries makes seaborne trade in a sense at the apex of world economic activity. Okeudo (2013), opines that as business has become more international, and newly industrialized countries have taken their place alongside the Organization for Economic Corporation and Development (OECD) countries, the maritime industry has provided the vehicle for an extraordinary growth of trade. This has also resulted to the progression from a world of isolated communities to an integrated global village.

The work of reveals that Nyama (2014) shipping is a complex industry and the conditions which govern its operations in one sector do not necessarily apply to another. In terms of its main assets, the ships vary widely in size and type. They provide the whole range of services for a variety of goods, whether over shorter or longer distances. The shipping market is made of the liner shipping, tramp shipping, bulk shipping, the charter market. Shipping is essentially a service industry; hence, ship demand depends on several factors such as price, speed, reliability and security.

Emenyonu, Onyema and Ahmodu (2016) in their study submit that liner shipping connectivity has a moderate positive and linear correlation of 0.442 with economic growth. This implies that as liner shipping connectivity increases, economic growth increases. In essence this aligns with the works of Emenyonu, Onyema and Ahmodu (2016) which was an econometric analysis of seaport development and its impacts on economic growth of Nigeria growth.

The findings of this study agree with the works of Roso and Lumsden (2010) who posit that the aim of liner shipping is to carry cargoes and transport them in various forms of packaging, such as pallets, boxes, barrels, and crates, by relatively small vessels, known as general cargo ships. These were twin-deckers and multi-deckers, i.e., ships with holds (cargo compartments) in a shelf-like arrangement, where goods were stowed in small pre-packaged consignments (parcels) according to destination.

Summary

This study investigated the relationship between liner shipping and container terminal performance of Apapa and Onne ports, Nigeria. Liner shipping has been examined as the independent variable. Also, container terminal performance served as the key dependent variable or criterion variable under which the measures such as cargo throughputs and vessel turnaround time have been appraised. The population of the study consisted of the staff in the two ports (Apapa, 636 and Onne, 277), that is 913 staff and the study sampled 279 respondents out of which 222 of them were found useful and valid foe the study analysis. The study used Pearson Products Moment Correlation Coefficient (r) to test the hypotheses with the aid of SPSS 22.0. The reliability of the research instrument was tested using the Cronbach alpha to ascertain the reliability of the instrument.

The study observed that liner shipping offers veritable opportunities for shipping operations in ports, quality of staff inputs in information engender the liner shipping of ports, passing information about liner shipping leads to the achievement of the expected shipping results in ports, ports give rooms for staff to suggest new ways or approach to liner shipping, liner shipping becomes everybody's business in ports.

Also, the study found that shipping companies value giving satisfactory services to customers in order to engage them for patronage leading to vessel turnaround time. Vessel turnaround time level is often used as a key performance index (KPI) to review the effectiveness and efficiency in shipping companies, ports give rooms for staff to engage customers for the vessel turnaround time, ports allows customers to make variety of choices through appropriate service engagements that elicit vessel turnaround time and staff in ship companies have the requisite skills to engage customers for the increased vessel turnaround time of the of the port.

Conclusion

The conclusions of this study provide holistic outcomes of the study. The study revealed that the perception of the respondents on how shipping operations are perfected vis-à-vis container terminal performance. The hypotheses tested indicate that there is a significant relationship between the dimensions of shipping operations and measures of container terminal performance. The conclusions of the outcome of the study also revealed that: Liner shipping has a positive and significant relationship with cargo throughputs of Apapa and Onne Ports; liner shipping has a positive and significant relationship with vessel turnaround time of Apapa and Onne Ports.

Recommendations

Based on the findings and the conclusions drawn in this study the following recommendations have been made:

1. Cargoes and passengers should be managed in most efficient manner through the use of tramp shipping so as to ensure optimum cargo throughputs in Nigerian ports.

2. There should be proper monitoring and control of inflows and outflows of containers

at the ports by liner shipping so as to reduce bottlenecks and improve vessel turnaround time.

3. Government and other stakeholders should expand the existing shipping operation models so as to enhance current container terminal capacity to accommodate more cargoes and vessels.

