The Effect of Cargo Management on Efficiency of Ports in South- South Geo-political Zone of Nigeria

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Abstract: This study examined the relationship between cargo management and efficiency of ports in South- South geo-political zone of Nigeria. Tool port, service port, landlord port and private port were conceptualized as the dimensions of cargo management while cargo throughputs was used as measure of efficiency of ports. The study adopted the cross-sectional survey in its investigation of the variables. Primary source of data was generated through self- administered questionnaire. The population of the study was 1396 staff of four ports South- South geo-political zone. The sample size of 311 was obtained using Taro Yamane sample size determination formula. The research instrument was validated through supervisor's vetting and approval while the reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70. Data generated were analyzed and presented using both descriptive and inferential statistical techniques. The hypotheses were tested using the Spearman's Rank Order Correlation Statistics. The tests were carried out at a 95% confidence interval and a 0.05 level of significance. The study findings revealed that there is significant and positive relationship between cargo management and efficiency of ports in South- South geo-political zone of Nigeria. The result of the findings further revealed that tool port, service port, landlord port and private port gave rise to enhanced cargo throughput in the sampled ports in South- South geo-political zone of Nigeria. The study recommends management of ports in the South-South geopolitical zone of Nigeria should adopt effective cargo management practices help increase revenues.

Keywords: Cargo Management, Efficiency Of Ports, Tool Port, Land Port, Private Port, Service Port

INTRODUCTION

Ports are critical nodes in international maritime transport and logistics chains. Cargo handling delays occurring at the ports, for instance, could to a great extent alter total transport and logistics costs. 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 (Njoku, 2009). 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 (Okeudo, 2013).

Consequently, new cargo management models were introduced to allow for joint public/private, or private participation in port finance and administration. According to Ikpechukwu and Olaogbebikan (2014), the basic port management models can be classified as Tool port, Service port, Landlord port, and Private port. Specific applications or elaborations of these models have been adopted by different countries ports undergoing reforms and outcomes reported so far vary by country.

Just as the shipping industry's usefulness, efficiency and overall performance is evaluated in the light of total logistics services rendered to the ships, crews, importers and exporters satisfactions, so also the usefulness of the seaports is relate to the entire economy in terms of revenue generation, foreign exchange, employments, ship and cargo throughput, vessel turnaround time etc. on the other, the number of customers to a commercial organization determines the viability of the enterprise; likewise, the volumes of ship traffic to a port determine the prosperity and economic life of the port (Ugboma, 2006).

Furthermore, the point of interaction and operation between the land mode and sea mode where trans-loading of containers and other cargoes are made possible at the port is referred to as the container terminals. From sea transport service perspective, container terminals are nothing more than intermodal nodes in global transport chains. The basic function is then to transfer efficiently shipped cargoes from a maritime transport mode (container ship) to a land transport mode (rail and truck) and vice-versa. The efficiency of this transfer operation can be assessed based on the availability of sizable berths, berthing equipment such as bollards, port cranes, adequate transit areas for effective crane and truck operations, stacking areas for container sorting and other relevant activities are all carried out at the port terminals. It is common knowledge that ports play a key role in economic growth and development. Similarly, European Union (2013) reported that nearly 75% of the trade worldwide is handled in ports. This implies that effective cargo management leads to positive outcomes to port performance and countries economic growth and development.

Jean-Francois et al (2012); and Usman (2015) have studied about the state of cargo management in African ports. In doing so, their study shows that there is a problem of cargo management in many of the African ports. In fact, their findings influence the will to undertake the study of this kind they noted that; the case of cargo dwell times is an illustration of a more general problem in African port developments. Most, if not all, the binding constraints to grow such infrastructure are the result of an equilibrium in which certain actors cause of problem. One of the resulting problems is the delay in cargo clearance. Okeudo (2013) posits that the process of cargo clearance in its international standards should take three to four days. But this is not in case of African port where the processes take 15 days to three weak. Dwell time and clearance time are major commercial instruments used to attract cargo and revenues. This study has therefore been embarked upon to evaluate the effect of cargo management on efficiency of ports in South- South geo-political zone of Nigeria.

