The dynamic nature of shipping business requires access to accurate and up to date information by the stakeholders on various aspects of shipping and maritime transport as whole. Most information available on shipping and maritime transport whether on the internet or in libraries around the world are mainly related to developed countries. Searching for current literature on shipping in developing countries like Nigeria is a herculean task. This limited access to relevant and current information hinders effective policy planning and management of the shipping industry. The book titled "Perspectives on Seaport and Shipping Operation" is a resource material based mainly on empirical research and rigorous, extensive and intensive academic research works of seasoned researchers and professionals in the field.The issues discussed are with reference to Nigeria as an emerging hub for global market in sub Sahara Africa. The intention of the authors is to put together relevant and useful literature that will educate and inform those in the field of shipping and tertiary institutions. Therefore, the book is a reader's master piece and a must read for everybody in field of shipping.

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Dr. John Adeyanju and Dr. Joel Ojekunle hold PhD in Transport Geography from the University Of Ilorin. They are both chartered members of Institute of Logistics and Transport. Dr Adeyanju is an Assistant Chief Lecturer at Maritime Academy of Nigeria,Oron while Dr Ojekunle is an Assistant Director at Nigeria Institute of Transport Technology,Zaria

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Perspectives In Seaport and Shipping Development In Nigeria.

J.A. Adeyanju
J.A. Ojekunle

Perspectives In Seaport and Shipping Development In Nigeria.

J.A. Adeyanju
J.A. Ojekunle

Dedication.

This book is dedicated to the life and time of Professor Albert Adeyomola Ogunsanya (1949-2009).

He will forever be remembered for his academic and scholarship steadfastness.

Foreword.

The importance of port and maritime transport to the world economy cannot be over emphasised. Apart from being economic gate way, the world spatial and economic integration are enhanced through the development of sea port and maritime trade. In developed countries, much effort has been put into research and development of maritime transport. This has been evident in the volume of literature that are available on the seaport and maritime transport of these developed nations. The situation is actually not the same in developing countries particularly in Africa where very few resource materials are available.

The lack and indeed the inadequacy of up-to-date materials on port operation and maritime transport generally have created serious knowledge and information gap between developing and developed countries in the maritime transport. Apart from that, inadequate information on maritime transport of developing countries in Africa has also hindered effective policy formulation and implementation. In addition, most international development partners are often constrained in the process of implementing economic development programmes in the maritime transport sub sector due to paucity of relevant data. The above among others informs the publication of this book.

The book *Perspectives in Seaport and Shipping Development in Nigeria* is a product of intensive and extensive academic works of experts and professionals in the field of maritime transport in Nigeria. It is an attempt to provide current and up- to-date resource materials for the use of policy makers, planners, researchers and students of maritime studies. The book is organised in twelve chapters covering diverse areas of port operation and maritime transport development. Chapter one is a review of previous studies on shipping development in Nigeria. It highlights different types of carriers particularly containers, an increasing trend in freighting in Nigeria. The chapter further discusses the trend in the development of

containerisation in Nigeria and various structural and organisational changes that have occurred in the shipping industry in Nigeria over the years.

Chapter two examines various factors that influence Nigerian port evolution and development. It also highlights the major capacity attributes of Nigerian port and its growth over the years. In chapter three, the main focus is the importance of performance monitoring and evaluation of the port operation in Nigeria. The chapter identifies various methods of measuring port performance and relevant performance indicators that should be considered while measuring port performance. The focus of chapter four is on port reforms in Nigeria. The chapter dwells on the reasons for port reforms in Nigeria, its benefits, the process of reforms and various instruments of port reforms adopted in Nigeria. The impact of the reforms is discussed as well as the challenges associated with the process.

The issue of environmental and health hazards in seaport port operation is the main concern of chapter five. The various ways environmental hazards can be identified, measured, minimised and managed are discussed in this chapter. Chapter six on the other hand, deals with the role of clearing and forwarding agents in Nigerian seaports. The chapter further highlights the scope of services offered by clearing and forwarding agents, the major challenges and the need for enforcement of global standards and best practices in clearing and forwarding business in Nigeria.

The major concern of chapter seven is the development of containers in Nigerian seaports. The chapter looks at the evolution and development of container ports in Nigeria and the various factors that promote the growth and development of containerized cargoes in Nigerian seaports

In chapter eight, the book examines the concept of port productivity, identifying various indicators of port productivity as it relates to container traffic in Nigerian seaports. The chapter also outlines how to measure port productivity and ways of modelling port productivity. Furthermore, the issue of discuss in chapter nine is the

spatial and economic basis for container transport in Nigeria. The chapter highlights the geographical endowment and economic attributes of Nigeria as a maritime nation. These attributes evidently expose the country's untapped potentials for maritime transport development. Furthermore, one of the major problems of transport sector of Nigerian economy is the issue of coordination. Chapter ten therefore deals with the issue of transport coordination and containerisation in Nigerian seaports. The chapter reviews previous studies on transport coordination, the need for effective coordination and various efforts of government at coordinating transport sector in Nigeria. The chapter further highlights the studies that identify the problems responsible for poor coordination of transport in Nigeria.

The major issues of discuss in chapter eleven is inland ports and containerisation. The chapter dwells extensively on the growing importance of inland ports not only in Nigeria but globally. The benefits of inland ports to the maritime transport and to the economy as a whole are discussed in this chapter. The chapter also looks at the challenges facing the operation of inland container terminal. The basic conditions for smooth operation of inland port are finally outlined for effective policy implementation on inland port operation in Nigeria.

Chapter twelve examines the economics of port and shipping operation. It provides basic information on the main economic principles that affect port operation and maritime transport. The major economic indicators for monitoring and regulating port operation and performance are key issues discussed in this chapter. The chapter also contains vital information on the factors that affect world shipping and maritime trade. The last chapter look at safety and security of ships and port facilities which are global threats to human life, global trade, shipping and world development. The chapter took a panoramic review of what constitutes maritime

security and safety and various international conventions and regulations enacted to curtail global threat to shipping.

There is no doubt that information provided in this book is very vital to policy planning, development and implementation for ports and maritime transport. In addition, the book contains extensive literature review on various scholastic works on port, shipping and maritime transport in Nigeria's economy. The scholastic contributions made by different contributors to this book are knowledge-enriching and informative for various stake holders in port and maritime transport. The varying issues addressed in the book are still current topical issues attracting the attention of both academia and the professionals in the maritime industry. The book has indeed provided concise and handy reference materials for researchers and students of maritime studies not only in Nigeria but also in other African countries. I therefore recommend this book for all stakeholders including students, lecturers, researchers, operators, policy formulators and decision makers as well as other professionals in port and maritime transport not only in Nigeria but in other developing countries in Africa.

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CHAPTER ONE
SHIP AND SHIPPING DEVELOPMENT IN NIGERIA

J.A Adeyanju

1.0 INTRODUCTION

Shipping is a global business, it is dynamic with various innovations and developments brought about by increase in world trades and breaking of trade barriers between nations and countries of the world. The dynamism is also as a result of improvement in information and communication technology which has brought the world closer than ever before. The world of shipping today has changed from what it used to be. In this chapter, developments in shipping in Nigeria are discussed.

1.1. DEVELOPMENT IN GLOBAL SHIPPING

Development in global transport system is dynamic. Barry et al (2002) used transport scenario to describe this in transport system. Transport scenario is an image of the future of the transport sector. In other words, transport scenario is seen as a picture of future trend in transport within the pre-specified framework of movement of goods and persons. There are four basic variables identified by Barry et al (2002 p.2) to evaluate the scenario. These are spatial organisation, distance, technology and modal split. Spatial organization is evaluated based on globalization of production and consumption, importance of ports and concentration of trade within a region. The distance variable is considered in term of major or minor increases in average distance which can be measured through the cost of transport. Technological development is the innovation and improvement in transport technicalities, planning and management such as Containerization, Information and Communication Technology. Modal split is the growth of inter-modal transport such as the trend of traffic recorded for road, rail, air and shipping. All these variables change from time to time and in space. Countries all over the world strive to meet this changing trend by investing significantly in the provision of transport infrastructures to accommodate intermodal operation.

Transportation requires an integrated system's approach, to form a seamless transportation system in this age of globalization. This is achievable only with an effective and efficient Multimodal Transport Operation, which in itself is a coordinated system of transport that offers connectivity to all modes of transport.

In freight movement, connectivity of modes requires effective methods of packaging that is compatible with all modes and this is offered by container packaging method. Unfortunately, studies in the past have paid less attention to this important aspect of freight transport. For example, Ogundana (1970) examined the inter regional flow of large tonnage of freight which flow from Lagos to Western, Mid-Western and Northern states after breaking of bulk cargoes and the packaging methods of these cargoes were not considered. In the same vein, Onakomaiya (1970) studied spatial structure of internal trade in delicacy foodstuff in Nigeria, while Ogunsanya (1979) examined the spatial aspects of urban freight transport in Lagos metropolis without examining the packaging methods commonly used in transporting these freight. These studies focused on interregional, inter-city or intra-city freight flow of cargoes in Nigeria. In fact, most of these studies were follow- up to Hay and Smith's work of (1970), which are concerned with the identification of the relationship between freight flow variables, interregional complementarities and urban dominance in the analysis of interstate trade.(Ogwude, 1997).

Study on the trend of containerization is important for several reasons. Among such reasons is the fact that containerization as a diffusion process possesses a distinct pattern of expansion both at global and national level. Also, it has changed the face of freight transport in that transferability has been more facilitated across mode. (Brian et al, 1998).

Containerisation facilitates multimodal transport operation. Multimodalism as a practice in Transport emerged in response to the changing marketing and distribution requirements for moving different types of cargo, and the need to reduce total transport cost in order to remain competitive in the global market. In recognition of this, the United Nations Convention on Trade and Development (UNCTAD) observed that the planning requirement for Multimodal Transport (MT) concept is the integrated approach to transport. All modes of transport need to be integrated in a complementary manner in order to achieve effective multimodal practice and better productive level of performance for the transport.

Containerisation is a packaging device which has regional and global dimensions. The global dimension is found within the context of international trade and this can be examined from the flow of containers across borders, the regional dimension is concerned with distribution pattern of container traffic within a country or within a region.

The widespread use of containers started around 1956 (Gerhardt 2000, Brian et al 1998), during which valuable cargoes were packed in large boxes to protect them from rough handling, weather and theft. Containerization probably started in the United States much earlier. For example, the Lake Erie container system of the 1920's involved inland freight forwarding stations equipped with mechanical systems that transferred cargo in a steel container directly from rail to truck, or from lighter to truck for door to door delivery (Gerhardt 2000 p.21). Containerization in the modern technology facilitates cargo interchange across different modes of transport without changing the loading unit.

Containerisation is associated with logistics management which involves moving freight considering the quantity, quality and also taking cognizance of time and price. Ajon (1997) associated the logistic component of containerisation to the changing marketing and distribution system required for moving all types of cargo. This organized and coordinated method, ensures total efficiency in transport. The essence of the logistic management in containerisation is to ensure continuity in the flow of cargo through the entire transport and transfer process. This invariably, is to increase the overall transport efficiency by aiming at optimum modal split within the transport chain. UNCTAD (1992) observed that the use of containers in multimodal transport makes it possible to introduce a modal split that enables the country to use each mode of transport in an optimum way.

The economic justification for using containers is based on the assumption that transport modes which display optimal intrinsic economic and operational characteristics should be integrated into inter-modal transport chain in order to improve the overall efficiency of transport system. This is not to compel or force a specific mode above the other but rather to improve the connections between all modes of transport and integrate them into a single system which allows better use of the rail, road, inland waters and short sea shipping. Gerhardt (2000 p.2), observed that this is not just about hard ware or equipment involved in the freight movement, but the process by which they are connected in a systematic and sustainable way.

Apart from the above, the forces of change in the global market especially in the introduction of Information Technology such as E- commerce and Internet business has influenced the direction and rate of response to the demand for cargo traffic. Today, consumers are interested in door – to - door delivery of their goods, which normally requires the use of more than one mode of transport. To be

effective, these modes must be integrated and well coordinated to achieve total transport efficiency between and within modes.

Shipping transport as a facilitator of international business is highly dynamic and the developed countries always dominate the trade especially the exportation of goods while the developing country's import increases over time. The review of maritime transport in 2006 indicates that the percentage import of African and Middle East countries in 2004 and 2005 were 13.5 and 12.0 percents respectively, while the European union import for 2003, 2004 and 2005 were 1.8%, 6.0% and 2.5% respectively.(World Trade Ooganisation ,2005).

The increases in the rate of growth of international trade especially in the quantity of cargo transported led to a new approach which is based on improved packaging system This system is containerisation which makes the utilization of different modes of transport possible. This system has transformed the shipping business over the years.

Containerization as a method of packaging was developed by the American Shipping Company, Seatrain, after building the first container which was designed to lift a whole railway wagon on the ship in 1928. It was later in 1956 that another American Company, Sea- Land Services, modified this by introducing a trucking executive, with the carriage of road trailers on the deck of coastal tankers. This was done by leaving the wheels of the standard road trailers ashore and only to transport the boxes i.e. the containers, from port to port. (Gerhardt 2000).

The above points explain the reason why container loading device has received attention in the global transport in the recent time. For example, in 2005 alone over 18 million total containers were transported to different countries of the world (PMP 2006). The trend in the development of container traffic clearly shows that freight transportation in container has gained global acceptability.

1.2 SHIP TYPES

The ship in its various forms has evolved to accomplish these functions of carrying cargoes across the waterways of the world safely, speedily, and economically.

The ships of today are highly specialized in that it is built for a purpose, unlike in the olden days where a ship is built to carry all sorts of cargo. Ships today, therefore have their own characteristics, which have to be recognized and appreciated. Below are some of the world recognized ship types:

1.2.1 General Cargo Ship

The general cargo ship is the "maid of all work", operating a worldwide "go anywhere" service of cargo transportation. It consists of a large clear open cargo earning space as possible with the facilities required to load and unload the cargoes.

One or more separate decks are fitted in the cargo holds and are known as tween decks. Greater flexibility in loading and unloading, together with cargo segregation and improved stability are possible using the tween deck spaces.

It may have deep tanks, which will allow it to carry a limited quantity of liquid cargo or water ballast.

Various combinations of derricks, winches and cranes are used for the handling of cargoes. A special heavy lift derrick may also be fitted covering one or two holds.

1.2.2. Refrigerated General Cargo Ship

The fitting of refrigeration plants for cooling of cargo holds enables the carriage of perishable foodstuffs by sea. Refrigerated ships vary little from general cargo ships. They may have more than one tween deck and all hold spaces will be insulated. Cargo may be carried frozen or chilled depending on its nature. Refrigerated ships are usually faster than general cargo ships, often having speeds up to 22 knots.

1.2.3. Bulk Carriers

Bulk carriers are single deck vessels, which transport single commodity cargoes such as grain, sugar and ores in bulk. Combination carriers are bulk carriers designed for flexibility of operation and able to transport any one of several bulk cargoes on any one voyage e.g. ore or crude oil or thy bulk cargo.

Large hatchways are a feature of bulk carriers, since they reduce cargo-handling time during loading and discharging. Double bottom tanks are used for ballast fuel or fresh water. Wing tanks are mainly used for ballast.

A large proportion of bulk carriers do not carry cargo-handling equipment, because they trade between special terminals, which have particular equipment for loading, and unloading bulk commodities. The availability of cargo handling gear does increase the flexibility of a vessel and for this reason it is sometimes fitted. Deadweight capacity range up to 150,000 tonnes depending upon type of cargo. Speeds are in the range of 12 – 16 knots

1.2.4. Container Ships

The container ship is, as the name implies designed for the carriage of containers. A container is a reusable box of 2435mm by 2435mm, with length of 6055, 9125 and 12190mm.

Containers are in use for most general cargoes although liquid carrying versions also exists, in addition there is also the refrigerated type. The cargo carrying section of the ship is divided into several holds, which have hatch openings the full width and length of the hold. The holds are fitted with cell guides into which the containers are slotted in. cargo handlings are therefore in vertical movements only. Containers can also be stacked on the hatch covers. Special lashing arrangements are provided for this purpose and this deck cargo to some extent compensates for the loss of under deck capacity.

Accommodation and machinery spaces are usually located aft of the ship to provide the maximum length of full bodied ship for container stowage.

Cargo handling gear is rarely fitted as these ship travels between specially equipped terminals for rapid loading and discharge. They vary in size with container carrying capacity up to 2000 TEU or more. As specialist carrier they are designed for rapid transits and are high powered, high speed vessels with bulk liquid cargoes, the most common type being oil. Many other liquid are carried in tankers and specially constructed vessels are used for chemicals, LPG, LNG, etc.

The cargo carrying section of the ship is divided into individual tanks by transverse and longitudinal bulkheads. Cargo pumps fitted in one or more pump rooms discharge cargo. Each tank has its own suction arrangement, which connects to the pumps and a network of piping discharges the cargo to the deck from where it is pumped ashore. Hose handling derricks are normally fitted near the manifolds. They range in size of up to 700,000 tonnes deadweight, with speed ranging between 12 to 16 knots.

1.2.5. Liquefied Gas Carriers

Liquefied gas tankers are used to carry, usually at low temperatures liquefied petroleum gas (LPG) of liquefied natural gas (LNG). A separate inner tank is usually employed to contain the liquid and this tank is supported by the outer hull which has a double bottom LNG mainly carry methane at cryogenic temperature (-164^0C) at atmospheric pressure in tanks made of special materials. The tanks used may be prismatic, cylindrical or spherical in shape and self supporting of

membrane construction, the containing tank is supported by insulation which also acts as a secondary barrier in case of leakage.

LPG carries propane, butane, propylene, etc which are extracted from natural gas. The gases are carried either fully pressurized, part pressurized-part refrigerated or fully refrigerated. The fully pressurized tanks operate at 18 bar and ambient temperature. The fully refrigerated tank at 0.25 bar and -50^0C. Separate containment tanks within the hull are used and are surrounded by insulation where low temperatures are employed. Tank shape is prismatic, spherical or cylindrical.

