

## INFLUENCE OF LANDLORD PORT ON EFFICIENCY OF PORTS IN NIGERIA

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### ABSTRACT

This study examined the relationship between landlord port and efficiency of ports in Nigeria. Data for the study were obtained by using a structured survey questionnaire as the research instrument to elicit data from the respondents. The population of the study consisted of six ports in Nigeria. The sample elements of the study consisted of 23 Managers/Officers/Supervisors from each of the six ports resulting to 138 copies of questionnaire were distributed to the respondents a, and 114 copies of questionnaire were retrieved from them. After editing them, 112 copies of questionnaire (representing 81% response rate) were found useful for the study analysis. Specifically, Pearson Products Moment Correlation Coefficient (r) was used to test the hypotheses with the aid of SPSS 25.0. The study revealed that landlord ports represent the most common management model where infrastructures, particularly terminals, are leased to private operating companies with the port authority retaining control of the land in order to encourage capacity utilization and efficiency aimed at achieving port efficiency. The study concluded that: landlord port significantly relates with berth occupancy rate ( $r = 0.854$ ), vessel turnaround time ( $r = 0.833$ ) and cargo dwell time ( $r = 0.796$ ) of ports in Nigeria. This study, therefore, recommended that on the basis of the success of the landlord port, Onne port should be given out or transformed into a private port for improved efficiency because the source of inputs like port infrastructures and machineries are the same as used with other ports.

**Keywords:** Landlord Port, Efficiency Of Ports, Berth Occupancy Rate, Vessel Turnaround Time, Cargo Dwell Time.

### I. INTRODUCTION

There are five main port management models based on the respective responsibility of the public and private sectors. They include the public service port, the tool port, the landlord port, the corporatized port, and the private service port (Zhang et al., 2019). Specific applications or elaborations of these models have been adopted by different countries' ports undergoing reforms and outcomes reported so far vary by country (Talley, 2017). In 2006, the Federal Government of Nigeria adopted the landlord port model and conceded the twenty-five (25) port terminals to private companies. In line with this agreement, the Nigerian Port Authority ceded some of its functions to the concessionaires. Cargo handling operations were transferred to these private companies and the Nigerian Port Authority (NPA) assumed the role of providing electricity, marine services and maintenance of facilities in the port (Ibrahim, 2022). Several studies have investigated the impact of the reform on the Nigerian ports, and all showed that the concession improved the performance of the seaports (Oyewole, 2020; Okeudo, 2013; Eniola, 2014; Akinyemi, 2016).

Effective port management, similarly, enhances sea trade, especially loading and unloading of cargoes (Eniola, 2014). The efficiency of terminal operations is important for cargo transshipment that ensures Nigeria ports comply with the 48 hours' cargo clearance rule of the International Maritime Organisation (IMO). Apparently, port efficiency is an important factor that boosts strategic development and port competitiveness. Ports respond to the escalating pressures to upgrade in order meet the growing sea traffic and changing technology in the maritime industry. Port efficiency should be improved in order to provide comparative advantages that will attract more customers. According to Tran (2019), some challenges encountered by ports are securing traffic flows and preventing diversion to other ports that include handling containers and goods rapidly, providing adequate equipment, decreasing berth times and catering large storage capacity and ensuring different modal connections to hinterland. The efficiency of a port has a direct and indirect impact on activities pertaining to maritime logistics, insurance and finance because of their position in a supply chain. These activities if well managed will enable job creation which will impact local and regional port vessel

turnaround time. Therefore, this research focuses on the examination of the relationship between landlord port and efficiency of ports in Nigeria.

### Objectives of the Study

The main purpose of this study was to empirically examine the impact of port management models and efficiency of ports in Nigeria. In line with this, the study seeks to achieve the following specific objectives:

- i. Assess the extent to which landlord port relates to berth occupancy rate of ports in Nigeria.
- ii. Examine how landlord port relates to vessel turnaround time of ports in Nigeria.
- iii. Ascertain the extent to which private port relates to cargo dwell time of ports in Nigeria.

### Research Questions

The following research questions was answered in this study:

- i. To what extent does landlord port relate to berth occupancy rate of ports in Nigeria?
- ii. To what extent does landlord port relate to vessel turnaround time of ports in Nigeria?
- iii. To what extent does landlord port relate to cargo dwell time of ports in Nigeria?

### Research Hypotheses

This study investigated the relationship between landlord port and port efficiency in Nigeria. Accordingly, the following hypotheses relating to the purpose and problems of the study have been formulated for investigation:

Ho<sub>1</sub>: There is no significant relationship between landlord port and berth occupancy rate of ports in Nigeria.

Ho<sub>2</sub>: There is no significant relationship between landlord port and vessel turnaround time of ports in Nigeria.

Ho<sub>3</sub>: There is no significant relationship between landlord port and cargo dwell time of ports in Nigeria.

## II. 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 such as queuing theory and general system theory. Also, the literature review has captured concepts like- landlord port, port efficiency, berth occupancy rate, vessel turnaround time, cargo dwell time and empirical studies.

### Theoretical Framework

This study examined the relationship between landlord port and efficiency of port in Nigeria. In this section, the theoretical framework that underpinned the study has been explored. Theories such as: Queuing Theory or Birth-and-Death Process Theory and General System Theory have been x-rayed in this section.

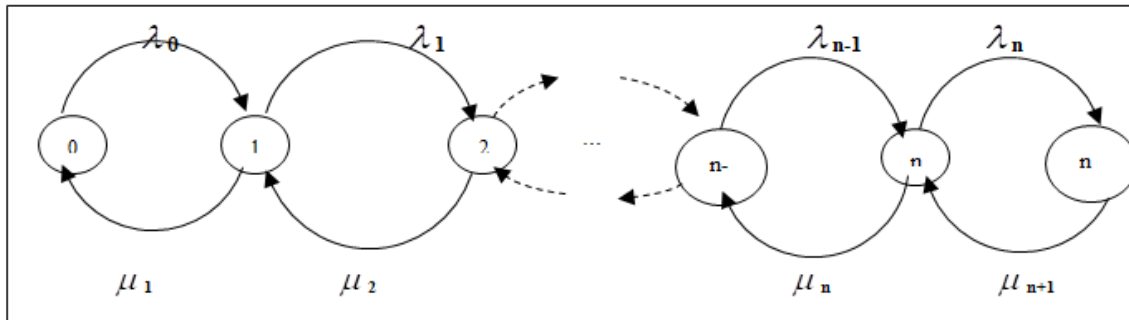
### Queuing Theory on Port Congestion (Birth-and-Death Process Theory)

In the context of queuing theory (Hillier & Gerald, 2014; Sundarapandian, 2009), 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 (Enyioko, 2016). The state of the system at time  $t$  ( $t \geq 0$ ), 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 Helix (2013) 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  $\lambda_n$  ( $n = 0, 1, 2, \dots$ ).

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

**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 state  $n+1$ , 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: Sundarapandian, V. (2009). Queueing Theory: Probability, Statistics and Queueing Theory. PHI Learning, 33(5) 519-527

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 (Enyioko, 2016). The approach is based on the rate-equality principle (Medhi, 2005) or balanced population model. Rate-Equality Principle states that the rate at which a process enters a state  $n$  ( $\geq 0$ ) 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. This principle implies that for any state of the system can be expressed by an equation which is called the balance equation for state  $n$  ( $n = 0, 1, 2, \dots$ ), and mean entering rate = mean leaving rate (Schwartz, 2015).

