International Journal of Business & Entrepreneurship Research
ISSN: 2360-989X, Volume 13, Issue 2, (August, 2020) pages 52 - 71
www.arcnjournals.org

Cargo Insurance Services and Sea Port Operational Efficiency in Nigeria

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Abstract: *The study examined the relationship between cargo insurance services and sea-port operational efficiency in Nigeria. The study adopted a cross-sectional survey in its investigation of the variables. Primary data was generated through self- administered questionnaire. The study population was made up of all the six major ports in Nigeria. Thirty copies of the research instrument were distributed to 30 senior managers/supervisors of the six major ports in Nigeria. The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70.The study stated and tested six hypotheses. The hypotheses were tested using Pearson Product Moment correlation analysis with the aid of Statistical Package for Social Sciences version 23.0. The tests were carried out at a 95% confidence interval and a 0.05 level of significance. The result of the tested hypotheses shows a positive relationship between cargo insurance services and sea-port operational efficiency in Nigeria. Therefore, the study concludes that there is a moderate positive relationship between cargo insurance services and sea-port operational efficiency in Nigeria. Deriving from the findings and conclusion, the study recommends that companies operating at the sea port should ensure that they take comprehensive insurance policy to cover all the goods that are been handle by the ship, the crane and the land transport for efficient sea-port operations and that the insurance services should also cover the container dwell time in such a manner that if the goods stayed beyond the expected time at the sea-port such goods should be covered under comprehensive insurance.*

Keywords: *Cargo Insurance Services, Sea-Port Operational Efficiency, Quay Crane, Container Dwell Time, Infrastructure.*

INTRODUCTION

Risk and uncertainty are two most fundamental facts of life. We all know that the one event which is certain about our lives on this planet is that one day we will die, but the actual date, time and circumstances of our deaths remain in the realms of uncertainty. Despite, the certainty of ultimate death which most of us prefer not to contemplate, everything else about our lives and future remain uncertain (Irukwu, 1996). Irukwu further opined that having recognised this element of risk and uncertainty as inevitable features of our lives coupled with the fact that we do not know what the future will bring then as intelligent, rational and creative beings, we have had to devise methods of combating and responding to the possible adverse effects of this permanent feature of risk and uncertainty. The most important responses to risk and uncertainty is insurance.

Marine cargo insurance is a contract whereby the insurer undertakes to indemnify the assured, in manner and to the extent thereby agreed against marine losses, that is to say, the losses incident to marine adventure (Marine Insurance Act 1906, S.1). Indemnity is provided against the majority of losses which can occur during transit. The marine insurance market comprises insurance companies, Lloyds underwriters and private underwriters and in practice, each insurer pools the premiums received from the insured in order to pay claims and expenses, to build reserve fund against future losses and to secure a small margin of profit, hence insurance is said to be based on the principles of contribution (Harrington et al., 2004 cited in Nwokoro & Ndikom, 2012).

One of the oldest forms of insurance is marine insurance. The development of marine insurance is as old the beginning of international travel. Marine insurance is provided to ships, boats and most importantly, the cargo that is carried in them (Kokumo, 1998). It is the agreement between a ship owner and an insurer in which the latter agrees to indemnify the former in the event of loss. The Nigerian Marine Insurance Act, 1961, defines marine insurance as a contract whereby the insurer undertakes to indemnify the assured, in manner and to the extent thereby agreed, against marine losses, that is to say, the losses incident to marine adventure. Marine insurance has resonated so well in some countries that it contributes significantly to their GDP. The International Union of Marine Insurance (IUMI) puts the global marine insurance premium in 2014 at USD32.6 billion.

According to a study conducted by Oxford Economics, 37% of maritime business services in EU are in marine insurance. Marine insurance services alone contributed £2 billion to the UK's economy in 2013. In developed countries the growth of maritime sector automatically translates to the growth of other ancillary services. The sad news is that the state of marine insurance in Nigeria is abysmally poor, which is a reflection of the overall insurance sector and the underdeveloped nature of our maritime industry.

Apart from the scant awareness and patronage of marine insurance in Nigeria, the sector is also affected by a myriad of challenges. In the basket of challenges are weak government legislation and policy, lack of human capital and expertise, high level of ignorance and poor port operational efficiency (Oladejo, 2008).

Port Operational efficiency is often associated with productivity and operational efficiency; also additional factors that are associated with the more organizational side of production such as how efficiently ports use inputs to produce current output levels and whether the technologies adopted by container terminal operators are most efficient, that are critical to determining container terminals efficiency (Chin & Tongzon, 1998). Efficiency often means speed and reliability of container terminal services. In a survey conducted by UNCTAD (2011), 'on-time delivery' was cited to be a major concern by most shippers (UNCTAD, 2006). In fast-paced industries where products must be moved to the markets on time, terminal operators are vital nodes in logistics chain and as such must be in a position to guarantee shipping lines with reliable service levels. These include on-time berthing of vessels, guarantee turnaround time for vessels and guaranteed connection of containers. That is the total turnaround time it takes to wait for pilot to berth, terminal time, un-berthing and final departure from port area (Tongzon and Ganesalingam, 2009). Terminal efficiency can be reflected in the freight rates charged by shipping companies, turnaround time of ships and cargo dwelling time. The larger a ship stays at berth, the higher is the cost that a ship will have to pay. This can be passed on to shippers in terms of higher freight charges and longer cargo dwelling time, thus reducing the attractiveness for them to hub at a port. Tongeon and Ganesalingam (2009) identified several indicators of terminal efficiency and categorized them into two broad groups, namely: operational efficiency measures and customer-oriented measures. The first set of measure deals with capital and labor productivity as well as asset utilization rates. The second set includes direct charges, ship's waiting time, minimization of delays in inland transport and reliability (Tongzon and Ganesalingam, 1994).