Displacement sizes for gas carriers range up to 60,000 tonnes with speeds up to 21 knots.

1.2.6. Passenger Ships

The passenger liner, or its modern equipment, the cruise liner, exists to provide a means of luxurious transport between destinations for human cargo. The passenger travelling in such a ship pays for and expects a superior standard of accommodation and leisure facilities. Large amount of superstructure are therefore an essential feature. Several tiers of deck are fitted with large open lounges, ballrooms, swimming pools and promenade areas.

Aesthetically pleasing lines are evident with usually well raked clipper-type bow. Stabilizers are fitted to reduce rolling and bow thrusters are employed to improve maneuverability. Large passenger liners are rare, the moderate sized cruise liner of 12,000 tonnes displacement now being the more prevalent with speeds of up to 22 knot.

1.2.7. Ro-Ro Vessel/Passenger Ferry

They may be divided into three main category namely, harbor ferries, cross channel ferries and trans-ocean carriers. Their distinct feature is the door or ramps that they have to allow vehicle to roll on and off the vessel. These ships may carry cargo, which is loaded by forklift trucks or carried shipped aboard low loader trailers. Might have moveable or fixed ramps. They also cater for passengers coming onboard with or without their own vehicles. Their size and speed varies depending on the area that they are operating in.

Discussions on the types of merchant ship in the world cannot be exhaustive. This book is just illustrating the major types of ship that is been utilized. There are many more different types of ship either designed to carry a particular cargo on a particular route or evolving from the designs stated above. For example, forest

product carries, timber carrier, large fishing factory ship, supply vessel, ocean going tugs, etc

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CHAPTER TWO
Seaport Evolution and Development In Nigeria.
J.A Adeyanju

2.0. Introduction

Seaports are areas where there are facilities for berthing or anchoring ships and where there are equipments available for transfer of goods from shore to ship or ship to shore or ship-to-ship. The term used to describe this is ship/shore interface.

Ports may evolve naturally over the course of time, or they can be developed to meet the need of the current time. Most of the traditional ports, which were built over a century ago, are now faced with a problem of small-antiquated docks with so little water that they cannot be reached by large modern vessel. For example, the port of Koko in Delta State played significant role during the pre- independence era in Nigeria, but today the port is almost in extinction due to restrictions in term of draft caused by silting. Also, in country like Malaysia, the port of Melaka used to be the hub of commercialism for the Malay Peninsula but not anymore. As time goes by, it cannot cope with the demand of modern shipping.

Port evolution in Nigeria predate the coming of British Colonia era. Water transportation has been one of the veritable means of moving goods in the old empires and kingdoms in the ancient time. In this chapter, the evolution of modern seaports in Nigeria is discussed.

2.1.Basic Definitions

(a) Port

A port is a town with a harbor and facilities for a ship shore interface.

(b) Harbor

Is an artificially constructed shelter for shipping with a gate or set of locks at the entrance so that ships within can remain afloat at all states of the tide.

(c) Dock

This is a long solid structure; built on the seaward side of the harbor for protection against the weather, rough seas and swells.

(d)Wharf

This is a structure built along the shore where vessels can berth alongside.

(e) Pier

This is a structure built out from the shore or riverbank on concrete, steel or wooden piles for berthing ships. Note that it is not a solid structure and should not impede the flow or tide or current.

(f) Dolphin

This is an isolated islet of piles or masonry to assist in the berthing or maneuvering ships.

2.2.Classification of Ports

Ports may be classified in many different ways depending on its characteristics. They may be classified by the following criteria:

1.function, an entreport or transit port, a Freeport a domestic port, i.e. a natural outlet for surrounding hinterland, naval port, oil port, ferry port or a large industrial zone with its own marine transport terminal.

2.Geographic type, coastal submergence, submerged estuaries (rias), tidal estuaries, artificial harbours or rivers (non-tidal).

3. Size, by the total weight of cargo handled in one year, by the value of the cargo by the number of ships that enter and leave the ship in one year,

4.The number of available berths,

5.The size of the largest ship that can be taken in. It must be understood that draft or depth of water available poses serious challenges to big ships. Finding a port with sufficient depth of water to accept a loaded 200,000 tonne deadweight tanker is difficult. It is not only a question of finding sufficient depth of water at the port and in the port but also in getting to the port, because many of the continental shelf areas of the world present real problems for the larger ship.

2.3.Types of Berth

i. Conventional break bulk general cargo berth. This is one of the most labour intensive berth. In general, cargo is moved from ship to shore by ship/shore crane. The cargo is then carried by forklift into transit shed where again it is handled onto lorries or truck for further distribution. Up to 20 gang men per shift may be required for the ship – crane – transit shed movement for each hatch of the ship working. It is also relatively slow as for general cargo this system would probably move only about 20 to 30 tonnes per hour per hatch working.

ii. Berth designed to Handled Palletised Cargo

These are very similar to general cargo berths and are general cargo berths with the cranes removed and the quay resurfaced to facilitate the smooth running of the forklift trucks which now handle the cargo directly from the ships hold to the transit shed through opening in the ships side. One or more mobile cranes may be available to be used.

iii. The Container Berth

One of the differences from other berth is that of the size. The average container berth requires large flat areas for the storage and movement of containers and its associated equipment/movers. Special facilities for reefer containers have to be available. Reception facilities should include a weighbridge and some arrangement to assist the person receiving the container to give it as complete an inspection as possible and to check on obvious external damage to the containers if any. To load and discharge the containers quickly, "gantry of portainer" cranes are used. These have an outreach of up to 120 feet and may weigh up to 450 tons. To take this weight, specially constructed quays are necessary. With the availability of modern equipment an average of 2400 containers a week from a single berth can be handled.

iv. Specialist Oil Berth

This tends to be long jetties stretching from the shore into the deep water. Because of the economies of using large storage space near to the berth is necessary. To avoid any secondary transport of crude oil, the sitting of a tanker terminal and a refinery is usually a common project.

v. Other Specialist Berths

With the growth of the carriage of cargo in bulk and the subsequent increase in the size of the ship concerned there have been constructed specialized berths with

specific handling equipment to discharge the cargo rapidly with the minimum labour requirements, i.e. ores, grain, sugar, coal, sulphur, LNG etc.

2.4 A Free Port or Zone

This is a small part of the national territory remaining under the full sovereignty of the state but placed outside customs limits. Goods are still subject to other laws, for example those involving the safety and sanitary aspects of the goods.

The advantages of a free port is that it reduces the time and effort required in customs formalities and avoids having large amounts of money deposited with the customs for duty on goods that are only in transit.

2.5 Dry Ports

These are otherwise also known as "Inland Container Depot" (ICD) or "Container Freight Station" (CFS). Most of these depots are located outside the principal container ports of the country as they were primarily established to ease the pressure off the ports due to increased container traffic. It was meant for the storage of empty containers. Recently however the trend has been towards the development of more sophisticated and a wider range of "Distripark" services, namely CFS facilities, storage of bonded and non-bonded cargo and even customs clearance facilities.

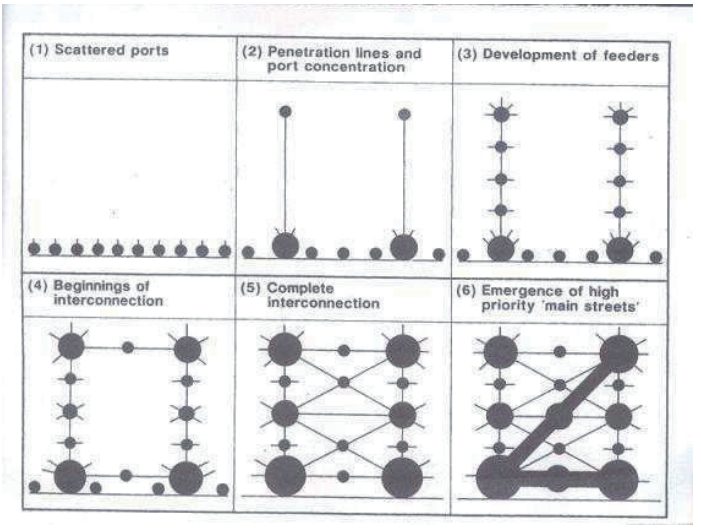
2.6. SEAPORT EVOLUTION

The evolution of studies on modern seaport followed the works of Taaffee, Morrill and Gould (1963), which used the West Africa coastland as an example of spatial seaport development. This work was an attempt to analyze the relationship between developments in terms of diachronic models in less developed countries. Six stages of transport network development were identified which started with scattered ports out of which penetration lines inform of road or rail lines and port concentrations emerged. Improvement in the economy of the hinterland resulted in the beginning of feeders and interconnections of transport networks. In the final

analysis this resulted in the complete interconnectivities of transport networks and the emergence of high priority of main arteries of networks. (see figure 1).

This work has influenced many studies on spatial variations of seaport growth and development. For examples (see Ogundana 1970 & 1974, Stanley 1970). Assessing the essential function of a seaport, Hoyle (1983) believed that the problems and characteristics of seaport must be assessed from regional, national and international perspectives.

Fig. 2.1: An Idealized Seaport Development Model



Source: Taaffe, Moril and Gould(1963).

Therefore, the systematic assessment of seaport operation in terms of its connectivity with other modes and other variables is an essential aspect of spatial efficiency of port development.

Scholars have advocated systematic assessment of port growth over the years. Birds(1973) explained that the growth and development of a seaport is due

not only to the direct influence of the qualities of land and water sites, but to the way in which the sites were assessed by founders. These assessments can be a combination of various factors such as environmental, technological, political, economic etc. In the same vein, Krause(1978) considered port pollution as an aspect of port development, which is part of systematic approach to port development and which considered the contributions of various variables as an aggregate input for port safety and pollution control.

The spatial operational efficiency of a seaport is an integral part of maritime trade, which can be used as a parameter to measure the development of maritime transport of any nation. Also, the changing nature of maritime trade coupled with advancement in transport technology has made it necessary to study the spatial operational efficiency of seaports.

Ordinarily, a seaport is an interface between sea transport and land transport. According to Hoyle (1983), it is a central place of economic and cultural interchange and its essential function is transport integration.

The evolution of Port system in Nigeria has come a long way in the history of the Nation. Before the arrival of the European traders into the shore of the geographical entity called Nigeria, there were traditional fishermen and traders who were using rivers and creeks along the coast for transportation and trade. The first attempt by the Europeans to open up marine contact was in 1485 when John d' Aveiro a Portuguese came in through the Bight of Benin. In 1553, Captain Wyndham a Briton also landed at the coast.

Attempt at development of the seaport in Nigeria did not start until 1906 when an order for the dredging of the Lagos bar was placed. This was followed by the construction of the first length of East Mole (NPA, 2002). Since then efforts at developing the seaports continued. For example, between 1913 and 1921 the

construction of the first four deep-water berth was undertaken at Apapa wharf. Also, the discovery of coal at Enugu in the South- Eastern part of Nigeria engineered the building and development of Port in Port Harcourt. The connectivity of Enugu rail line to Port Harcourt was completed in 1916. Earlier, the construction work at Port Harcourt wharf had started and by 1913, Lord Lugard opened the wharf for shipping activities.

Prior to the Nigerian Civil war, private companies were operating the ports of Warri, Burutu, and Calabar. For example Holt Transport a subsidiary of John Holt Company and United African Company (UAC) owned Warri Port , while Calabar port was owned by five operators.

In consideration of port as essential in economic growth as well as national security, the Federal Military Government enacted a special decree, which empowered the Nigerian Port Authority to acquire these ports which were privately operated before the civil war.

The post civil war which increased the level of international trade in Nigeria presented two major problems. These include: Port congestion and inability of the port facilities to cope with the quantity of cargo entering Nigerian ports. This led to the decision to construct the ultra – modern Tin Can Island Port in Lagos and also the new Calabar port.

As part of effort to give a holistic approach to port development in Nigeria, construction of a deep-sea port at Onne was conceived in the late 1970's. By 1980, construction work of Federal Ocean Terminal (FOT) started in Onne. Among the economic reasons why FOT Onne was developed was to serve as a long-term measure to curb the repeat of congestion problem experienced in the 1970s. It was also planned to support Port Harcourt port, which was over stretched in handling conventional cargo. Also, the FOT was designed to facilitate the handling of raw

materials required at the National Fertilizer Company of Nigeria (NAFCON) and Ajaokuta Steel Mill.

The introduction of container packaging system in the Nigerian ports in the 1970'ies brought about the construction of Apapa Container Terminal, which was officially commissioned in September 1979. The port was officially named Third Apapa Wharf Extension and is sited on quay wall of 1000 metres which provides for 4 berth for container vessels equipped with 2 ship – shore gantry cranes and two mobile crane.(NPA 2002). Apapa container terminal(now refer to as AP Moler Meask terminal) is the main specialized port for container operation in Nigeria, although other ports such as Tin Can Island, Onne, Port- Harcourt and Calabar ports handle container traffic but more than 60% of the container traffic in Nigeria were handle at the port.

2.7.Port Planning and Development in Nigeria

Geographic requirements in port planning are important features which can encourage or discourage bigger vessels in a port. These features are prerequisite to the preparation of engineering works and they include geology, coast morphology, meteorology, sea or river conditions and siltation rate. The physical requirements especially those related to the coast morphology are best described under the coastal zones of a port.

The division of coastal zones in Nigeria according to Pugh(1954) consists of four zones. These include; (i) the Western sand ridges and Lagos complexes, (ii) the Niger Delta, (iii) the Eastern sand ridges, mudflat and creeks complexes and (iv) the Cross River estuary. This divisions seems to agree with Ajao(1997), who identified four coastal zones which consist of the barrier- Lagoon complex which extends from about 200km from the Benin/ Nigeria border, the transgressive mud beach extending for about 75km from the vicinity of Lekki lagoon to Benin river

on the North-west flank of Niger Delta. It also consists of the Niger Delta area of approximately 200km^2 in area and this is more pronounced between Benin and Opobo River, and lastly, the strand coast of about 85km long, which extends from the Imo River to the Cross Rivers at Nigeria/ Cameroon border.

One of the physical constraints to port development in Nigeria is siltation to the port entrance. This has constituted in no small ways to the inability of bigger ships such as the super tanker and supper container ships to patronize Nigerian ports due to draft restrictions imposed on such ship as a result of shallow depth. The silting at port entrance and the nature of the ports seaward approaches has been variously studied in Nigeria. Such studies include that of Ogundana(1976) where the means net deposit at the Lagos harbour was estimated to be 450,000m^3. In the same vein, Udo (1970) observed that the bars across Lagos harbour could only be crossed from December to February when the North East winds were prevalent. This was due to the tidal amplitude varying from 1.0m to 2.5m and as such these bars could only be crossed at high tides, which wasted a lot of valuable time and increased the cost of handling cargoes. It is important to note that these studies though established the importance of physical characteristics of coastal area in port location, however this problem has been able to be overcome through intermittent maintenance dredging. The dredging of port approaches is one of the main technical requirement in port development.

Another serious physical constraint to port development is the seaward approaches. This is related to the shoaling of the creeks and rivers as well as the configuration of the creeks. Table 4.2 indicates some of the geographic attributes of port approaches of Nigeria.

TABLE 2.1: GEOGRAPHIC ATTRIBUTES OF SEAPORTS IN NIGERIA.

PORTS	KEY PARAMETERS					
	ACCESS CHANNEL LENGTH. (KM)	ALLOWABLE VESSEL LENGTH. (M)	ACCESS CHANNEL DRAUGHT (M)	DESIGNED DEPTH AT QUAY. (MCD)	PRESENT POSSIBLE DRAUGHT. (M)	QUAY LENGTH. (M)
APAPA PORT	6	185	-10.0	-9.7 to 13.5	-9.7	4.270
TIN CAN ISLAND	10	185	-10.0	-11.5	-10.0	2,650
PORT HARCOURT	7.9	185	-7.6	-7.8 to –10.0	-7.6	1,290
FOT, ONNE	47	185	-10.0	-13.5	-10.0	500
FLT, ONNE	49	150	-10.0	-5.9	-5.9	1250
CALABAR	84	150	-7.0	-8.0	-7.0	860
WARRI	86	200	-6.0	-11.5	-6.0	1510
SAPELE	125	170	-6.0	-10.0	-6.0	1,150

SOURCE: Master Plan For an Integrated Transportation Infrastructure for Nigeria (2002)

The geographic attributes summarized in the table were reviewed below;

(1). Apapa Port Complex.: The seaside approach is accessible through the Commodore channel of about 6km length. The port has allowable draught of 10.0m which is subject to intermittent maintenance dredging. The total quay length is 4,270m,although additional 1,510m third wharf extension has been added. The maximum Center Depth (CD) is –13.5m. The port is interconnected with road networks and rail system. Although, the rail is highly deficient and in bad condition and as such not in use as at the period of review. The Road network is in fair condition with pot holes and bad spots which need maintenance. Apart from these, the traffic congestion, which is characteristics of Lagos, is a major constraint to interconnectivity of the port.

(2). Tin Can Island Port.: The Port is accessible from the seaside through the Commodore Channel passing through Apapa Port. Approach Channel is 10km which allows any vessel with draught of up to 11.5m. The quay length is 2,650m,while the draught at berth is 10.0m average. There is adequate road network linking all the berth and storage areas. Rail is not directly linked to the port.

(3). Port- Harcourt Port: Located on Bonny River and about 79km upstream from open sea. Maximum length overall of vessels permissible to navigate to the port is 185m. The draught is restricted to about 7.6m. Road network is connected to the port and also linked with rail network which is not however operational because of poor condition.

(4). Federal Ocean Terminal (FOT): The port is located at Ogu Creek of Bonny River which is about 47km upstream from the open sea. The port permits any vessel of 10m draughts and Length Overall (LOA) of 185m. Total quay length is 500m, with depth of –13.5m center depth. Interconnectivity is through the single lane road, which is in bad condition as at the time of the review. A new rail track between Port-Harcourt and Onne is under construction.

(5). Federal Lighter Terminal (FLT): Located about 2km further upstream from Federal Ocean Terminal making about 47km from open sea. The quay length is about 1,250km and the water depth is about 5.9m. The only land ward connectivity is through a single lane road from Onne town which is in bad condition as at the time of this review. Rail track is under construction, which is expected to also connect the port.

