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# Evaluation of container shipments in Nigerian maritime industry

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## *Abstract*

*The study is an evaluation of container shipments in Nigerian maritime industry. The aim is to determine the trend and the growth of container shipments (inward and outward) laden and tonnages in Nigerian maritime industry as a way of suggesting need for an integrated intermodal transportation system in Nigeria. Data was source through secondary data collection technique. Online Nigerian ports statistical database was the source of data used for the purpose of the study. To achieve the objectives of the study, four hypotheses were formulated. Statistical tools were used to analyze the data collected on the study and to answer the research questions. Trend analysis, regression and correlation analyses were employed for the data evaluation. The findings of the study show that the trend lines of container shipment (inward and outward) experience series of fluctuations and were unsteady over the period of study which may be attributed to the volatile nature of shipping trade and/or as a result of global economic recession. The study however, shows there is expectation of growth in inward and outward container laden which was shown on the growth line and forecast shows increasing trend on graphs. Similarly, the tonnage inward and outward experience great fluctuations over the period of study, and however, the growth lines show increase in growth and forecast graphs prove increasing trend for the container tonnages inward and outward in Nigerian ports. The findings of the study show that there is a negative linear correlation between inward and outward container, whereas there is a positive*

*linear correlation between inward and outward container tonnages. Based on these findings, the researchers made some recommendations on the need for integrated intermodal transport system to effectively and efficiently cater for the expected growth in container shipments in Nigerian maritime industry.*

**Keywords: evaluation, container shipments, maritime industry**

## 1.0 Introduction

Nigeria is a maritime nation signifying that it has well developed port industry and transport infrastructural systems to handle imports and exports commodities arriving at the seaports. Nigeria has about six major seaports comprising of the Lagos Apapa ports complex, Tincan Island ports, Warri ports complex, Port Harcourt ports complex, Onne Ports complex and Calabar ports complex. Each of these ports is concessioned to various concessionaires who have so much invested in the development of the port industry to international standards and best practices making the ports very efficient in the twenty first century in container handling. There are dedicated container terminals in Nigerian ports which are capable of handling volumes of container shipments. These terminals are operated by the concessionaires; in Apapa, AP moller operates one of the biggest container terminals and West African Container terminal in Onne ports and so many others in the various port locations in Nigeria. Nigeria also operates inland container depots located in the six geopolitical regions of the country. The inland container deports also called inland dry ports were created to lessen the congestion problem in the main seaports and allowed the containers moved closer to the importers locations and provision made for customs clearance at the inland port regions. There are seven Federal Executive Council approved locations for the inland container depots or container freight stations in Nigeria. These freight stations are concessioned to private operators as shown in the table below:

**Table1**

| S/n | CONCESSIONAIRES | LOCATIONS | CAPACITY IN TEUS |
|---|---|---|---|
| **1.** | EASTGATE INLAND CONTAINER TERMINAL LTD | ISIALA-NGWA (ABA) (ICD) | 50,000 |
| **2.** | CATAMARAN LOGISTICS LTD | IBADAN (ICD) | 50,000 |
| **3.** | DALA INLAND DRY PORT LTD | KANO (ICD) | 20,000 |
| **4.** | DUNCAN MARITIME SERVICES | JOS (ICD) | 20,000 |
| **5.** | EQUATORIAL MARINE NIGERIA LTD | FUNTUA (CFS) | 10,000 |
| **6.** | MIGFO NIGERIA LTD | MAIDUGURI | 10,000 |

(CFS)

Source: Nigerian shippers' council

Generally, in the recent time, Nigerian ports have recorded a total cargo throughput of over 18.8million tones, and it has also been revealed by Nigerian Ports Authority (NPA) that the ports have welcomed over I, 045 vessels with gross registered tonnage of 32.97million tones in the first three months of 2019 (hellenic, 2019). Container shipments in Nigerian ports are gradually on increasing, in 2012, Nigeria exported 137540 metric tons of non oil commodities through Nigeria approved export ports-Apapa and Tincan Island ports (BusinesssDay, 2013). Similarly, Nigeria witnessed an upsurge on imported cargoes rising to 239722,000 in November 2020 (trading economics, 2021). This has envisaged the extent of container shipments in Nigerian ports industry in the 21st century port concession and the attendant needs for viable intermodal transport infrastructural systems to support the easy movements of export and import containers to and fro the ports community. Intermodal transportation which entail the use of more than one transport facilities in the transportation of freight from origin to destination in a container unit load without disruption in the arrangement of the consignment.

In reality, the propelling force of intermodal transportation concept globally is undoubtedly the use of the standardized ISO containers, which has enhanced handling of freights between the various carrying modes of transportation systems. Adopting the intermodal transport concepts would have been meaningless without the use of ISO containers. This implies that without the ISO container, the intermodal concept of transportation from source to destination of maritime industry would have been very difficult, inefficient, labour intensive, time wasting and costly.

According to the European Conference of Ministers of Transports (2001) a shipping container is defined as in a generic term for a "hollow box for loading freight, strong enough for repeated use, usually stackable and fitted with devises for transfer between modes". It further explains that a shipping container is a large standard size metal box in which cargo is packed for shipment aboard specially configured to fix in various transport modes. It is designed to be moved with common handling gears or equipment enabling high-speed intermodal transfers in economically large units between container ships, railcars (Container on Flat Car), truck chassis, and barges using a minimum of labour.

Going by the definition above, Container therefore, represents a load of consignments and can be shipped as a unit, moveable from one mode to another without resorting or rearranging to fit into another mode during change of mode. There are many types of shipping containers which comes in various forms and sizes for different purposes, the reference sizes of containers acceptable for global shipping are the International Standard Organization (ISO) containers such as the 20 foot container measured about 20

feet long, 8'6″ feet high and 8 feet wide popularly refer to as the Twenty-foot Equivalent Unit (TEU) and the other forty foot long refers to as the Forty-foot Equivalent Unit (FEU). There are also the "Hi cube" containers which are commonly used and they are one feet higher (9'6″) than the standard TEU. In all these standard containers, a wide variety of shipping containers have been put in use today in the global maritime industry. The most commonly used globally is the 40 FEU, which is measured about 2,400 cubic feet capable of loading average of 22 ton cargoes. According to Jean-Paul and Brian, (2017), transporting cargo in such a 20 TEU container is usually about 20% cheaper than transporting cargo in a 40 FEU. Although, the transport time and distance may be the same, only that 20 FET may have some capacities unoccupied. Jean-Paul and Brian, (2017), also note that shipping containers are either made of steels (the most common for maritime containers) or aluminum (particularly for domestic) and their structures give flexibility and hardiness for this purpose. He summaries that the reason behind the diffusion and generally use of ISO containers is the standardization agreement reached about its base dimensions and latching system through the International Standards Organization (ISO).

Containerization is the use of the ISO containers to arrange consignments meant for shipment as a unit load for freight transportation. This process can be referred to as cargo unitization and the container used can also be referred to as intermodal containers because it enables the transfer from one mode of transportation system to another without resorting of the consignments. Containerization involves processes and has enabled increasingly use of the intermodal containers because of the unitization of cargo and the transferability from one mode to another in terms of its flexibility which has greatly supported freight distribution and also is able to diffuse spatially as a growing number of transport systems are able to handle such containers. The intermodal containers can either be owned by a shipping liner that transport containerized cargoes from one geographical location to another in the maritime industry which tend to use their own containers in shipment of cargoes, and as a tool to help fill up their ships. This can also be a way of encouraging patronage to the shipping line. However, there are other companies which specialized on renting or leasing intermodal containers and using such as assets for revenue generation. Many factories that produce ISO containers also lease containers to shipping companies for use.

There are basically five types of shipping containers used in intermodal transportation of cargoes globally and they are:

- **Standard container:** this container is designed to carry a wide variety of general cargoes. It is often labeled as dry container because it carries dry goods either in break bulk (most common) or bulk (less common) form. Cargo is loaded and unloaded through a double door which marks the "back side" of the container.

- **Tank container:** this container is designed to carry liquids (chemicals or foodstuff). It is composed of a tank surrounded by a structure making it the same size than a standard 20 foot container, including its four latching points.
- **Open top container:** is a container with an open roof and designed to carry cargoes that are over size or too large to be loaded through standard container doors, such as machinery. The container is loaded from the top with a tarpaulin used to cover its contents.
- **Flat container:** a flat container has an open roof and sides (collapsible), designed to carry heavy and oversized cargo. The cargo transported is left exposed to outdoor conditions.
- **Refrigerated container:** this is also known as a reefer. It is container designed to carry temperature controlled cargo, often around or below freezing point. It is insulated and equipped with refrigeration plant maintaining the temperature range.

Moreover, containerization is the brainchild of the global intermodal transportation concept. The efficiency in intermodal transport system is largely achieved by the uniformity in the dimension and widely use of the intermodal containers as a unit load which are conveyable in various modes of transportation system without repackaging, resorting or rearranging which would have involved additional cargo handling costs.

Intermodal transport exists in three dimensions. This seeks to integrate various mode of transportation to form a system of intermodalism for safe and easy transferring of passengers and freights.

- **Intermodal transportation**: This is the most common concept. It is the movement of passengers or freight from an origin to a destination relying on several modes of transportation. Each carrier is issuing its own ticket (passengers) or contract (freight). The movements from one mode of transport to another are commonly taking place at a terminal specifically designed for such a purpose.
  Therefore, intermodal transportation in the literal sense refers to an exchange of passengers or freight between two transportation modes, but the term has become more commonly used for freight and container transportation across a sequence of modes.
- **Multi-modal transportation**: This is the movement of passengers or freight from an origin to a destination relying on several modes of transportation using one ticket (passengers) or contract (freight). Technically the same as intermodal transportation, but represents an evolution requiring a higher level of integration between the actors involved such as carriers and terminal operators.
- **Trans-modal transportation**: This is the movement of passengers or freight within the same mode of transport. Although “pure” trans-modal transportation rarely exists and an intermodal operation is often required (e.g. ship to dockside to ship), the purpose is to insure continuity within the same modal network. It initially

began as improving the productivity of shipping evolving into an integrated supply chain management system across modes and the development of multi-modal transportation network. This is possible in transshipment operation.