Cargo management plays a key role in port performance and subsequently in economic growth and development. This is due to the fact that, large percent of trade in Africa and the

rest of the world are handled in ports. Thus, the importance of ensuring proficiency in cargo management in the ports is related to the ability to adapt efficiency in order in to meet the ever changing and developing needs of the industry (Nwoloziri, *et al.* 2018). In Nigeria, the contribution of cargo management in port performance has been inadequately researched and documented. However, the little knowledge which is available suggests the needs to undertake the study of this kind.

Nigerian ports are said to be performing better than it were before the reform. However, comparatively, it is still obvious that there is no competitiveness among the ports because of poor management. Some ports are still performing below expectation in spite of the concession of the ports. The research is focused on cargo management and efficiency of ports in South- South geo-political zone of Nigeria.

This study therefore examines the effect of cargo management on efficiency of ports in south- south geo-political zone of Nigeria. Furthermore**,** this study will also be guided by the following research questions:

i. Determine the extent to which tool port affects the efficiency of ports in the South- South geopolitical zone of Nigeria.
ii. Ascertain the extent to which service port influences the efficiency of ports in the South- South geopolitical zone of Nigeria.
iii. Assess the extent of relationship between landlord port and efficiency of ports in the South- South geopolitical zone of Nigeria.
iv. Examine the extent of relationship between private port and efficiency of ports in the South- South geopolitical zone of Nigeria.
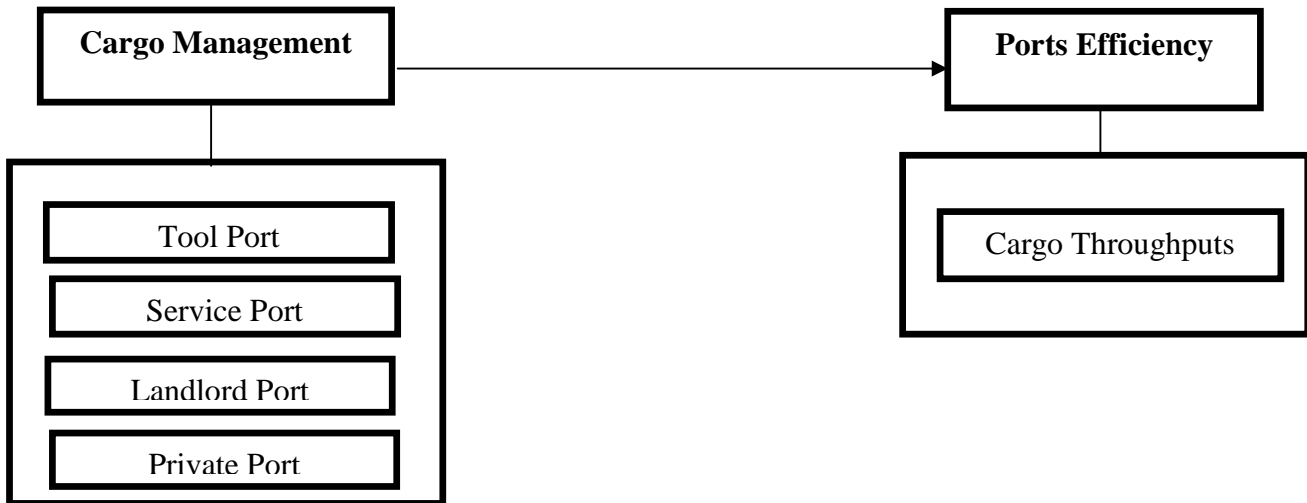

Fig.1 Conceptual Framework for the relationship cargo management and ports efficiency

Source: Author's Desk Research, 2020

LITERATURE REVIEW

Theoretical framework
Queuing Theory on Port Congestion (Birth-and-Death Process Theory)
In the context of queuing theory (Obamiro. 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 (Williams, Ogege & Ideji, 2014). 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 Williams, Ogege and Ideji (2014) 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 untilnext 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 untilthe 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 2.1 leads directly to the formulae that measure the performance of this queuing system.

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 (Medhi, 2005). 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.

Oyatoye *et al.* (2011) article pointed out the application of Queuing theory to curb port congestion problem at Tin Can Island Port in Nigeria, Adedayo *et al.* (2006) observed 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.