(6). Calabar Port.: Located on the Calabar river, with channel of about 84km length and width of 150m. The tidal current is about 3.0 knot making it one of the strongest tidal stream in Nigeria. The permissible length overall (LOA) of vessel is 150m, while the draught is 7.0m. The port has a total quay length of 860m and is

directly connected to the double lane road network that extends to Calabar town. There is no connection with railway. Air transport is available but not directly connected to the port.

(7). Warri Port: The port is located on Warri River and can be approached through both Forcados and Escravos Rivers. The two approaches are hindered by sandbars, which limit the draught of vessels to 6.0m. The Forcados River is better and is about 86km in length. The port has a total quay length of about 1510meters.The Rail connection linking Aladja from Ajaokuta.

2.8. Development of Inland Container Depot in Nigeria.

The concept of Container Depot connotes a facility that provides cargo handling services which include transfer of container from one transport mode to another and as well as storage of container at a specially constructed terminal. In a similar vein, a Container Freight Station (CFS) or a Bounded warehouse (BW) is a designated place for grouping of consignment and packaging them into a shipping container. Whether Container Depot, Container Freight Station or Bounded Warehouse, these structures are essential for efficient container transportation in Nigeria.

The evolution of Inland Container Depot in Nigeria started in 1979 when Elder Dempster (a Shipping Company) in conjunction with other members of the United Kingdom West Africa Liner Conference (UKWAL), the defunct Nigerian National Shipping Line(NNSL), and National Insurance Corporation of Nigeria(NICON) established an Inland Container Depot in Kano. The ICD was managed under the name Inland Container Nigeria Limited (ICNL). Due to initial successes recorded at the terminal it was extended to Kaduna in 1982. However, these successes were short lived and the ICNL could not continue its operation due to many factors among which are non-involvement of Nigerian Port Authority (NPA) in the project. This resulted in non-recognition of the terminals as dry ports

by both then Nigerian Port Authority and the Nigerian Custom Service. The ICNL operated like a mere bonded terminal or warehouses because the full UNCTAD compliments were not accorded the terminals. Other reasons identified for the failure of ICNL include poor state of rail and road networks, inadequacy of haulage trucks etc.

In a more technical approach Marine Container Terminals (MCT) are associated with the activities of Seaports. They served as temporary storage and stacking areas for container traffic. The Marine Container Terminals have been described as critical points in any multimodal transport networks, this is because they are points where containers received from ocean vessels are transferred to inland carriers such as trucks, trains or canal barges and vice- versa (Omole 2004). In Nigeria, the Nigerian Port Authority (NPA) manages Marine Container Terminals until recently when the ports were fully concessionned to private operators. There are four main Marine Container Terminals (MCT) in Lagos managed under the former Apapa Container Terminal which is presently conceded to AP Molers a shipping firm which specialized in handling containers. These Marine Container Terminals include the New Terminal which serve as main depot, Adekunle Way/ Cogfa, Bull Nose and Lily pond Terminals. There also terminals and stacking areas for container at the Ports of Tin Can Island, RoRo, AP Molers all in Lagos. Apart from these, there are also many Privately owned Container Bonded Terminals most of which were located in Lagos and Port Harcourt.

In Nigeria, five Inland Container Depots and three Container Freight Stations were sited at different location recently. However, these sites were not functional as at the time of collecting relevant data for this study. Although, the implementation of this approval which is on Build, Own, Operate and Transfer (BOOT) has commenced on some of the sites with construction works.

Summary of collected data on the geographical attributes of the five of the sites and connections to other modes are tabulated below.

Table 2.2: Geographic Attributes of ICDs and CFSs Locations in Nigeria.

ICD LOCATIONS	AREAS/ (HECTRE)	RAIL LINKAGE	ROAD LINKAGE	PROXIMITY TO SEAPORT	PROXIMITY TO AIRPORT	CAPACITY IN TEUS
Ibadan	200	Yes, from Iddo-Abeokuta via Lalupon in Ibadan. Also, Narrow gauge.	Single lane	About 132km from lagos	About 20km to Ibadan airport	50,000
Jos (Heipang)	50	Narrow gauge in Jos town. not yet connected to site	Access road to the site under construction	Far away about 1,168km to Lagos and 808km to P.H	Within the vicinity of the site.	20,000
Bauchi (Bichi Village	About 50	Narrow gauge in Bauch town. not yet connected to site	Single Lane	About 970km away from P.H.	N.A	20,000
Gombe	27	Linked to rail line from Kafanchan-Jos-Gombe-Maiduguri.	Linked to Two single lane road.	About 1,122km to P.H	N.A	10,000
Borno (Bulunkutu)	20	Rail is linked by Single gauge.	Road is available	About 1,419km to P.H	N.A	10,000
Kano (Zawachiki)	N.A	Rail is linked directly from either Lagos or P.H.	Single lane road from Jos and double lane from Abuja	about 1,139km from Lagos	Aminu Kano IN'T airport.	20,000
Aba (Isiala Ngwa)	N.A	Linked to rail and close to Mbawsi Station	Double Lane road from P.H	About 40km from P.H	About 40km to Sam Mbakwe Cargo airpor Owerri	50,000.

SOURCE: ADEYANJU (2011)

In the table above, the geographic attributes of the proposed inland container sites in Nigeria are highlighted. The survey carried out revealed that apart from clearing work embarked upon at some of the sites, there are no indications that container traffic have arrived the sites. However, the survey of the geographic attributes was done to ascertain the suitability of the site.

(a) Ibadan Inland Container Depot: The site is directly accessible to the Single lane highway at Erumun village along Iwo – Ibadan road. According to record available from the Nigerian Shippers Council the area is about 200 hectares with capacity to stack about 50,000TEUS of containers. It is also linked with rail line coming from Lagos through Iddo, Abeokuta Olodo Lalupon, etc. It has proximity to both seaport and airport, about 132km to Lagos Seaport and just 20km to Ibadan airport. The location of the depot is suitable considering the fact that Ibadan is a central city in South West and can easily be reached from other big towns in the region. Apart from the fact that Ibadan is a major commercial city, it is also a transit zone between the South West and the North Central or Middle belt region in Nigeria. Unfortunately, as at the time of visiting the site no appreciable work has been done except land clearing.

(b). Aba Inland Container Depot: The original site of the ICD has been changed to Isiala Ngwa along Port Harcourt – Aba Express way which is about 50km to Port Harcourt. It has capacity to accommodate about 50,000TEUS of containers. There are road and rail linkages and the site is close to the Mbawasi rail station. It also has close proximity to Sea and Air Ports considering the close distance to Port Harcourt Seaport as well as Sam Mbakwe Cargo Airport at Owerri which is about 40km. The site is considered suitable considering the commercial status of Aba, Onitsha, Nnewi, etc in the Eastern region of Nigeria.

(c). Jos Inland Container Depot: The site is located within the vicinity of the airport and connected to road. Although, the site is accessible to the rail passing through Jos town, but it is not yet connected. Record available at the Nigerian Shippers Council also indicated that the area is about 50 hectres and can stack about 20,000TEUs of container when fully utilized. There is no close proximity to the Seaport, the closest seaport is the Port Harcourt Port which is about 808km. The site is suitable because of its location in the North- Central region of Nigeria and

can easily serve as clearing depot especially for containers traffic destined for the North-Central and North-Eastern corridor.

(d). Kano Inland Container Depots: Although Kano site is the pioneer Inland Container Depot in Nigeria, but the activities at the old site operated by the Inland Container Nigeria Limited is completely moribund. The old depot has capacity to stack about 2,000TEUs of containers and is linked to the railway. Also, there is a proposal to locate a new site under the control of Nigerian Shippers Council at Kwakowso village which is also linked with road and rail transport. Generally, Kano is a commercial nerve of the Northern region and is about 1,139km from Lagos which is the closest seaport. Apart from been a modern commercial city, the prominence of Kano dated back to the time of Trans- Sahara trade between the North Africa, West Africa, Europe and the Arabian countries. Kano site is suitable in that it will not only serve the neighboring states but also it will provide services for other neighbouring land locked countries of Niger, Chad, Burkina Faso etc.

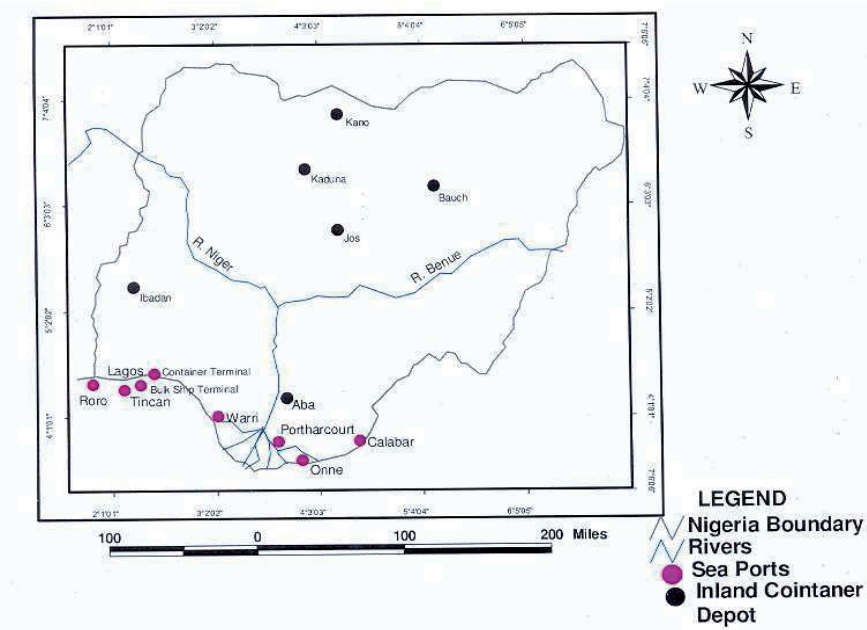


Fig. 4.3 : Map of Nigeria showing the Seaport and Inland Container Depot in Nigeria
Source: Adapted from Macmillan Atlas Map of Nigeria.

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CHAPTER THREE
Port Performance Monitoring and Evaluation
J.A. Ojekunle

3.0 Introduction

Performance evaluation is critical to effective and efficient management of any organization. Performance evaluation helps the management of an organisation to monitor the performance of its organisation. Monitoring and evaluation of an organisation performance provides useful input for management decisions. It forms a reliable basis for corporate planning, as well as identifying areas of improvement in the entire operation of the organisation.

Performance evaluation of port operation needs to be carried out from time to time to ensure optimum performance and efficient management of port. However, to carry out port performance evaluation certain indicators of port performance must be identified. These indicators are the measurable standards through which port operation performance is evaluated.

In this chapter, various port performance indicators are identified and discussed. In addition, some examples are given to enable us understand how to measure these indicators and how these indicators can be applied for evaluation of port operational performance.

3.1 Port Performance Indicators

Port Performance indicators are simple measures of various aspects of ports operation. To fulfill their purpose, such indicators should be easy to calculate and simple to understand. They should provide insight to port management into the operation of key areas. They can be used, first, to compare performance with a target and secondly, to observe the trend in performance levels. For example, the productivity for handling general cargo for the first month might be 15tons per gang-hour. If successive monthly figures show a decline from this value, clearly

actions to determine the reason for the decline and measures to remedy it will be necessary. The indicators can also be used as input for negotiations on port congestions surcharges, port development, port tariff considerations and investment decisions.

3.2 Operational Indicators

Perhaps of more direct concern to port management than financial indicators are operational ones. If port charges have been well thought out and actual traffic follows the projected figures, then through the control of the operational performance, management will control the financial performance of the port as well. The indicators presented are not exhaustive but it is felt they are the most important ones for port management initially to select for medium-term planning and control.

Important information to maintain is the number of ship arrivals and a breakdown of the ships' time in port for each class of cargo. These data are of prime concern to the ship owners and operators for the setting of freight rate and thus of direct concern to shippers and consignees who must pay the freight rate. Perhaps the most complicated and intricate problem existing in the transport field today is the turn-round of ships in ports.

An excellent indicator to maintain of port effectiveness is the quantity of cargo worked per ship hour in port with a high figure being desirable. To maintain this indicator, information on the arrival time, departure time and ton of loaded/discharged for each ship must be recorded. In addition, the time of berthing, ship length and location of berthing should be noted. The various ship times must be accurately defined and then consistently recorded. In addition to the above information, data on the total hours at berth during which the ship was worked and on the total gross gang-hours worked should be recorded, to permit measurement of the intensity of working.

From these records, the following averages can be calculated on a monthly basis for each berth group servicing a cargo class:

(a) Arrival rate: Number of ships arriving during a month divided by number of days in the month;

(b) Waiting time: Total time between arrival and berthing for all berthing ships, divided by number of berthing ships;

(c) Service time: Total time between berthing and departure for all ships, divided by the number of ships;

(d) Turn-round time: Total time between arrival and departure for all ships, divided by number of ships;

(e) Tonnage per ship: Total tonnage worked for all ships, divided by number of ships;

(f) Fraction of time berthed ships worked: Total time that berthed ship were actually worked, for all ships, divided by the total time between berthing and departure of all ships;

(g) Number of gangs employed per ship per shift: Total gross gang time, divided by the total time that berthed ships were actually worked;

(h) Tons per ship hour in port: Total tonnage worked, divided by total time between arrival and departure;

(i) Tons per ship hour at berth: total tonnage worked, divided by total time between berthing and departure;

(j) Tons per gang-hour: Total tonnage worked, divided by total gross gang time;

(k) Fractional of time gangs idle: Total idle gang time, divided by total gross gang time. Table 3.1 shows the list of data needed for calculating operational indicators of port performance.

Table 3.1: Summary of operation Data Required for Measuring Operational Performance

Indicators	Units
Arrival late	Ships/day
Waiting time	Hours/ship
Service time	Hours/ship
Turn-round time	Hours/ship
Tonnage per ship	Tons/ship
Fraction of time berthed ships worked	-
Number of gangs employed per ship per shift	Gangs
Tons per ship-hour import	Tons/hour
Tons per ship berthed	Tons/hour
Tons per gang-hour	Tons/gang-hour
Fraction of time gang idle	_

Source: J.C. Telfer 1972

3.3 Indicators of Utilization

Indicators of utilization are measures of how intensively berth facilities are used. There are two important indicators in this group.

1. Berth occupancy – the proportion of time a berth is occupied by vessels.
2. Berth working time-the proportion of ship's time at berth for which labour is scheduled to work.

3.4 Berth Occupancy

Berth Occupancy effectively indicates the level of demand for port services. It can be measured over time intervals, (a week, a month, a year) and is normally expressed as a percentage; the number of (or days, when calculating over very long periods) the berth is occupied in a given period (whether cargo is being worked or not) divided by the total number of hours (or days) in the period, multiplied by 100 percent.

Berth Occupancy:- $\frac{\text{Hours for days) berth is occupied}}{\text{Total possible hours (or days) in period}} \times 100$

Example 1

What was the Berth Occupancy for the period that ships were at your berth on 275 days last year?

Answer: Berth Occupancy = $\frac{275 \text{ days}}{365 \text{ days}} \times 100 = 75\%$

Berth Occupancy is often misunderstood and misused by port managers and unless it is fully understood; it is a particularly dangerous basis for decision making. This is so because the tendency is to think that a high Berth Occupancy value is desirable, and that it indicates high berth efficiency. The operational disadvantages of High Berth Occupancy include:

1. Little or no time to plan and prepare cargo handling operations
2. There is insufficient time to consolidate exports
3. There is not enough time to clear imported cargoes from quays, sheds and yards before next ship arrives
4. Working under this sort of pressure puts considerable strain on labour, management storage space and equipment.

So high berth occupancy causes quality of service to decline. It signals congestion, and the danger that ships might queue for a berth, putting costs through increased turnaround time, congestion surcharge, demurrage charges, etc. But low Berth Occupancy or 50% of less indicates that resources are being underused, perhaps lying idle for much of the time and that there is spare ship and cargo handling capacity.

Berth Occupancy values within the range of 60% and 70% are perhaps the safest to aim for, and depend on four main reasons.

1. The arrival pattern of general cargo ships

2. The number of general cargo berths in the ports
3. How effective the berth allocation system is and
4. The average ship's time at those berths

High Berth Occupancy may be tolerated on the condition of ships arriving at regular pattern, with a few day interval between the departure of one vessel and the arrival of the next, giving time to plan effectively and to prepare for the next vessel while the berth is vacant.

The second factor, the number of general cargo berths available is linked closely to the first, the more berths there are available, the more easily can ship arrivals be distributed to ease pressure and allow berths to recover.

The third factor encompasses the advantage of a flexible responsive Berth Allocation Policy (BAP). This has to do with the flexibility at which vessels can be allocated to different. In a situation where only a particular type of vessel can be allocated to a particular berth does allow for flexibility and cause undue pressure on some berth facilities while others are idle or underutilized.

The fourth factor deals with the question of ship's time berth, which is really a matter of how much cargo passes through the berth and how quickly it is handled.

To reduce high Berth Occupancy to an acceptable level adopt the following measures:

1. Speed up cargo handling; either by using more gangs and equipment or more shifts and overtime
2. Work vessels at an anchor via barges, to reduce the number of vessels waiting for berths.
3. Improve Berth Allocation policies to ensure fair distribution of vessels and appropriate matching of ship to berth

4. If bunching of ship arrivals is the cause, bring it to the attention of senior management, so that they can try to persuade ship-owners and agents to even out vessel arrivals.

The over-riding solution is a reduction in the time wasted at the berth – an increase in Berth Working Time.

3.5 Berth Working Time

It is that part of ship's time at berth for which labour is scheduled to work. It is usually expressed as hours or days, it can also be expressed as a percentage of the hours available for working in the period that is, as a percentage of ship's time at berth.