Sundarapandian (2009) pointed out the application of Queueing theory to curb port congestion problem at Tin Can Island Port in Nigeria, Hillier and Gerald (2014) observed that there are many queueing models that can be formulated and used to analyze problems of port congestion. The port management was using queueing model to handle 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.

**General System Theory**

The purpose of a theory is to explain, analyze, and possibly predict future trend of events and outcomes. A theory is a generalized explanation of the relationship that exists in a phenomenon with the primary purpose of explaining and predicting the phenomena (Bertalanffy, 1973). To understand port management and marine terminals in Nigeria, we employed general system theory as our theoretical framework of analysis for this work. As remarked by Bertalanffy (1973) who propounded the general system theory, system theory serves as the lens through which the activities of an organization are understood and explained. Accordingly, systems theory sees an organization as a unified purposeful entity composed of interrelated parts, rather than dealing separately with various parts of the organization (Schwartz, 2015). The theory gives managers a way of looking at an organization as a whole and part of the external environment. The theory makes the manager to understand the activity of any part as it affects the activity of all other parts or segments.

Above all, general system theory stresses the central point that the management of an organization cannot respond only to what administrative laws demand but must place what administrative laws dictate into perspective with other environmental pressures. In this regard, general system theory examines Nigerian Ports Authority with a view to determining how the seaports administration in Nigeria is done. It should explain how the management and administrative agencies of the Nigeria Ports Authority interact with their environment (Alderton, 2013). The theory makes possible the examination of formal administrative law prescription in the context of actual behavior in real organizations, such as Nigerian sea ports and other agencies. General system theory believes that if an agency like Nigeria Ports

Authority has real power in its environment like in the administration of seaports in Nigeria, it must have the ability to force the Federal Government policies on the seaport administration. Hence, if the Nigeria Ports Authority, for example, makes a policy decision, yet not authoritatively binding, it would presumably perish since the policies would not be obeyed. Applications of the theory.

In relating this general system theory to this work, the theory sees Nigeria sea ports as a unified and purposeful entity composed of interrelated parts, rather than dealing separately with various parts of the organization. The theory gives the management of Nigeria Ports Authority a way of looking at the Nigeria sea ports as a whole and Apapa port complex as part of the external environment. The theory makes Nigeria Ports Authority management to understand the activity of every segment of the Nigeria sea ports as it affects the activity of every other part of the seaports in Nigeria, as well as the duty of the Nigeria Ports Authority management in the administration of seaports in Nigeria. It will also ensure that all parts of the organization, (seaports in Nigeria), are well co-ordinate so that the Federal Government objective in the seaports administration in Nigeria is realize/achieve. The theory equally makes possible the examination of formal administrative law prescription in the Nigeria seaports and other agencies. The theory helps to explain how agencies of the seaports in Nigeria struggle to survive in a hostile environment like the Apapa port complex in particular and other ports complex in general in carrying out their assigned duties (Akinyemi, 2016).

**Conceptual Review**

**Conceptual Framework**

This study is interested in intellectualizing landlord port as the umbrella for the conceptual framework of the study. This conceptualization has been adopted from the earlier works of Acheampong et al., (2022), Ma et al., (2021) and Brooks et al., (2020) as depicted in Figure 2.

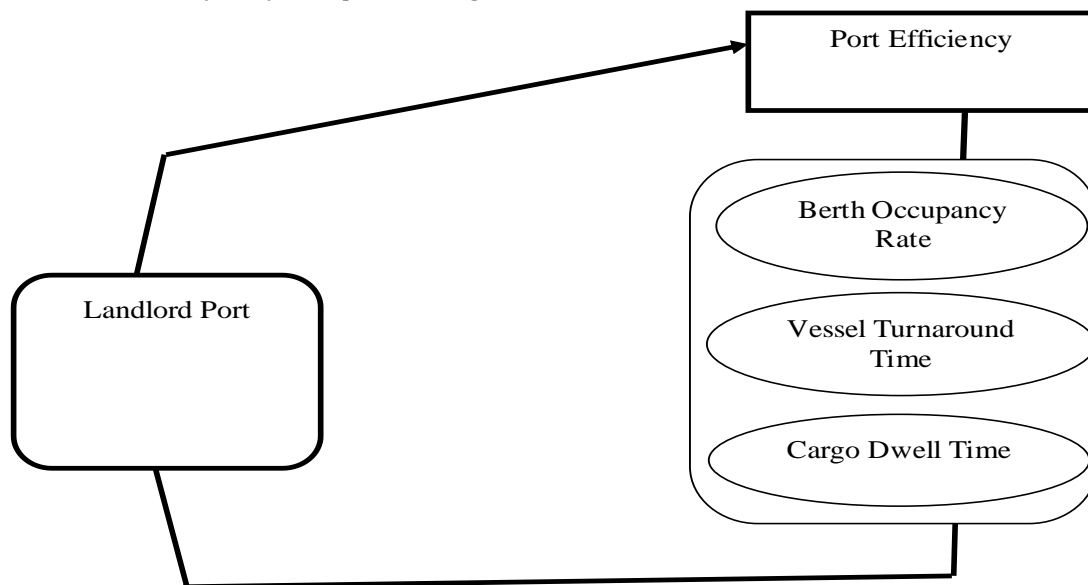


Figure 2: Conceptual Framework of the Relationship between Landlord Port and Port Efficiency in Nigeria

Sources: Acheampong *et al.* (2022). Stakeholder legitimacy and efficiency: The case of innovation at the Port of Tema, Ghana. *International Journal of Business and Global Trade* 30(1),92–110.

Ma *et al.* (2021). Port integration and regional economic development: lessons from China. *Transport Policy* 110:430–439.

Researcher’s Review of Relevant Literature, (2023).

**Landlord Port**

The landlord port pattern may be regarded as the provision and transfer of basic port infrastructure and services to private companies by means of some sort of leasing arrangement or contractual agreement to provide cargo-handling services. The contractual arrangement may be on short term or long-term basis. Besides, the port authority provides the operators with land areas for storage and other activities to protect the interest of the port (Dooms, 2018). It could be a city port decentralised from the state. In exercising some

control, the Port Authority regulates the activities of the port, ensuring that all activities are in the interest of the port, administers land and ensures the maintenance of the infrastructure including the depth of the berths (Brooks et al., 2020).

The landlord port is the most widely used model being undertaken by many ports around the world especially in many advanced countries. It is characterized by its mixed public-private orientation. Contrary to the philosophy of the tool port model where the port authority invests heavily in both structures and superstructures and maintain operational staff, the landlord model has a clear separation of functions where the port authority acts only as regulatory body and also as landlord of the port, while port operations; cargo handling to be specific are carried out by private companies authorized by the port authority to carry out those functions. For instance, the ports of Rotterdam, Antwerp and New York among others are classified to be landlord ports (De Langen & Sharypova, 2013).

This type of model allows for the release of port infrastructure through lease arrangement to private operating companies or to industries such as refineries, tank terminals, and chemical plants where the money to be paid to the port authority is usually a fixed sum per square meter per year which is worked to take into consideration inflation and other economic variables to be agreed by both parties before commencement. The calculation is also to be worked to commensurate the cost involved in preparing the structures put in place. An example of such are land reclamation and quay wall construction (World Bank, 2019).