Cargo Management
Sea transport plays a huge role in logistics and trade, managing and controlling the flow of

goods, information, and energy. Applying management to cargo can dramatically increase cargo revenues of a port (Williams, Ogege & Ideji, 2014). The concepts used in cargo management are similar to those deployed in passenger revenue management. However, differences in the cargo business process present a more complex problem, differences such as: Uncertain capacities, cargo capacity changes, departure time and the number of spaces for cargoes (Okeudo (2013).The first step in cargo management is to estimate the available capacity on future voyages. When determining capacity for cargo, both the weight and volume (or container positions, for awide body ship) of the cargo must be considered. Since cargo management centers around the space that is available for free sale, any space that is reserved for other materials must be excluded (Gidado, 2015).

The development of seaports in Nigeria started in the mid 19 centuries, which later led to the opening up of the Lagos Lagoon, resulting in the opening of seaports at Apapa and Port-Harcourt. This eventually led to the establishment of the Nigerian Ports Authority in 1955, by the Ports Act of 1954, to maintain the ports as well as load and discharge cargo. The Nigerian Ports Authority commenced operation on the 1st of April 1992. On the 15th of June 1992, the Nigeria Port Plc was incorporated. In October 1996, the organization was reverted to its former name "Nigerian Ports Authority" (NPA) in consideration of its full government ownership and its commercial status. Presently, Nigerian Ports Authority, as government owned organization under the supervision of the Federal Ministry of Transport, has the responsibility of providing specific ports and harbor services for the country's maritime industry.

Among these are: provision and operation of cargo handling and quays facilities, pilotage and towage services, supply of water and fuel to vessels at anchorage or mooring buoys, repairs and maintenance of vessels, dredging and contract dredging of water ways, etc. This is in pursuance of the Federal Government's efforts to ensure efficiency of Nigerian Ports Authority. Thus, the operations of Nigerian Ports Authority became fully commercialized in May,1992. As remarked by Pyre and Briggs in Eze (2004), "For any steady economic development, there must be adequate, efficient and effective operated seaports. As a result, some responsibilities and duties were allotted to Nigerian Ports Authority as an autonomous entity. Then, instead of the forty-eight hours' international standard for a ship at berth, it took weeks or even months to dischargea vessel or clear containers at the ports. There was no adequate cargo handling equipment, incompetent manpower, lack of technical knowhow and inadequate funds for port development.

An effective cargo management system accurately forecasts and deploys available supply, resulting in improved revenue and profit. The available supply and anticipated demand are matched in the system's optimization process to maximize the profits (Ekwuem, 2005). This maximization can occur at the flight, segment or system-wide level. Functions of a cargo revenue management system include: Managing supply, forecasting and managing cargo capacity, and overbooking. Identifying and serving demand Generating demand forecasts while knowing the value of the demand type, in addition to recognizing the strategic importance of certain customers. Combining supply and demand determining the applicable bid price and ensuring that space is protected for high-value demand. The optimization process determines the correct rate/density mix, that is, the amount of cargo authorized for handling.

The era of concession has wiped those experiences and has given the ports a fresh look (Okeudo, 2013). Among these duties and functions include the provision of specific ports and harbour services for the country's maritime industry as well to see that machines and equipment there in are functioning very well. Other functions assigned to Nigeria Ports Authority are:

(a) Provision and operation of cargo handling and quays facilities for effective and efficientservice delivery,

(b) Pilotage and towage services,

(c) Provision of adequate and sufficient warehousing facilities

d)   Supply of water and fuel to vessels at anchorage or mooring buoys as at when due.

e)   Repairs and maintenance of vessels for effective and efficient performances

6.   Dredging and contract dredging of water ways for easy flow of water to avoid flooding in and around the complex, among others.

The administration of the seaports in Nigeria rests solely on the Nigeria Ports Authority (NPA). This means that, the Port Authority plays an important role in the economic and trade development of Nigeria. Nigeria Ports Authority operates under the supervision of the Federal Ministry of Transport with the responsibility of providing specific ports and harbor services for the country's maritime industry. Presently, Nigerian Ports Authority controls eight (8) major ports excluding oil terminals with a cargo handling capacity of about 35 million tons per annum.