Berth Working time = hours available for working in the period

Ship's time at Berth

= % of ship's time at Berth

There are three components of Berth Working Time:

1. Non operational time that is, time when the berth is not scheduled to work e.g. Sundays, public holidays, meal breaks
2. Idle time: Time due to unscheduled interruption to cargo handling at a berth due to bad weather, various stoppages resulting equipment breakdown and non-availability of cargo.
3. Operational Time: Time that cargo is actually being worked at Berth, after all delays have been deducted.

This can be summarized as follows

- Ship's Time at Berth Minus Non-Operational Time Equals Operational Time

Berth Working Time and Berth Occupancy give useful indication of how effectively the Berth and its resources are being used. These also consist of non-operational Time and idle Time that both represent berth capacity that is not being

used and also contribute to the unnecessary costs for handling cargo due to surcharges imposed on Idle time.

3.6 Indicators of Productivity

The two categories of indicators discussed so far provided useful data for a management information system, but do not measure efficiency and cost effectiveness of the Berth Operation; they do not indicate how effectively labour, equipments buildings and land are being used.

Efficiency therefore is defined as the ratio between output achieved and effort put in. In business and industry, `efficiency' is used in the sense of cost-effectiveness; the cost per unit of production or the profit per unit capital investment. Therefore efficiency in ports operation is the cost of tone of cargo handled.

There is a distinction between productivity and output. A factory may well be able to increase output by building new production lines, buying machinery and employing more labour, but these will not necessarily improve productivity, the extra capital investment and running costs could actually put up the cost of each item manufactured. In other words, increased production does not necessarily improve productivity. But lower costs per tone can be achieved by maintaining output using existing resources to so ORGANIZE and SUPERVISE operation that the same men, with same gang and equipment, handle more cargo per shift.

3.7 Financial indicators

A port authority should be aware of the cost generated by its operations and the revenue resulting from these operations. The bulk of this information must come from the accounting system. The current global trend, even in countries where ports are not treated as autonomous bodies within the national economy, is towards making them increasingly financially viable. Sound financial information is pre requisite to a sound port tariff system.

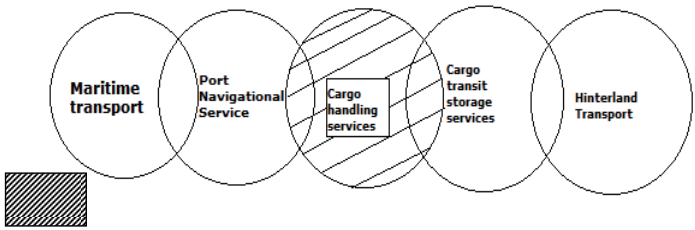

Fig. 3.1: Portion of chain (transfer of cargo to or from vessels) covered by performance indicators

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FIGURE 3.1 Functional areas of the transport chain as seen by port management

For the purpose of this discussion only the cost and revenue associated with the transfer of cargo to or from ships are taken into account in the calculation of the various indicators (see figure 8.1). Thus cost and revenue generated from the transit storage and warehousing function and from the delivery and receipt of cargo via these storage areas are excluded. This decision is based on the fact that cargo handling to or from vessels takes place during a well-defined period of time, namely, when the ship is at berth, for the same ship, the delivery of discharged cargo from storage areas within the ports can extend over a period of months. Thus, a separate group of indicators should be developed for the transit storage and warehousing areas that are not linked to the particular ship call.

The port areas should be divided into berth groups which are or sub areas, each handling a different cargo class. The primary financial indicator for each berth group is the contribution per ton of cargo handled over specified time period. To arrive at this indicator, the cost and revenue produced at the berth group are first calculated to indicate the position of each element to the contribution. The elements to be considered for each berth group are:

a. Ship revenue related to the berth group.

b. Cargo revenue related to the cargo handling, services of the berth group.
c. Labour cost.
d. Capital equipment cost.

The ship revenue may come from berth occupancy charges or port dues. Normally, only a portion of the revenue from port dues is set aside to cover the cost associated with the cargo handling service. The assumption is that ship revenue comes from berth occupancy charges. The cargo revenue may originate from charges for the cargo-handling operation from ship to storage area and vice versa. Port authorities may also charge dues to help cover the cost of this operation.

In addition, port authorities may contract private firms to handle one phase of the cargo-handling operation. In this case, only the costs and revenues flowing between the authority and the private firms should be considered when calculating the indicators, but the authority should nevertheless be aware of the charges made by the private firms.

A negative contribution may not necessary be a bad thing provided it has arisen as a result of a policy decision to allow other local or national economic interest to benefit from a port subsidy. If the policy of the port is to operate as a profit centre, the rate of return maybe determined on the total capital employed in the port. Such a measure is perhaps the best single indicator of the financial success of the employment of capital. However, as most ports are justified not on a micro-economic level, the use of the rate of return indicator may not be appropriate for evaluating the financial performance of such port.

An extremely important indicator, both operationally and financially, is the monthly volume of the cargo worked. If, for example the port charges for cargo handling are based on tons of cargo worked, management must be made aware of the variance between the budgeted and the actual quantity handled. This difference

is an indication of the likely revenue variation. With volume variances, ship traffic and cargo projection can be estimated and used to determine the cost of action the port should follow. Figure 8.2 shows an example of trend in labour productivity in a port.

Possible alternatives to improve cash flow when the quantity of cargo handled is lower than expected are:

a. Port marketing promotions to increase traffic and revenue.
b. Increase in tariff to increase revenue.
c. Measures to increase productivity and increase the variable cost per ton.
d. Re-adjustment of deferrable budgeted expenditure.

The following indicators should be calculated each month for the ship sailing from each berth group;

a. Total tonnage worked;
b. Berth occupancy revenue per ton of cargo: total berth occupancy revenue produced, divided by tonnage worked;
c. Cargo handling revenue per ton of cargo: total revenue produced from transferring cargo to or from ships, from or to storage areas, divided by tonnage worked
d. Labour expenditure per ton of cargo: total direct labour expenditure for transfer of cargo to or from ships, from or to storage areas, divided by tonnage worked.
e. Capital equipment expenditure per ton of cargo: total amortization and interest allocated to and maintenance and operating costs incurred for the berth group, excluding the costs of transit sheds and warehouses, divided by tonnage worked.

f. Total contribution: berth occupancy and cargo handling revenues minus labour and capital equipment expenditure.

g. Contribution per ton of cargo: total contribution divided by tonnage worked.

h. Number of gangs employed per ship per shift: Total gross gang time, divided by the total time that berthed ships were actually worked;

i Tons per ship hour in port: Total tonnage worked, divided by total time between arrival and departure;

j Tons per ship hour at berth: total tonnage worked, divided by total time between berthing and departure;

k Tons per gang-hour: Total tonnage worked, divided by total gross gang time;

l Fractional of time gangs idle: Total idle gang time, divided by total gross gang time.

Berth group : General Cargo

Period : February 1975

a. Av. Tons/hr. : 22.5tons/hr. (21.5 tons/hr. previous period)

b. Number of Ships : 103

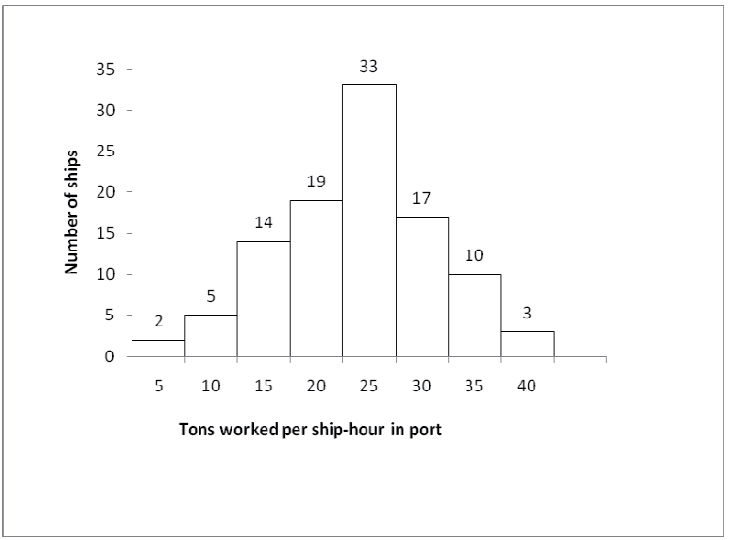

Figure 3.2 showing trend in labour productivity in a port

In addition to the calculation of the above average figures, it is important that certain indicators be calculated on an individual ship-call basis and plotted as a frequency distribution. Figure 8.2 illustrates such a distribution for the tons per ship-hour in port.

One aspect of port operation that management should carefully monitor and take steps to correct when unfavourable trends appear, is the productivity per gang. The maintenance of the tons per gang-hour indicator will supply the index for monitoring this important phase of port operation. The actual figure could also be compared with standards established by application of such methods as work study. Action should follow if values are outside an established range, to determine the reasons for this variation, and steps should be taken to correct the deviation.

The indicators that have been proposed are summarized in the tables 8.1 and 8.2. These indicators allow port manager to measure, first, the quality of the service their ports supply and secondly, the demand for these port services. The fact that an indicator does not vary over time does not mean that the performance measured by that indicator is necessarily good. It may be consistently bad! Thus the need exists to establish standard or norms.

The decision regarding which indicators to maintain depends on the port authorities' particular requirements. Ports which do not have sufficient strength in their statistical sectors to deal with the collection of the data and calculation of the chosen indicators should review the purposes and benefits of other information collected by these sections. In addition, the accounting systems should differentiate between the various berth groups, to allow cost and revenue data to be collected easily. The following chapter proposes a manual system for the collection of the data necessary for the calculation of the indicators.

Table 3.2 Summary of financial indicators*

Indicators	Units
Tonnage worked	Tons
Berth occupancy revenue per ton of cargo	Monetary unit/ton
Cargo-handling revenue per ton of cargo	Monetary units/ton
Labour expenditure per ton of cargo	Monetary units/ton
Capital equipment expenditure per ton of cargo	Monetary units/ton
Contribution per ton of cargo	Monetary units/ton
Total contribution	Monetary units

***Calculated monthly for each berth group servicing a cargo class.**

The financial indicators proposed answer the following two questions:

1. What revenue is produced from a service?
2. What is the cost of the service?

With the development of these financial indicators, port management personnel would be supplied with the information necessary for them to take steps to achieve financial viability. If financial criteria for performance are removed, a significant incentive to efficiency also goes. In addition, financial viability criteria are often important when the port has to negotiate loans.

The Nature of Port Cost

The port costs usually consist of two components:-

- Fixed cost and
- Variable costs

Ports costs = fixed cost + variable costs

Fixed costs are independent of the output, performance or utilization. They have to be paid irrespective of the volume of cargo handled. Variable costs are directly related to the output they increase with the quantity of cargo handled.

Fixed costs include:-

- The capital cost of port facilities (or the interest charges on the investment);
- Cost of building sheds and offices
- Salaries of permanent staff
- Cost of ownership of equipment; the purchase cost (or interest in borrowed capital) of cranes, trucks etc; and some routine maintenance costs
- Variable costs consist of
- Wages of casual of hourly paid labour
- Incentive bonus or overtime payment to staff and labour
- Some equipment maintenance and repair cost
- Cost of stationery, electricity, water, etc.

The question of whether equipment maintenance costs are fixed or variable is not a simple one (for its appearance on both headings). Some maintenance certainly has

to be done at regular intervals (daily, monthly, annually, etc) regardless of the mileage or hours of use. On the other hand, the more a vehicle is used the more frequently tyres and other parts have to be replaced and so on. So it is probably wise to apportion them as more routine preventive maintenance under `Fixed' along with the investment cost, as a `cost of ownership', and the bulk of them as `maintenance repairs' under `variable costs'

Example 1

At the end of last year, the operating records of a berth at Apapa Port that handled 100,000 tones of cargo, were analyzed for planning purposes, and the following cost data emerged:

	Note	
Investment costs (buildings, workshop etc)	N500,000	F.C.
`Ownership' cost of equipment including pm	N150,000	F.C.
Maintenance repairs to plant	N200,000	V.C.
Salaries of Management and other permanent Staff	N300,000	F.C.
Wages of Casual and Hourly Paid Labour	N300,000	V.C.
Bonuses and Overtime Payment	N200,000	V.C.
Fuel Power, etc.	N 50,000	V.C.

Use these data to calculate the total fixed and variable costs, the cost per tonne, and the effect of increasing annual throughput from 100,000 tonnes to 150,000 tones using the same resources.

a. Find the total annual fixed cost: N(500,000+150,000+300,000 = N950,000)
b. Calculate the fixed cost per ton $\frac{N950,000}{100,000}$ = 9.50/ton
c. Find the total annual variable cost N200,000+300,000 -200,000+50,000 = N750,000
d. Calculate the variable cost per ton $\frac{N750,000}{}$ = 7.50/ton

100,000

e. Calculate the total cost per ton = (9.50+7.50) = 17.00/ton
f. What would be the total fixed cost if annual throughput were to be increased to 150,000 tones. Answer is same
g. Calculate the Fixed Cost per ton at the increased rate

$$\frac{950,000}{150,000} = N6.30/ton$$

The fixed cost per ton has fallen from N9.50 per ton to N6.30 per ton a 30% reduction following a 50% increase in throughput.

h. Calculate the total variable cost for a throughput of 150,000 N7.50/tonnex150,000 tones = 1,125,000 it means that the total variable cost has gone from N750,000 to N1,125,000, a 50% increase for 50% greater throughout
i. calculate the total cost per ton at 150,000 tone throughput N950,000+N1,125,000 = N2,075,000. Note that the total cost per ton throughput increase is N2,075,000/150,000t = N13.80/t. That is, it has gone down from N17/t to N13.80/t a decrease of 19% for a 50% increase in throughput.

In summary, increasing throughput shoots up total costs (though by proportionately less than the throughput increase) and total variable costs (in direct proportion to the throughput increase but leaves total Fixed cost completely unchanged. For costs per ton, however, the situation is quite different. Total cost per ton falls as output rises, as does Fixed Cost per ton (a more pronounced decrease) but the Variable cost per ton, of course is unchanged.

If labour is paid for overtime at a higher than standard wage rates, then variable cost per ton will increase. The extra wear and tear on equipment might also

increase maintenance costs, adding to this rise in variable cost per ton. That is the extra output has been achieved without additional investment of resources. If some at least of these extra labour costs could have been avoided the benefits of increase throughput, in terms of cost per ton of cargo would have been even greater.

Therefore cost per ton of cargo handled is a good and useful measure of productivity

Another useful productivity indicator is labour cost per ton which is expressed as follows:-

$$\text{Labour cost/ton} = \frac{\text{total labour cost per shift}}{\text{Tons handled per shift}}$$

The savings that can be made in cargo handling by increasing output without employing extra labour and resources, i.e. by improving organization and supervision are very great. They are demonstrated very clearly by the Indicators or Productivity cost per ton and Labour Cost per ton these are two extremely useful measures of cost Effectiveness that are used regularly in monitoring performance in port operations.

Example 2

Over a particular period, Berth I at Calabar Port employed 100 men per shift.

Output was 250t per shift on average and the men were paid N7.50 per shift.

(a) What was labour cost per ton, (b) how would it have changed if output could have been increased to 750t per shift without employing more men and (c) what would it be if the output increase to 759 per shift, was achieved by giving a bonus of 50 kobo per man for every 100t over 250t per shift?

Solution

Total Labour Cost per shift = 100x7.5 = N750

(a) Labour Cost per tonne = N750: 250t = 3/t

(b) Labour cost/t = N750:750 = N1/t

A change = N(3-1)t = N2/t

(c) Every 100t over/shift = $\frac{750\text{-}250}{100t}$ x 50 kobo = 2.50/man

Total Labour Cost N(750+250) = 1000

Labour Cost per tones = $\frac{1000}{750t}$ = N1.33/t

To improve productivity means increase output substantially with existing resources of labour, equipment and facilities, or with only small increases. It might even be possible to reduce some cost by BETTER PLANNING AND ORGANISATION leading to reduction in cost per ton of cargo handled hereby contributing significantly to reducing overall transport cost.

Example 3

Calculate the cost per ton of cargo handled for our berth operation with annual throughput of (a) 120,000t and (b) 360,000t. Assume fixed costs of N1.5 million per year and Variable costs of N7.50 per ton.

Solution:

(a) Total cost = fixed costs (N1.5 million) + Variable (N7.50x120,000) = N2.4 million Cost per ton = 2.4 million: 120,000t = 20 per ton

(b) Total Costs = N1.5 million + N7.50x360,000 = N4.2 million Cost per ton = N4.2 million: 360,000t = N11.67 per tone

So if cargo throughput is only one-third of capacity, costs per ton are over 70% higher than they should be N20 per ton instead of N11.67 per ton. Therefore higher productivity is the key to reducing cargo handling costs, for it is a measure of cost effectiveness, output in relation to the resources employed.

3.8. Conclusion

This chapter has so far discussed the importance of performance evaluation and how to evaluate port operation performance. It highlights various indicators of port performance and the importance of data gathering, recording and analysis in port planning and evaluation process. The various types of data that can be collected are equally highlighted in order to guide port managers on the process of carrying out performance evaluation in the ports.

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Chapter Four
Review of Nigeria Port Reforms
J. A. Ojekunle

4.0 Introduction

For many years, Nigeria's port system has suffered from poor performance and high costs, leading to long turn-around times of ships, and rising container dwell time. Furthermore, unlike the usual status of ports as "Cash-Cows", the Nigerian Ports generally required financial support from the Federal Government, especially for its capital investments. Before the reform, the Nigerian ports system was highly centralized. The Nigerian Ports Authority (NPA) required permission from either the President or the Minister of Transport for virtually all the major decisions. This led to inefficiency and lengthy decision-making process in the Nigerian Ports subsector. The Nigerian Port Authority (NPA) was responsible for both regulatory and operational functions of the ports which, was considered as another major bottleneck to attaining efficiency in the port operations.

Comprehensive reform of the port sub-sector began in 2000. The reform program was designed to remove the major impediments to efficient operation and thereby facilitate streamlining of import and export activities. The measures adopted included a shift of management from government controlled system toward the landlord port model and the extensive award of private sector concessions for port-based cargo-handling facilities. Despite significant progress since 2000, much still remains to be done to improve the productivity of Nigeria's main ports. The policies and strategies adopted in effecting this improvement are collectively described as reform.