The introduction of the landlord structure requires a consensus between government, labour and private management on the procedures for transferring contract of services and assets to the private sector. This is followed by a regional expansion of the private sectors role in operations and investment in the evolution of the contractual relationship between the parties and the development of a common set of goals for the port and its users. Ideally, the process should not emphasize the form one institutional structure to another but rather the continuing allocation of responsibilities so as to improve the quality of Port services (Dooms, 2018). In order to be effective this process requires specific objectives.

The Landlord Port is characterized by the mixture of public-private composition. Under this model, the port authority serves a dual role as both regulator and landlord, while the operations of the port, in particular the cargo handling activities, are carried out and implemented by private firms (World Bank, 2019). The ports of Rotterdam, Antwerp and Singapore are classic examples of the Landlord port model.

Today, this model is the most dominant port model, adopted by small, medium and large ports across the world. Additionally, the infrastructure such as refineries, tank terminals, and chemical plants is leased to private companies by the port authority (Acheampong et al., 2022). Usually, the lease amount paid to the port authority is a fixed sum and is adjusted to either the present or future value of the investment or future inflation. Furthermore, the superstructure, which is consider a mobile or removable asset (such as workshops, warehouses, offices, container freight stations), is owned and maintained by the private operators. The purchase and installation of equipment and employment within the terminal is the responsibility of the private companies. As explicitly argued by the World Bank (2007), in this model, dock workers are employed by the private terminal operators. However, in some cases or some ports, a segment of the dock labour force maybe provided through a pool system.

### **Port Efficiency**

Port efficiency is a multi-dimensional concept that refers to operational performance, particularly the maximization of the produced output or the production of a given output with limited possible resources. It has expanded to include additional dimensions of port performance. Ancor et al., (2016) define efficiency as the ability to achieve an end goal with little to no waste, effort, or energy. Being efficient means, achieving results by putting the resources available in the best way possible. Several careful literature reviews have disclosed numerous aspects that occupy port research involving efficiency evaluation (Al-Eraqi et al., 2008; Demirel, et al., 2012).

Efficiency can be broken down further in terms of its technical and allocative nature. Port efficiency (PE) analyses the ability of a port to obtain the maximum output under a given number of inputs. Therefore, gains in efficiency represent an improvement in performance closer to optima (Suarez-Aleman et al., 2016). PE is a keen

component of port performance (Notteboom et al., 2021). Several authors studied the effects of PE on transportation cost, trade, port competition, and socio-economic issues.

Port performance indicators (PPIs) is simply defined as a measured aspect of a port's operation to maximize berth occupancy rate and economic objectives (UNCTAD 2016). Hence a cost-effective port must achieve optimum and technical efficient (TE) throughput to meet its goals (Shetty and Dwarakish 2018; Talley 2006). A port performance measurement depends on several PPIs that affect regional competitiveness and optimum throughput. These factors may vary depending on the port location and region; however, the essential Port performance indicators (PPIs) are berthing capacity, storing capacity, loading/unloading equipment, floor size, and the number of gates lanes (Melalla et al., 2016). Nevertheless, the standard measurement of port performance is related to several factors such as vessel dwell time (DT), loading/unloading the cargo, quality storage, and inland transport (Shetty and Dwarakish 2018).

### **Berth Occupancy Rate**

Occupancy ratio plays an important role in port planning and port master plan design. The number of berths should be established based on operational requirements, driven primarily by berth occupancy considerations (Gani, 2017). The optimum berth occupancy depends on throughput requirements and site constraints. The assessment of the berth occupancy is based on the consideration of vessel arrival and departure times, time at berth or vessel turnaround time, downtime caused by maintenance, and severe environmental conditions (stopping of loading and/or vessel leaving the berth) (Figueiredo De Oliveira & Cariou, 2015). This parameter is obtained as the function of berth occupancy, number of births, number of containers, waiting and service times and berthing and unberthing times (CEPAL 2019).

Various methods and approaches are presented in references and standards for definition of berth occupancy ratio. For example, this ratio is presented in PIANC mainly in term of yearly working times that results an average value of occupancy ratio in a year (Clark et al., 2004).

Çelebi (2017) defines berth occupancy rate in term of weekly working and service hours which may results various values for seasons and every month in a year. In addition to design stage and port planning, occupancy ratio is used to evaluate in service port performance in order to planning and performance optimization purpose. Berth occupancy studies help the designers to plan a terminal in optimum throughput, traffic condition and ship waiting time. Low value of berth occupancy ratio is not acceptable to the port authority from economically point of view, while the high value leads to traffic congestion and increase of ship waiting time. The optimum range of 30-90 and 40-70 percent are given in terms of number of berth and cargo type (container, bulk and liquid bulk) in the related standards (Jung, 2011). . Berth occupancy is the ratio of time the berth is occupied by a vessel to the total time available in that period. High berth occupancy is a sign of congestion (>70%) and hence decline of services, while low berth occupancy signifies underutilization of resources (<50%) (Talley, 2017).

### **Vessel Turnaround Time**

Turnaround times directly impacts port container performance from both economic and operational point of view (Sarriera, 2015). 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 (Pérez et al., 2016).

The vessel turnaround time can vary depending on many factors: ships' particulars such as size, and type, and speed of service being provided to ship operators. The larger the vessel, the longer the ship-turn round time tends to be. Similarly, a general cargo vessel with many small consignments and different packaging requires a longer services time and thus longer turnaround time compared to a Ro/Ro vessel with only one type of cargo, mainly vehicles. On the other hand, it is obvious that the faster the service provided to the ship operator, the shorter the vessel turnaround time will be. Therefore, it is more logical to present the average turn round time of each type of ship (Talley, 2017).

Turnaround times directly impacts port container performance from both economic and operational point of view (Kraemer, 2021). 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 (Bhadury, 2016). Based on statistics provided by CEPAL (2020) for a certain period, ships' turn-around time is equivalent to the ships' service time at berth as there is 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 (Çetin et al., 2017). 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. Gani (2017) submits that vessel turnaround time is the average time the unit (vessel) spends in the system.

### **Cargo Dwell Time**

Cargo dwell time (CDT) is the amount of time a cargo or ship spends within a port (Rodrigue & Notteboom 2021). It is also an indication of the efficiency levels of a seaport (Notteboom et al., 2021). DT impacts port productivity and efficiency; thus, reducing DT will improve port productivity. Port productivity is used frequently to measure and compare the performance of a firm's ratio of output over input, while PE analyses the ability of a port to obtain the maximum result under a given amount of input (Suarez-Aleman et al., 2016; Talley 2017). Several authors studied the relationship between DT and port productivity. Shetty and Dwarakish (2018) reviewed the relationship between performance parameters and the port's productivity. PPI's data was retrieved from the new Mangalore port from 1990 to 2015. Results revealed a strong negative correlation between idling time at berth, turnaround time of a vessel, and idle time at berth to the port's productivity.

Aminatou et al. (2018) studied the impact of long cargo Cargo dwell time (CDT) on port performance. A shipment level analysis was conducted using original and extensive data on container imports in the Port of Douala, Cameroon. They investigated why containers stay an average exceeding two weeks at berth. Their findings revealed that internal factors such as the logistics performance of consignees, port operations, and the efficiency of customs clearance operations and external factors such as customs procedures, shippers, and shipping lines were the main contributors to long Cargo dwell time (CDT). Hassan et al., (2017) analyze the Cargo dwell time (CDT) of containers at container terminals in Indonesia. Root Cause Analysis and Problem Tree framework analyzed operational data and interviews. The results from the simulation revealed that container handling equipment had a significant impact on DT. Finding also revealed that most DT was contributed by a prolonged time of containers stay at the terminal yard (Aigner et al., 1977).