Effective cargo management practices help increase revenues for a variety of companies in many different industries, including airline passenger sales, air cargo and hotels. Characteristics of the air cargo business — perishable commodities, demand that does not always show up and customers willing to pay different prices for the same commodity — make it a prime candidate for revenue management techniques. Given these characteristics, an air cargo business can take advantage of revenue management functions. These functions include allotment management and overbooking to help reduce spoilage, as well as demand segmentation and bid price optimization, which differentiate between high-revenue and low-revenue demand and allocate inventory appropriately. An effective revenue management system improves the profits on flights and increases the productivity level of the analyst responsible for managing the flights. The system frees the analyst to concentrate on critical flights (high revenue, highly competitive flights) and also provides decision-support information for intelligent decision making. An effective cargo management system improves the profits on flights and increases the productivity level of the port.

Although port major aims are identical in reality the tasks and functions are organised and distributed differently in different countries, sometimes in different ports of the same country. Basically, these dissimilarities are a necessity of differing degree of cargo handling. Thus, Baudelaire (1986.123) asserts that selection of a particular status is influenced by the

attitude towards cargo handling. This is why it is argued that port organisation influences the performance of a port. Therefore, four major cargo management patterns among which are service, tool, private and landlord ports exist. In Nigeria two of these cargo management patterns operate but under a central authority.

Dimensions of Cargo Management
Tool Port
The basic characteristic of a tool port is the provision of heavy but essential infrastructure and superstructure (offshore cranes - gantries, cranes, warehouses and equipment, sheds etc) at the disposal of private operators. Put differently, besides the administration and development of land the Port Authority creates the tools and rents them to various port operators. It is argued that the authority's interference is necessitated by the need to guarantee the installation of efficient and the right equipment as well as forestall monopoly by certain operators. Port of Le Havre is a concrete example. The Port Authority maintains and repairs the structures and the staff of the port management operates the handling equipment. Other stevedoring activities onboard vessels, quay apron and on the terminals such as pilotage and towage services etc are executed by the private companies contracted to by shipping agents. Therefore, the 11 participation of private companies is limited. The tool port is organisation between two extremes: the service and landlord ports systems, hence, double entity operates during handling operations. Secondly, there exists double owning of equipment, a possible source of induced conflict. The Port Authority owns the infrastructure, the superstructure and heavy equipment, rents it to operators which carry out commercial operations, and retain all regulatory functions.

Service Port
The port authority develops, owns and maintains the infrastructures - quays, sheds, warehouses, channels, aids to navigation, roads, railways, docks, locks, land and superstructures - cranes of various types, forklifts etc, including related services. It is responsible for the entire operation ofthe port as well as management of it, hence, referred to as operating port. It sometimes provides stevedoring activities and maintains direct industrial and commercial relations with port users while retains its governmental powers. The Port Authority may play a role through an enterprise separate from itself in which it holds shares. A situation of this nature calls for a distinction between its governmental role and its role in industrial and commercial activities. Such policy is necessary when the port authority deems it essential performing the operating functions. Operating port system is common in the developing nations with less efficiency and usually controlled directly by the Ministry of Transport or Communications. This guarantees unity of command and management but more power to unions. Service ports are found in Singapore, Nigeria, Ghana, Kenya etc. However, the port of Singapore is a typical service and leading world port reckoned with for its effectiveness, efficiency and innovative management and operation system.

The Port authority provides all commercial services to ships and cargo, owns and operates every Port asset, and fulfills all regulatory functions, the service Port. Authority can be

either a publics entity, as used to be in former socialist countries, and in Singapore, or a private one, as in the case in felixtowe (United Kingdom), or Hong Kong are outstanding references ad far as productivity of Port services are concerned, this could suggest that to some extent, ownership could be a secondary matter. However, the service Port experience in former centralized economics clearly demonstrated its shortcomings, and the former Port of Singapore authority was turned in 1997 into PS A Corporation, a Port operating port, while regulatory powers were vested into the newly created maritime and Port Authority (MPA).

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. 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. The private operators on the other hand, acquire the superstructure according to their operating activities and set their tariffs, which are regulated by the port authority. As Baudelaire (1986:120-121) points out, the port authority is limited to direct responsibility for the following in addition to decisions concerning the use of land. The Ship: -Aids to navigation -Channels and fairways, breakwaters -Turning areas, locks docks and wharves 12 -Navigation information and radio-telephone service, traffic management Land carriers: - Quays, roads, parking lots and amenities - Railway tracks - Marshalling yards - Waiting docks (inland waterway craft) General port service: -Conservancy -Lighting -Firefighting -Police force -Sanitation.