Intermodal transportation involves the use of at least two different modes in a trip from origin to destination through a transport logistics supply chain, which permit the integration of several transportation networks. Intermodal enhances the economic performance of a transport chain by using modes in the most productive manner. The key is that the entire trip is seen as a whole, rather than as a series of individual operations with separate sets of documentation and rates. The concept of containerization in intermodal transportation system is essentially needful to enhance the efficiency in the use of varying mode of transportations.

## 2.1 Statement of the problem

Obviously container shipping has been in use since the invention and recently has increasingly been adopted for shipment of most consignments as it has developed in a standardized unit for carrying different types, shapes and sizes of cargoes in maritime industry. The concept of container shipping has become globally recognized and is used most frequently by many industries around the world to consolidate their products into a unit load for easy handling and transportation across various modes of transportation systems. Many authors have noted the importance and efficiency of container use in the era of “Industrial Evolution” where there are high demands for transportation of goods and services across the globe involving varying modes of transportation systems. Container use has proven its advantages and potentiality for transportation in term of safety and security of cargoes, enhanced ship turnaround time and economic of scale in term of cost, unitization of large amount of cargoes and time effectiveness in the maritime industry.

In Nigeria today, over 80 percent of non oil commodities of both the imports and exports cargoes are shipped in container loads which are conveyed on vessels, trucks and trains from origin to final hinterland destinations. Nigeria is a developing Nation with increasing population and a great deal of industrial activities evolving, and global commerce with other nations and continents of the world which demands transportation of raw materials, semi finished and finished products in containerized units. The increasing industrial activities and high dependency on imported goods increases the demand for container shipping in Nigeria. Notwithstanding, this draws attention to the need for viable intermodal transport infrastructural facilities in terms of good road networks, availability of truck cars, and rail wagons to enhance the containerization in a developing economy such as Nigeria.

The research is therefore, intended to determine the trend of container shipments and to evaluate the growth of container shipments in Nigerian maritime industry as a way of suggesting the need for viable integrated intermodal transportation system in Nigeria.

## 1.3 Research objectives

The main objective of the study is to evaluate container shipment in Nigerian maritime industry. Other specific objectives include:

1. To determine flow of inward and outward container laden or shipments in Nigerian ports.
2. To determine flow of inward tonnage and outward tonnage of container shipments in Nigerian ports.
3. To determine the linear correlation between inward and outward container shipments in Nigerian ports.
4. To determine the linear correlation between inward and outward tonnages of container shipments in Nigerian ports.

## 1.4 Research questions

1. What is the flow of inward and outward container laden or shipments in Nigerian ports?
2. What is the flow of inward tonnage and outward tonnage of container shipments in Nigerian ports?
3. Is there linear correlation between inward and outward container shipments in Nigerian ports?
4. Is there linear correlation between inward and outward tonnages of container shipments in Nigerian ports?



## 1.5 Hypotheses

$H_{01}$: there is no growth in the flow of inward and outward container laden or shipments in Nigerian ports.

$H_{02}$: there is no growth in the flow of inward and outward tonnage of container shipments in Nigerian maritime industry.

$H_{03}$: there is no linear correlation between the inward and outward container shipments in Nigerian maritime industry.

$H_{04}$: there is no linear correlation between inward and outward tonnages of container shipment in Nigerian maritime industry.

## 2.0 Review of related literatures

### 2.1 History of the Shipping Container

According to John (2016), 26th April, 2016 marked the 60th anniversary of the maiden voyage of the Ideal - X and the birth of modern container shipping, a development that has played significant roles in spurring the global economy. Containerization has played an immense role in shipping industry development globally. The idea of containerization is the brainchild and cause of maintained continuous development in the intermodal transportation system which has offered economic of scale to the importers and exporters in the global industry.

Ακαδημια (2015) infers that the idea of shipping products in containers is a very old one that the ancient Greeks used sealed vases – or amphorae – to transport oil or wine and cultures used large trunks to ship valuables aboard their sailing vessels. However, containerization is a modern phenomenon in the transport industry which is about 65years old today the world has known and adopted the concept of containerization as a means of shipping containers as unit loads onboard vessels, trailers on roads or transporting cargoes on railroad trains which every part of the world enjoys in the industry.

Notteboom *et al*., (2008) and Raine (2006) both authors acknowledge the fact that the first thought for the use of container to package cargoes as a unit load was cultivated and nurtured by an American entrepreneur "Malcom McLean" who featured prominently in the transport industry development. It was first put into practice about 60 years ago according to John (2016); McLean, boss of his own trucking business in North Carolina, was frustrated by the laborious methods of handling goods in the early part of the 20th century. According to the history, Malcom McLean sought how possibly to overcome congestion on the highways and the inefficient loading and discharge procedures of conventional cargoes onboard ships that would be of benefits to the industry and operators. This idea brought about lifting the consignment part of the truck chassis onboard the ship. The idea required considerable alterations to the ship and truck bodies which Malcom McLean nurture and brought to reality. On 26 April 1956 McLean produced a prototype – he termed the Ideal-X and sailed from Newark to Houston carrying 58 truck bodies with the wheels removed for the first time. These shipments of the first modern containers indicate a huge revolution in transportation industry that has changed the world till date (Daniel 2012).

Ακαδημια, (2015) noted the great global impacts of the new innovation on ship turnaround time, reduction on sharp practices of cargo theft at the loading and unloading ports as well as reduction in the insurance costs for the shippers and other stakeholders in the shipping industry.

Another innovation in this regards include the development of container terminals where there are dedicated quayside, stacking area and relevant facilities and superstructures to handle the container shipments in order to derive maximum efficiencies from the use of the containers. Most importantly, this includes the need to train new dockside cranes operators rather than large teams of stevedores or laborers.

## 2.2 Container impacts on the global shipping, logistics supply chain and economy

Containerization and unitization of consignments have actually elevated huge burden on shipping industry globally. The idea of container box and intermodal transportation is a thought that has turned the shipping industry around and would out live the shipping industry with huge advantages that many generations would enjoy in material handling and logistics supply chain management. According to Nicolas et al (2018), before containerization and unitization of cargoes, global shipping was very expensive, slow and time consuming. Vessels spent weeks into months at ports while the gangs of dock workers handled cargoes piece by piece which contributed to too much time spent at the ports and high costs of cargo handling, as well as affecting the profitability of both the port industry and the ship-owner in terms of vessel turnaround time and efficiency. Hence, Port costs on cargo handling accounted for a significant share of the total shipping costs. The American Association of Port Authorities estimated that in-port costs, primarily, labour accounted for half the costs of moving a truckload of medicine from Chicago to Nancy, and France in early 1960s (Levinson, 2008; Eyre 1964).

Another record breaking innovation in the shipping industry was the second phase of development in container shipping which was the key exploration of container concept. This was brought about by the establishment of International Standard Organization (ISO) containers, which provided a uniform common standards container sizes, stacking techniques, and grip mechanisms, which has minimized intensive manual labour and introduced technical knowhow in cargo handling. These standards allow containers to be used across different modes of transportation-ships, trucks, and rail across countries and continents of the world (Nicolas *et al*., 2018).

In the recent time particularly in this 21$^{st}$ century, the wave of industrialization and globalization has enormously improved the ability of transporting goods from one location to another in the global commerce. Industrialization entails high degree or increase in production of goods and service around the world which globalization has brought the world into a community of commerce whereby goods and service are sourced and distributed within the global communities. According to Levinson (2008), the decline in the significance of physical distance owes much to the development and rising of containerization. Containerization has simplified cargo handling by unitization, protection, shipment, pricing, and the transfer between modes from ship to train to truck vise visa. It has actually minimized or even eradicated the manual routine on material handling and evil of cargo pilferage at the ports. Banerjee, A., Duflo, E. and Qian, N.,

(2012) note that containerization has caused international trade to grow by more than 1,000 percent since its invention and innovation on ISO containers use in the maritime industry. The United Nations Conference on Trade and Development, (UNCTAD, 2013) infers that containerized cargo now accounts for over 80 percent of global commodity trades, especially the non- oil commodities. It is noteworthy to understand that the decline in trade costs brought by containerization, impacts on global economic activities which have productive reflection on the industries of many nations. The adoption of the new shipping technology by ports of many nations is a ripple effect of containerization. Container ships sit much deeper in the water and so require deeper ports in which to dock. Dredging a harbour to increase depth becomes necessary despite cost. However, the cost advantages overtime makes a port more likely to containerization. Containerization requires large extensions of land, as port activity shifts from water-based Finger-piers to giant cranes and vast marshalling yards (Nicolas *et al*., 2018).

Container shipping makes it possible for true global economy to work, it connects countries, markets, businesses and people, allowing them to buy and sell on a scale which was not previously possible. Feyrer, (2009) and Pascali, (2017), acknowledge the reduction in trade costs brought by containerization which has effect on the spatial distribution of economic activity across contents of the world. According to Rizzoli A E, Fornara N, Gambardella L M (1999), container shipping has improved access to international markets affecting country level outputs in terms of Gross Domestic Products (GDP). Indeed shipping has led to a tremendous growth in world merchandise, which has consistently grown faster in the recent time. In 2016, goods loaded at major seaports worldwide are estimated at 9.42 billion tones (Kang J-G and Kim Y-D, 2017)

## 2.3 Intermodal transportation development in Nigeria

Transport plays a major role in the economic and sociopolitical development of any nation. A well functioning transport system stimulates national development, allows unrestricted movement of goods and services and serves as a vital link with facilities among others. The different transport modes- rail, road, water and air have specific advantages and uses; hence the overall efficiency of the transport system depends on the development of these modes.

The evolution of modern transportation systems can be categorized into the colonial era where the networks of road, rail and water transportation systems were built to meet the exportation of agricultural produce and the post colonial era where with the discovery of petroleum, it became an instrument of unification and an important tool of social and economic development (Oscar, 2011). In Nigeria today goods and passenger movement are performed majorly by the road transport while water, rail and air play significant roles, more specially the water transportation which is the major channel for larger scale international transportation of raw materials and finished products.