The objective of this chapter is to examine the nature of this reform, outline its guiding principles and discuss the international best practices in port and maritime

sub-sector reform programmes. The chapter also examines the concept of reform, port reform process in Nigeria with reference to its objectives, strategies and progress.

4.1 The Concept of Reform

4.1.1 Reform – Its Meaning, Spirit and Purpose

The world-view originally associated with the word reform means to 'restore the original form'. When used in this way, it implies that there must have been an observable decline in the way things were handled to the extent that a reversal to the *status quo* was necessary. From 18th century, however, the word assumed another meaning and it typically implied "forming something new". Today the word reform is used to imply a change made to a system or organization to improve it or remove the unfairness in it. From international best practises on sector reform programmes, reform is used to connote a change in the method of operating, funding, maintaining, administering and managing a system. It is a change to a preferred, more effective and more efficient method of doing things in order to achieve better results. Therefore, reform entails any programme of systematic change in policies or institutions, with the objective of attaining greater efficiency and productivity.

Sector reform programmes are necessary in modern times because of the dwindling resources available to governments for providing services to the people. Government either seek ways of passing service costs to the consumer directly or seek the intervention of the private sector by creating pathways through which private funds can flow into public works and services. The contractual agreement under which this is undertaken is known as Private Public Partnership (PPP). In the PPP, government entrusts private operator with the long term implementation of a project particularly large scale and complex construction projects. "It is an

approach for introducing private management into the public service through long term contractual bond between the operator and public authority." (HMSO 2000)

But PPP is not the only approach or strategy of reform. Others include Privatization which entails the outright transfer of public service or facility to the private sector to manage in line with market forces. There is also the commercialisation approach whereby government runs its project by itself, in line with market principles. In PPP or other forms of reform, the public does not lose its authority; it still supervises and ensures service quality.

In general, reform is undertaken in order to:

a) Increase efficiency in the execution of public projects.
b) Enhances project implementation capacity such that with the same resources, greater and more responsive services are delivered.
c) Reduce the risk carried by the public sector in the execution of projects and in the delivery of services.
d) Mobilize financial resources from private sector.
e) Free scarce public funds for other uses.

4.2 Reform – Its Historical Development

The PPP is not a completely new approach. Concession which is a form of PPP has existed very early in the history of infrastructure management. Concession laws governing public estate licences existed as early as 530 A.D. During this time, public facilities such as estates were concessioned out for management. Concession disappeared during the 5^{th} Century with the fall of Roman Empire and appeared again during the middle ages (12^{th} and 13^{th} Century) and applied to the construction of fortified towns and occupation of new lands. It shortly disappeared again only to come back during 16^{th} and 17^{th} Century with the Europeans and particularly France conceding public works to their "financial investors" called

entrepreneurs. Such works contracted out include Canal construction, road construction, waste collection, public lighting, mail distribution, public transport, and general stores.

Britain engaged in canal construction through the concession approach in 1791. This was strengthened in the whole of Europe in the 18th Century; PPP was weakened by the preparation for war. During this period concession was cancelled and state owned companies emerged. In France, the railways, electricity supply, canals, telephone and subways were nationalized. PPP bounced back in 1960s and by the 1990s it had become a major means of stimulating the European economy. Many countries are now involved in PPP to develop their infrastructure. According to the word Bank, PPP currently finances 15% of world's infrastructure investment, with the volume of investment doubling between 1993 and 1995 from 17-37 dollars. (UN 2000)

4.3 Channel of Reforms

Modern sector reform utilizes the private sector to achieve results. This is because private initiative and private enterprises are the engine of growth and progress in modern day competitive economy. Private sector driven-enterprises search for new opportunities and new methods of getting things done in a better way. This continual search for new opportunities, based on knowledge and experience of many individuals permit better utilization of the potential of a country's resources.

One of the key problems of many countries is inadequate capital and the improper use of available ones. The successes of private enterprises in their prudent and efficient utilization of resources, resulting in high profits and savings, constitute the main sources of accumulation of their investment capital, which could be use in the country. The generation of domestic capital may be implemented by foreign investors. A responsible foreign investors also brings the "know how" and usually, a better understanding of modern technology. (TSRC 2002)

Thus the private sector is the major channel for affecting a reform programme in any country. This does not mean that the government will abdicate its responsibilities but rather a refocus of the role of government under the private-public sectors performing their functions. The government under the public-private sector partnership will play the role of an enabler, facilitator, regulator, planner and supervisor of national projects helping the private sector to grow, generate jobs and create wealth. The private sector will be the executor investor and manager of business. The specific delineation of the role of government depends on the actual situation and may change with an achieved level of development.

4.4 Instruments of Reform

A variety of options exist for involving the private sector in the provision and management of the port. Some of these include

- Outright Privatization
- Equity Participation
- Concessioning

  BOT⇨ Build, Operator and Transfer

  BOO⇨ Build, Operate and Own

  BTO⇨ Build, Transfer and Operate

  BOOT⇨ Build, Own, Operate and Transfer

  DBFO⇨ Design, Build, Finance and Operate

  DCMF⇨ Design, Construct, Maintain and Finance
- Outsourcing
- Management Contract
- Commercialization
- Etc

The type of instrument adopted depends on the infrastructure and service under reform, and the country's socio-economic and political environment.

4.5 The Need for Reform

There are two major reasons why reform in the port sub- sector is desirable. First, port is dynamic, affecting the social, economic and political environment. As economy grows, it requires improved transportation system in which port forms a critical part. Only constant reform in port can meet the changing nature of the environment. Second, government is a bad business body. It's delivery of transport services usually falls short of the efficiency with which the private sector will deliver the same services.

Similarly, the performance of the private sector in the construction and maintenance of infrastructure cannot be beaten by government. For these and other reasons a reform in the way government handles port infrastructure development and service delivery is always desired. Modern changes in international logistics and the liberalization of domestic economy with their implications make this reform extremely necessary.

4.6 Areas where reform is desirable

There are three main areas where reform in port may be anticipated or found desirable. These include; infrastructure, service provision and administration. Conventionally, government has been providing the three over the years. In the early stages of national development, the government, of necessity played a major role as a promoter, developer, investor and manager of many activities. In most countries during the early stages of railways development, the government was building and operating ports without following commercial principles.

Under this transport reform, issues relating to the planning and administration of the transport system are the main functions of government. For example government regulates the types of vessels, port operational standards. Under this

transport reform process, it is increasingly the task of the private sector to invest, own and manage different elements of the transport system, while the government provides proper environment to attract the best and honest entrepreneurs and protect the users and the society against dishonest and undesirable practices.

4.7 Port Reform in Nigeria.

4.7.1 Background to Nigerian Port Reforms

As earlier observed, in order to overcome the inefficiency and improve the productivity in the ports, the Federal Government of Nigeria embarked on a ports reform program including concession of its terminal operations following the recommendations of a diagnostic study in 2001. To facilitate the reform program, the Bureau of Public Enterprises, with financial assistance from the World Bank, engaged the services of CPCS Transcom International Ltd in December 2003 as the transaction advisors for the port reform. Initially, the consultants from CPCS reviewed previous studies, and carried out the necessary legal, regulatory and financial due diligence. CPCS also proposed a restructuring framework, including a bid tender strategy, a new legal and regulatory framework for the entire port subsector in Nigeria, In addition, the consultant examined the regulatory changes, human resources plan, a financial plan, as well as business plans for the proposed port authorities and proposed the basis for reform policy and programmes for implementation.

4.7.2 Legal and Regulatory Framework

Based on the proposed new legal and regulatory framework, a Ports Authority Bill and a Ports Commission Bill were drafted. Following stakeholder consultation, the Ports Authority Bill was amended to form two Port Authorities, namely, Lagos Ports and Harbour Authority and the Nigeria-Delta Ports and Harbour Authority. The Ports Commission Bill was also amended to be included in the National Transport Commission Bill (NTC bill), which would form a National Transport

Commission to act as the economic regulator and overseer of other regulations for Ports, Inland Water Transport, Roads and Rail sub-sectors. Later, the "aviation" sector was also included in the draft NTC bill to be supervised by the NTC. As of April 2008, the Ports and Harbour Authority bills are with the National Assembly for enactment.

Although the new acts are expected to govern the reforms in the Nigerian Ports sector in an optimal manner, the present Ports Act (1999), provided an adequate legal basis to go ahead with the concession program. Thus, following the necessary approval from the National Council on Privatisation (NCP) and the President of the Federal Republic Nigeria, the Bureau of Public Enterprise (BPE) initiated the concession process in October 2004.

The key features of the new institutional restructuring for the port sector in Nigeria include:

- Creation of the two Autonomous Ports and Harbours Authorities
- Creation of the National Transport Regulatory Commission (NTC) which is expected to regulate all transport sector including seaports in Nigeria.
- Limiting the role of the Government (i.e Ministry of Transport)
- Private Operators to perform the Port Operations

The functions of the new port authorities include day-to-day technical and safety regulatory functions, primary rights to the basic and operational infrastructure within their respective jurisdictions, power to coordinate marine activities, general responsibility for overall port planning and development, power to issue licenses (as authorised by and subject to guidelines set by NTC), authority to lease and concession port infrastructure, authority to collect port authority tariffs, etc. Although, in the present arrangement, the Port Authorities have been performing operation relating to marine services (i.e. pilotage, mooring, vessel traffic

management etc.), the draft bill has provisions to "outsource" such services from the private sector.

The role of the Federal Ministry of Transport in the new structure would be limited to the development of port policies, creation of a suitable legal environment, master plans and overall conducive environment for effective service delivery by the private sector.

In this regard, the major responsibilities and functions of the government as rightly outlined by the Nigeria's Draft National Transport Policy include:

- Monitor the performance of the transport system and its adequacy to meet the requirement of socio-economic development. This implies the identification of existing or new problems, bottlenecks and inadequacies and making sure that appropriate action is taken by the private sector, or if not, through taking steps to resolve the problems and eliminate inadequacies.
- Providing the necessary infrastructure, where private sector is unable to do so, or where direct working of a price mechanism is not feasible.
- Assuring the continuation of essential services and provision of services required on social basis, either through grants or subsidies or by direct operation.
- Establishing and administering necessary regulations and prescribing appropriate norms regarding safety of transport, protection of the environment, protection of users, employee and the society at large. Such regulation is not viewed as a replacement of market mechanism, but as the necessary conditions for its efficient an honest operation and for diminishing social and environmental costs.
- Promoting research and development relevant to the solution of the transport problems, improvement of productivity, absorption and development of relevant technology.

- In the international sphere, negotiating, signing and monitoring international, regional, and bilateral conventions and agreements, making sure that legitimate interests of Nigerian transport operators and shippers are protected and that the commitments arising out of such conventions and agreements are observed.
- Negotiating, signing or guaranteeing foreign loans and investments and creating proper atmosphere to attract responsible foreign investors.

4.8 Impact of Port Reforms

Despite significant progress since 2000, much sill remains to be done to improve the productivity of Nigeria's main ports. As of 2006, the performance parameters for Nigeria's major ports were poor by global and even by African standards. A report by Foster and Pushak (2011) indicates that in 2006 general-cargo crane productivity was 8-9 tons per hour compared to 30 tons per hour internationally.[1] For container crane productivity, the figure for Apapa port was 12 moves per hour compared to 25-30 moves per hour internationally. The global benchmark for container dwell time was about seven days in 2006, compared with 30 to 40 days in major Nigerian ports. And for truck cycle time, global best practice is on the order of one hour, compared with about one day in the major Nigerian ports.

Table 4.1: Key Indicators for Seaports of Comparator Countries

Country	Total merchandise exports & imports net of petroleum products (US$ bill) 2010	Container port traffic ('000 TEU: 20 foot equivalent units) 2010	Quality of port infrastructure index[1] 2011	Liner shipping connectivity index (Maximum value in 2004=100) 2012
United States	2,780.6	42,337.5	5.5	91.7
Japan	1,247.2	18,098.8	5.2	63.1
Indonesia	169.1	8,482.6	3.6	26.3
Brazil	327.4	8,138.6	2.7	38.5
South Africa	128.4	3,806.4	4.7	26.8
Mexico	533.9	3,693.9	4.0	38.8
Russia	387.8	3,200.0	3.7	37.0
Pakistan	46.4	2,149.0	4.1	28.1
Bangladesh	28.6	1,356.1	3.4	8.0
Nigeria	55.1	904.8	3.3	21.8

Source: World Bank, Development Indicators database, UN Comtrade database and UNCTAD.

Table 4.1 sets out some key indicators related to port operations for Nigeria and comparator countries. The value of merchandise exports and imports (excluding petroleum and products) for Nigeria was reported by the UN Comtrade database to be about US$55 billion – substantially small than all comparator countries other than Bangladesh and Pakistan. The World Bank reports that the amount of container traffic through Nigerian ports in 2010 was 904,800 TEU 20 foot equivalent units. This is lower than all the other comparator countries, including Bangladesh and Pakistan. The World Economic Forum Executive Opinion Summary indicates that Nigeria's rating for their Quality of Port Infrastructure Index was 3.3 in 2010. The only comparator with a lower rating was Brazil. In the case the Liner Shipping Connectivity Index of UNCTAD, which is based on the number of ships, their container carrying capacity, maximum vessel size, and number of companies that deploy container ships in a country's ports, Nigeria's rating was 22 out of a maximum value of 100 – lower than all comparators except Bangladesh.

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CHAPTER FIVE
Perspectives in Environmental and Health Hazards in Sea Port Operations.

A. M. Lawal

5.0 Introduction

Hazard is a term applied for any state of incidents that poses a threat to the environment and in turn affects human health. The chapter aimed to explore the extent to which health and environmental hazards have affected the Nigerian sea port, including an assessment of mitigation measure on ground. Both environmental and health hazards have potential to cause ill-health, affects better quality of life, damage the environment More generally, hazards itself can be divided into five types: chemical, physical, mechanical, biological and psychosocial (for example, stress).

Interestingly, several studies have been carried out in depicting the impacts of hazards on environment and health in particular (Memorial University, 2011; Murray, 2007; Lindell, 1994), but little has been done regarding the impacts of environmental hazards in the sea port and maritime sector as a whole (Lawal 2013a & b). It is on this note that this chapter explores the situation in the Nigerian sea port using a critical review and in this way, answering to a call that was suggested about 11 years ago on the need for a research work to investigate the extent to which hazards has been managed in Nigeria (See Oni, 2003).

In light of the above, the chapter identifies the concepts and major sources of hazards in sea port operation, including an explanation of likely hazards identification process. The chapter further evaluates how the mitigation measures on ground have been implemented within the Nigerian sea port context and also suggests measures for mitigating sea port environmental and health hazards. The

chapter identifies a sound gap by assessing the reasons why the available mitigation measures in the Nigerian sea port have not been translated into practice.

5.1. Concepts and major sources of hazards in sea port operation

Hazard is a qualitative term expressing the potential of an environmental agent to harm the health of certain individuals if the exposure level is high enough and/or if other conditions apply. Environmental hazards should revolve around four main features. First, is the characteristic of hazard agent; second, is the characteristic of the impact; third, the perceived personal implication; and the fourth, is affective reaction to the hazard (Lindell, 1994). Moreover, hazards and their mitigation measures can be classified into different categories but OISD (2011) has identified eight hazards related to the sea port operations (see Table 1). Meanwhile, issues related to environmental hazards are not new in Nigeria and as such impacts of environmental hazards on environment and health demands adequate attention. This is because Nigeria's environment is under a serious threat from human activities and natural hazards (Lawal, 2013; Benebo, 2010; Ofomata, 2003).

Table 5.1: Sources of hazards and their mitigating measures at the sea port

Hazards	Measures
1. Release of toxic gas such as H_2S	Well design should include measures for handling H_2S gas hazards know area. Toxic gas detector should be provided and the crew should have adequate availability of breathing apparatus.
2. Man overboard (that is offshore operations)	Emergency preparedness for man overboard to include the use of rescue boat at the installation and competent and trained crew to manage rescue boat.
3. Fire on board	The protective devices together with tripping devices such as relays, fuses and circuit breaker should be inspected
4. Bad weather for example strong wind or heavy rains	System of getting accurate weather forecast from independent sources should be encouraged. For offshore-weather reliable and functioning monitoring device at the rig and watch keeping at bridge should be provided.
5. Health related hazards for example over exposure of noise	The noise level should be reduced and the time to be spent in noisy environment should be minimized. Meanwhile, the use of hearing protection should be encouraged.
6. Explosion	Alarms and trips should be used to detect seal failure.
7. Overload	Please use load indicator, load limit chart where necessary.
8. Vessel collision	Joint Safety Analysis should be used following industrial standards with some specific boundary conditions

Source: OISD, 2011 pp. 22-32

Hazard in a more general term can emanate from chemical, microbiological, noise, manual material handling, plant and equipment handling, radiation and nature of air quality (Memorial University, 2011). Similarly, hazard is sometimes related to life, and this is defined as the existence of a situation that might likely cause serious injury or death. It is therefore paramount for someone to observe this life hazard zone and when such happen it is called 'Life Hazards Lookout' (see Memorial University, 2011). One of the knotty questions is that how do we study environmental health hazard for example? Three ways are suggested:

1. Examining the nature of the hazard, which can be categorized as biological, chemical, and so on;

2. Stating the sources of hazard and this can be through air, water and land and sometime it might involve route of exposure for example inhalation, ingestion, skin contact and so on; and

3. Understanding the setting that is where the hazard occurs and for example office (occupation), house, hospital and in the case of this study the Nigerian sea port is considered as the setting.

5.2. Hazards identification process in seaport operation

The process of identifying all events that could give rise to the potential injury, illness or damage to human health and environment as a whole is termed 'hazard identification'. Then, 'identification of hazards is based on physical and chemical properties of the material being handled, processing conditions, environmental conditions, arrangements of equipment and operating and maintenance procedures' (OISD, 2011 p. 8). One of the reasons for hazard identification is to depict, as fast as possible, the hazardous events. Hazardous events are series of incidents that may lead to release of hazardous materials, equipment failure rates, human error,

and incidence of natural occurrences or power failure as the case may be (Nwafor, 2006).