The assertion that the cargo dwell time of ports is largely influenced by a national and/or regional situation was confirmed by the positive influence of GDP per capita and of the number of calls on cargo dwell time. However, three composite indices about logistics performance, port infrastructure quality, and global connectedness, did not play a statistically significant role on cargo dwell time (Ndikom, 2013). Only the Logistics Performance Index (LPI) played a significant role in reducing average turnaround times at ports for the year 2020, but this research has provided only the results from the pooling database for the sake of space and compactness (UNCTAD, 2021a). Among the network indicators mobilized in this study, only the eccentricity of ports played a significant role. Between centrality, degree centrality, and the clustering coefficient (hub position) had some significance only when trying to explain traffic volumes. One of the contributions of this study is the complementary perspective it provides on cargo dwell time where continental and national factors play a vital role alongside individual port trajectories: port authorities can improve the efficiency of their ports, but their choices are to some extent determined and constrained by national conditions.

### **Empirical Studies (Landlord Port and Port Efficiency)**

Most countries do not intend to privatize port authorities, adopting a landlord model with private operators with concessions of 30 years or more (De Langen & Sharypova, 2013; Cong et al., 2020). In turn, there are port authorities fully privatized as in New Zealand port (Brooks et al., 2020) or by grant of a concession by

government, such as Piraeus or new autonomous port authorities, such as the ones of the ports of Turkey and China (Notteboom et al., 2013; Da Silva & Rocha, 2012).

Notteboom and Haralambides (2020) investigated port management and governance in post Covid-19 era: Quo Vadis. The study observed that the landlord port is characterized by its mixed public-private orientation. Under this model, the port authority acts as regulatory body and as landlord, while port operations (especially cargo handling) are carried out by private companies. Examples of landlord ports are Rotterdam, Antwerp, New York, and since 1997, Singapore. Today, the landlord port is the dominant port model in larger and medium sized ports (Tran, 2019).

Kraemer (2021) did an overview of operational issues: port management and operations and found that in the landlord port model, infrastructure is leased to private operating companies or to industries such as refineries, tank terminals, and chemical plants. The lease to be paid to the port authority is usually a fixed sum per square meter per year, typically indexed to some measure of inflation. The level of the lease amount is related to the initial preparation and construction costs (for example, land reclamation and quay wall construction). The private port operators provide and maintain their own superstructure including buildings (offices, sheds, warehouses, container freight stations, workshops). They also purchase and install their own equipment on the terminal grounds as required by their business. In landlord ports, dock labor is employed by private terminal operators, although in some ports part of the labor may be provided through a port wide labor pool system.

Van Dyck (2016) conducted an empirical assessment of inter-port competition in West Africa towards hub port selection. The revealed that there are port authorities that depends on local cities or regional, national or federal central decisions. In Brazil, the power was recently concentrated in a national authority. The study further found that government plays an important role in defining and achieving strategic and socio-economic policy objectives, underlying its ownership of the port authority.

Onwuegbuchulam (2012) examined productivity and efficiency of Nigerian Seaports: A production frontier Analysis. The study revealed that the strategic choices and strategic management options for port authorities are co-determined by port characteristics, such as location, infrastructure - both natural as created-, activities, and competitive environment. Also, Notteboom et al. (2021) in their work port economics, management, and policy: A comprehensive analysis of the port industry revealed the term 'port' that is used in this research is derivative and is sufficiently broad to incorporate a wide range of possible strategic issues of port authority's objectives including landlord port orientation. They maintain that the port is a land area with maritime and hinterland access that has developed into a logistics and industrial centre, playing an important role in global industrial and logistics networks.

While Notteboom (2015) in his exposition focuses on the role of a port in logistics networks we extend the definition with the role of ports in industrial networks. The port defined as such is a collection of a diverse set of economic activities. We define the port authority as a land manager with responsibility for a safe, sustainable and competitive development of the port. The landlord function of a port authority is defined in line with literature on port governance models (Wang et al., 2012; Port Strategy, 2020; Russ et al., 2018).

Sorgenfrei (2018) in port business observed that the landlord function comprises the development, management and control of the port area, including nautical access and port infrastructure, taking into account safety and environmental issues. With strategic scope we mean the set of strategic activities that an organization determines as core activities. Activities can be fully incorporated in the organization or done in some kind of network form.

Töngür et al. (2020) submit that in port studies not so much can be found on the specific strategy making of port authorities for their own organization. A vast amount of literature focuses on port governance, putting central the question how responsibilities in the port are coordinated: by the market mechanism (private companies) or by some kind of public organization (Talley, 2017; Treves, 2020; Rodrigue, 2020). Ogunsiji (2011) as he examined comparative port performance efficiency measurement in developing nations: A matching framework analysis, found that port management models have helped structuring thinking about governance in ports, however they do not cover the complete field that can be found in practice. Although the port authority plays a central role in these port governance models, their functioning is rather a resulting



factor. Additional remark that we have on the port governance modeling work is that the responsibilities in the port are analysed individually. The responsibility for integration and coordination of the different functions is left aside. Making use of theories from strategy research, Brooks et al. (2020) have developed a matching framework that optimizes the fit between the port's operating environment, the strategy and the structure of the port, together leading to an optimal performance of the port. It is a conceptual approach, based on configuration theory that tries to incorporate the differing environments of different ports into the approach on port governance (structure and strategy relationship).

Zaucha and Kreiner (2021) concluded that the economic analysis and implementation of dynamic terminal concession contracts in ports remains an unexplored study field for maritime economists We can say that in the last three decades academics have made valuable contributions to the field of port governance and thereby touching the role of the port authority. The study hypothesizes that: Ho<sub>4</sub>: There is no significant relationship between landlord port and berth occupancy rate of ports in Nigeria. Ho<sub>5</sub>: There is no significant relationship between landlord port and vessel turnaround time of ports in Nigeria. Ho<sub>6</sub>: There is no significant relationship between landlord port and cargo dwell time of ports in Nigeria. cargo throughput of ports in Nigeria.

### III. METHODOLOGY

The research design to be applied in this study is the cross-sectional survey design. The cross-sectional survey design method emphasizes quantitative analysis whereby data are collected through questionnaire, interviews, or from existing documents for example. The population of the study consisted of 6 ports in Nigeria, namely Lagos Port Complex, Tincan Port, Warri Port, Calabar Port, Port Harcourt Port and Onne Port. Considering that the population of the study was not large 23 Managers/ Officers/ Supervisors were selected in each of the six ports and that brought the total to 138 staff. There was no need to involve the study in random sampling. Rather the researcher conducted a census study. The sampling technique used in this study was the purposive sample distribution. The choice of this method is predicated on the fact that the sample distribution has the characteristics needed to execute the study. The sample elements of the study were drawn from the Port Managers/Harbour Managers/Officers, Port Servicom Officer, Chief Port Accountants/Accountants/Officers, Port Human Resources Managers/Officers, Traffic Managers/Officers, Port Legal Officers and others who are directly involved in the port managerial activities. In this study, the reliability was verified by conducting a confirmatory test of internal consistency on the instrument with the sample using the Cronbach alpha. The Cronbach alpha that indicated the only result of 0.7 and above were considered as reliable while any result below 0.7 were painstaking taken as unreliable. All the analyses in this study were done with descriptive and inferential statistical tools. Correlation analyses were used to test the extent of the relationship between individual and collective variable(s) on the other. Also, Pearson's Product Moment Correlation Coefficient (r) was used to test the hypotheses formulated in the study as they tested relationships. The formula for Pearson's Product Moment Correlation Co-efficient is given as follows:

$$r = \frac{n(\sum x y) - (\sum x)(\sum y)}{\sqrt{[n(\sum x^2) - (\sum x)^2] [n\sum y^2 - (\sum y)^2]}}$$