Sea-port operation is defined as cargo handling (or moving) activity, performed by a designed company (gang or team), consisting of labor and machines. It is also defined as the operation of a wharf and other port facilities, operation of port passenger transport service, operation of cargo loading/unloading, haulage and warehousing services within a port area and so on (Acciero & Seira, 2013). Presently, there is difficulty in defining port efficiency due to non-universal definition of what indicates an efficient port or what port efficiency entails (Bailey, 1985). An efficient sea-port should be one that is competent in operations, Bakshi & Gans 2011). Based on this definition, efficiency of sea-port operations is determined by duration (time) of ship's stay in a port, quality of cargo handling and quality of service to inland transport vehicle during passage through the port. Quality of cargo handling is in the form of berth throughput (Bakshi & Gan, 2011) and quality of service to inland vehicle is dependent on port infrastructure. Productivity has been identified as a measure of sea-port operational efficiency (Alreck & Settle, 1985).

It is important to establish that Customs regulations require every importer to locally insure a cargo coming into Nigeria. However many shippers ignore this Customs requirement. This deliberate disregard for a legal importation requirement introduces other issues that should be probed further. According to Customs regulations, any individual without insurance certificate for a cargo is expected to immediately pay a fine. In order to quickly get cleared by the Customs, shippers usually opt to pay fine. And for those who are not interested in paying huge fine, they resort to patronizing fake insurance agents who arrange fake insurance certificates. Sometimes shippers also patronize fake insurance agents in order to avoid paying exorbitant rate for a policy. This is symptomatic of the ignorance in the industry because in actual fact the premium for a policy is sometimes cheaper than the fine that will be paid to Customs in the absence of an insurance certificate or when the fake certificate is discovered.

As an import dependent country, marine insurance is a major maritime support service with enormous capacity for wealth. Just as many other aspects of the maritime industry, all that is required is a collective commitment to take advantage of the many opportunities waiting for our attention. The purpose of this study is to examine the relationship between cargo insurance and sea-port operational efficiency in Nigeria.

Furthermore**,** this study was guided by the following research question:

i. What is the relationship between cargo insurance services and quay crane services in Nigeria Sea ports in Nigeria?
ii. What is the relationship between cargo insurance services and dwell time in Nigeria sea Ports?
iii. What is the relationship between cargo insurance services and Infrastructure in Nigeria Sea Ports?

Figure 1.1: *Conceptual framework of the relationship between cargo insurance services and sea-port operational efficiency*

Source: Desk Research (2019).

LITERATURE REVIEW

Theoretical Framework

Data Envelopment Analysis (DEA)

The application of Data Envelopment Analysis (DEA) in seaport industry to measure port efficiency and operational efficiency was first proposed by Roll and Hayuth (1993). They think that seaports are complex service organizations and there is a long list of outputs and inputs characterizing the operations of seaports. Due to this complexity of factors affecting seaport efficiency, it is difficult to determine the efficiency and the extent to which a seaport's resources are fully exploited in achieving the goals. According to Roll and Hayuth (1993), DEA is considered as one of the most suitable tools for measuring seaport efficiency. They mentioned that DEA has some advantages compared with traditional approaches. For instance, it enables coinstantaneous analysis of multiple output and multiple inputs and enables the inclusion of environmental and other qualitative factors, which are highly important to evaluate operational efficiency; it can recognize the possibility of different but equally efficient combinations of outputs and inputs (in different propositions); and it does not require an explicit priori determination of relationships between outputs and inputs, or the setting of rigid importance weights for the various factors. However, they demonstrated the applicability of the DEA technique in seaport industry by constructing a hypothetical numerical example data with four outputs and three inputs where the operational efficiency of 20 ports are compared. They showed that DEA is a promising and easily adaptable method for obtaining the relative efficiency ratings of seaport and it is possible for a series of secondary research to provide a deeper insight into seaport operational efficiency and point out potentials for improvement (Roll and Hayuth, 1993).

Valentine and Gray (2002) compare the efficiency of 31 North America and European ports for the year 1998 forming outputs such as container a total throughput and the number of containers and inputs, such as the total length of berth and container berth length. According to these Authors the DEA method is useful to test the container seaport efficiency. Also, Barros (2003) analyzed technical and allocative efficiency of five Portuguese ports from 1999 to 2000 using cross-section data. The main objective was to investigate how port regulatory procedures affect the productivity of the port. He concluded that the incentive regulation for increasing productive efficiency was not achieving its aims and proposed a policy revision to enforce efficiency.

For inputs he took the number of employees and the book value of assets and for outputs he took ships, movement of freight, gross tonnage, market share, break-bulk, containers, etc. The same author with Athenassiou (2004) studied the relative efficiency of Portugues and Greek ports using the DEA method. The results of the analysis indicated that there were inefficiency in ports which could improve their operational efficiency. Kaisar, Pathomsiri and Haghani (2006) analyzed the port productivity using the DEA method. They determined an efficient frontier or a set of the best practice seaports, which inefficient seaports may want to emulate and then concentrated on the sources and the extent of inefficiency of ports which could improve their operations. Assuming that the container port depends on the equipment and information marine insurance and by the competition among ports, the main objective of their study was to minimize the use of inputs (the total quay length and the quay gantry cranes) and to maximize the output (container throughput).