A peep into the draft of national transport policy shows that the Federal government plans to establish an integrated transport system that will ensure effective connectivity between the ports, rail, road, inland waterways and air, thereby making use of the advantages of different modes to ensure smooth movement of goods and services for socioeconomic development (A.O Adeniran, 2016).

Intermodal transport involves the transportation of goods and services in using multiple modes of transportation systems (air, rail, ship, and truck), without any handling of the Freight itself when changing modes. This could be made possible by the use of ISO standard container sizes to package and transport goods as unit loads. It is generally agreed that effective and efficient intermodal transport system reduces vessels turn-around-time, reduces cargo dwell time at the ports, and reduces total costs on exports and imports; as well as insuring the security of ships at berth, cargoes at terminals and security of persons in the ports which are major determinants of a good, efficient and user-friendly ports (A.O Adeniran, 2016). Obviously, the desire to achieve these standards informed the policy which the Federal Government of Nigeria embarked upon in 2006. The policy was to ensure that Nigerian seaports were re-engineered to compete favourably with other ports of the world. The primary aim was to turn Nigerian Ports Authority into a brand name and a first- choice port in West and Central Africa, and indeed a hub port for Africans (A.O Adeniran, 2016).

Apart from this rationale, Nigerian ports were also in need of huge resources for rehabilitation and modernization to make them more efficient and meet the demands of port users to handle the increasing container traffic and also be a profitable venture. The idea of restructuring the ports which is also in tandem with the economic policy of the Nigerian government is to grow an economy that is robust, private sector- driven, locally and globally competitive and efficient.

The port reform programme was therefore, designed to make the ports competitive, innovative and capable of attracting private sector investments. The basic tenet of this reform programme provide for public ownership of port infrastructure and transfer of cargo operational responsibilities to the private sector as a means of improving efficiency, attracting private funds and freeing public resources for social services.

## 2.4 Improvement initiatives for intermodal transport system in Nigeria

According to Okoroji (2013), the Federal Government of Nigeria under President Goodluck Jonathan realized the importance of effective intermodal transport systems and has made huge investments in the various modes of transportation systems. Hence, the Nigerian government is promoting stronger private sector participations and in search of solution in transport industry and infrastructural development of the sector. Okoloji (2013) notes that the major aspect of the transport system is the fulfillment of the presidential initiative projects which is essentially geared towards linking all the six geopolitical zones on dual carriage ways. Indeed the Federal Government has so far

invested in the rehabilitation of the railway together with the progress and success recorded which includes, contract award of Lagos-Jebba track rehabilitation, deployment of heavy duty civil engineering equipment and immediate mobilization to sites of the contractor, China Civil Engineering Construction (CCEC). According to the former Managing Director of NPA, Omar Suleiman, the Nigerian Ports Authority is committed to being the hub of West and Central Africa and every effort has been channeled to connecting the Ports to the Railways (Oscar, 2011). This will permanently improve speedy clearance of cargoes and free the burden on one mode of transport- "the roads". As an interim measure of freeing the roads pending the establishment of an integrated transport system and completion of major rail works that are in the pipeline, the Federal Government has in various occasions and each successive year set up committees to decongest the ports. The Management of the Nigerian Ports Authority (NPA) also in conjunction with the enlarged committee has flushed out all dilapidated and abandoned trucks along the Tin Can Island Port (TCIP), and other port access roads which hitherto were hampering smooth traffic (Oscar, 2011). While these efforts yielded results in the interim, a much more enduring solution is being sought because while container cargo traffic is increasing in Nigerian Ports only road transportation in existent cannot handle the volume in a growing economy like Nigeria economy, and bad roads not helping matters.

## 2.5 NPA and NRC collaboration on Rail Network

According to A.O Adeniran, (2016), NPA has made a case for the establishment of an intermodal connectivity to the rail lines and seaports concern with the issue of extensive cases of containerized cargo congestion at the nation's seaports. The report noted that the Nigerian Railway Corporation (NRC) in collaboration with NPA has initiated rehabilitation and standardization of all rail networks within the major Ports facilities with a view to enhancing and facilitating speedy container cargo delivery. The Nigerian Ports Authority recognizing the role of effective intermodal transportation also initiated several road projects within the port areas and these are efforts to ensure speedy delivery of cargo. Already remedial works for Tin Can Island service lane has been completed while the Rehabilitation of access road to Kirikiri Phase 1 Apapa is ongoing with the rehabilitation of access roads to the Lilypond container terminal as well as the rehabilitation of Port-Harcourt road in progress (A.O Adeniran, 2016).

Notwithstanding, the Nigerian Ports Authority through one of its concessionaires has commenced movement of containerized cargoes through barges. P.C Onokala *et al.*, (2020) noted this as a welcome development and an evidence of efforts to improve intermodal transport system in the Port operations. With all these in place and the combined initiatives of the Nigerian Ports Authority this mode of transport will begin to witness patronage via cargo transfer and delivery.

## 3 Research methodology

The data for the study was sourced through secondary data collection. Basically, data was sourced online; a database of Nigerian Ports Authority statistics on container traffic volume for the periods 2007-2017. In order to evaluate the data collected on this study, the researcher used varying statistical tools to test the hypotheses. Time series trend analysis, regression and correlation analyses were used to analyse the behavior of the container trade and tonnages generated in Nigerian ports within the period under review. The analysis of data was computed using a computer based SPSS version 22 and Excel Microsoft word 2013 version. The exponential smoothing is a forecasting method for univariate time series data. This method produces forecasts that are weighted averages of past observations where the weights of older observations exponentially decrease. The Alpha value used is 0.1. Lower values produce smoother fitted lines because they give more weight to past observations, averaging out fluctuations over time while, the smoothed value is given a large weight (i.e. 0.9). (Jim Frost, 2013).

## 4.0 Data presentation and analysis

**Table2: CONTAINER TRAFFIC STATISTICS AT NIGERIAN PORTS: 2007- 2017**

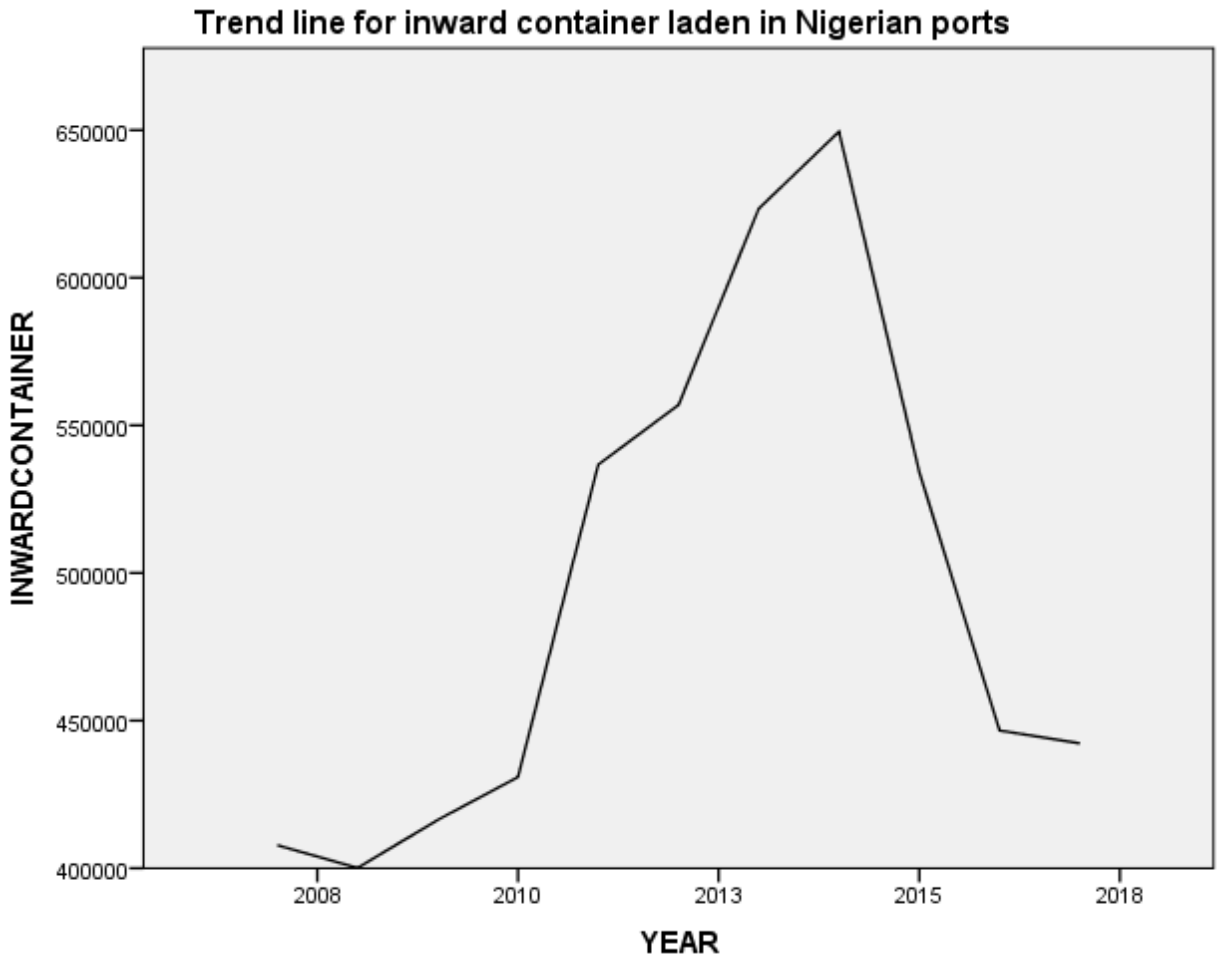
| YEAR | NO. OF EMPTIES | NO. OF INWARD LADEN | TONN INWARD LADEN | T.E.U | NO. OF EMPTIES | NO. OF OUTWARD LADEN | TONN OUTWARD LADEN | T.E.U |
|---|---|---|---|---|---|---|---|---|
| **2007** | 979 | 407,828 | 2,697,353 | 356,551 | 382,481 | 247,076 | 298,627 | 75,399 |
| **2008** | 2,844 | 400,119 | 7,794,894 | 551,682 | 286,897 | 47,197 | 685,248 | 61,300 |
| **2009** | 177 | 416,351 | 5,802,550 | 577,267 | 376,276 | 57,830 | 897,994 | 76,317 |
| **2010** | 738 | 430,923 | 7,534,972 | 603,479 | 337,308 | 66,289 | 1,224,443 | 82,458 |
| **2011** | 97 | 536,719 | 9,252,781 | 753,411 | 435,134 | 66,202 | 1,239,600 | 86,566 |
| **2012** | 273 | 556,900 | 4,298,373 | 783,279 | 496,237 | 72,774 | 662,815 | 97,318 |
| **2013** | 437 | 623,409 | 10,729,910 | 887,211 | 503,225 | 79,718 | 1,435,972 | 105,455 |
| **2014** | 106 | 649,514 | 5,428,8 | 935,3 | 522,942 | 102,081 | 750,620 | 128,1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 46 | 09 | | | | 77 |
| **2015** | 126 | 534,223 | 9,419,672 | 771,130 | 417,627 | 128,687 | 2,263,594 | 168,249 |
| **2016** | 7,839 | 446,645 | 8,976,048 | 654,166 | 309,546 | 121,037 | 2,103,798 | 154,421 |
| **2017** | 85,263 | 442,290 | 10,379,152 | 667,826 | 207,539 | 116,319 | 2,325,091 | 154,880 |