For 't' we have:

$$t = \frac{r \sqrt{n-2}}{\sqrt{1-r^2}}$$

Where;

- r = correlation coefficient
- n = number of observations
- x = predictor variable
- y = criterion variable

#### IV. RESULTS

In this section, the study presents the univariate data analysis on the examined constructs. The univariate analysis on each of the operationalized variables is presented. In generating the data on the operationalized variables, the study used a 4-point Likert scale instrument. Based on this scale; options, responses and associated rating points, the mean, standard deviation, variances, and responses to issues raised in the research are presented below, using the SPSS software package window output, Version 25.0. The analysis is commenced with the table on landlord port.

**Table 1:** Responses on Landlord port

	Question Items on Landlord port	Mean	STD
1	Landlord port offers prompt, effective and efficient port services towards achieving optimal port efficiency in Nigeria	3.672	0.510
2	Landlord port influence seaborne trade in Nigerian ports	3.133	0.642
3	Landlord port is very impactful in improving sea transport for effective efficient port in Nigeria	3.200	0.997
4	Landlord ports represent the most common management model where infrastructures, particularly terminals, are leased to private operating companies with the port authority retaining control of the land in order to encourage capacity utilization and efficiency aimed at achieving quick cargo throughputs	3.110	0.929
5	Landlord port has been impactful in achieving the objective of port efficiency in Nigeria	3.438	0.586
	Valid N listwise	112	

**Source: Survey Data, 2023, and SPSS Window Output, Version 25.0 (Appendix B)**

In order to ascertain whether landlord port offers prompt, effective and efficient port services towards achieving optimal port efficiency in Nigeria, the study used 5 question items on the 4-point scale of very strongly agree often to very strongly disagree. As shown in Table 1 above, the first question item asked if landlord port offers prompt, effective and efficient port services towards achieving optimal port efficiency in Nigeria. The response generated indicates that they agree that the landlord port offers prompt, effective and efficient port services towards achieving optimal port efficiency in Nigeria. This is shown by the mean and standard deviation scores of  $3.672 \pm 0.510$ . For the 2<sup>nd</sup> question item, the question sought to know whether landlord port influences seaborne trade in Nigerian ports. The mean and standard deviation scores of  $3.133 \pm 0.642$  indicate that respondents agreed that landlord port influences seaborne trade in Nigerian ports. In the case of the 3<sup>rd</sup> question item determined if landlord port is very impactful in improving sea transport for effective efficient port in Nigeria.

From the response, the mean and standard deviation scores of  $3.200 \pm 0.997$  it is quite assertive that the respondents agreed that landlord port is very impactful in improving sea transport for effective efficient port in Nigeria. For the 4<sup>th</sup> question item, it sought to know if ports have the facilities, equipment and personnel to perform maximally for efficiency in vessel turnaround time of the port. From the responses showing the mean and standard deviation scores of  $3.110 \pm 0.929$  confirm that landlord ports represent the most common management model where infrastructures, particularly terminals, are leased to private operating companies with the port authority retaining control of the land in order to encourage capacity utilization and efficiency aimed at achieving quick cargo throughputs. From the mean and standard deviation scores of  $3.438 \pm 0.586$ , the respondents agree that landlord port has been impactful in achieving the objective of port efficiency in Nigeria.

**Table 2:** Responses on Berth Occupancy Rate

	<b>Question Items on Berth Occupancy Rate</b>	<b>Mean</b>	<b>STD</b>
1	Ports value giving satisfactory and accurate information to the stakeholders to achieve lower berth occupancy rate	3.848	0.373
2	Ports engage in activities that encourage efficiency and berth occupancy as berth occupancy studies help the designers to plan a terminal in optimum throughput, traffic condition and ship waiting time	3.190	0.588
3	Ports allow for the management staff to engage other staff in robust and critical issues pertaining to their efficient performance with reference to berth occupancy rate	3.352	0.770
4	Lower berth occupancy rate is the target all stakeholders aim to achieve because a higher productivity and rippling effect on the supply chain and can even lead to less cost incurred in the chain that ultimately leads to port efficiency.	3.281	0.808
5	Berth occupancy rate in term of weekly working and service hours which may results various values for seasons and every month in a year at ports.	3.214	0.576
	Valid N listwise	112	

**Source: Survey Data, 2023, and SPSS Window Output, Version 25.0(Appendix E)**

Table 2 shows descriptive results on berth occupancy rate which is measured with five question items on the 4-point scale. The first question item which sought to know whether ports value giving satisfactory and accurate information to the stakeholders to achieve lower berth occupancy rate had the mean and standard deviation scores of  $3.848 \pm 0.373$  meaning that the respondents agreed that ports value giving satisfactory and accurate information to the stakeholders to achieve lower berth occupancy rate.

The 2<sup>nd</sup> question sought to determine whether ports engage in activities that encourage efficiency and berth occupancy as berth occupancy studies help the designers to plan a terminal in optimum throughput, traffic condition and ship waiting time and the mean and standard deviation scores of  $3.190 \pm 0.588$  indicate positive agreement from the respondents. In the case of the 3<sup>rd</sup> The mean and standard deviation scores of  $3.352 \pm 0.770$  revealed that the respondents agreed that ports allow for the management staff to engage other staff in robust and critical issues pertaining to their efficient performance with reference to berth occupancy rate. Also, the 4<sup>th</sup> question items which sought to determine whether lower berth occupancy rate is the target all stakeholders aim to achieve because a higher productivity and rippling effect on the supply chain and can even lead to less cost incurred in the chain that ultimately leads to port efficiency had the mean and standard deviation scores of  $3.281 \pm 0.808$  as agreed by the respondents. The 5<sup>th</sup> question determined whether berth occupancy rate in term of weekly working and service hours which may results various values for seasons and every month in a year at ports. The item has the mean and standard deviation scores of  $3.214 \pm 0.576$  which reflects that the respondents agreed that berth occupancy rate in term of weekly working and service hours which may results various values for seasons and every month in a year at ports.

**Table 3:** Responses on Vessel Turnaround Time

	<b>Question Items on Vessel turnaround time</b>	<b>Mean</b>	<b>STD</b>
1	Port satisfactory services to clients and shipping firms lead to effective vessel turnaround time	3.338	0.709
2	Vessel turnaround time is often used as a key performance indicator (KPI) to review the effectiveness and efficiency in your port	3.933	0.872
3	Port allows rooms for staff to engage customers in discussions on how to improve the port's vessel turnaround time	3.295	0.823
4	Port allows clients to make variety of choices through appropriate service engagements that elicit vessel turnaround time	3.262	0.832
5	Ports have the facilities, equipment and personnel to perform maximally for efficiency in vessel turnaround time of the port.	3.757	0.556
Valid N listwise		112	

**Source: Survey Data, 2023, and SPSS Window Output, Version 25.0(Appendix F)**

Vessel turnaround time as a measure of port efficiency was examined and empirically expressed in Table 3, in the studied six ports and 5 question items were raised. For the first question item, the result indicated that ports give satisfactory services to clients and shipping firms that lead to effective vessel turnaround time. The mean and standard deviation scores of  $3.338 \pm 0.709$  prove that. The second question item with the mean and standard deviation scores of  $3.933 \pm 0.872$  is an indication that the respondents agreed that vessel turnaround time is often used as a key performance indicator (KPI) to review the effectiveness and efficiency in your port. The third question item has the mean and standard deviation scores of  $3.295 \pm 0.823$  revealed that the respondents agreed that port allows rooms for staff to engage customers in discussions on how to improve the port's vessel turnaround time. The 4<sup>th</sup> question item also sought to know whether port allows clients to make variety of choices through appropriate service engagements that elicit vessel turnaround time.