The activities involve in hazards identification is discussed in Figure 1. This figure 1 comprises of the needs for baseline survey that is essential before a proper assessment can be achieved be it environmental or health impact assessment. Furthermore, figure 1 shows the rationale for the identification of hazards and periodic survey by putting into consideration the connectivity between updating control (that is to mitigate the hazards) and taken inventories (that is to take proper documentation).

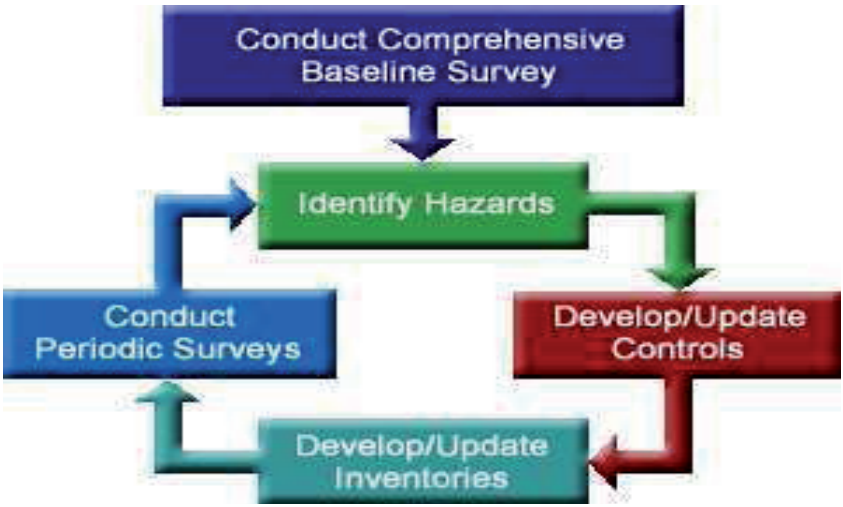

Figure 5.1: Activities related to hazard identification, assessment and mitigation

Source: Memorial University, 2011 p. 7

Even though environmental and health hazards are connected as earlier mentioned, they can be identified differently. For instance, in order to identify health hazards, the African Development Bank has developed a guideline for different sector and subsector. The purpose of health hazard identification is to facilitate the

identification of hazards associated with a project as a result of health sensitive location and health sensitive component (Nwafor, 2006). It appears that health hazards can be categorized as communicable, non-communicable and injuries (Murray, 2007; Nwafor, 2006).

In contrary to identification of health hazard, environmental hazard can be identified through the following techniques:

1. A variety of information sources, records of accidents in similar facilities and activities;
2. Discussions with the professionals or experts who have prepared the design, and visit to existing facilities, or in the case of a proposed design, to similar facility;
3. Use of hazard and operability study (HAZOP) where available, may be helpful in the identification of keys impacts. This HAZOP 'is a detailed examination of plant design and is a key tool in the identification of potential hazards…also HAZOP helps to indicate the sequence of events which could lead to such incidents…but the main uncertainty in hazard identification concerns the ability of the assessor to guarantee that ball hazardous materials and events have been identified (Nwafor, 2006 p. 325).

Therefore, once hazards have been identified, the Incident Commander (IC) should assess the level of risk and the IC should also determine how likely it is that someone could be harmed by the hazards and how serious the injury or illness could be. In answering the itemized above questions, it is mandatory for the IC to consider the following: first, is the severity of the consequences of an accident occurring. By putting into consideration how serious would the injury or illness be? Second, how many people are at risk? In the same context, the Memorial

University in its publication in 2011 suggests that consideration should be given to likelihood of the accident occurring in this way:

- Has it happened before?
- How often might it happen?
- When is it most likely to happen?

The effectiveness of hazards identification depend on the skills, knowledge and efforts of the personnel undertaking the work and then multi disciplinary team efforts are required. These should include members from field operations having competence on how to carry out hazard identification and establishing control measures as described in International Standards Organization (ISO) 31000 (OISD, 2011). It should be pointed out that hazard identification must be completed before changing a workplace practice, activity, procedure or process. According to Murray (2007) hazard identification must be completed before the introduction of any new plant or substance; and most cases if a task does not have a pre-existing hazard assessment. Importantly, hazard identification may fail to fulfill its potential when provisions or procedures stipulated under Occupational Health and Safety (OHS) Act are not adequately put into consideration. These provisions have been summarized in the form of questions and they include:

- Have statutory assessment to identify hazards been conducted?
- Have all steps of the hazards assessment process been documented and completed?
- Has an adequate level of communication/consultation between employees and management been established for this process?
- Is the Job Safety Analysis held at the worksite?
- Has a Statement of Review – OHS considerations been completed for all projects? If so cite some recent examples.

- Have all staff been trained in the principles of hazard identification?
- Are staff trained in the use of the hazard assessment tools?

Source: Murray, 2007 p. 1

The uniqueness of this section is that hazards that have the potential to cause harm to the environment, health and safety of personnel must not only be identified and listed, but they must also be assessed first and then, the appropriate control strategies or measures should be suggested and this is achieved in the next section.

5.3. Mitigating measures for preventing hazards within the Nigerian seaport

Even though the process of mitigating the hazards is essential, it should not introduce a new hazard or constitute additional threat to human health and the environment; thus, hazard analysis has become necessary. Hazard analysis involves a variety of work site examinations to identify not only existing hazards, but also conditions and operations in which changes might create hazards. Effective management actively analyzes the work and the work site to anticipate and prevent harmful occurrence (Memorial University, 2011).

Generally speaking, the process of mitigating hazards can be in different hierarchy of control as suggested by (Memorial University, 2011; OISD, 2011; Capital Health, 2010; Murray, 2007) and these processes are:

a. Elimination of the hazards;
b. Substitute safe materials for hazardous ones ;
c. Engineering controls for example using ventilation system and machine guarding;
d. Administrative controls, which can be achieved via supervision and training; and
e. Personal protective equipment for example putting on safety glasses and hearing protection

Within the Nigerian context, hazards can be mitigated via the following measures: legal and institutional approaches, rehabilitation, prediction, technological measures, avoidance and reclamation (Lawal 2013a & b; Nwafor, 2006; Adinna, 2001). These approaches have been discussed respectively because of their importance in ameliorating environmental and health hazards. Legal and institutional approaches have varieties of policy implementation strategies for managing environmental issues which are currently in operation across the world (Lawal, 2013b, Wilson and Piper, 2010). Many of these are consistent with the sixth Environmental Action Program which refers to horizontal integration measures as including Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA), Integrated Coastal Zone Management and vertical measures (Lawal, 2013b; Wilson and Piper, 2010). Environmental Impact Assessment is one of the most prevalent operating procedures globally, having become the primary means by which potentially adverse environmental impacts can be prevented and mitigated (Lawal, 2013b), and EIA can be applied to prevent hazards when it is correctly done (Ekpo and Umoh, 2003).

In Nigeria, EIA Act has been institutionalized since 1992 to mitigate environmental consequences of major projects including the sea port projects (Lawal, 2014; Lawal, 2013a & b; Lawal et al 2013c; Nwafor, 2006). However, EIA is seen in practice particularly within the developing countries context as a burdensome paper work that needs to be done to satisfy the requirement of the law. EIA is also seen as a law for law's sake with nothing to do with environmental reality in the human, social and environmental context…this EIA in Nigeria is further seen as a form to be filled and filed away while the bulldozers ramble into the field…this is the mindset that makes law makers in Nigeria to be issuing empty threats… (Ojo and Gaskiya, 2003 p. 5).

It has been suggested that while EIA can be used to mitigate environmental hazards though not fully translated into practice in Nigeria as earlier mentioned, Health Impact Assessment (HIA) should be applied to prevent health related hazards before they pose a threat or risk. This HIA is a component of EIA, but it can also be applied as a stand-alone study. Even though applying HIA guarantees several benefits such as preventing serious deterioration in health conditions, its application in practice has been proved to be very weak (Nwafor, 2006). Given that HIA itself has not been given adequate recognition in some EIA report, institutional capacity of some health agencies still remained questionable and in some case health experts have not been fully involved in HIA processes (Nwafor, 2006).

Apart from EIA and HIA, there are some regulations and laws enacted in Nigeria to prevent environmental and health hazards though they have not been effectively implemented and these are:

1. Public Health Act 1990
2. Mineral Oil Safety Regulation 1963
3. The Fire Service Regulation 1988
4. Factories Act 1990, formerly it was an ordinance in 1955 later it was amended in 1987 and now Factories Act 1990. Factories Act 1990 has been described as the landmark in legislation in occupational health in Nigeria; and
5. Federal Environmental Protection Agency 1988; Decree no 58 now EIA Act 1992, which gave birth to the present Ministry of Environment in 1999.

Source: Lawal, 2013a & b; Omokhodion, 2009; Williams (no date)

Several authors have further identifies different strategies and some management options by which environmental hazards can be mitigated and managed (see

Nwafor, 2006; Singh and Prakash, 2003; Adinna, 2001). It should be recalled that hazards can be managed through rehabilitation, prediction, and technological strategies among other measures but applying technological measures is a matter of choice irrelevant of its benefits.

The nature of rehabilitation for example 'depends on the magnitude of the incidents and the effects…but importantly, rehabilitation takes one of these two forms: emergency support and sustained help' (Adinna, 2001 p. 39 & 40). Interestingly, rehabilitation is needed after the victims have been identified, and then the next thing is to attend to the victims by evacuating, treating and resettling them accordingly.

As earlier mentioned, prediction is another way of mitigation hazards. Simply put, I have defined prediction as a scientific method of revealing the way things will happen in the future. There is no doubt that prediction is pivotal, as it gives adequate room for planning particularly in an ideal setting but it is not fully clear whether this prediction is achieving its potential or not in the developing countries and Nigeria in particular. It has been argued that political reasons, social and cultural attachment to special areas are preventing prediction from achieving its potential (Adinna, 2001). This is the situation in the Nigerian sea port and Apapa in particular, where the owners of tank farm have been directed by the government to relocate based on the experts prediction and suggestion that their present is causing hazard to environment and social well-being. In spite of repeated calls and orders, the tank farm's owners have failed to carry out the government directives and expert advice. Thus, tank farm has remained major source of hazard in the Nigerian sea port and Apapa port in particular (also see Lawal et al, 2013c). .

Another key issue is that Nigeria has not only ratified International Maritime Organization (IMO) conventions but it has also domesticated such conventions (for example, MARPOL {International Convention for the Prevention of Marine

Pollution from Ship}, OPRC {Oil Pollution Preparedness Response and Cooperation} and so on). Therefore, it is mandatory for the country to implement the content of IMO conventions and part of which is putting in place a waste reception facility to reduce the impacts of environmental hazards at the sea port. However, what we cannot measure is the extent to which these international conventions have been fully translated into practice. Although most of the foreign vessel's operators seem to be complying, while local vessel's operators are still struggling to implement the content of these international conventions and IMO in particular.

Apart from putting reception facilities on ground, another way by which environmental hazards can be mitigated at sea port during operation is by complying with other IMO regulation. For example, the use of single hull vessel should be eradicated but rather operators should be encouraged to use double hull vessel (Lawal, 2012). The beauty of this double hull vessel is that it helps in preventing pollution and guarantees safety. It seems that NIMASA is moving towards achieving a robust technique of mitigating environmental hazards through the establishment of its search and rescue unit and this unit has been confirmed by IMO as a Regional Headquarter for the search and rescue in West Africa. Paradoxically, it appears that both issues related to double hull vessels and acquiring a standard search and rescue center have failed to fulfill their potential as the government has not put modalities in place to support operators in acquiring double hull vessel for example.

5.4 Conclusion

Interestingly, one of the unique conclusions that can be drawn in this chapter is that while it is obvious that measures such as national legal frameworks have not been fully translated into practice, those measures as stipulated under IMO convention

have been implemented to an extent by foreign operators. Yet, this chapter maintains that environmental pollution is noticeable both at sea port and high sea. . Then, the conclusion emerging from this chapter is that even though it is becoming increasingly recognized that health and environmental hazards in sea port can be mitigated and prevented via environmental regulations and different management options, I would argue that insufficient attention has been paid to the implementation of the country's environmental regulatory systems (Lawal, 2013b). I would suggest that the Nigerian Government should support the implementation of the country's environmental regulations through a strong political will (Lawal, 2013b; Lawal et al, 2013c). Meanwhile, international conventions that have been ratified and domesticated should be sustained through proper monitoring, and local operators should be educated on the need to implement IMO conventions. In order to meaningfully contribute to knowledge, I suggest that further study should be conducted to find out the reasons why mitigation measures have not been fully translated into practice in the Nigerian sea ports. In addition, future research should assess the extent to which mitigation measures have been fully translated into practice in other sectors of the Nigerian economy.

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CHAPTER SIX
Roles of Clearing and Forwarding in Shipping Operation

O.O. OLAOMI

"Until we have a Star Trek capability and can move things through space electronically, all freight will have to move physically from point A to point B. And that is what we called logistics". (Thomas Cook, 2010).

6.0. Introduction

The logistics of moving freight from one point to another is the responsibility of Freight Forwarders (Clearing and forwarding agents) and customhouse Brokers who are to assist in managing supply chains.

Irrespective of the extent of services offered, freight forwarders renders important of service in global supply chain. They can make or break transport and logistics chain. They have expertise, qualified personnel and resources to assist the importer and exporter to make supply chain function in a timely, safe, and cost effective way. Cook (2010), observed that the quality of one's choice of freight forwarders and the delivery of the international services they provide, can make or break one's export operation. Even though, they are necessary evil according to him; freight forwarders can be one's best ally in mitigating the hazards of world trade and assuring successful and profitable international transactions.

Like other key vendors, freight forwarders need to be managed and treated as partners with mutual goals, common direction, and a full understanding of what each party brings to the relationship and ultimately the benefit to each other through their association. Freight forwarders get rewards for their services through charges called commission.

6.1. Clearing and Forwarding in Perspectives.

Clearing and forwarding (Or Freight forwarding) is the process that occurs when a shipping company or an agent clears cargo/shipment through customs and then delivers it to its respective destination. Customs broker or an international shipping company will be expected to clear shipments of goods through the country's Customs Inspection facilities and then ship them onwards to their final destination within that country.

Ndikom, (2011) defined freight forwarding as a systematic, well articulated process whereby a freight (cargo) forwarder carries out his assigned responsibility of taking goods in his custody from the port of origin to the port of destination. He further submitted that, it might also be from one warehouse to another, which he claimed to also reflects a process by which freight is taken to a berth for export at the port of sail or taken/cleared from the berth to its final destination (such as a warehouse), depending on the type of agreement reached between the freight forwarder and the consignee. Freight forwarding activities should not be limited to sea ports alone as it also operates in air ports, rail stations and other freight generating transport and logistics destinations.

Branch (1995) defined clearing and forwarding organization as an entity/company responsible for undertaking export/import cargo arrangements on Clients/Shippers behalf at a seaport, airport and so on. Alderton (1995) in agreement with Branch(1995) further submitted that clearing and forwarding activities at seaport would include collection of freight; collection and issuing bills of lading; notification of arrival and loading of goods; customs, import and export documentation; certificates of shipment; arranging and sorting of cargo; cold storage; warehousing; transport to destination including near continent; cargo or damage surveys; among other functions as terms of agreement with client may indicate.

Ndikom (2011) defined a Freight Forwarder who manages freight forwarding processes as a professional business manager of time, men, money and resources within and without the confines of the port. The assets and resources committed to him are managed in a most efficient way; he ensures that goods are sourced rightly, packaged through a formidable and suitable transport system. He takes over the destination port's activities in terms of documentation and ensures that the goods are safely delivered at the right time, place, and condition according to the consignee's specifications.

A closer look at the definitions of Clearing and forwarding and freight forwarding in above, revealed that the two concepts are not the same, though, over the years the two terms have been used interchangeably by many in the maritime and freight movement industries. To start with, Clearing and forwarding is a subset of Freight forwarding. This is because Freight forwarding activities involved at least two locations (Continents, countries, Regions etc) while clearing and forwarding activities start and end at the final destination of the cargo or goods.

Also, freight forwarding is international in nature, and freight forwarders are expected to use robust information and communication processes to liaise with all stakeholders like the consignor, consignee, ship owner, customs and other agencies before, during and sometimes after the transactions have been concluded. Clearing and forwarding agents may not go through all long chain of stakeholders as he/she received the documents and goods from the freight forwarder at the destination point; sometimes freight forwarder would have done all customs clearance before handling the documents to clearing agent to clear and forward the goods to the consignee for onward delivery to the consignee's warehouse.

A freight forwarder must be skilled in almost all aspect of international business practices and operations in order to understand the global languages of export and import such as the INCOTERMS, differential time changes in different part of the

globe for effective delivery; a Clearing agent need not to be so skilled as he/she only need to master his/her immediate local environment since he/she is just expected to convey cargo from his/her port of destination to the hinterland most of the time.

It should be noted that for easy purpose, the two terms are used interchangeably in this literature, but the clear distinctions above should be in mind if and when necessary.

6.2. Roles of Clearing and Forwarding Agent.

Freight forwarding operations and practice in Nigeria, like in any other places in the globe, is seen as a noble and respectable profession. It is as old as man himself and as wide as important component of shipping activities. It is a core component of shipping operation. Without it, the delivery process would be less meaningful and much cumbersome. It is the vital link between the consignee and the consignor in import-export trade. It is also vital to the logistics supply-chain and physical distribution of goods in port operations. Hence, there is no way port trade can function optimally, giving the desired economic objectives, without the good functioning of freight forwarding (Ndikom, 2008).

A Clearing and forwarding agent is expected to play some crucial roles in the course of duty to his/her clients, these roles could be classified into three broad types namely, General roles; Scope of services/ Forwarders relationship with consignor (exporter) and Scope of services/ Forwarders relationship with consignee (importer).