Source: (NPA statistics)

## 4.2 Data analysis

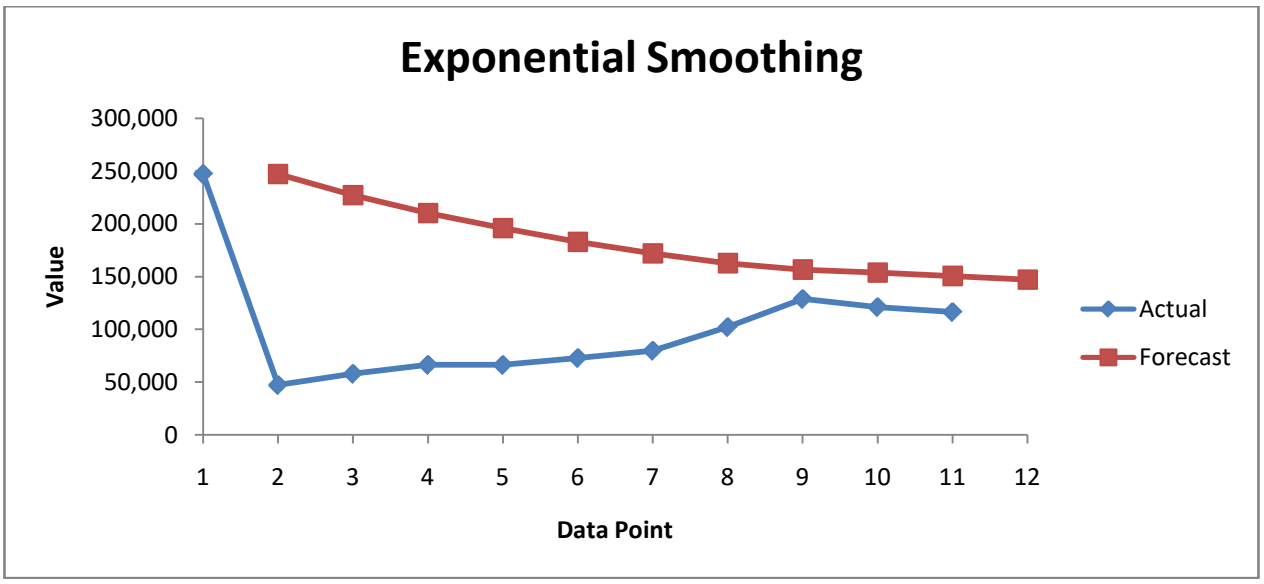
**Fig1**




The figure above represents the trend line of inward container laden in Nigerian ports from 2007 to 2017. The trend line shows a spontaneous growth from 2009 to 2014, which suddenly crashed and dropped steeply from 2005 to 2017, and is yet to pickup or recover in the recent time. The instability or the steepness on the trend line could be explained owing to the volatility nature of the trade; however, the abrupt drop can be attributed to the recent recession on economic activities. This also could be associated with Nigeria naira devaluation in the international money market system which has

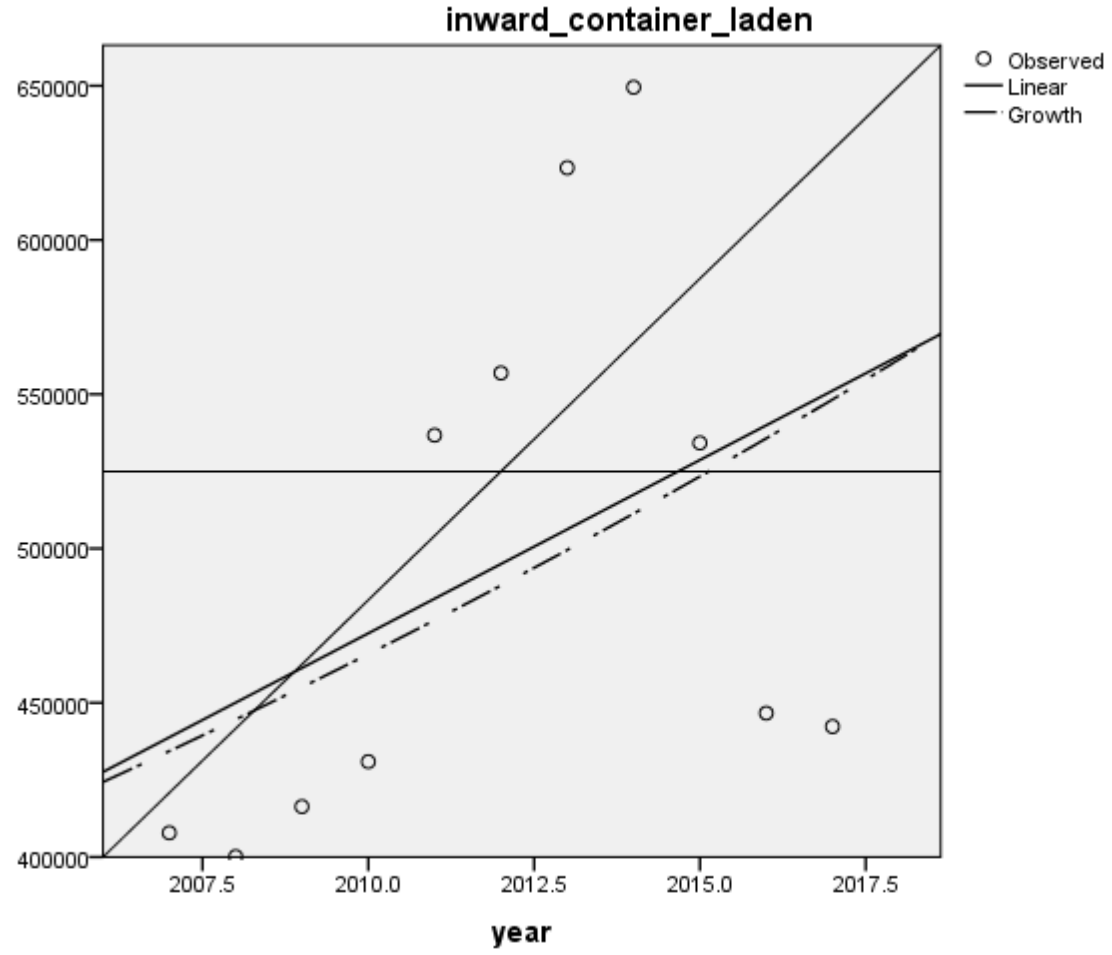
favoured increase in dollar rate against Nigeria naira, making it impossible for naira to purchase equal value of cargoes in the international market.