In effect the private companies are allowed to function with the following and Unmooring -Labour. The private operators are given free hand in the organisation of their activities through limited government and authority interference, thus sometimes could be described as partial privatisation. This situation implies innovation, creativity, enhanced efficiency and productivity with the ultimate result of stiff competitiveness. Nonetheless, there is the likelihood of the evolution of over-capacity of equipment and facilities. Rotterdam, Hamburg, New York, Antwerp are operating the landlord port system. The under listed are conditions for a proper functioning of a landlord port. - Large throughput to facilitate competition among various companies and to fund the superstructure. - Sufficient capital, know-how and qualified man-power to cater for the facilities and services acquired and required. - A conducive political climate that is a sine qua non for economic activities.

The best institutional structure for promoting private sector participation in the public Ports system is landlord Port model. This provides a broad framework in which the private sector can replace the public sector in the provision of services to the vessel and its cargo it allows the public sector to retain ownership on the Land and infrastructure and to continue regulating their use while sharing responsibility for coastal investment. This framework has been used throughout Western Europe, and the united states for much of the century. In the

last decade, it has become increasingly popular in Asia and South America. Its popularity is based on the efficiency, providing flexibility in the structure of the tripartise relationship between government, labour and private management and promoting event - oriented management. It allows Port to improve the quality of its 26 services through a process of evolution which can accommodate the changes in trade, shipping and regional practice call structures. The introduction of the landlord structure requires a concensus 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 (Ekwueme, 2005).

Private Port
When choosing the best form to introduce private participation in the organization of Port services there are several alternatives depending on Port size, initial condition and the type of services considered among the different possibilities, the following can be mentioned: 1. Selling the seaport as a whole (full privatization). Using this form all assets and liabilities are transferred to the private sector, which can be justified by serious focal needs from the public sector. 2. Transferring to the private sector part of the seaport for their development by the private operators (build operate) and own, (BOO). Short - term financial needs justify the use of this form of privatization. 3. Introducing private participation in the Ports in order to build or renovate facilities required for services provision (Build/ Rehabilitate, Operate and Transfer, (BOX) or (ROT). In this case, the public sector does not loose ownership of the Port.

Infrastructure and even those new facilities built by the private firms are transferred to the public sector after a specified period of time, this is the case of classical concessions. Creating a new independent port, from the combinations of efforts of two or more firms, joint-ventures. This type of agreement arises when two parties with common interest join forces. Thus, for example, in some cases a firm can supply technology and know-how, between Port authorities and private firms, as in the cases of Shangai China), Kelany (Manaysia), and other Asian Ports with large investment projects, where Port authorities have formed many joint ventures to develop and operate new terminals.

In other cases, collaboration may be found between several public firms, as in the example of the Singapore Ports Authority with the authority of Dalian,yo develop and operate a container terminal in the Port of rent Port of Dayaowo (China). 5 Leasing: In some cases, Port authorities simply rent Port assets to be used by private operators during a fixed period, and thus they obtain income from contract fees, contrary to concession contracts, in this case private firms are usually not required to make investments; therefore, they only assure commercial risks. Some Ports facilities such as storage buildings or cranes are rented by operators under this scheme. 6. Licensing: In this case the Port authority allows operators to provide some services which only require relatively simple equipment, and these assets are

generally owned by private operators. Infrastructure is provided for these operators to use it, generally for some specified fee, and in some cases, they may use some superstructure element owned by the Port authority stevedoring companies, pilots, tug operators or consignees can work under this type of agreement. A simple form of introducing private participation in a Port is by contracting out the Port management.

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 2.1 shows that the cargo throughput increased from 46,150,518metric tons in 2006 to 77,104,738metric 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.

Relationship between Cargo Management and Ports Efficiency (Empirical Studies)
Okeud, (2013) argues 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 more so, when the cargoes and promptly and timely managed. 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.

Nyema (2014) in his study of factor influencing container terminals efficiency at Mombasa Port; 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 Dar es Salaam Port which needs comprehensive strategic plan to alleviate.