Cargo Insurance

Cargo insurance provides insurance cover in respect of loss of or damage to goods during transit by rail, road, sea or air. Thus cargo insurance concerns the following :(i) export and import shipments by ocean-going vessels of all types, (ii) coastal shipments by steamers, sailing vessels, mechanized boats, etc., (iii) shipments by inland vessels or country craft, and (iv) Consignments by rail, road or air and articles sent by post.

Cargo insurance or marine cargo insurance covers and protects the cargo when the ship is actually sailing in the oceanic waters. This type of insurance is mainly beneficial for oil tankers and other heavy cargo-carrying ships. In technical terms, cargo insurance covers losses that occur while the ship is *in transit.*

There are many companies across the world which provide for marine insurance and cargo marine insurance policies. Depending on the client’s convenience and necessity the right marine insurance policy can be recommended by the insurance company and then chosen by the client.

Some of the companies that offer marine insurance policies (including cargo insurance) include the Saucon Mutual Insurance Company established in the year 1832 and Insurance Network of America established in the year 1949. However, there are a lot of minor points that a client needs to consider while going for a marine insurance policy. If these points are ignored, then the client could lose money as compensation even after paying proper premium amounts.

If the goods are not packed properly or if the goods that are shipped are second hand then the cargo insurance policy will not be applicable. Similarly, if the loss to the cargo is due to the negligence of the ship workers or if the workers on the ship are dishonest, then the marine cargo policy will not be applicable. Even weather conditions influence whether a marine insurance policy will be covered or not.

Sea Port Operational Efficiency

Sea-port operation is defined as cargo handling (or moving) activity, performed by a designed company (gang or team), consisting of labor and machines. It is also defined as the operation of a wharf and other port facilities, operation of port passenger transport service, operation of cargo loading/unloading, haulage and warehousing ser-vices within a port area and so on. Presently, there is difficulty in defining port efficiency due to non-universal definition of what indicates an efficient port or what port efficiency entails. An efficient sea-port should be one that is competent in operations. Based on this definition, efficiency of sea-port operations is determined by duration (time) of ship's stay in a port, quality of cargo handling and quality of service to inland transport vehicle during passage through the port. Quality of cargo handling is in the form of berth throughput and quality of service to inland vehicle is dependent on port infrastructure. Productivity has been identified as a measure of sea-port operational efficiency.

Many researchers have used various approaches to evaluate sea-port efficiency. Annual firm level surveys have been employed as indicators of sea-port operational efficiency, but there was almost no information on how port efficiencies evolve over time from these studies. A number of studies have used data on inputs, out-puts and production function theory, by means of data envelopment analysis, to estimate the most efficient production frontier across a set of sea-ports. The approaches using this method have the advantage of economies of scale derived from econometric evidence but the drawback is that they typically assume constant return to scale. Some research has been done on the contribution of port ownership to efficiency. Transformation from public to private ownership is believed to improve sea-port operational efficiency even without change in level of competition. Some researchers contended this position and have opinion that principal agent problems may also arise in the private sector as a result of capital market imperfections. On the contrary, a number of studies have shown relationship between port ownership and sea-port operational efficiency.

Relative efficiency of a number of Asian ports was assessed by Goss (1990) using a combination of cross-sectional and panel data versions of stochastic frontier model and the finding was that there seems to be some support that privatization should have some relationship with improvement in efficiency. These efforts by the researchers show that port ownership is a likely determinant of operational efficiency. It has been found that size of sea-port has positive effects on its efficiency. Also, it has been shown that ports with larger throughput seem to have certain operational efficiency advantage over those with smaller throughput. In research on 15 sea-ports Goss, (1990) showed that port efficiency has no clear relationship with its size.

Measures of Sea Port Operational Efficiency

Quay crane operation

The quay crane operation is one of the important operations for the container terminal logistics, which carries out loading a container from a truck to a vessel or unloading a container from a vessel to a truck. Several major container terminal operations influence the efficiency of container terminal, which include the vessel berthing operation, the crane unloading/loading operation, the container delivery operation by trucks, the inspection operation, and the container storage operation. Of those operations, the crane operation is the key factor that determines the efficiency and effectiveness of a container terminal (Lee, Wang & Miao, 2000; Kim & Park, 2004). When a container vessel is moored at berth, several cranes are arranged to load or unload containers for that vessel. Unloaded containers are transported by trucks and then go through

other terminal operations. After finishing all unloading jobs, cranes will start load containers from land side on to the container vessel (Lee, Wang and Miao, 2000; Kim and Park, 2004).
These interfaces are the quayside with loading and unloading of vessels, and the landside where containers are loaded and unloaded on and off trucks and trains. A container yard connects the quayside and landside, and provides space for container storage. Containers are stored either in stacks on the yard deck, or on truck chassis. Under a chassis storage system, each container is individually accessible providing fast transfer to landside movements. Yard cranes are utilized to access containers and reposition them within the stack. Because of increased demand and limited storage space in most modern seaports, nowadays stacking on the ground is the most commonly used storage approach (Steenken, Voß & Stahlbock, 2004).