**Fig2 shows forecast on inward container laden**



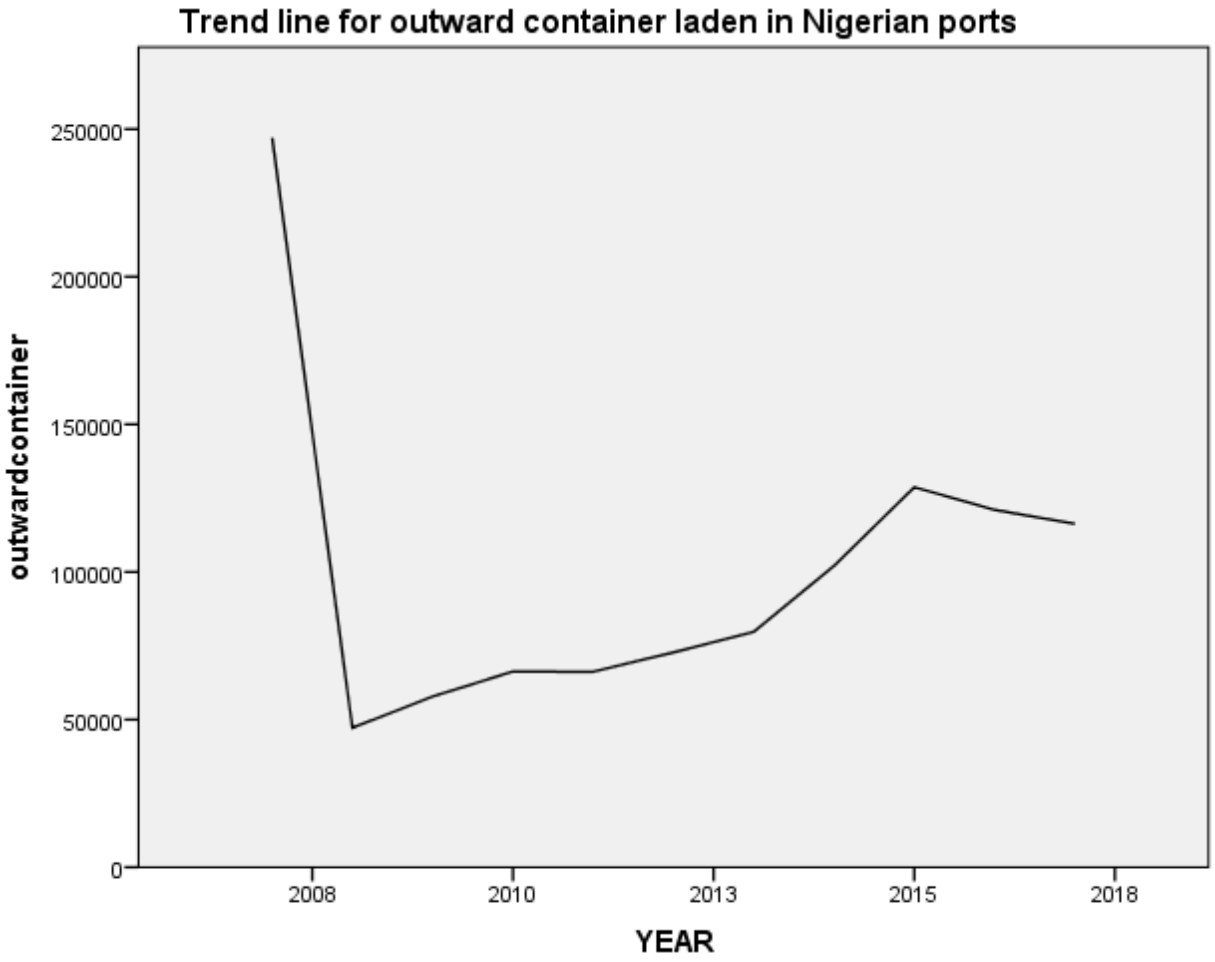

The figure2 above represents the forecast of inward container laden in Nigerian ports. Here the alpha value is set to 0.1, given a relatively small weight to the data points while the smoothed values are given a larger weight (i.e. 0.9). Then, as the result, peaks and the valleys are smoothed out. The graph shows an increasing trend on inward container laden in Nigerian ports.

**Fig3**



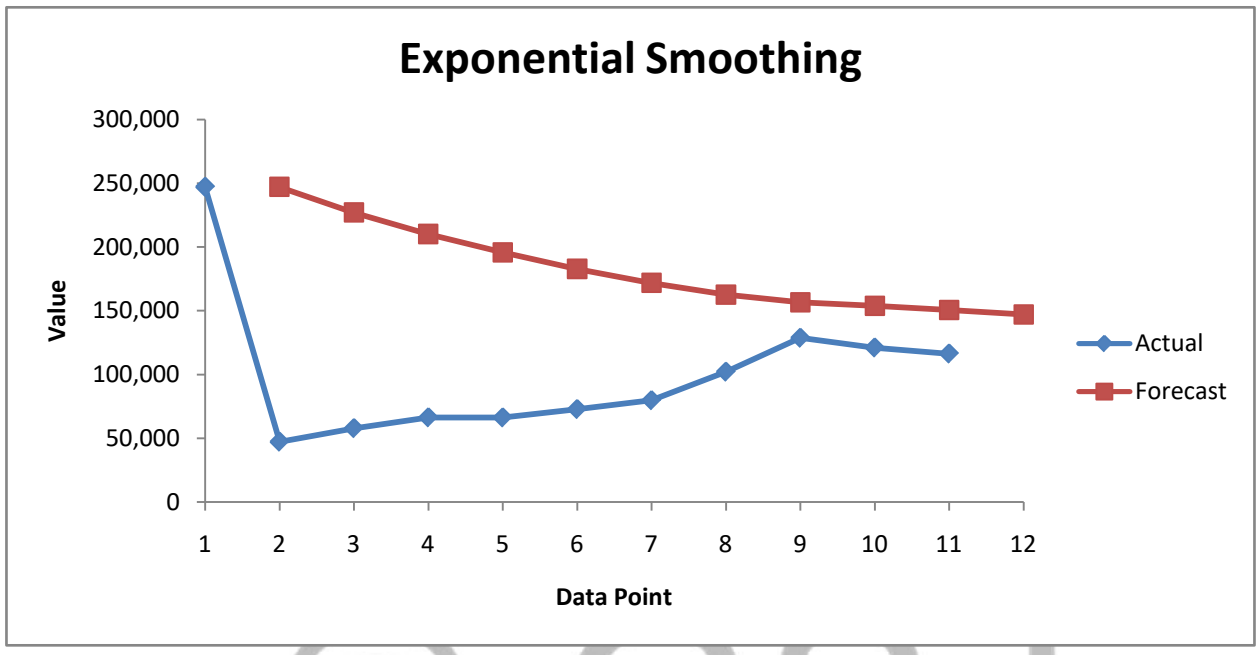

The above diagram represents the linear and growth line of the inward container laden for the periods under review. It can be observed that there is a gradual upward growth in the inward container laden which lies within the linear line. The reference line on the y-axis shows the rate at which the growth exceeds average whereas, the reference line from the equation tells the extent of the growth which however, reveals only four points exceeding the reference line when the inward container laden peaked higher.

**Fig4**



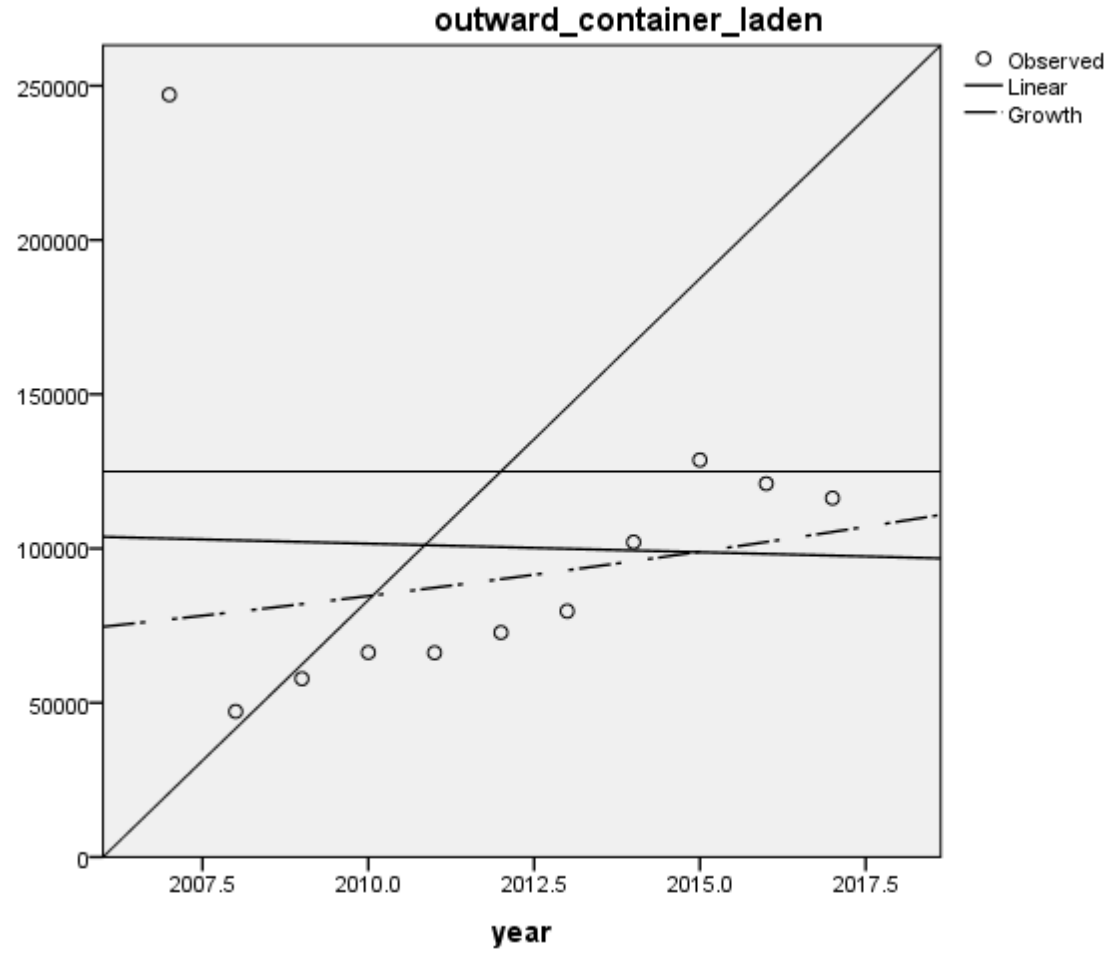

Similarly, trend line of the outward container laden of the Nigerian ports presented on the diagram above witnessed a great deal of export activities in early 2007 which sudden collapse in 2008. The experience was drastically and the number of outward container laden dropped from 247,076 in 2007 to 47,197 in 2008. However, the trend line shows a gradual upward growth in number of outward container laden from 2008 to 2017. The outward container laden represents export trade and this in essence explains that Nigeria records a gradual increase in export containerize cargoes in the recent time.

**Fig5 shows forecast on outward container laden**




The figure5 represents forecast on the outward container laden in Nigerian ports. The alpha value is set to 0.1, given a relatively small weight to the data points while the smoothed values are given a larger weight (i.e. 0.9). Then, as the result values peak, the valleys are smoothed out. The graph therefore shows increasing trend on the outward container laden in Nigerian ports.

**Fig6**




This diagram shows the outward container laden. The linear line slanted slightly downward tending to a negative slope. The growth line shows insignificant growth. The reference line on the y-axis implies that only two points exceed the average line which occurred at varying intervals and one point exceeding the reference line from the equation which implies no rapid or significant improvement on outward container laden of the Nigerian ports.