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 Dar es Salaam port the situation is still the unconformity persist due to the unilateral planning and operations at the port. Raballand et al (2012) in his study on why do cargo spend weeks in sub-Saharan African ports argued that the primary indicators of operational performance in ports are dwell, ship turnaround time and port through put. Raballand et al. (2012) used a mix

of databases, individual questionnaires, and aggregated statistics from customs agencies and terminal operating companies in eight countries. While this phenomenon has been pertinent for a long time, other criteria such as asset performance are also widely used to compare berth, yard, or gate performance of different ports.

Arvis*et al.* (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.

From the foregoing point of view, we hereby hypothesized thus:

Ho$_1$: There is no significant relationship between tool port and cargo throughputs in the South-South geopolitical zone of Nigeria.

Ho$_2$: There is no significant relationship between service port and cargo throughputs in the South-South geopolitical zone of Nigeria.

Ho$_3$: There is no significant relationship between landlord port and cargo throughputs in the South-South geopolitical zone of Nigeria.

Ho$_4$: There is no significant relationship between private port and cargo throughputs in the South-South geopolitical zone of Nigeria.

METHODOLOGY

The study adopted the cross-sectional survey in its investigation of the variables. Primary source of data was generated through self- administered questionnaire. The population of the study was 1396 staff of four ports South- South geo-political zone. The sample size of 311 was obtained using Taro Yamane sample size determination formula. The research instrument was validated through supervisor's vetting and approval while the reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70. Data generated were analyzed and presented using both descriptive and inferential statistical techniques. The hypotheses were tested using the Spearman's Rank Order Correlation Statistics. The tests were carried out at a 95% confidence interval and a 0.05 level of significance.

DATA ANALYSIS AND RESULTS

Bivariate Analysis
Ho$_1$: There is no significant relationship between tool port and cargo throughputs in the South-South geopolitical zone of Nigeria.

Table 1: *Correlation matrix for the relationship between tool port and cargo throughputs*

			Tool Port	Cargo Throughputs
Spearman's rho	Tool Port	Correlation Coefficient	1.000	.735[**]
		Sig. (2-tailed)	.	.000
		N	276	276
	Cargo Throughputs	Correlation Coefficient	.735[**]	1.000
		Sig. (2-tailed)	.000	.
		N	276	276

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

Source: Research Data 2019, (SPSS output version 21.0)

From the result in the table above, the correlation coefficient shows that there is a positive relationship between tool port cargo throughputs. The *correlation coefficient* 0.735 confirms the magnitude and strength of this relationship and it is statistically significant at p $0.000<0.05$. The correlation coefficient represents a strong correlation between the variables. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate accepted. Thus, there is a significant relationship between tool port and cargo throughputs in the South-South geopolitical zone of Nigeria.

Ho₂: *There is no significant relationship between service port and cargo throughputs in the South-South geopolitical zone of Nigeria.*

Table 2: *Correlation matrix for the relationship between service port and cargo throughputs*

			Service Port	Ports Efficiency
Spearman's rho	Service Port	Correlation Coefficient	1.000	.726[**]
		Sig. (2-tailed)	.	.000
		N	276	276
	Ports Efficiency	Correlation Coefficient	.726[**]	1.000
		Sig. (2-tailed)	.000	.
		N	276	276

**. Correlation is significant at the 0.01 level (2-tailed).
Source: Research Data 2019, (SPSS output version 21.0)

From the result in the table above, the correlation coefficient shows that there is a positive relationship between service port cargo throughputs. The *correlation coefficient* 0.726 confirms

the magnitude and strength of this relationship and it is statistically significant at p 0.000<0.05. The correlation coefficient represents a strong correlation between the variables. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate accepted. Thus, there is a significant relationship between tool port and cargo throughputs in the South-South geopolitical zone of Nigeria.

Ho₃: There is no significant relationship between landlord port and cargo throughputs in the South-South geopolitical zone of Nigeria.