6.3. General roles of Clearing and Forwarding Agents.

The followings are the general roles expected of a clearing and forwarding agents:

1.Provide Exporter Service: To ensure smooth and timely shipment of goods. Selection of Mode and Route of Transport for Goods:

2. Guide Customer (Exporter) in Shipping types and selection (Water, Air, Rail)
3. Guide exporter to the availability of alternative mode of transport and decision making about the final choice of transport to achieve the optimal cost in transport.
4. Provides strategic solution of long distance product sourcing and movement.
5. Provides capabilities interfaced across a range of different transport modes.
6. Offers supply chain management solutions.
7. Delivery and customs clearance
8. Cargo handling and distribution management.
9. Intermodal transport services.
10. Consultancy/advisory services on international trade.

6.4. Scope of Services/ Forwarders relationship with Consignor.

In accordance with exporter shipping instructions, the forwarders would:

1. Book space with carrier
2. Choose route.
3. Take delivery.
4. Arrange warehousing.
5. Note damage/loss weigh and measure cargo.
6. Advise on insurance.
7. Monitor cargo movement.
8. Study Letter of credit provisions.
9. Transport the goods.
10. Pay fees and other charges.
11. Attend to foreign exchange transactions.
12. Arrange for transshipment.

6.5. Scope of Services on Consignee's behalf.

1. Receive and verify relevant documents.
2. Monitor cargo movement.
3. Take delivery.
4. Arrange customs clearance.
5. Assist in pursuing claims.
6. Warehousing and distribution.

In addition to the specific scope of services rendered to either consignor or consignee, a forwarder could offer following additional services; (1).other value added services; (2).Special cargoes e.g. project cargo, garment hanging services; (3). Overseas exhibition and inventory and (4). supply chain management among other.

Mega forwarders have increasingly enhanced their role by adapting to changing global logistics scene and investing heavily in information technology and quality trained committed staff in order to be more efficient and ensure timely delivery of cargo.

6.6. Procedures for Freight Forwarding and Documentation.

Freight forwarding procedures and documentation can be broadly classified into two; namely (i) Partial Engagement of Freight Forwarder and (ii) Absolute/Wholly Engagement of Freight Forwarders.

6.6.1. Partial Engagement of Freight Forwarder.

This scenario occurs where the exporter/importer decides to handle certain aspects of freight movement by him/her and decides to handle over the process to a professional freight forwarder at a stage. For example in Nigeria, an exporter may decides to collect the necessary export/import forms like Nigeria Export Proceeds form (NXP), which is the current document used for export in Nigeria and

personally meet all other mandatory documentations such as Certificate of Clean Inspection (CCI) in Nigeria.

The exporter/importer can then decide to engage the services of proven Freight forwarders from this point henceforth. Thereby, the Freight forwarder can then commence the packaging of the goods after the inspection of the goods when exporter or its agents must have completed bank transactions. Freight forwarder is expected to have identified a carrier and certified the demands of inspection. Then, the goods can be moved to the Port of shipment for customs inspection. The inspection is conducted at the Customs Processing Centre which has eight Customs Processing Units at major ports in Nigeria. After all these activities have been duly completed, the loading and eventual shipment of goods can commence.

6.6.2. Absolute/Wholly Engagement of Freight Forwarders.

For Exporter/Importer who is aware that a Freight forwarder is a professional business manager of time, men, money and resources with absolute or wholly engagement. A freight forwarder ensures that the assets and resources committed to him are managed in a most efficient way; and that he also ensures that goods are sourced rightly, packaged through a formidable and suitable transport system. Plus the fact that he can take over the destination port's activities in terms of documentation and ensures that the goods are safely delivered at the right time, place, and condition according to the consignee's specifications.

The awareness by an exporter/importer that freight forwarder is a professional make him go into a 'door to door' service contract instead of partial contract earlier discussed. As service client is aware that freight forwarding operation is the vehicle for ensuring perfect movement of goods from a point of supply to a point of high demand or higher value, especially in international trade. Therefore, the clients seek freight forwarder's help to help him/her takes off the entire burdens of the freight movement and operations right from the onset of the freight movement

(Ndikom, 2009). The client starts the process much more early and transfer entire burden to freight forwarder by informing him of his intention to import/export a particular brand of product within a particular segment of the market. In other words, the expression of interest kick-starts the freight forwarding process.

The freight forwarder, is a professional and risk bearer, he takes off the operational burden of export/import from the exporter/importer. He communicates the expression of interest letter to the exporter, supplier or owner of the goods overseas. The later replies by sending a pro-formal invoice to the exporter/importer's agent, indicating the price of the goods, quantity of goods, product specifications (as requested by the importer), source of the product, port of sail and so on. If eventually the price quoted is considered good enough, the pro-forma will be used to process the letter of credit with a local bank in the importer's country; but if the price is considered high, he bargains; that is, he applies for a reduction in price based on the competitive nature of the product in the market

After the letter of credit has been established with the local bank and remittance is assured to the corresponding bank overseas, the goods are then sourced by the freight forwarder in conformity with the specifications of the importer. The goods are moved to the port of sail for purposes of satisfying all export procedures and formalities on the said goods. Freight forwarder also take up the clearing and forwarding responsibilities and ensures that the goods are processed through the presentation of all relevant papers and pays all charges and tariffs in relation to the goods. He finally delivers the goods to the warehouse of the owner through an appropriate haulage system (Ndikom, 2010).

6.7. Review of Export and Import Guideline in Nigeria.

Over the years, import and export guidelines have witnessed changes in Nigeria. These changes are results of economic policies of different

administrations as well as global economic changes. This section takes panoramic views of these changes over the years.

6.7.1 1996 Export Guideline.

The following was the procedure for export of goods out of Nigeria, up to 1st April, 1999.

1. All goods exported out of Nigeria shall be subject to inspection by inspection agents appointed for that purpose.
2. The agent shall ensure the quality and quantity of all export as well as the true value of goods to the consignee and shall issue clean certificate of inspection in respect of such goods.
3. The exporter shall complete in sextuplicate the NXP form and submit to his bank for endorsement and thereafter return to the inspection agent.
4. The exporter will pay to his bank the Nigerian Export Supervision Scheme (NESS) administration charge of 1%.
5. Upon completion of loading, the inspection agent will issue the exporter the original copy of the Clean Certificate of Inspection (CCI) and, together with the NXP, return this to the exporter's bank to reconcile the foreign exchange received.
6. The exporter shall open a domiciliary account with any bank in Nigeria and must ensure that export proceeds are paid into this account.

6.7.2.The 1999 Guidelines for Export Documentation.

The following constitute the basic documentary requirements for export transaction within the 1999 guidelines for export documentation:

1. A duly completed NXP form
2. A pro-forma invoice
3. A sales contract agreement, where applicable.
4. Nigerian Export Promotion Council's certificate.

5. Relevant certificates of quality issued by authorized agencies.
6. Other certificates as may be required.

6.7.3. Import Guidelines and Procedures

The 1996 Import Guideline Procedures:

The following guidelines are considered important for import business:

1. Modified Form M should be dully filled for all imports into Nigeria.
2. Letters of credit (L/C) or cash payments are mandatory for import into Nigeria.
3. All goods, irrespective of value, should be subject to pre-shipment inspection – recently, destination inspection has replaced this.
4. All imports into Nigeria must be accompanied with the relevant IDR (Import Duty Report); imports for which IDR is not produced would be confiscated.
5. All personal effects should be subject to pre-shipment inspection, but they will be imported under zero duty, equally certified by the pre-shipment inspection agent. Such goods, under destination inspection scheme, will only be inspected on arrival into Nigerian ports.
6. Pre-shipment Inspection Agent (PIA) must forward a copy of the import duty (IDR) directly to the importer's local bank or the bank to which Form M was originally sent; another copy should be sent to the designated bank and a third to the Nigerian Customs Service. Under destination inspection, local Customs officers will assess the goods and give correct value for the goods.
7. It is the duty of the importer's bank or the bank to which Form M was sent to issue a certified cheque in respect of the amount stated on the IDR to the customer who shall then pay such cheque to the designated bank.

8. All goods imported through neighbouring countries must be accompanied by the relevant IDR.
9. Importers would pay CISS administrative charge of 1% of Free on Board(FOB) value of all import assessed based on the average autonomous rate of exchange at the previous week, as submitted by the Central Bank. There will be consolidated funds that will look after Custom's official's interest under destination inspection.
10. Payment to Customs duties and Comprehensive Import Supervision Scheme (CISS) administrative charges should be based on IDR without amendments.

6.7.4.1999 Guidelines for Import Documentation.

Completed Form M would be submitted to the bank with the following support documents:

1. Detailed description of the goods.
2. Quantities and their measurements.
3. Units and total value of goods to be imported.
4. Freight cost.
5. Mode of transport.
6. Insurance certificate.

6.8. Current Procedural and Documentary Obligations Under Automated System for Customs Data (ASYCUDA).

Since 2001, the Federal Government of Nigeria change the import and export policies to be in tune with global trend of computerization in shipping industry and mandated all agencies and organizations to comply with such. ASYCUDA, which is the modern process of clearance is a computerized online data concept, which is an innovation used by Customs to facilitate the quick release (48-hour clearance of goods in the ports) of goods through the Customs

Processing Centre (CPC). The following procedures and documentation is required:

6.8.1 Export Procedures:

1. The exporter takes a decision which normally entails the collection of information from a reliable source via specialized database, e-mails, websites, on quantity, licensing, price offers, demand schedules, sales or supply of contract schedules etc, concerning his interest.
2. Preparation stage then follows. This entails getting all the requirements needed in place and finding how to finance the export project in terms of payments of insurance and other bills.
3. Performance stage, which entails the attractive and safe packaging of exports, considering port clearance, Customs clearance procedures follow preparation stage. This stage aids effective and efficient process.
4. Post-Shipment stage completes the procedures. Here, the financing, receiving payment, tax and port dues and other taxes and possible rebates on some of the exports are explored.

6.8.2. Export Documentary Requirements:

The following are the legal documents required of an exporter before exporting his product:

1. Certificate from the Nigerian Export Promotion Council.
2. Certificate of incorporation.
3. NXP (for non-export product).
4. Pro-forma invoice.
5. CCI (from COBAT): this is clean certificate of inspection which is usually issued by COBAT, a government appointed agent responsible for inspecting all exports in Nigeria.
6. Signed Customs Single Goods Declaration (SGD).

7. Ocean freight certificate, either prepaid or payable at destination.
8. Plant quarantined certificate, from the Plant Quarantine Service.
9. DNI certificate- defence naval intelligence certification of product.
10. SSS (State Security Service) certification.
11. NDLEA certificate – National Drug Law Enforcement Agency certification of the product would be necessary to show that it has no hard drug substances..

6.9. Challenges of Freight Forwarding in Nigeria.

Freight forwarding business has encounter a lot of challenges in Nigeria. Among which are:

1. Free Entry and Exit of Practitioners: There is little or no guidelines for entering or exiting the freight forwarding business in Nigeria presently. This encourages all manner of people to come into the
2. Presence of Quack: The immediate result of the above (1) is the presence of quack freight forwarders who readily give themselves the title "Clearing and forwarding agents".
3. Lack of Education or Exposure: Combine effect of 1 and 2, is the gross educational inadequacy of majority of present days practitioners. Many of them are ignorant of the enormous knowledge, exposure and relevant education require of the profession they are in to.
4. Balkanization through Unions: There are too many unions claiming to represent one freight forwarders group or the other. This does not make the practitioners to speak with one voice and create more confusion to the industry and this also makes it difficult for government to know which union to deal with due to unnecessary rivalry among competing unions claiming to

represent members, but, whose actions/inactions cause more harm than good.

5. Lack of Regulation: The industry still remains largely unregulated till date. Though, government is presently working towards this direction, but, such efforts are yet to come to a fruitful conclusion.
6. Insufficient Capital: It is a fact that most freight forwarders operating in Nigeria are one man business venture, where the man is all in all, ranging from CEO to loader of goods or cargo. This brings a lot of restriction to how much a man/woman can bring to the table in terms of capital. The resultant effect is the fact that the 'company' soon goes bankrupt.
7. Non- Sustainability of Business: The impact of point (6) is that, when the company folded up, the owner will not be able to sustain the organization formed and sadly, he/she withdraw into oblivion without transferring the expertise, experience gained to nobody in particular. Therefore, denying the industry much required continuity to grow the business.
8. Inconsistence Government Policy: Most government policies with regards to freight forwarding operations are inconsistent and are changed frequently with no prior notice, thereby making it for practitioners to plan for a long time. This affects the industry adversely and slows than the growth and development of the sector.
9. Importer/Exporter Documentation Challenges: Ndikom (2008) submitted that, since freight forwarding and clearing and forwarding are vital components of the maritime industry, the manipulations involving import-export documentation processes are intentionally carried out by them to rob both government and importers/exporters of their revenue; this is not in the set interest of the system.

10. Malpractices/Sharp Practices: Most of the points raised earlier individually and collectively combined in encouraging corruption/sharp practices in the shipping industry. This ranges falsification of documents and receipts by freight forwarder, with the connivance of Customs officials, so as to defraud consignees of their imported goods; to *hanging* practice with regard to goods with customs, which is a ploy to defraud importers of their goods. A lot of unethical business practices like manipulations, fraud and graft, as well as the case of non-existing 'freight forwarders' called briefcase carrying 'freight forwarders' (who are actually clearing and forwarding agents) with no fix office address. Finally, there are so many people with virtually no business in the port vicinity who make already complicated system more complex, these include hooligans (area boys), port touts among others.

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CHAPTER SEVEN
Development of Containerisation in Nigerian Shipping.

J.A. Adeyanju

7.0. Introduction

Containerisation as a packaging method has gain global acceptability and today millions tones of cargoes are transported by the use of container. This chapter examines the introduction and development of container as a packaging method in the Nigerian transport system.

7.1.Evolution of Containerisation in Nigeria.

The introduction of containers in the transport system in Nigeria started in the late 1960's. Although one cannot really say precisely when the first container landed in the Nigerian port, available records indicate that by 1968 the Lagos port experienced the first appreciable containers traffic with about 182 different sizes of containers at Apapa quays (NPA 2000).

In his own account, Badejo (1985) reported that by 1976 there was the presence of containers at Nigerian Ports and this contributed to the port congestion experienced within this period due to lack of technical requirements in handling them. This led to the building of container terminals at Apapa which was completed in 1978. By 1979, the Inland Container Depot system was introduced in Nigeria. The first Inland Container Depot which was incorporated as the Inland Containers Nigeria Limited (ICNL) was sited in Kano and by August 1980 the first container was delivered at the site.

7.2 Development of container Traffic in Nigeria

Containers are the major loading units which facilitate multimodal transport. Unfortunately, records produced by Owusu (2001) indicate that Nigeria and indeed West Africa has no single container ship registered in their flags.

In comparative analysis of cargo throughput by ports in Nigeria between 1994 – 1997, the Container Terminal at Apapa (now known as AP Molers) port

which is the main container port in Nigeria handled only 6.2%, 7.2%, 7.1% and 8.1% of the total cargo throughput in 1994, 1995, 1996, and 1997 respectively (NPA 1998).

TABLE 7.1: ESTIMATED CONTAINER TRAFFIC AT ALL NIGERIAN PORTS (1968- 2006).

YEAR	IMPORT CONTAINER (TEU)	EXPORT CONTAINER (TEU)	TOTAL CONTAINER (TEU)
1968/69	182	-	182
1969/70	909	-	909
1970/71	2513	-	2513
1971/72	5168	-	5168
1972/73	8281	34	8315
1973/74	9490	37	9527
1974/75	15457	12009	27466
1975/76	24503	23049	47552
1976/78	43294	40565	83859
1978/79	63850	54149	117999
1979/80	80345	69902	150247
1980/81	86361	67535	153896
1981/82	80334	72302	152636
1982/83	81201	80204	161405
1983/84	84239	86306	170545
1984/85	66239	92117	158356
1985/86	81203	75821	157024
1986/87	71496	83677	155173
1987/88	82526	84363	166889
1988/89	62426	85391	147817
1989/90	100121	105479	205600
1990/91	109848	99486	209334
1991/92	134278	116954	251232
1992/93	111564	102842	214406
1993/94	85627	88470	174097
1994/95	94580	76816	171396
1995/96	80857	60005	140862
1996/97	102660	87978	190638
1997/98	183517	103335	286852
1998/99	141594	121105	262699
1999/2000	161146	109794	270940
2000/01	190467	167596	358063
2001/02	198778	176641	375419
2002/03	222865	165778	388643
2003/04	232920	141663	374583
2005/06	248393	177938	426331
TOTAL	3,349,232	2,829,341	6178573

Adeyanju (2011)

The lopsidedness in the levels of container operation in the country is a serious problem. The rate of container imports is more than the exports and this

situation is not unconnected with low level of industrial activities coupled with the import dependent nature of Nigeria economy. This is responsible for the outflow of empty containers or their conversion to other uses such as kiosk and porter cabins in the country. This has contributed to low port productivity and a drain of foreign exchange in the nation economy.

The problem is that, the container loading unit which facilitates Multimodal Transport Operation is still not widely utilized in Nigeria. This does not enhance efficient cargo transfer between modes. Most cargoes are still transported by break bulk, pallets, and general form or at the best in conventional ship with some spaces for containers. Transportation of cargo in containers guarantees safety against pilferage, theft and unfavorable weather. This is apart from providing door-to- door delivery of cargoes.

Because containerization requires the integration of the port areas with the hinterland, it has changed the relationship between a port and its hinterland. Thus, port connectivity with the hinterland requires efficient rail and road transport which is still a serious problem in Nigeria.

The total length of Federal Road in Nigeria was about 32,000km, majority of which were paved (FGN, 2002). Most of these roads are in a state of disrepair due to persistent use by heavy haulage vehicles. In the same vein, the total length of rail track in Nigeria which is about 3,557KM consists mainly of narrow gauge (Federal Ministry Of Transport 1998). The implication of these is that there are linkage problems between road, rail and port areas, which do hinder the efficiency of transporting container and in effect hinders transport coordination.