**Fig7**

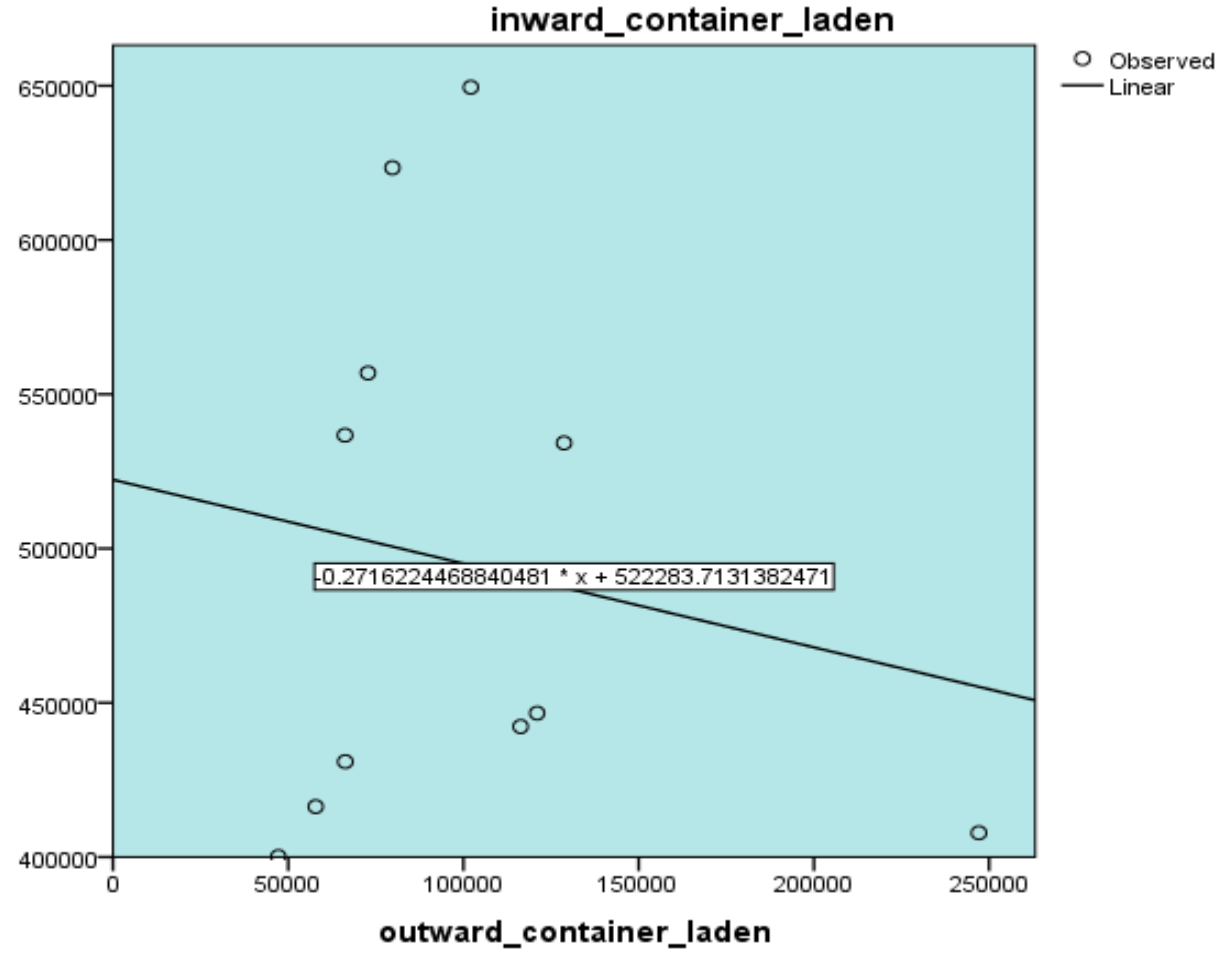
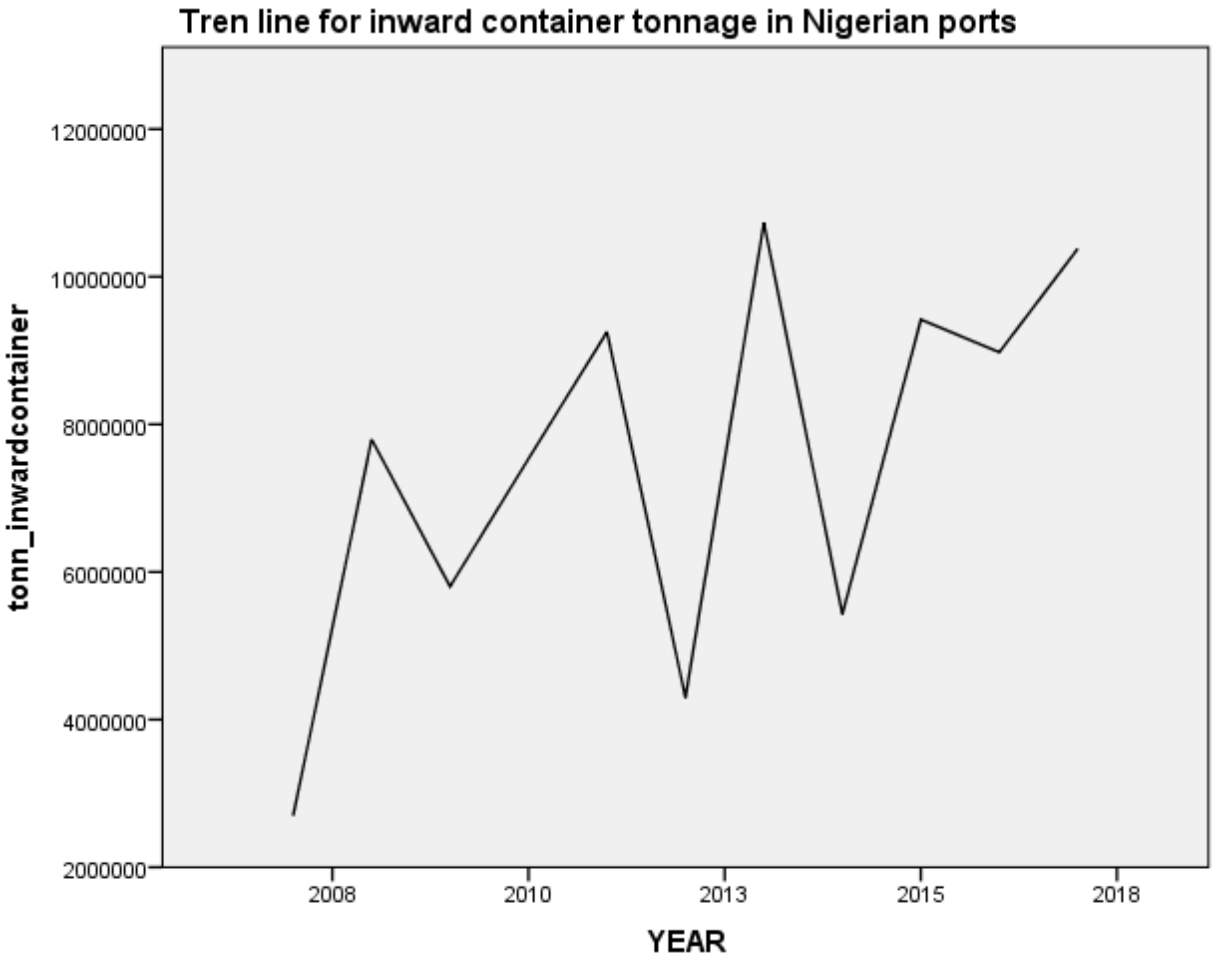


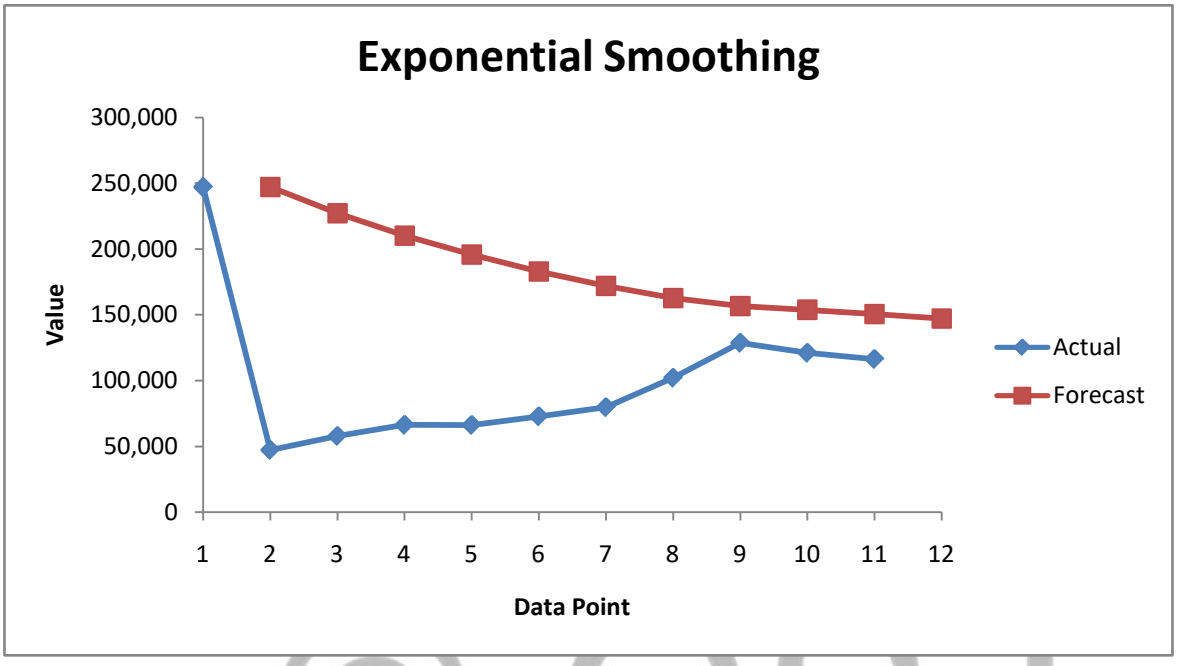

Figure7 represents the linear regression line which indicates that there is a negative relationship between the inward container laden and the outward container laden for the periods 2001 to 2017. Therefore, it means that a steady decrease on inward container laden would encourage increase in outward container laden verse versa; implying that if Nigeria would continue to limit the importation of domestically manufactured cargoes as well as outsourcing raw materials locally for the manufacturing industries, this would encourage high production of goods and services at minimum costs and increase exportation of Nigeria produced cargoes which would raise exportation and result to increase in outward container laden in Nigerian ports.