4. Operators' performance should be appraised constantly in order to ensure that the maritime sector is positioned to achieve the stakeholders' objectives in Nigerian ports

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Appendix A: SPSS Output of Liner Shipping and Container Terminal Performance of Apapa and Onne Ports
Reliability Computation Of The Instruments
Reliability
Scale: Liner Shipping

Case Processing Summary			
		N	%
Cases	Valid	222	100.0
	Excluded[a]	0	.0
	Total	222	100.0
a. Listwise deletion based on all variables in the procedure.			

Reliability Statistics	
Cronbach's Alpha	N of Items
.765	5

```
RELIABILITY
/VARIABLES=CT11 CT12 CT13 CT14 CT15
/SCALE ('CARGO THROUGHPUTS') ALL
/MODEL=ALPHA.
```

Reliability

Scale: CARGO THROUGHPUTS

Case Processing Summary			
		N	%
Cases	Valid	222	100.0
	Excluded[a]	0	.0
	Total	222	100.0
a. Listwise deletion based on all variables in the procedure.			

Reliability Statistics	
Cronbach's Alpha	N of Items
.829	5

```
RELIABILITY
/VARIABLES=VTT16 VTT17 VTT18 VTT19 VTT20
/SCALE ('VESSEL TURNAROUND TIME') ALL
/MODEL=ALPHA.
```

Reliability

Scale: VESSEL TURNAROUND TIME

Case Processing Summary			
		N	%
Cases	Valid	222	100.0
	Excluded[a]	0	.0
	Total	222	100.0
a. Listwise deletion based on all variables in the procedure.			

Reliability Statistics	
Cronbach's Alpha	N of Items
.783	5

SECTION B: LINER SHIPPING

To what extent do prompt, effective and efficient shipping services offer veritable opportunities to optimize container terminal performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	60	27.0	27.0	27.0
	Large Extent	78	35.1	35.1	62.2
	Moderate Extent	57	25.7	25.7	87.8
	Low Extent	21	9.5	9.5	97.3
	Very Low Extent	6	2.7	2.7	100.0
	Total	222	100.0	100.0	

To what extent does the quality of interaction of your staff with customers relate to the shipping operational services and influence vessel throughputs?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	112	50.5	50.5	50.5
	Large Extent	66	29.7	29.7	80.2
	Moderate Extent	24	10.8	10.8	91.0
	Low Extent	14	6.3	6.3	97.3
	Very Low Extent	6	2.7	2.7	100.0
	Total	222	100.0	100.0	

To what extent do you pass customers' service information to all the staff together to achieve the expected port results?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	80	36.0	36.0	36.0
	Large Extent	78	35.1	35.1	71.2
	Moderate Extent	56	25.2	25.2	96.4
	Low Extent	4	1.8	1.8	98.2
	Very Low Extent	4	1.8	1.8	100.0
	Total	222	100.0	100.0	

To what extent are there rooms for staff to suggest new ways or approach for meeting your customers satisfactorily in service?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	98	44.1	44.1	44.1
	Large Extent	50	22.5	22.5	66.7
	Moderate Extent	46	20.7	20.7	87.4
	Low Extent	20	9.0	9.0	96.4
	Very Low Extent	8	3.6	3.6	100.0
	Total	222	100.0	100.0	

To what extent has service to customers become everybody's business in shipping activities?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	120	54.1	54.1	54.1
	Large Extent	36	16.2	16.2	70.3
	Moderate Extent	44	19.8	19.8	90.1
	Low Extent	16	7.2	7.2	97.3
	Very Low Extent	6	2.7	2.7	100.0
	Total	222	100.0	100.0	

Summary Of Section B: Liner Shipping

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
To what extent do prompt, effective and efficient shipping services offer veritable opportunities to optimize container terminal performance	222	1.000	5.000	3.25676	1.042892
To what extent does the quality of interaction of your staff with customers relate to the shipping operational services and influence vessel throughputs?	222	1.000	5.000	2.81081	1.037867
To what extent do you pass customers' service information to all the staff together to achieve the expected port results?	222	1.000	5.000	2.98198	.922146
To what extent are there rooms for staff to suggest new ways or approach for meeting your customers satisfactorily in service?	222	1.000	5.000	3.05405	1.156041
To what extent has service to customers become everybody's business in shipping activities?	222	1.000	5.000	2.88288	1.123494
Valid N (listwise)	222				