When a vessel arrives in a seaport, it first has to moor for container loading and unloading. For this purpose, a number of berths are available at container terminals. Berths have very large construction costs, and therefore the number and length of berths at a container terminal is one of the most important strategic decisions that must be made at the strategic level. Berthing decisions initiate the work within a terminal by pushing and pulling containers into and from the yard storage areas. Obviously, the utilization of berths directly affects the overall utilization of the terminal, and therefore the operational level decision of allocating berth space to vessels is crucial. Most container berths in the large ports of the United States and Japan are leased by ship operators. Under such arrangements, ocean carriers are directly responsible for the containers. Such berthing systems are called dedicated berth systems, and terminals operating with dedicated berths are called dedicated terminals Vis & de Koster, 2003).

An alternative system, known as public berths, is used by many major hub ports like Hong Kong, Singapore, Rotterdam, and Hamburg. Public berth systems are used in multi-user terminals that process the vessels of different carriers, and generally have longer berths and higher berth utilization rates than dedicated terminals. When a vessel is moored at a berth, the unloading and loading of containers begins. Quay cranes are the standard equipment designed for this task. A quay crane is a special type of gantry crane having a large steel framework, which is positioned along the wharf (or quay) alongside a berthed vessel. Quay cranes are generally classified by their lifting capacity, and the size of the container ships they can load and unload. A Panamax crane can fully load and unload containers from a container vessel capable of passing through the Panama Canal (vessels 12-13 container rows wide). A Post- Panamax crane can fully load and unload containers from larger container vessels up to about 18 container rows wide. The largest modern container cranes are classified as Super-Post Panamax, and are used for vessels up to 22 container rows wide (Steenken et al. 2004) A modern container crane capable of lifting two 20-ft containers at one time generally has a lifting capacity of at least 40 tonnes. Some new cranes have now been built with 120 tonne load capacity enabling them to lift up to four twenty foot or two forty foot long containers. The speed of quay cranes during unloading and loading movements is also important. Modern quay cranes have hoisting speeds of 60-80 m/min when carrying a load. Trolley speeds can exceed 140 m/min. Given these parameters, it takes about 90 seconds to load or unload a single 40-ft container with an experienced crane operator. Post-Panamax cranes weigh approximately 800- 900 tonnes while the newer generation Super-Post Panamax cranes can weigh 1600-2000 tonnes (Vis & de Koster, 2003; Stahlbock, and Voss, 2008).

Dwell Time

Container dwell time is one of the many operational efficiency indicators to assess the efficiency of terminal operation. As compared to standard indicators such as ship turnaround time or productivity indicators it is however not yet widely used for global benchmarking purposes. It is therefore challenging to define standard limits above which dwell time would be considered too long in any given seaport. Maritime industry sector experts tend to agree however on a 3 to 4 days representative mean value (Goardon, 2003). From a national perspective, the issue of dwell time has been specifically identified as a major hindrance to country economic development for a long time (KPA, 2009).

The average current dwell time is 5 days depending on where the goods are destined – it does not compare favorably with international standards which are typically 1 – 3 days. On the other hand, gateways seaports are not only gateways, they are also a place of integration a number of players within the supply chain: port operators, public administration and authorities, brokers or intermediaries and shippers. Each of these players has a specific use of the seaport that conditions its perception of the long dwell time issue. For the terminal operations at the Mombasa Entry Port – there is a direct relationship between distribution of dwell times and terminal occupancy. It therefore needs to precisely evaluate a standard dwell time beyond which the efficiency of the terminal is negatively affected. This standard is the free time period defined "as the period during which a container can reside in the container yard without being assessed a demurrage fee" (Huynh, 2006).

According to UNCTAD (1995) it should correspond from a user perspective to the "sufficient time to allow efficient importers to clear their cargo" (UNCTAD, 1995), but in practice, the seaport authority and terminal operators define this free time according to capacity constraints, profit maximization, container traffic patterns or other consideration (for instance differentiation between transit and domestic goods), and they tend to reduce it for example when facing high congestion patterns. As for shippers (importers or exporters) dwell time in seaports can be assimilated to a temporary storage period which is justified either by the time necessary to complete cargo clearance formalities (transactional dwell time) or by a decision to leave cargo in the port for a definite number of days superior to that clearance delay (discretionary dwell time) . For containerized imports, cargo dwell time is defined as the time between vessel arrival and container exist from the port facilities – exceeds 20 days in average for most seaports in developing countries which makes them the most time-inefficient seaport in the world (UNCTAD, 2003).

From a transport service perspective, container terminals are nothing more than intermodal nodes in global transport chains. Their basic function is then to transfer efficiently utilized cargo from a maritime transport mode (container ship) to a land transport mode (rail and truck) and vice-versa. The efficiency of this transfer operation is then assessed against operational efficiency objectives which are in general berth, yard and quay productivity objectives. If we focus specifically of time operational efficiency of entry ports for containerized imports we can however simply look at the agility at which containers are physically transferred from the containership to the land transport mode via the container yard. This total time for the physical transfers only plus the necessary idle time between operations is defined as operational dwell time (UNCTAD, 2003).