**Fig8**



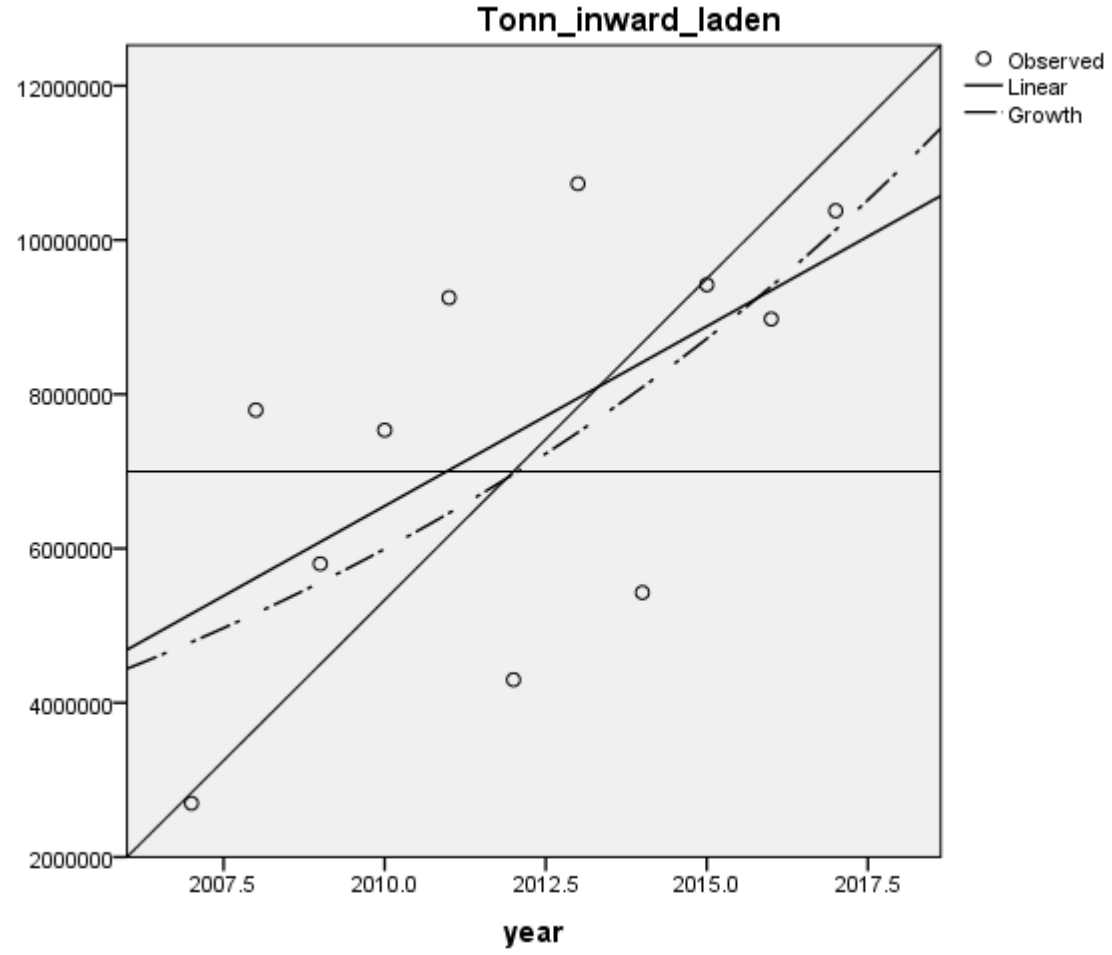

The trend line shows the inward container tonnage for the periods 2007 to 2017 of the Nigerian ports. Tonnage is weight measured in tons which represents the real amount of container cargoes imported. The trend line shows series of steep falls which indicate fluctuations on imported goods values, explaining the extent of instability on the import container shipment tonnages in Nigerian ports. It also signifies that the market demand for import container shipments is very volatile and varies with unstable economic activities in Nigeria which also is subject to and accounts for the naira devaluation in the international market.

**Fig9 shows forecast on tonnage inward container laden**



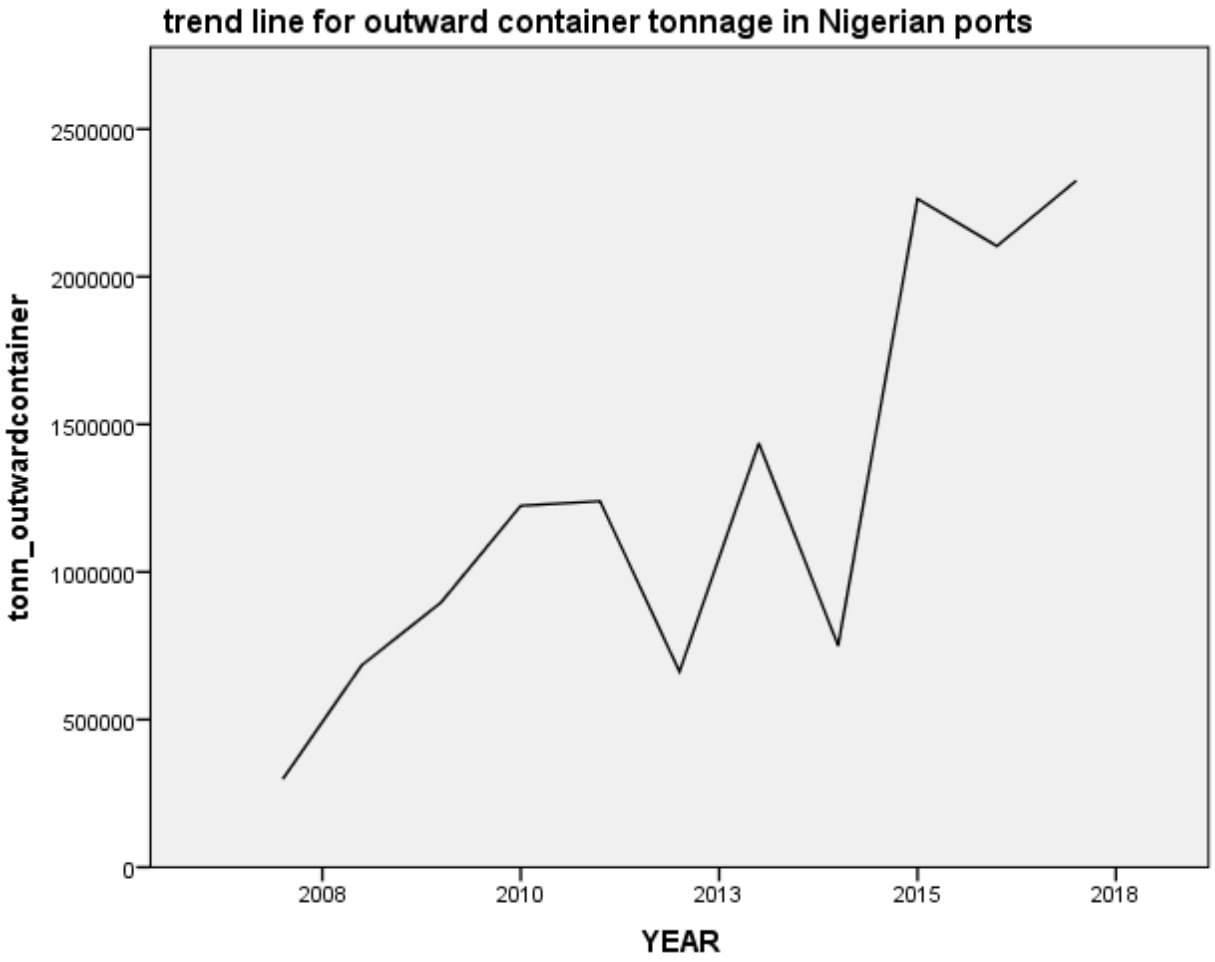

The figure9 represents forecast on the tonnage inward container laden in the Nigerian ports. The alpha value is taken at 0.1, which implies that the previous data points are given relatively small weight while the smoothed values are given a larger weight (i.e. 0.9). Hence, the forecast trend line shows increasing trend on the tonnage inward container laden of the Nigerian ports. We noted as the result values peak in the trend line, the valleys are smoothed out.

**Fig10**



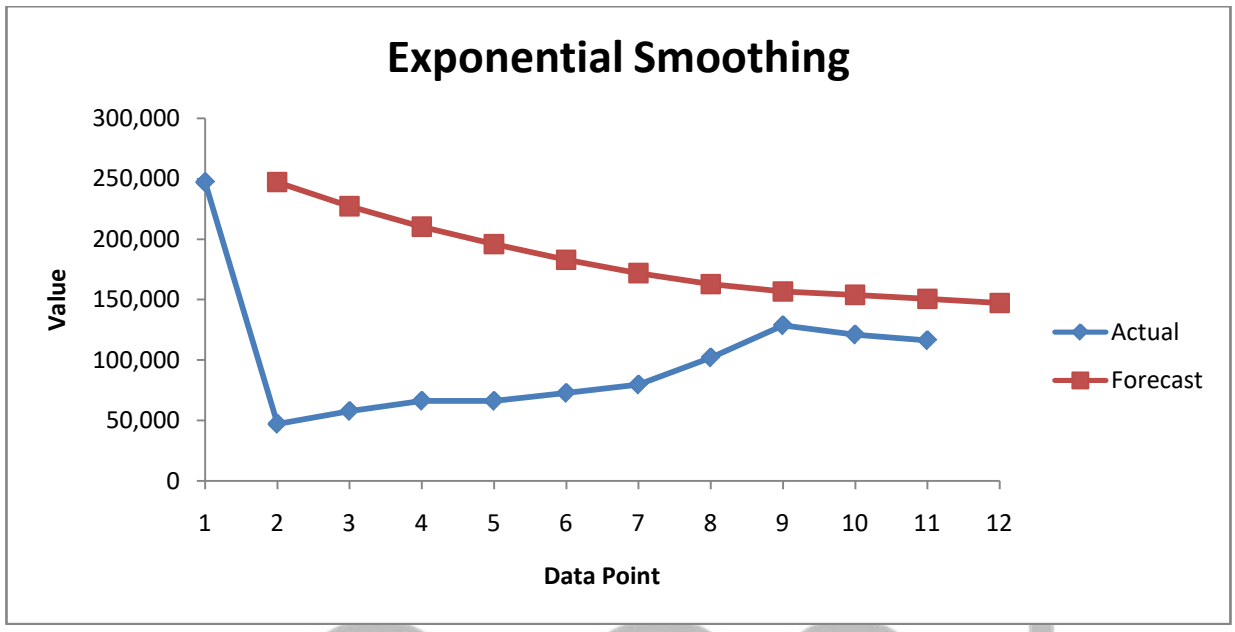

The figure10 represents tonnage inward laden of the Nigerian port for the periods under review. The diagram indentifies significant growth. The reference line on y-axis shows many more points above the average line whereas, the reference line of equation identifies only four occasions where the tonnage inward rise significantly.