Measures Of Container Terminal Performance
Section C: Cargo Throughputs

To what extent does effective shipping operations boost the container terminal performance of shipping activities?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	46	20.7	20.7	20.7
	Large Extent	72	32.4	32.4	53.2
	Moderate Extent	76	34.2	34.2	87.4
	Low Extent	26	11.7	11.7	99.1
	Very Low Extent	2	.9	.9	100.0
	Total	222	100.0	100.0	

To what extent are you always involved in important shipping activities that improve container terminal performance?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	55	24.8	24.8	24.8
	Large Extent	62	27.9	27.9	52.7
	Moderate Extent	70	31.5	31.5	84.2
	Low Extent	25	11.3	11.3	95.5
	Very Low Extent	10	4.5	4.5	100.0
	Total	222	100.0	100.0	

To what extent does your supervisor consider the opinion of others before making important decision that affects cargo throughputs?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	84	37.8	37.8	37.8
	Large Extent	62	27.9	27.9	65.8
	Moderate Extent	46	20.7	20.7	86.5
	Low Extent	26	11.7	11.7	98.2
	Very Low Extent	4	1.8	1.8	100.0
	Total	222	100.0	100.0	

To what extent do senior shipping staff discuss issues concerning the increase of cargo throughputs in your port?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	52	23.4	23.4	23.4
	Large Extent	90	40.5	40.5	64.0
	Moderate Extent	46	20.7	20.7	84.7
	Low Extent	22	9.9	9.9	94.6
	Very Low Extent	12	5.4	5.4	100.0
	Total	222	100.0	100.0	

To what extent is cargo throughputs often used as a key performance index (KPI) to review the effectiveness and efficiency in your port?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	63	28.4	28.4	28.4
	Large Extent	74	33.3	33.3	61.7
	Moderate Extent	62	27.9	27.9	89.6
	Low Extent	21	9.5	9.5	99.1
	Very Low Extent	2	.9	.9	100.0
	Total	222	100.0	100.0	

Summary Of Section C: Cargo Throughputs

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
To what extent does effective shipping operations boost the container terminal performance of shipping activities?	222	1.000	5.000	3.39640	.972744
To what extent are you always involved in important shipping activities that improve container terminal performance?	222	1.000	5.000	3.42793	1.114176
To what extent does your supervisor consider the opinion of others before making important decision that affects cargo throughputs?	222	1.000	5.000	3.11712	1.099064
To what extent do senior shipping staff discuss issues concerning the increase of cargo throughputs in your port?	222	1.000	5.000	3.33333	1.103949
To what extent is cargo throughputs often used as a key performance index (KPI) to review the effectiveness and efficiency in your port?	222	1.000	5.000	3.21171	.991022
Valid N (listwise)	222				

Section D: Vessel Turnaround Time

To what extent does your shipping company value giving satisfactory services to customers in order to engage them for patronage leading to vessel turnaround time?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	60	27.0	27.0	27.0
	Large Extent	72	32.4	32.4	59.5
	Moderate Extent	60	27.0	27.0	86.5
	Low Extent	26	11.7	11.7	98.2
	Very Low Extent	4	1.8	1.8	100.0
	Total	222	100.0	100.0	

To what extent is vessel turnaround time level often used as a key performance index (KPI) to review the effectiveness and efficiency in your shipping company?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	42	18.9	18.9	18.9
	Large Extent	85	38.3	38.3	57.2
	Moderate Extent	70	31.5	31.5	88.7
	Low Extent	16	7.2	7.2	95.9
	Very Low Extent	9	4.1	4.1	100.0
	Total	222	100.0	100.0	

To what extent does your give rooms for staff to engage customers for the vessel turnaround time					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	92	41.4	41.4	41.4
	Large Extent	63	28.4	28.4	69.8
	Moderate Extent	48	21.6	21.6	91.4
	Low Extent	14	6.3	6.3	97.7
	Very Low Extent	5	2.3	2.3	100.0
	Total	222	100.0	100.0	

To what extent does your port allow customers to make variety of choices through appropriate service engagements that elicit vessel turnaround time t					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	86	38.7	38.7	38.7
	Large Extent	66	29.7	29.7	68.5
	Moderate Extent	54	24.3	24.3	92.8
	Low Extent	14	6.3	6.3	99.1
	Very Low Extent	2	.9	.9	100.0
	Total	222	100.0	100.0	