Infrastructure

The critical role that container infrastructure plays in favoring the economic development of a Country or region is well established. Infrastructure is the necessary condition for efficient cargo handling operations and adequate infrastructure is needed to avoid congestion, foster trade development as well as securing deep-sea container connectivity for economies heavily dependent on international trade. Container infrastructure, however, needs to be complemented by efficient hinterland transport connections if the port is to fully exploit its potential as growth catalyst and supply chain node (Suykens and van de Voorde 1998). Unfortunately, it is not uncommon for development projects to focus exclusively on enhancing the infrastructural capabilities of the port, without adequate consideration of the hinterland connections. The urgency of looking at port and terminal development in conjunction to their hinterland connectivity is exacerbated by the pressure on container terminals to increase their efficiency levels resulting from the rapid growth of containerized cargo traffic flows and their increased variability (Haralambides, Cariou & Benacchio, 2002).

As port capacity cannot be developed as rapidly as increases in demand (Haralambides, Cariou & Benacchio, 2002), any overcapacity is eventually exhausted and episodes of congestion ensue even in the most efficient terminals. This calls for a phased but continuous and well-coordinated effort in expanding container capacity at terminals. Terminal operations are affected not only by the larger number of vessel calls but also by the increased variability of all sizes. As Vessels of over 12700 TEU are becoming increasingly common, despite the fact that they may only be able to access a few large hubs (Cullinane & Khanna, 1999). This will concentrate container flows on a few megaports, in turn impacting berth and crane productivity of the terminal and adding pressure on hinterland links, often with adverse effects on congestion and the environment (Yap & Lam 2013).

The expected increase in transshipment associated with larger vessel size, is likely to influence the terminals not only forcing them to handle higher volumes in the same period of time, but also to reduce the variability of their operations (i.e. increase reliability) in order to guarantee seamless flows of cargo among transshipment ports and/or transshipment port and feeder ports (Gilman 1999). The increases in productivity and reliability at terminals will require more tracking, greater container visibility and more emphasis on environmental and regulatory compliance particularly as terminals now occupy critical positions the supply chain (Notteboom 2008).

Generally, infrastructure is divided into physical and soft elements. Physical infrastructure includes not only the operational facilities such as the number of berths, the number of cranes, yards and tugs and the area of storage space, but also the intermodal transport such as roads and railways (Tongzon and Heng, 2005). Whereas, the soft infrastructure refers to the manpower employed. Maximum deployment of both types will assist in reducing vessel turnaround, thereby increasing the terminal capacity to accommodate more containers. Ships are continually increasing their carrying capacity and container made for large transport units in overseas container transport are under consideration. This scale enlargement requires new and capital-intensive transshipment facilities in gateway ports. Particularly, inter-modality is essential for the speedy transport of cargoes into and out of a gateway port. Without proper linkages, the efficiency of container terminal operation may decline due to congestion and delays (Tongzon and Heng, 2005).

Empirical Review

Some scholars (Tongzon, 1995; de Langen, 2003) have researched factors influencing cargo flow. Other studies (Wiegmans *et al*, 2007) have focused factors influencing the choice of ports. These studies are interdependent since the cargo flow depends on the port choice of port users. Using these findings is particularly interesting in order to understand which variables can be included in the model. Additionally, advantages such as the location of the port and the distance to the consumer markets play an important role in the volume of port throughput. However, more factors of ports determine the terminal throughput volumes. Also, Tongzon (1995) determines that cargo flow is dependent on the following factors: the first factor is the geographical location of a port. If the port is located on an easily accessible location by different modalities, more cargo is likely to flow to that specific port. The second factor is the frequency of ship calls. The higher the frequency of ship calls, the higher the port throughput. The third factor is the terminal efficiency. This indicator can be measured by looking at the container mix, the crane efficiency, the size of the vessels and cargo exchange (economies of scale), average number of container handled per hour. Again, Tongzon states that port charges could also be included as variable in the model. However their contribution to the total costs is relatively small (Tongzon, 1995).

Conversely, some scholars (Tongzon & Heng, 2005) have identified factors influencing the choice of port users. The studies determine choice factors of different port users. These studies are relevant for this research since the choice of the port users determine the cargo flows to the ports. The most discussed factors from these studies are, besides the location, the physical and technical infrastructure, the port efficiency, the hinterland connections, the port charges and the available (logistic) services. The physical and technical infrastructure includes port physical characteristics such as the depth of the water, the type of cranes in the port and the meters of quay. These variables indicate the limits of the capacity of the port and so the possible port throughput (Tongzon & Heng, 2005; Wiegmans *et al*, 2007; Chang et al, 2008; Tongzon, 2002; Tongzon, Chang & Lee, 2009). On the other hand, port competition has had an impact on the port choice factors. Containerization has led to standardization in the maritime industry, implying that ports cannot rely on specialization to maintain their market share and to generate revenues as much as they used to do (OECD, 2008). By containerization, ports in the same region became closer substitutes for the port users Furthermore, port competition has moved from competition between ports to between transport chains (de Langen, Nijdam & Van der Horst, 2010). Hinterland connections are of vital importance for a port, because container ports are nowadays a link in a logistics chain (de Langen *et al*, 2010).