**Fig11**



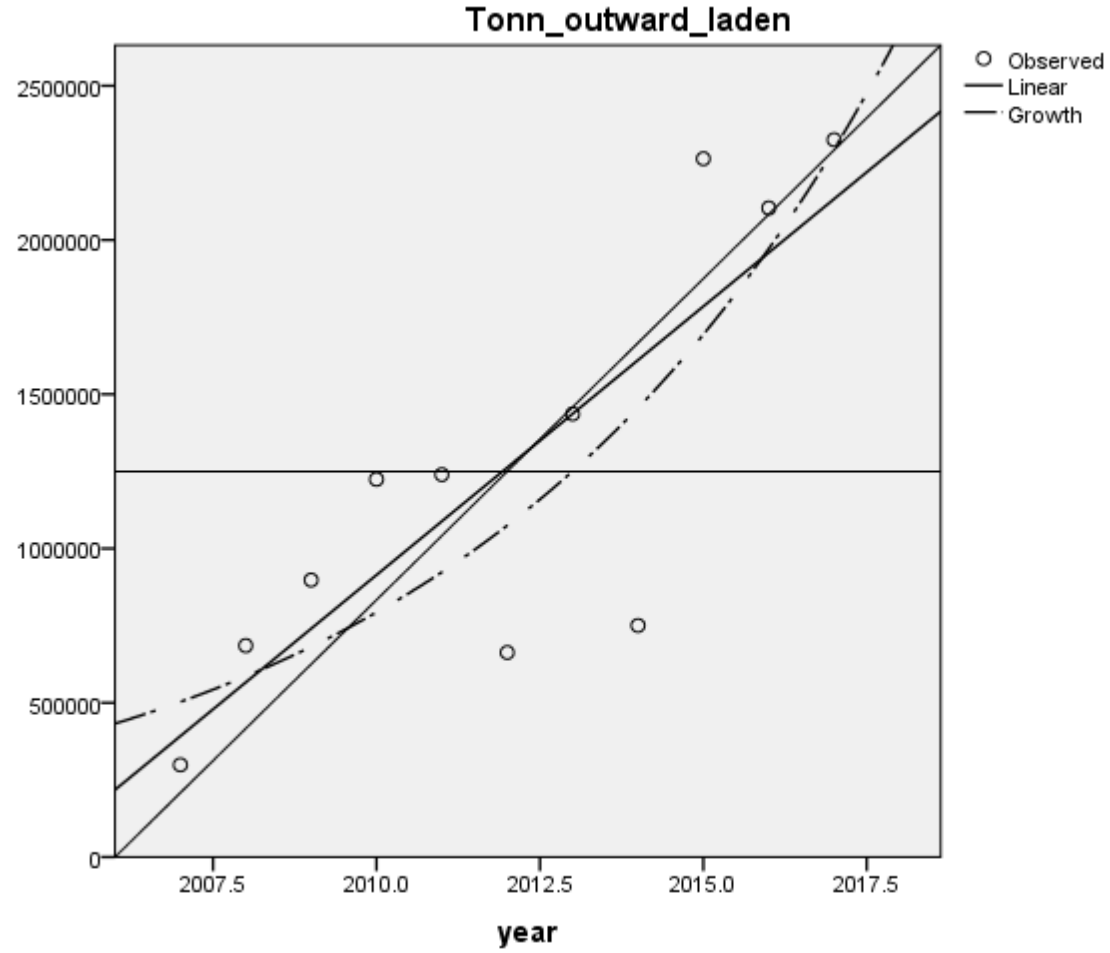

The figure above represents the trend line for the outward container tonnage of the Nigerian ports. On a careful observation, there is upward rise between the periods 2007 to 2011 which suddenly dropped in 2012 and 2014. However, the trade bolstered again from 2015 and remained very much dynamic to date. This entails rise in the amount of cargoes exported in Nigerian ports.

**Fig12 shows forecast on tonnage outward container laden**



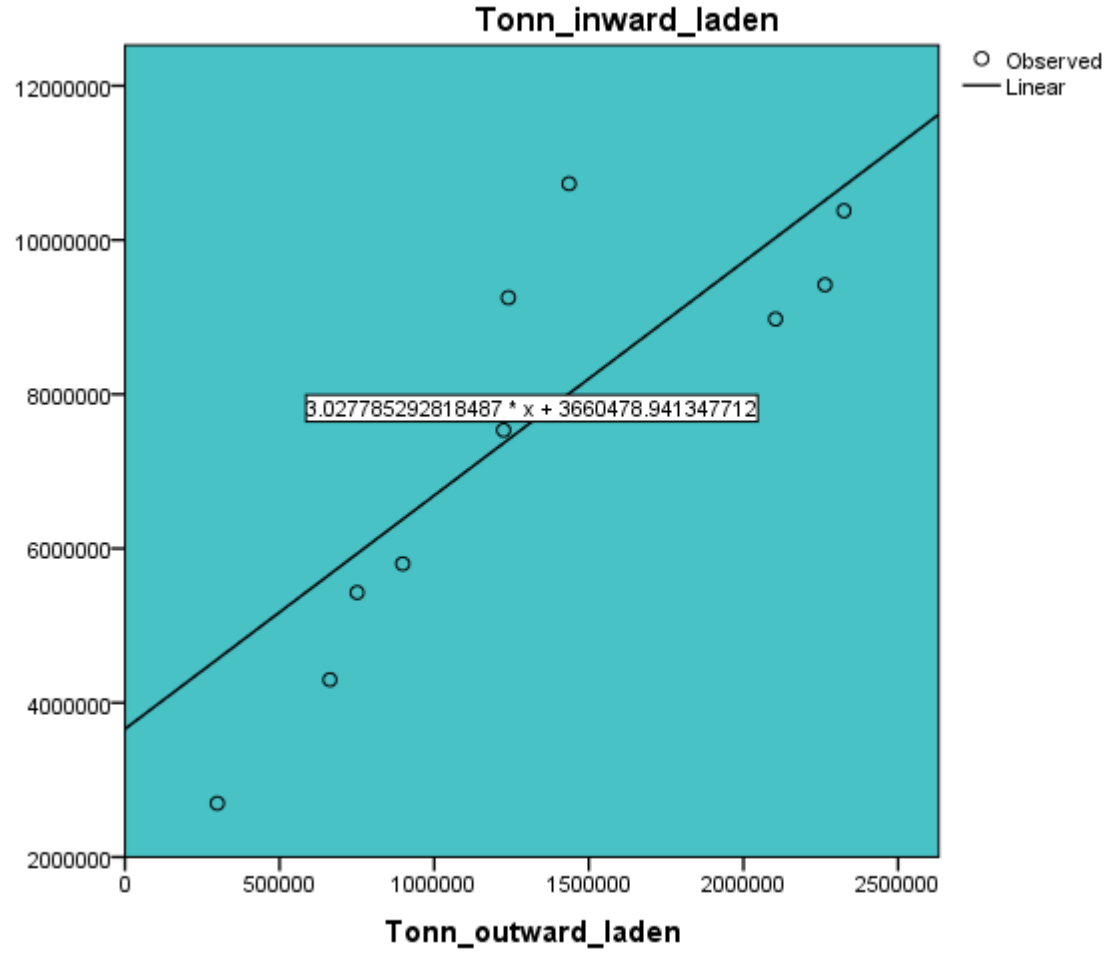

The figure12 represents forecast on the tonnage outward container laden in the Nigerian ports. The alpha value is taken at 0.1, which implies that the previous data points are given relatively small weight while the smoothed values are given a larger weight (i.e. 0.9). Hence, the forecast trend line shows increasing trend on the tonnage inward container laden of the Nigerian ports. It shows that as the result values peak in the trend line, the valleys are smoothed out.

**Fig13**




The chart on fig13 above shows the linear and growth line on tonnage outward container laden. This shows a curvy growth line. However, there is spontaneous growth represented on growth line lately. On average, the tonnages are more below the average line showing about four points exceeding average tonnage line on the y-axis. On the other hand, the reference line of equation identifies great performance from the origin where the points lie above the reference line, leaving less than three points below the line. In summary, this shows that Nigerian ports exports cargoes with improving container tonnage.

**Fig14**




The regression line indicates positive linear correlation between tonnage outward laden and tonnage inward laden. This means that increase in container tonnage outward laden will results to increase in container tonnage inward laden. This can be observed from weighty importation due to high rate of Dollar to Naira exchange in the international money market. The devaluation of naira has contributed to increase in financial value or worth of items imported in Nigerian ports.

## 5.1 Conclusion

Obviously, maritime shipping trade is volatile in nature. The trade is affected so much by economic activities, the actors behavours and as well as the political decisions of many nations. However, the shipping trade has been proven to be a progressive trade by

this study either slowly or rapidly. The study focused on evaluation of container shipments in Nigerian maritime industry as a way of suggesting need for intermodal transport system for the benefit of Nigerian maritime industry.

It was observed in this study that there is continuous increasing growth in the container shipments for both inward and outward laden and tonnages alike as demonstrated on trend lines shown in the figures on this study. These suggest greater need for a viable standard integrated intermodal system for efficient transportation of containerized cargoes in Nigerian maritime industry.

## 5.2 Recommendations

The findings of the study show that there is expected growth in container shipping in Nigerian ports industry which suggests greater need for standard integrated intermodal system in transportation of containerized cargo units in Nigerian ports. Hence, the researchers recommend immediate development on the railroads and hinterland transport infrastructural systems for fast, easy and safe transportation of freights.

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