Table 3: *Correlation matrix for the relationship between landlord port and cargo throughputs*

			Landlord Port	Ports Efficiency
Spearman's rho	Landlord Port	Correlation Coefficient	1.000	.773**
		Sig. (2-tailed)	.	.000
		N	276	276
	Ports Efficiency	Correlation Coefficient	.773**	1.000
		Sig. (2-tailed)	.000	.
		N	276	276

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

Source: Research Data 2019, (SPSS output version 21.0)

From the result in the table above, the correlation coefficient shows that there is a positive relationship between landlord port cargo throughputs. The *correlation coefficient* 0.773 confirms the magnitude and strength of this relationship and it is statistically significant at p 0.000<0.05. The correlation coefficient represents a strong correlation between the variables. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate accepted. Thus, there is a significant relationship between landlord port and cargo throughputs in the South-South geopolitical zone of Nigeria.

Ho₄: There is no significant relationship between private port and cargo throughputs in the South-South geopolitical zone of Nigeria.

able 4: *Correlation matrix for the relationship between private port and cargo throughputs*

			Private Port	Ports Efficiency
Spearman's rho	Private Port	Correlation Coefficient	1.000	.829[**]
		Sig. (2-tailed)	.	.000
		N	276	276
	Ports Efficiency	Correlation Coefficient	.829[**]	1.000
		Sig. (2-tailed)	.000	.
		N	276	276

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

Source: Research Data 2019, (SPSS output version 21.0)

From the result in the table above, the correlation coefficient shows that there is a positiverelationship between private port cargo throughputs. The *correlation coefficient* 0.829confirms the magnitude and strength of this relationship and it is statistically significant at p 0.000<0.05. The correlation coefficient represents a strong correlation between the variables. Therefore, based on empirical findings the null hypothesis earlier stated is hereby rejected and the alternate accepted. Thus, there is a significant relationship between private port and cargo throughputs in the South-South geopolitical zone of Nigeria.

DISCUSSION OF FINDINGS
This study using descriptive and inferential statistical methods examined the relationship between cargo management and efficiency of ports in South- South geo-political zone of Nigeria. The findings revealed a significant and positive and significant relationship between cargo management and efficiency of ports in South- South geo-political zone of Nigeria. The findings of this study confirmed the views of conducted by Okeudo (2013) who argued 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 more so, when the cargoes and promptly and timely managed. 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.

Nyema (2014) in his study of factor influencing container terminals efficiency at Mombasa Port; 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 Dar es Salaam Port which

needs comprehensive strategic plan to alleviate. Refas and Canteen's (2011) in their World Bank research report on "Why Does Cargo Spend Weeks in Africa Ports" the case study of Douala, Cameroun pointed out that, the ports efficiency is attributed to improving berths operations, clearance procedures, timely handling of ships, proper planning and controlling of cargo, truck operations, gates operations and behavioral change of the players.

The current study is in line with Twinstar case study, it revealed that the importance of quick cargo handling has been identified as a significant factor affecting profitability of shipping. An interesting question is how the loading speed could be raised in practice. The two possibilities are either to invest in port facilities or on-board cargo handling facilities. These solutions are possible in ports with sufficient container stacking space. For the case of Dar es Salaam port container stacking is now six high. Offloading the ship may be quicker, but what about loading vehicles out of the terminal to give room for other incoming containers, suppose when the first container has to be taken! This means five containers will be shifted first to give accessible to the first container.

CONCLUSION AND RECOMMENDATIONS

Cargo management plays a key role in port performance and subsequently in economic growth and development. This is due to the fact that, large percent of trade in Africa and the rest of the world are handled in ports. Thus, the importance of ensuring proficiency in cargo management in the ports is related to the ability to adapt efficiency in order in to meet the ever changing and developing needs of the industry (Nwoloziri, et al 2018). Based on the findings, this study concludes that cargo management through its dimensions of service tool port, service port, landlord port and private port are significant predictors of ports efficiency of ports in the South-South geopolitical zone of Nigeria.

Based on the discussion and conclusion above, the following recommendations are hereby made: As a result of the foregoing, the researcher makes the following recommendations:

i. Management of ports in the South-South geopolitical zone of Nigeria should adopt effective cargo management practices help increase revenues.
ii. Management of ports should guarantee the installation of efficient and the right equipment at the disposal of private operators.
iii. Management of ports should develop, own and maintain port infrastructures such as quays, sheds, warehouses, channels, aids to navigation, roads, railways, docks, locks, land and superstructures - cranes of various types, forklifts etc, including related services.
iv. Management of ports should provide proper regulatory policies to guide the operations of private ports.

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