To what extent do staff in your ship have the requisite skills to engage customers for the increased vessel turnaround time of the of the port					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Large Extent	69	31.1	31.1	31.1
	Large Extent	73	32.9	32.9	64.0
	Moderate Extent	60	27.0	27.0	91.0
	Low Extent	4	1.8	1.8	92.8
	Very Low Extent	16	7.2	7.2	100.0
	Total	222	100.0	100.0	

Summary Of Section D: Vessel Turnaround Time

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
To what extent does your shipping company value giving satisfactory services to customers in order to engage them for patronage leading to vessel turnaround time?	222	1.000	5.000	3.28829	1.045459
To what extent is vessel turnaround time level often used as a key performance index (KPI) to review the effectiveness and efficiency in your shipping company?	222	1.000	5.000	3.39189	1.004302
To what extent does your give rooms for staff to engage customers for the vessel turnaround time	222	1.000	5.000	3.99550	1.044259
To what extent does your port allarge customers to make variety of choices through appropriate service engagements that elicit vessel turnaround time t	222	1.000	5.000	3.00901	.983994
To what extent do staff in your ship have the requisite skills to engage customers for the increased vessel turnaround time of the of the port	222	1.000	5.000	3.21171	1.123685
Valid N (listwise)	222				

Computing Pearson Product Moment Correlation Coefficient Between Liner Shipping (X) And Cargo Throughput (Y) At The Nigeria Ports

The stated hypotheses are as follows:

H_0: $\rho_s = 0$: There is no significant correlation between liner shipping and cargo throughput at the Nigeria Ports;

H_1: $\rho_s \neq 0$: There is a significant correlation between liner shipping and cargo throughput at the Nigeria Ports;

Correlations			
		LINER SHIPPING	CARGO THROUGHPUTS
LINER SHIPPING	Pearson Correlation	1	.867**
	Sig. (2-tailed)		.000
	N	222	222
CARGO THROUGHPUTS	Pearson Correlation	.867**	1
	Sig. (2-tailed)	.000	
	N	222	222
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: SPSS ver. 22 Output window

From the SPSS output window, the correlation coefficient of the variables x and y is 0.867.

Interpretation

This positive large value of r (= 0.867) says that there is a weak positive correlation between liner shipping (x) and cargo throughputs (y) in the sample.

Because of the positive value of r direction is said to be the same: That is, as one increases, the other also increases.

Since the p-value (= 0.000) is less than the level of significance, α (= 0.05), we therefore, reject the null hypothesis and conclude that:

$H_1: \rho_s \neq 0$: There is a significant correlation between liner shipping and cargo throughput at the Nigeria Ports;

Computing Pearson Product Moment Correlation Coefficient Between Liner Shipping (X) And Vessel Turnaround Time (Y) At The Nigeria Ports

The stated hypotheses are as follows:

$H_0: \rho_s = 0$: There is no significant correlation between liner shipping and vessel turnaround time at the Nigeria Ports;

$H_1: \rho_s \neq 0$: There is a significant correlation between liner shipping and vessel turnaround time at the Nigeria Ports;

Correlations

		LINER SHIPPING	VESSEL TURNAROUND TIME
LINER SHIPPING	Pearson Correlation	1	.885**
	Sig. (2-tailed)		.000
	N	222	222
VESSEL TURNAROUND TIME	Pearson Correlation	.885**	1
	Sig. (2-tailed)	.000	
	N	222	222

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS ver. 22 Output window

From the SPSS output window, the correlation coefficient of the variables x and y is 0.885

Interpretation

This positive large value of r (= 0.885) says that there is a strong positive correlation between liner shipping (x) and vessel turnaround times (y) in the sample.

Because of the positive value of r direction is said to be the same: That is, as one increases, the other also increases.

Since the p-value (= 0.000) is less than the level of significance, α (= 0.05), we therefore, reject the null hypothesis and conclude that:

$H_1: \rho_s \neq 0$: There is a significant correlation between liner shipping and vessel turnaround time at the Nigeria Ports;

11/24/2019