The mean and standard deviation scores of  $3.262 \pm 0.832$  indicate that port allows clients to make variety of choices through appropriate service engagements that elicit vessel turnaround time. The 5<sup>th</sup> question item also sought to know if ports have the facilities, equipment and personnel to perform maximally for efficiency in vessel turnaround time of the port. The mean and standard deviation scores of  $3.757 \pm 0.556$  indicate that ports have the facilities, equipment and personnel to perform maximally for efficiency in vessel turnaround time of the port.

**Table 4:** Responses Cargo Dwell Time

	<b>Question Items on Cargo dwell time</b>	<b>Mean</b>	<b>STD</b>
1	Effective cargo handling equipment boosts the cargo dwell time in Nigerian Ports	3.605	0.765
2	Ports are always involved in the activities that can improve cargo dwell time in Nigerian Ports	3.605	0.699
3	Ports consider the opinion of workers before making important decision that affects cargo dwell time	3.457	0.771
4	Ports deliberate on issues concerning the increase of cargo dwell time in your port	3.576	0.495
5	Cargo dwell time is often used as a key performance indicator (KPI) to review the effectiveness and efficiency in port	3.957	1.159
Valid N listwise		112	

**Source: Survey Data, 2023, and SPSS Window Output, Version 25.0(Appendix G)**

Cargo dwell time as a measure of port efficiency was examined and empirically expressed in Table 4 in the studied ports; 5 question items were raised on it. For the 1<sup>st</sup> question item, the result indicated that effective cargo handling equipment boosts the cargo dwell time in Nigerian ports . The mean and standard deviation scores of  $3.605 \pm 0.765$  were the evidence that effective cargo handling equipment boosts the cargo dwell time in Nigerian Ports . The 2<sup>nd</sup> question item with the mean and standard deviation scores of  $3.605 \pm 0.699$  indicate that the respondents agreed that ports are always involved in the activities that can improve cargo dwell time in Nigerian ports. The 3<sup>rd</sup> question item has the mean and standard deviation scores of  $3.457 \pm 0.771$  indicating that the respondents favour the statement that ports consider the opinion of workers before making important decision that affects cargo dwell time. The 4<sup>th</sup> question item also sought to know if ports deliberate on issues concerning the increase of cargo dwell time. The mean and standard deviation scores of  $3.576 \pm 0.495$  indicate that ports deliberate on issues concerning the increase of cargo dwell time. The 5<sup>th</sup> question item also sought to know whether cargo dwell time is often used as a key performance indicator (KPI) to review the effectiveness and efficiency in port, the mean and standard deviation scores of  $3.957 \pm 1.159$  authenticate that.

**Test of Hypotheses**

To determine the relationships that exist between these variables, the study formulated the following hypotheses:

To test the relationship between the landlord port and port efficiency the study formulated the following hypotheses:

Ho<sub>1</sub>: There is no significant relationship between landlord port and berth occupancy rate.

Ho<sub>2</sub>: There is no significant relationship between landlord port and vessel turnaround time.

Ho<sub>3</sub>: There is no significant relationship between landlord port and cargo dwell time.

**Table 5:** Test Result of landlord port and port efficiency

Statistics	LP (BOR)	LP (VTT)	LP (CDT)
Pearson correlation	0.854**	0.833**	0.796*
Sig(2-tailed)	.000	.000	.000
N	112	112	112

\*\*correlation is significant at the 0.01level (2-tailed)

**Source: Survey Data, 2023, and SPSS Window Output, Version 25.0**

Table 5 shows inferential results on the nature of relationship between the examined variables as contained in Ho<sub>4</sub>, Ho<sub>5</sub> and Ho<sub>6</sub>. The statistical outcomes are indicative of the nature of relationships. For Ho<sub>4</sub>, the r -value of  $0.854 @ P0.000 < 0.01$  indicates a positive and significant relationship between landlord port and berth occupancy rate; therefore, the null hypothesis has been rejected and alternate hypothesis 4 accepted. Ho<sub>5</sub> also showed a positive and significant relationship with r -value of  $0.833 @ p0.000 < 0.01$  meaning that the examined relationship between landlord port and vessel turnaround time has been accepted and rejection of the null hypothesis earlier stated. For Ho<sub>6</sub>, which sought to find out the nature of relationship between landlord port and cargo dwell time, the result of r -value of  $0.796 @ p0.000 < 0.01$  indicates a moderate and significant relationship between the variables. It also means that the stated null hypothesis is rejected and alternate hypothesis 6 accepted.

From the inferential results, it can be stated as follows:

1. Landlord port as a dimension of port management models has a positive and significant relationship with berth occupancy rate as a measure of port efficiency.
2. Landlord port as a dimension of port management models has a positive and significant relationship with vessel turnaround time as a measure of port efficiency.
3. Landlord port as a dimension of port management models has a weak positive and significant relationship with cargo dwell time as a measure of port efficiency.

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

Research Hypotheses	r - value	Result	Decision
Ho <sub>1</sub> : There is no significant relationship between landlord port and berth occupancy rate	0.854	Positive and Significant	Reject
Ho <sub>2</sub> : There is no significant relationship between landlord port and vessel turnaround time.	0.833	Positive and Significant	Reject
Ho <sub>3</sub> : There is no significant relationship between landlord port and cargo dwell time.	0.796	Positive and Significant	Reject

**Source: Survey Data, 2023, and SPSS Window Output, Version 25.0**

Hi<sub>1</sub>: There is no significant relationship between landlord port and berth occupancy rate.

Hi<sub>2</sub>: There is significant relationship between landlord port and vessel turnaround time.

Hi<sub>3</sub>: There is significant relationship between landlord port and cargo dwell time.

## V. DISCUSSION

The findings of this study were drawn from the results of the study analyses. In this section, the study discusses the findings to draw conclusions. However, the discussion of the findings was done in four compartments according to the three basic dimensions and one moderating variable of the study against the criterion variable. The first section deals with the relationship between service port and efficiency of ports in Nigeria, the second section centres on relationship between landlord port and efficiency of ports in Nigeria, the third section focuses on the relationship between private port and efficiency of ports in Nigeria and the fourth section deals with the influence of legal framework on port management models and efficiency of ports in Nigeria.