Nevertheless, this implies that the quality of the hinterland connections and the diversity of the modalities available determine the level of container terminal throughput. Additionally, the costs of hinterland have become relatively important. However, OECD (2008) states that the cost per kilogram per km on the hinterland is 5 to 30 times as high (this depends on the hinterland transport mode) as the shipping cost by sea. Also port charges have an influence on the competitive position of the port; they include taxes, administration costs and shipping tariffs. Port users prefer the port with the best price/quality ratio. However port charges are not the most important choice influencer since this indicator is mentioned lower in the list compared to the other factors in several studies. Also, Tongzon (1995) states that port charges form an extremely low proportion of the overall costs of international trade. To make a link between port competition and the psychical and technical infrastructure: when these infrastructures are strongly congested, their quality decrease and this weakens the ports competitive position.

The activities of the Nigerian Ports were commercialized in 1992 under the name, “Nigerian Ports Plc”. However, considering the fact that the government still wholly owns the company, it reverted to its former name, Nigerian Ports Authority in October 1996. This reversion is however, not in conflict with commercialization efforts and commitment to improved services. Okorigba (2008) observed that the efficiency improved at the ports after the reforms of 2006, as cargo dwell time and turn round time of vessels reduced to an average of 2.45days as compared to an average of 6.85days and 10.43days before the reforms. He equally found out that infrastructural modernization and equipment enhancement reduced delays of cargo discharge at the ports thus increasing efficiency of the ports.

Ehbenine (2009) opined that port concession is very viable in a national economy because of its significance as a global tool for port development and unquantifiable gains to the economy, eliminating poor quality services and delays at the ports. He concluded that private operators would be more reasonable in their dealings to avoid government revocation of their license and unnecessary public reaction; freeing up of government funds for other priority developmental projects; attracts and uses foreign investment and marine insurance and also port concessioning will expose the private sector concern for a more efficient service than government (NPA) in port service delivery. Josiah (2008) in his study of Lagos port complex (port operational efficiency) noted the following as the contributing factors to low port operational efficiency at Nigerian ports: (a) poor services and poor cargo handling (b) documentation procedures characterized by long procedures (c) poor labour operational efficiency (d) queuing for berths problems and allocation (e) poor customs and port authority relationship (f) corruption and port pilfering and so on. Josiah (2008) concluded by suggesting the following:

(a) The use of satisfactory port traffic flow arrangement and reviewing them very often for the arrival and departure of vessels.

(b) Improvement of documentation process in terms of information reliability and spread of efficiency using ship arrival message (SAM), which is a linkage of port networks that allows port computers to interact with each other so that as a soon as a ship departs a port, the next ports of call are notified automatically through this network. The ships travel, arrival times, at these ports of call, the type, volume of cargo to be delivered at each port of call, as well as the names of the consignees, the shipping agents, ships and nationality of the ship. This makes preparation for ships arrival fast and easier. This works on the principle of Electronic Data Interchange (EDI).

(c) Efficient berth allocation policy that considers ships length, size, draught, volume and type of cargo etc hence reduction in waiting time, idle time and improved turn round time of the vessel.

Emeghara (1992) noted that from 1975-76, ship congestions at the Nigerian seaports was not due to lack of berthing facilities, but due to the fact that the cargoes stacking areas were not relieved of traffic as early as they should be. He further argued that lack of adequate, efficient and cost effective transport linkages with the hinterlands of the ports poses operational problems which mitigate against capacity utilization. He concluded that the Nigerian ports are under-utilized considering berthing and cargo handling capacities available hence the poor operational efficiency of the ports.

Adebayo (2005) equally identified cumber some clearing, system as one of the problems of poor port operational efficiency in Nigeria as the cargo clearing system depends on manual paper and physical movement of document to and from various processing centers located within and outside the ports. He also identified the non availability of multimodal transport system or rather the utilization of trucks rather than rail transport for the movement of goods to and from the hinterlands to the ports. This is also bad in some ports whereby no provision is made for the parking of the trucks prior to loading and so on. Emeghara (2008) in his study on the various delay causative factors influencing the high turnaround time of ships in Nigerian port, he identified the following:

(a) Corruption at all levels in the port.

(b) Lack of cargo handling equipments.

(c) Lack of skilled manpower among dockworkers.

(d) The channel depth or drafts of the entry channels.

However, the Onne and Rivers ports has drastically improved on the quantity and quality of cargo handling equipments since after the reforms and also on the other issues raised by the researcher in his study hence the operational efficiency currently. He also alleged low productivity of an average Nigeria dockworker as well as the private terminal operator slow training and retraining of the abundant unskilled dockworkers. These trends have reduced since after the reforms of the ports as they were evident in the ports prior to the port concessioning.

Operational efficiency measurement plays an important role in the development of an organization. As a result, all ports, without exception, use a variety of methods to examine their operational efficiency. Operational efficiency can be defined as the capacity to produce positive results that is, depending on the expectations (Ducruet, 2009). Ports are essentially providers of service activities, in particular for vessel, cargo, and inland transport. As such, it is possible that a port may provide sound service to vessel operators on one hand and an unsatisfactory service to cargo or inland transport operators on the other. Hence, port operational efficiency cannot normally be accessed on the basis of a single value or measure, rather evaluations are made by comparing indicator values for a given port over time as well as across ports for a given time period (De Monie, 1987). Despite the importance of port operational efficiency measurement, however, it is surprising to note that there are almost no standard methods that are accepted as applicable to every port for measurement of its operational efficiency (Cullinane, Song & Gray, 2002). More surprisingly, it is even harder to find standard terminology to describe port production, with different container ports using different terms to describe port production. "Measurement will always have a natural tendency to be terminal-specific" (Robinson, 1999). As reported by De Monie (1987), the measurement of port productivity has been greatly impeded by the following factors:

(a) The sheer number of parameters involved.