### Relationship between Landlord Port and Efficiency of ports in Nigeria

The findings associated with the relationship between landlord port and port efficiency, point to the fact that, landlord port enhances port efficiency. This is due to the fact that when employees are treated fairly with equity and inclusivity by the organization or the individual in the organization, such employee will perform well (Nan-Nan & Sanamthong, 2019). A critical analysis of finding reveals that a strong, positive, and significant relationship exists between landlord port and berth occupancy rate as a measure of efficiency of ports in Nigeria with r -value of 0.854. This finding aligns with the study of Edewor, Yetunde and Onabanjo (2017) that showed that different landlord port provide different values for companies and these values can complement each other which improves companies' performance. However, Merve (2015) found that age heterogeneity on its own has a negative effect on individual berth occupancy rate/performance.

Moreover, in the case of routine tasks, there are no substantial gains from y that could offset the increasing costs resulting from greater port efficiency, the study found that the line with Shetty and Dwarakish's (2018) position that landlord ports represent the most common management model where infrastructures, particularly terminals, are leased to private operating companies with the port authority retaining control of the land where the port develops either by owning it or via retaining the rights for exclusive exploitation (as granted by the competent public authority). Thus, in companies with routine types of work, increasing age heterogeneity overall leads to a decline in berth occupancy rate.

The introduction of the landlord structure requires a consensus between government, labour and private management on the procedures for transferring contract of services and assets to the private sector. Unlike service port, organizations rarely undertake initiatives to increase landlord port. Traditional age distributions within organizational structures were derived from hiring employees at a young age and retraining them through most of their working lives. The research on landlord port is much less developed than that on race and service, suggesting the need for new paradigms and new approaches to studying age in the work setting.

However, the majority of research has been conducted in a western setting, and as pointed out by Shetty and Dwarakish (2018).

The port authorities focus varies considerably. It may be concentrated in its core port business, it may be in local relations, with port community and the municipality, or it may be on a more regional level within the logistics platforms and supply chains in the hinterland (regionalization), which is considered a new phase of port's life (Notteboom et al., 2021). According to Utulu (2018) Mexican ports are now looking to widen their focus on hinterland logistics. Ostensen and Brady (2018) reported that the regionalization phase brings the perspective of port development to a higher geographical scale, which is beyond the port perimeter. The relations between nearby ports and its port authorities are discussed and includes integration or cooperation strategies, such as China (McLaughlin, 2017) and cooptation or competition, as in the case of the Belgian or Dutch ports.

The study found that many regional ports integrate small ports and there is a discussion about possible integration of large ports located in the same region, with the government requiring greater cooperation between port authorities. Management coordination between ports, while maintaining their respective autonomy, is another possible perspective (Notteboom & Haralambides, 2020). Kalgora et al. (2019) refer to the case of cooperation between US ports in logistics chain to combat the threat of the Panama Canal. Notteboom (2015) reported that cooperation between competing ports (typically in proximity) is often seen to avoid inter-port destructive competition. Port Authorities strive to minimize competitive environment using flexible governance framework within ports. The organization of ports varies from country to country, varying from more centralized models of a single national port authority, such as South Africa, Cyprus or Taiwan, where four authorities were concentrated in a single national (Njoku, 2009; Park et al., 2020) to regional or multi-port authorities, as is being developed in Italy and as is the case of West Australian ports.

A critical examination of the finding discloses that a strong, positive, and significant relationship exists between landlord port and vessel turnaround time as a measure of efficiency of ports in Nigeria with  $r$ -value of 0.833. The finding is supported by Bivbere (2019) posits that landlord port is characterized by its mixed public-private orientation and that the landlord model has a clear separation of functions where the port authority acts only as regulatory body and also as landlord of the port, while port operations; cargo handling to be specific are carried out by private companies authorized by the port authority to carry out those functions. Blonigen and Wilson (2007) classify ports of Rotterdam, Antwerp and New York among others as landlord ports. Alderton (2013) revealed that landlord port model allows for the release of port infrastructure through lease arrangement to private operating companies or to industries such as refineries, tank terminals, and chemical plants where the money to be paid to the port authority is usually a fixed sum per square meter per year which is worked to take into consideration inflation and other economic variables to be agreed by both parties before commencement. The calculation is also to be worked to commensurate the cost involved in preparing the structures put in place. An example of such are land reclamation and quay wall construction.

This is aligned with the findings of Merve (2015) who investigated the effects of port management models and inclusion on organizational outcomes and found that age and education levels were key predictors to worker's berth occupancy rate. Under inferential analysis, the findings showed that demographic port management models had a negative impact on port efficiency. A unit change in demographic port management models will result to a unit decrease change on port efficiency. The finding is consistent with Kundu, Bansal and Pruthi (2019) who investigated port efficiency consequences of landlord port and found that landlord port negatively influenced port efficiency.

Nevertheless, he found that most routine work was carried out by women. Similarly, Akpakip (2017), in his study on the effect of port management models on employee performance in Nigerian banking industry found that there is significant positive relationship between service port and employee performance. Furthermore, his study found that service port can highly predict employee performance. The finding is consistent with the findings of Phiri (2019) who found a significant positive relationship between service port and employee performance.

A vivid examination of the finding discloses that a strong, positive, and significant relationship exists between landlord port and cargo dwell time as a measure of efficiency of ports in Nigeria with  $r$ -value of 0.796. The

study also found that landlord port is very impactful in improving sea transport for effective efficient port in Nigeria leading to increased cargo dwell time. The finding of this study agrees with Omoankhalen and Ohiria’s (2019) study that established a positive relationship between landlord port and customer attraction/high cargo dwell time. Odhiambo, Gachoka, and Rambo (2018) determined the relationship between landlord port and employee performance of public universities in Western Kenya and found positive relationship between landlord port and possession degree.

In the words of Patten (2016) port management models is a phenomenon that can collectively cost organizations billions of dollars per year, the success of oil servicing company depends on the attitude of the workers in the organization because the equipment are so expensive that any deliberate damage to any of these equipment will lead to serious financial difficulties to the organization.

**VI. CONCLUSION**

The conclusion of this study provides holistic outcomes of the study. The values possessed by different port management models complement each other in many countries and it tends to achieve better performance. Thus, ineffective use of port management models most likely impedes corporate functioning and leads to port inefficiency.

Conclusively, it is evident that: Landlord port is positively and significantly related with port efficiency because strong positive and significant relationship exists between: Landlord port and berth occupancy rate ( $r = 0.854 @ P0.000 < 0.01$ ); landlord port and vessel turnaround time ( $r = 0.833 @ P0.000 < 0.01$ ); landlord port and cargo dwell time in Nigeria ( $r = 0.796 @ P0.000 < 0.01$ ).

**VII. RECOMMENDATIONS**

Based on the findings of the study and conclusions reached the following recommendations have been made:

1. Government should consider making all ports in the country independent of each other instead of the current administrative guide where one single port authority oversees all policy, regulatory and sometimes operational needs of all the ports in the country.
2. The Onne Port based on the performance of the landlord partner needs to go fully privatized where even the bulk cargo operations and management are handed over to private partners who will bring the needed capital to boost operational efficiency of the port.
3. On the basis of the success of the landlord port, Onne port should be given out or transformed into a private port for improved efficiency because the source of inputs like port infrastructures and machineries are the same as used with other ports.
4. The main governance characteristic is private port operations through concession, although land ownership and port management should be kept public and not privatized. The port authority should abandon definitively port operations, and make an approach to the logistics chain, but avoiding a direct participation in the land transport or logistics areas management.