(b) The lack of up-to-date, factual and reliable data, collected in an accepted manner and available for dissemination.

(c) The absence of generally agreed and acceptable definition.

(d) The profound influence of local factors on the data obtained.

(e) The divergent interpretation given by various interests to identical results.

Port operations are increasingly specialized and processed in dedicated terminals but many flows of goods are still handled at general purpose berth; as in the case of Port Harcourt port and Onne ports. For instance, both ports in reference handles General cargoes, bulk, containers, refined petroleum products, oil exploration equipments and so on; hence there is no homogeneity of products/terminals for comparison. Depending on the case, port operational efficiency should be assessed for an homogenous set of berths or terminals. It is usually expressed as the average number of calls and the average flow-volume or weight of goods over a standard period of time, number of calls per berth and per year, volume or weight of cargo handled per hour, per call or per day, per gang or per crane or based on the new port operational efficiency indicators (PPI). In addition, other criteria can be used to see how existing capacity and operational efficiency meet the requirements of

(a) the shipper or the ship owner: mainly average waiting time of ship, dwelling time of cargo and data related to quality (value).

(b) Port Authority/concessionaire: basically berth occupancy rate and global traffic and so on.

Data Envelopment Analysis (DEA) which is a non-parametric efficiency evaluation model based on mathematical programming theory which was developed by Charnes et al (1978). It is used in operations research and econometrics for multi-variant frontier estimation and ranking which can be used in calculating efficiency levels within a group of organizations. The concept of DEA is developed around the basic idea that efficiency of a DMU is determined by its ability to transform inputs into desired outputs. This concept of efficiency was adopted from engineering which defines efficiency of a machine/process as output /input = 1. In this approach, efficiency is always less than or equal to unity as some energy loss will always occur during transformation process.

Resulting from the empirical studies, the following hypotheses relating to the purpose and problems of the study have been:

H_{01}: There is no significant relationship between Cargo insurance services and Quay crane services in Nigeria Sea Ports

H_{02}: There is no significant relationship between Cargo insurance services and Container dwell time in Nigeria Sea port.

H_{03}: There is no significant relationship between cargo insurance services and Infrastructure in Nigeria sea Ports.

METHODOLOGY

The study adopted a cross-sectional survey in its investigation of the variables. Primary data was generated through self- administered questionnaire. The study population was made up of all the six major ports in Nigeria. Thirty copies of the research instrument were distributed to 30 senior managers/supervisors of the six major ports in Nigeria. The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70.The study stated and tested six hypotheses. The hypotheses were tested using Pearson Product Moment correlation analysis with the aid of Statistical Package for Social Sciences version 23.0. The tests were carried out at a 95% confidence interval and a 0.05 level of significance.

DATA ANALYSIS AND RESULTS

The level of significance 0.05 was adopted as a criterion for the probability of accepting the null hypothesis in ($p > 0.05$) or rejecting the null hypothesis in ($p < 0.05$).

Hypothesis 1

H_{01}: there is no significant relationship between cargo insurance services and service quay crane services of the sea ports in Nigeria.

Table 1: Cargo insurance and quay crane services

	Cargo Insurance	Crane Service.
Pearson Correlation	1	.75**
Sig. (2-tailed)		0.060
N	27	27
Pearson Correlation	.75**	1
Sig. (2-tailed)	.060	
N	27	27

Source: SPSS Output

The table above present a coefficients of 0.7 which indicate a strong positive relationship between cargo insurance and efficient crane services of the sea ports in Nigeria. The correlation is statistically significant; hence, we reject the null hypothesis which infers that there is no significant relationship between use of cargo insurance services and crane service of the Nigerian sea-ports and accept the alternative which state that there is a significant relationship between use of cargo insurance and crane services of the sea ports in Nigeria

Hypothesis 2

H_{02}: there is no significant relationship between cargo insurance services and container dwell time of Nigerian sea-ports

Table 2: Cargo insurance and container dwell time

	Cargo Insurance	Dwell time
Pearson Correlation	1	.72**
Sig. (2-tailed)		.062
N	27	27
Pearson Correlation	.72**	1
Sig. (2-tailed)	.062	
N	27	27

Source: SPSS Output

The table above presents a coefficient of 0.72. This indicates a strong positive relationship between cargo insurance and container dwell time of the sea-port in Nigeria. The correlation is statistically significant. Hence we reject the null hypothesis which infer that there is no significant relationship between cargo insurance and container dwell time of Nigeria sea-ports and accept the alternative.

Hypothesis 3

H_{03}: there is no significant relationship between cargo insurance and infrastructures of the sea ports in Nigeria.

Table 3: Cargo insurance and infrastructure

	Cargo Insurance.	Infrastructure.
Pearson Correlation	1	.56**
Sig. (2-tailed)		.070
N	27	27
Pearson Correlation	.56**	1
Sig. (2-tailed)	.070	
N	27	27

Source: SPSS Output

The table above presents a correlation r of 0.56. By interpretation, this is a moderately positive relationship between cargo insurance and the infrastructure of the sea ports in Nigeria, and it is statistically significant. Hence, we reject the null hypothesis which infer that there is no significant relationship between cargo insurance and infrastructure of the sea-ports in Nigeria and accept the alternative which infer that there is significant relationship between cargo insurance and infrastructure quality of the sea-ports in Nigeria. .