**APPENDICES**

**SUMMARY: LANDLORD PORT**

**Descriptive Statistics**

**Table 7:**

	N	Minimum	Maximum	Mean	Std. Deviation
Landlord port offers prompt, effective and efficient port services towards achieving optimal port efficiency in Nigeria	112	2.00	4.00	3.671	.510
Landlord port has a number of variants, depending upon the level of decentralization and autonomy of the port authority involved, the cultural	112	1.00	4.00	3.133	.642



disposition of the country considered, the division of infrastructure investments					
Landlord port is very impactful in improving sea transport for effective efficient port in Nigeria	112	1.00	4.00	3.200	.997
Ports have the facilities, equipment and personnel to perform maximally for efficiency in vessel turnaround time of the port	112	1.00	4.00	3.110	.929
Landlord port has been impactful in achieving the objective of port efficiency in Nigeria	112	2.00	4.00	3.438	.586
Valid N (list wise)	112				

**SUMMARY: BERTH OCCUPANCY RATE**

**Table 8:**

	N	Minimum	Maximum	Mean	Std. Deviation
Berth occupancy is the ratio of time the berth is occupied by a vessel to the total time available. High berth occupancy is a sign of congestion (>70%) and hence decline of services, while low berth occupancy signifies underutilization of resources (<50%)	112	3.00	4.00	3.848	.373
The port management is aware that berth occupancy is expressed as a percentage of the number of days a berth is occupied by a vessel to the total number of berth-days available in the port.	112	1.00	4.00	3.190	.588
Ports allow workers to know that berth occupancy loss due to operational time affects both the ship owner and the port. As the idle time is reduced, the time stay of a ship at port and the cost would be reduced so their profits would be increased.	112	1.00	4.00	3.352	.770
Lower berth occupancy rate is the target all stakeholders aim to achieve because a lower occupancy rate indicates higher productivity and rippling effect on the supply chain and can even lead to less cost incurred in the chain that ultimately leads to port efficiency.	112	1.00	4.00	3.281	.808
Berth occupancy rate in term of weekly working and service hours which may results various values for seasons and every month in a year at ports	112	1.00	4.00	3.214	.576
Valid N (list wise)	112				

**SUMMARY: VESSEL TURNAROUND TIME**

**Table 9:**

	N	Minimum	Maximum	Mean	Std. Deviation
Port values giving satisfactory services to customers in order to engage them for patronage leading to vessel turnaround time	112	1.00	4.00	3.338	.709
Vessel turnaround time is often used as a key performance indicator (KPI) to review the effectiveness and efficiency in your port	112	1.00	4.00	3.933	.872
Port allows rooms for staff to engage customers in discussions on how to improve the port's vessel turnaround time	112	1.00	4.00	3.295	.823
Port allows clients to make variety of choices through appropriate service engagements that elicit vessel turnaround time	112	1.00	4.00	3.262	.832
Ports have the facilities, equipment and personnel to perform maximally for efficiency in vessel turnaround time of the port	112	1.00	4.00	3.757	.556
Valid N (list wise)	112				

**SUMMARY: CARGO DWELL TIME**

**Table 10:**

	N	Minimum	Maximum	Mean	Std. Deviation
Effective cargo handling equipment boosts the cargo dwell time in Nigerian Ports	112	1.00	4.00	3.605	.765
Six ports engage in activities that encourage service port and cargo dwell time in six ports	112	2.00	4.00	3.605	.699
Ports consider the opinion of workers before making important decision that affects cargo dwell time	112	1.00	4.00	3.457	.771
Ports deliberate on issues concerning the increase of cargo dwell time	112	4.00	4.00	3.576	.495
Cargo dwell time is often used as a key performance indicator (KPI) to review the effectiveness and efficiency in port	112	1.00	4.00	3.957	1.159
Valid N (listwise)	112				

**COMPUTING PEARSON PRODUCT MOMENT CORRELATION COEFFICIENT BETWEEN LANDLORD PORT (x) AND BERTH OCCUPANCY RATE (y) OF PORTS IN NIGERIA**

The stated hypotheses are as follows:

$H_0: \rho_s = 0$ : There is no significant correlation between landlord port and berth occupancy rate of ports in Nigeria;

$H_1: \rho_s \neq 0$ : There is a significant correlation between landlord port and berth occupancy rate of ports in Nigeria;

**Table 11:**

**Correlations**

		Landlord port	Berth occupancy rate
Landlord port	Pearson Correlation	1	.854**
	Sig. (2-tailed)		.000
	N	112	112
Berth occupancy rate	Pearson Correlation	.854**	1
	Sig. (2-tailed)	.000	
	N	112	112

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

**Source: SPSS ver. 25 Output window**

From the SPSS output window, the correlation coefficient of the variables x and y is 0.854.

**INTERPRETATION**

This positive large value of r (= 0.854) says that there is a strong positive correlation between Landlord port (x) and berth occupancy rate (y) in the sample of ports in Nigeria

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

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

$H_1: \rho_s \neq 0$ : There is a significant correlation between Landlord port and berth occupancy rate of ports in Nigeria;

**COMPUTING PEARSON PRODUCT MOMENT CORRELATION COEFFICIENT BETWEEN LANDLORD PORT (x) AND VESSEL TURNAROUND TIME (y) OF PORTS IN NIGERIA**

The stated hypotheses are as follows:

$H_0: \rho_s = 0$ : There is no significant correlation between Landlord port and vessel turnaround time of ports in Nigeria;

$H_1: \rho_s \neq 0$ : There is a significant correlation between Landlord port and vessel turnaround time of ports in Nigeria;

**Table 12:**

**Correlations**

		Landlord port	Vessel turnaround time
Landlord port	Pearson Correlation	1	.833**
	Sig. (2-tailed)		.000
	N	112	112
Vessel turnaround time	Pearson Correlation	.833**	1
	Sig. (2-tailed)	.000	
	N	112	112

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

**Source: SPSS ver. 25 Output window**

From the SPSS output window, the correlation coefficient of the variables x and y is 0.833.

**INTERPRETATION**

This positive large value of r (= 0.833) says that there is a strong positive correlation between Landlord port (x) and vessel turnaround time (y) in the sample of ports in Nigeria

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

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

H<sub>1</sub>:  $\rho_s \neq 0$ : There is a significant correlation between Landlord port and vessel turnaround time of ports in Nigeria;

**COMPUTING PEARSON PRODUCT MOMENT CORRELATION COEFFICIENT BETWEEN LANDLORD PORT (x) AND CARGO DWELL TIME (y) OF PORTS IN NIGERIA**

The stated hypotheses are as follows:

H<sub>0</sub>:  $\rho_s = 0$ : There is no significant correlation between Landlord port and cargo dwell time of ports in Nigeria;

H<sub>1</sub>:  $\rho_s \neq 0$ : There is a significant correlation between Landlord port and cargo dwell time of ports in Nigeria;

**Table 13:**

Correlations		Landlord port	Cargo dwell time
Landlord port	Pearson Correlation	1	.796**
	Sig. (2-tailed)		.000
	N	112	112
Cargo dwell time	Pearson Correlation	.796**	1
	Sig. (2-tailed)	.000	
	N	112	112

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

**Source: SPSS ver. 25 Output window**

From the SPSS output window, the correlation coefficient of the variables x and y is 0.796.

**INTERPRETATION**

This positive large value of r (= 0.796) says that there is a strong positive correlation between landlord port (x) and cargo dwell time (y) in the sample of ports in Nigeria

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

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

H<sub>1</sub>:  $\rho_s \neq 0$ : There is a significant correlation between Landlord port and cargo dwell time of ports in Nigeria;

**VIII. REFERENCES**

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