DISCUSSION OF FINDINGS

Discussion of Findings

The study examined the relationship between cargo insurance and operational efficiency of sea-ports in Nigeria. The study observed that to a very large extent, respondents agreed that companies provide insurance for loss of goods in transit and that operating companies in the Nigerian ports provide adequate insurance for damages of goods in transit. This is actually one of the major requirement for operators at all the Nigerian sea-ports and which must be complied with completely. This finding is in line with that of Goss (1990). Furthermore, respondents agreed to a very large extent that companies provide insurance to cover cargo when the ship is actually sailing but moderately agree to a small extent that companies provide insurance for second hand goods on vessels.

On the issue of operators obtaining hull insurance, respondents agreed to a very large extent that companies provide insurance cover for the torso and hull of vessel. They also agreed to a large extent that owners of vessels provide insurance for piece of furniture on the ship. This observation is also in line with the outcome of the study by Goss (1990). Cargo handling corporation and its allies are much more interested in the risk protection of the vessels carrying the cargo as they are in protecting the cargo from theft, or/and damages. Respondents also agreed that vessels owners provide insurance cover for machinery and equipment on vessels. Lastly, respondents agreed to a very large extent that all vessel operators provide insurance for vessels as a measure of safety.

On the issues of quay crane services, respondents agreed to a very large extent that cranes are used for ship loading and unloading on a consistent manner. This finding is in alliance with that statement in the literature review that the quay crane operation is one of the important operations for the container terminal logistics, which carries out loading a container from a truck to a vessel or unloading a container from a vessel to a truck. Several major container terminal operations influence the efficiency of container terminal, which include the vessel berthing operation, the crane unloading/loading operation, the container delivery operation by trucks, the inspection operation, and the container storage operation. Of those operations, the crane operation is the key factor that determines the efficiency and effectiveness of a container terminal (Lee, Wang and Miao, 2000; Kim and Park, 2004). Respondents agreed to a very large extent that Cranes are used for stacking of containers and that the cranes are used to move containers between stacking areas and the landside operation they agreed to a very moderate extent that operators provide different types of cranes for port operational efficiency.

Furthermore, respondents agreed to a very large extent that Port provides minimum time period for ship to berth at the quays. Container dwell time is one of the many operational efficiency indicators to assess the efficiency of terminal operation. As compared to standard indicators such as ship turnaround time or productivity indicators it is however not yet widely used for global benchmarking purposes. It is therefore challenging to define standard limits above which dwell time would be considered too long in any given seaport. Maritime industry sector experts tend to agree however on a 3 to 4 days representative mean value (Goardon, 2003). From a national perspective, the issue of dwell time has been specifically identified as a major hindrance to country economic development for a long time (KPA, 2009). Respondents further agreed to a moderate extent that Port provide a specify period for containers to reside in the court yard before being assessed for demurrage. This is a practice that administered in order to reduce port congestion. Respondents further agreed that Port authorities provide efficient time for importers to clear their cargos and that Port authorities provides minimum days and complies with the day between vessel arrival and container exit from the port facilities.

On the issue of port infrastructure, respondents agreed to a very large extent that Port authority provide efficient hinterland roads to access the ports. As observed in the literature review, the critical role that container infrastructure plays in favoring the economic development of a country or region is well established. Infrastructure is the necessary condition for efficient cargo handling operations and adequate infrastructure is needed to avoid congestion, foster trade development as well as securing deep-sea container connectivity for economies heavily dependent on international trade. Container infrastructure, however, needs to be complemented by efficient hinterland transport connections if the port is to fully exploit its potential as growth catalyst and supply chain node (Suykens and van de Voorde 1998). Unfortunately, it is not uncommon for development projects to focus exclusively on enhancing the infrastructural capabilities of the port, without adequate consideration of the hinterland connections.

Furthermore, respondents agreed to a moderate extent that Port terminal development and port capacity are ongoing to avoid port congestion and that port authorities Provide increase number of crane yards and area of storage space, provide inter modal transport such as roads and rails. Finally, respondent agreed moderately that Port authority provide adequate manpower for port activities.

CONCLUSION

Carrying the world's trade by sea comes with its challenges and risks. The increase in maritime activities, and shipping in particular, has also given rise to criminal activities on the sea thereby increasing the attendant risks of maritime business. Apart from the scant awareness and patronage of marine insurance in Nigeria, the sector is also affected by a myriad of challenges. In the basket of challenges are weak government legislation and policy, lack of human capital and expertise, high level of ignorance and poor port operational efficiency. In the light of the above the study evaluates the relationship between the cargo insurance services and operational efficiency of Nigerian ports. The study finds reasonable evidences and concludes that there exist a moderately positive relation between cargo insurance services and the operational efficiency of sea-ports in Nigeria.

RECOMMENDATIONS

Deriving from the findings of the research work, the research recommends as follows:

i. Companies operating at the sea port should ensure that they take comprehensive insurance policy to cover all the goods that are been handle by the ship, the crane and the land transport for efficient sea-port operations.
ii. That the insurance services should also cover the container dwell time in such a manner that if the goods stayed beyond the expected time at the sea-port such goods should be covered under comprehensive insurance.
iii. That the insurance services should cover all the infrastructure at the sea-ports in Nigeria.

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