Besides, the poor nature of road and rail connection is the major focus of investment and policy over the years. For example, Ezeife and Bolade (1984), observed that the percentage multimodal share of transport sector investment in road, rail, water and air in 1981 – 85 was 60%, 25%, 9% and 6% respectively. These and other factors perhaps have resulted in the decline in the freight traffic share of other modes of transport in Nigeria. For instance, over 90% of internal freight traffic was carried by road between 1980 and 1990, in Nigeria. This skewed distribution of freight traffic in favour of road has been reported in the studies such as Ogunsanya (1981), Ogwude (1997) among others. In both rail and road freight transport, unitization predominates and containerization is only just evolving. For example, out of 117,000 tons of cargo transported by rail in the year 2000, only 7,560 tons correspond to containerized cargo at an average weight of 14 tons per

Twenty- Foot Equivalent Unit (TEUs). This is to be approximately 550 TEUS. (Hamburg Port Consultant 2002).

7.3 Container And Intermodal Coordination

In transport planning and logistic, containerisation is an important packaging method that ensures effective inter-modal co-ordination. Inter-modal co-ordination of transport requires significant attention in Nigeria if trade is to enjoy the benefit of globalization. At present there is competition, instead of complementarities between road and rail movement of freight in Nigeria. For example, while road carried about 80% of the country's freight in 1995, rail carried only about 18%. This reduced further in 2000 when road carried about 95% and rail less than 3%. Today, with the current efforts by the Federal Government of Nigeria in rejuvenating the rail transport, freight transport carried by rail has greatly improved and it is expected that in the nearer future more than 60% of freight will be transported by rail.

The failure of rail in freight transport in the past includes inadequate locomotive and rolling stocks. Lack of maintenance of rail networks and most importantly the narrow gauge system with flanged rails which reduces the speed of the train compared with the latest technology in rail transport in other developed countries of the world.

One of the essential tools for effective inter-modal co-ordination is modal connectivity which is the ability of modes to adapt freight to each other without necessarily changing the loading unit. Unfortunately, this connectivity is seriously deficient in Nigeria transport system. Container revolution is an important instrument to which modal connectivity has been made possible. Nigeria is extremely slow in tuning its transport system to imbibe the technology of containerization. For example, container handling equipment and facilities at the port are inadequate. The rail is also poorly prepared for container traffic. The port congestion of 1976 was as a result of many factors one of which was the inability of the port to adapt port freights conveniently to other modes, resulting in un-stuffing of cargo in general form. This situation persisted until 1978 when a purposefully built container terminal was completed in Lagos (Badejo 1991).

There are various studies in freight transport in Nigeria. The study conducted by Stanford Research Institute in 1961 examined the comparative advantages between rail and road transport in Nigeria. The study indicated that the

average real cost of road transport in Nigeria in the early 1960 was 6 pence per ton-mile while the corresponding figure for rail and water transport were 2.2 and 1.7 pence respectively. The study suggested that freight traffic should be shared among various modes of transport based on economic principle of comparative cost advantage. The contribution of Hay and Smith (1970) was probably the pioneering study on spatial pattern and composition of freight flow in Nigeria. The study examined the domestic freight volume, composition and distribution in Nigeria. However, issues such as modal split of freight and packaging methods were not examined.

Ikporukpo et al (2000) in their study of transport co-ordination in Nigeria observed that the actual performance of transport function and spatial pattern of infrastructure provision reflected attempt at co-ordination in the early history of transport development in Nigeria. Further development indicated un-coordinated trend in freight among the modes. This has been attributed to various reasons such as inter-modal disparity in public investment, discriminatory modal subsidies etc. Also, the issue of packaging in freight transport is not discussed. Containerisation as a packaging method fits to all modes and the neglect of rail and inland waters transport could be as a result of non-compliance of the infrastructure requirements to container loading practices and planning. Alokan (1995) identified the structural and operational practices in Nigeria during the pre- oil boom years. Such practices made both rail and road secure their business from the import and export trade. Between 1960 and 1970, freight carried by road rose from 1.216 million tonnes to 1.703million tonnes, while goods carried by rail fell from 254million to 209million. One can assume that as the trend in the use of container packaging gain acceptability in Nigeria rail freight traffic diminishes.

Other studies include, Ogwude (1997) which examined freight movement within industrial cities in Nigeria. He used logit model to estimate the relative contribution of the factors that influence the determination of modal choice such as annual sales, vehicle ownership, freight charges, transit time and reliability of delivery time. The result of the study suggested that the most important determinant of modal choice is the economic cost of transport services and freight rates. Ogunsanya (1981) used the principle of dominant association to stratified Lagos freight traffic. Most of these works examined interregional freight transport as it affects the road mode and not the entire transport system using intermodal perspective.

Identification of the trend in container traffic is important in Nigeria for two important reasons. The first is because it allows us to understand the direction of growth of container traffic and forecast future development in the country, while the second is to show the future needs for improvement. Both provide a useful basis for physical planning especially the provision of adequate infrastructure and superstructure at the port. In the same vein, the need to examine the trend of container is important to determine the development of spatial pattern of infrastructure of road, rail and inland water with the aim of improving transport modes and their capacity for container freight handling. The pattern in the growth of container traffic in Nigeria can be used as an indicator of the spatial perspective in the adoption of multimodal transport operation.

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Chapter Eight
Containerisation And Port Productivity.

J.A. Adeyanju

8.0 Introduction

This chapter examines productivity indicators at the port and how this is related to container traffic. Seaport productivity models were discussed and the models serve as basis upon which performances and productivity at the seaports can be evaluated.

8.1 Productivity Indicators

Productivity indicators at ports according to UNCTAD (1975) include Berth Occupancy Factor, Superficial Throughput, and Linear Throughput etc. Berth Occupancy Factor are tonnage of cargo handled per hour of ship's time at berth. The Cargo Performance Index (CPI) which is the tonnes of cargo handled per hour of ship cargo-handling time is one of the indices to measure the Berth Occupancy Factor at the port. Equally, the Port Performance Index takes into consideration the idle time of a ship within the port area. However, both the Berth Occupancy Factor and Cargo Performance Indices considered the operational time of the ship and these reflect the work schedule at the port as well as the throughput of cargoes handled per hour.

Superficial throughput is the expression of the ratio of the tonnage of cargoes handled at a berth to the degree of utilization of other facilities such as transit shed, warehouses etc. To determine the superficial throughput at a berth each unit of the storage areas is usually compared to the volume of cargoes received at the berth during a particular time. The transit shed and stacking areas at each port can be used to determine the superficial throughput, although, the data is difficult to collect due to average time each category of cargoes spends at the transit shed and stacking areas. According to Bohdan(1972), occupancy of cargo at the transit sheds and open storage areas are not easy to express in accurate

figures because of overcrowding of cargoes with some having overlapping days in the shed. However, Berth Occupancy Rate, expressed in percentage of the dwell time of ship at port, can still be used as productive factor for vessel at port.

Container transportation requires efficient and careful port planning in order to increase ship and port productivities. Also, measuring port productivity involves both physical and institutional planning which can have limiting factors. These factors influence the productivity measurements which make it impossible to compare ports in different locations. According to Thomas and Thomas (1989), there has not been universally valid way to compare productivity on a cross-sectional analysis because there is lack of uniformity in the data used in productivity formula. This was also supported by Hanh et al(2006) who observed that the productivity of port is influenced by a range of factors and only few of which can be controlled by terminal operators.

Data related to port productivity as identified by Thomas et al (1989) are outlined in the table 8.1 below:

TABLE 8.1 : Productivity Measures Of Ports and Container Terminals.

Terminal Operating Element.	Important factors influencing productivity	Nature of influence on operation.	Productivity Measure	Productivity Factor Measured.
Port Yard/Terminal	Area, shape layout, yard handling methodology box size mix Dwell time.	Extent to which containers must be grounded, stacked	TEUS/Gross acre. TEUS Capacity/net storage areas.	Yard Throughput/ Yard Storage.
Crane	Crane characteristics, Level of Operator Skill, training, Availability of cargo, Breakdowns, Breaks in yard support, vessel Characteristics.	Operational Delays.	Moves/gross gang or crane hours- down time. Moves/gross gang or crane hours.	Net Productivity Gross Productivity.
Gate	Hours of Operation, Numbers of Lanes, Degrees of Automation, Availability of data.	Extent to which weighing, inspection, documentation checks are expedited.	Containers/hour/ lane Equipment moves/hour/lane Truck turnaround time.	Net Throughput. Gross Throughput.
Berth	Vessel scheduling. Berth length, Number of Crane.	Extent of berth utilization	Container vessel shifts worked/year/container berth.	Net Utilization
Labour	Gang size, work and safety rule, workforce skill, training, motivation, vessel characteristic	General tempo, speed of operations.	Number of moves/man hour	Gross labour Productivity.

SOURCE: Thomas et al (1989)

Using the above measurement indices, the productivity of port can be said to depend on cargo throughput handled at a period of time at a port and more so other variables as identified in table 8.1 above. In the same vein, the table serves as a check list upon which the productivity at Nigerian Ports was assessed in this study. Therefore, the productivity indices used in this study are:

- Cargo Throughput of both import and export traffic
- Berth Occupancy Rate in percentage per annum,
- Ship Turn Around Time per Annum,
- Net Gang Utility Rate in hours,
- Crane Idle Time per hour and

- Plant Availability Rate.

The contribution of seaport to effective co-ordination of transport is important in the total transport chain. Hoyle (1983) defined seaport as an element in a global transport system, a servant of an international economic order, and a gateway to and from a national and regional hinterland.

Highlighting the concern of geographers to seaport development, Hoyle (1983) enumerated the spatial functionality and geographic approach to seaport study. These include the essential port functions, the development of an effective node in an international transport system, linking together several interdependent transport modes and integrating efficiently a range of transport networks. This observation has been supported variously by many scholars i.e. Couper (1972), Nagorsk (1972).

Seaports are variously defined using three basic terms:

- Interface
- Link
- Gateway

"Interface" refers to port as provider of the facilities and services required for the transfer of cargoes from ship unto land and vice versa or unto ship in the sea of transshipment. The word interface is preferred because it brings out the concept of a meeting point between different modes of transport. The various steps involved in the transportation processes from origin to destination are often compared to the "link" of a chain. Transport chain is a popular expression and this is referred to port as a link in transport chain. Port as a link in transport chain is preferred especially in multimodal coordination.

Studies on port evolution and development in West Africa can be linked to the works of Taaffee, Morill and Gould (1963) which used the West African

Coastland as an example of spatial seaport development. This work identified six stages of transport network development starting from the scattered ports which had no hinterland connection. The economy of the hinterland brought about port lines and port concentration which later resulted in the emergence of the complete inter-connection between ports and the hinterland. It is important to note that city port hierarchy of West Africa is predominantly evolved in this way based on the regional economic structure of their respective countries. The economic factor especially the expansion of trade by the European consortium was among the important factors which encouraged initial development of the West African Ports. The work of Taaffee et al (1963) influenced many other studies on spatial variations in seaport growth i.e. Stanley (1970); Rimmer (1967); Ogundana (1970 and 1974); Ogunsanya (1986).

Hoyle (1983 p.27) identified four separate sets of factors which affect the growth of city port. These include: water site, land situation, water situation and land site. "Water site" refers to the physical condition of the harbour which is an initial stimulus for the development of port in an area. The land situation is the level of port development measured in terms of cargo- handling capacity or volume and value of commodity through the port. The water situation is the navigability of the water including the depth, width, under-water situation etc, while the land site constitutes a direct control over the pattern of urban growth. Wherever the factors are favorable, there tends to be some degree of correlation between the level of port development and the extent of associated urban growth (Hoyle 1983 and Ogunsanya 1986). Jean- Georges (1986) looking at port sites from co-ordination point of view observed two categories of constraints, which are physical or geographic and socio- economic. To the sea, the physical or geographic constraints consist of the approach conditions; natural or artificial, consistent with the size of the ship expected to call at the port. Toward the land, the lines of

communication and transport networks with the hinterland to be served by the port are important. A port cannot be considered with respect to measurement of the facilities alone, the activities of the port area must be placed within a much wider setting, involving the hinterland on the landward side and the sea routes and the foreland on the maritime side.

Another important issue that should be considered in port development is productivity which is primarily measured in term of level of trade transacted in the port within a period of time. Port productivity can be seen from the total cargo throughput of both import and export in a particular port. The productivity of a port or terminal is a complex issue which is often influenced by a range of factors. According to Hanh et al (2006 p. 3) these factors are both internal and external, some of which can be controlled by terminal operators (also see Dowd et al 1990). The internal factors which can be controlled by operators include terminal configuration and layout, capital resources invested, labour etc, while external factors are trade volumes, shipping pattern, and ratio of import to export of containers. Apart from these, other external factors which in most cases are not controllable by the operators includes the size and the type of ship accommodated by a terminal as well as the land ward capacities such as the performance of rail and road system.

In a study carried out to compare the productivities of Los Angeles and Long Beach with other ports in the world. Hanh, et al (2006 p. 6) used aggregated measures such as Berth utility rate, Crane productivity, and land areas utilization as inputs data. The study revealed that the two ports are comparable in physical capacities with other leading ports in terms of terminal areas. Also, the assessment indicated that the ports were the busiest container ports in the United States and the 5th busiest in the world in 2004. Although, aggregate measures can be used

quantitatively to determine the productivity of a port, however, caution should be taken, because while the number may indicate poor performance of a port in a certain aspect relative to others, effort to improve other element could unintentionally undermine the entire container handling system. For example, considering a lower land utilization as indicator of unproductive port may be misleading because this will actually depend on economic circumstances of the terminal.

In his own observation, Thomas et al (1989) identified physical or institutional constraints to the performance of a port or terminal. The physical constraint include the area, shape, layout etc, while institutional constraint may include union work rules, import and export mix, container size mix, custom regulation, intermodal train scheduling etc.

8.2Container And Port Productivity Models

8.2.1Regression Model

The strength and direction of relationship between volume of containers handled and port productivity measures are related and can be modeled by multiple regression method of the form :

$Y= f(x_1,x_2, x_3, x_4$----------xnth)

Y = Volume of containers entering the port.

X = measures of port productivity.

The regression equation can be operationalised as follows;

$Y= a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e$

The table below provides information on the description of both independent and dependent variables that can be used for container and productivity modeling.

TABLE 8.2: DESCRIPTION OF VARIABLES IN PRODUCTIVITY MODELLING.

Variables	Description	Measurement
(Y)=CTP(Container Traffic at the port).	Container traffic entering the port as import or export freight.	TEU's of container entering or leaving the sampled port from 1985-2005.
(X_1)= PTA (Port and Terminal Area).	TEUS/Gross acre. TEUS Capacity/net storage areas.	Yard Throughput/ Yard Storage
X_2= GUH (Gang Utility per hour/ crane idle time).	Moves/gross gang or crane hours- down time. Moves/gross gang or crane hours.	Gang or Crane utility rate per hour.
X_3= BOR (Berth Occupancy Rate).	Container vessel shifts worked/year/container berth.	Berth Occupancy Rate in percentage.
X_4= STAT (Ship Turn-around Time)	Extent to which weighing, inspection, documentation checks are expedited.	Ship Turn Around Time in hours

SOURCE: Adeyanju (2011).

Other models that are applicable in port productivity and container interrelationship include:

8.2.2 Container Trend Model/ Innovation Diffusion Model

The trend modeling for container traffic is done using the logistic function of S-shaped curve with the equation.

$$P = \frac{u}{1 + e^{(a - bt)}}$$

Where;

u = maximum number of adopter. (Represented by the container traffic)
p = proportion of adopter at different time periods
a = number of adopter at the start of the innovation. (Number of container at the base year
b = the rate of changes of p with t. (regression co-efficient)
t = time
e = constant

Containerisation is an innovation in freight transport. Innovation diffusion theory as propounded by Haggerstrand (1967) is a spatial process whereby the rate and time of adoption of technological innovation is different from one region to another and over time. Consequently, diffusion of innovation can be plotted for equal and consecutive time periods. Geographers have examined a wide range of phenomena that have spread in space and time and have recommended the S-shaped curve to estimate the spread (Turner, 1974). The S- shaped curve when plotted has phases of diffusion over time such as the origin, diffusion and the saturation or equilibrium phases. The rate of early adoption of innovation tends to be slow but after some time it diffuses rapidly and begins to slow down when a large majority of the population has adopted it. The S- shaped curve may be determined using the logistic functions which can be determined by way of least square regression. (Abler et al 1972).

The least square method is a technique of time series analysis which is used for explanatory and forecasting of future trend. The logistic curve/model is of the form as earlier stated;

$$P = \frac{U}{1+e^{(a-bt)}} \text{----------Equation 1}$$

Haggett(1972) explained that the constant b in the model controls the form of the innovation curve. Low b values suggest innovation curves with a smooth form and higher b values describes innovations that have a slow initial build –up, rapid explosion in the middle section and a final slow consolidation. The S – shaped curve parameters can be derived using the method of least square regression.

Alokan (1993) used the logistic function of S-shaped curve to analyze the growth of trucking industry in Nigeria using the b co-efficient. The study observed

that there does not appear too much difference in the rate of growth in the industry in the four cities of Lagos, Port-Harcourt, Kano, and Kaduna between 1907-1985.

TABLE 8.3 : PROPORTION OF CONTAINER ADOPTION IN NIGERIA.

S/N	YEARS	IMPORT TRAFFIC		EXPORT	
		ACTUAL VALUE	LOGISTIC VALUE	ACTUAL VALUE	LOGISTIC VALUE
1	1969	182	5.88	NA	-
2	1970	909	70.70	NA	-
3	1971	2513	441.4	NA	-
4	1972	5168	1808.89	NA	-
5	1973	8281	4773.19	34	8.49
6	1974	9490	7352.03	37	16.48
7	1975	15457	*13861.54*	12009	7922.55
8	1976	24503	*23436.63*	23049	18990.69
9	1977	43294	*42528.49*	40565	37263.46
10	1978	63850	*63406.16*	54149	*52232.08*
11	1979	80345	*80104.69*	69902	*68855.40*
12	1980	86361	*86274.73*	67535	*67112.19*
13	1981	80334	*80298.67*	72302	*72114.50*
14	1982	81201	*81187.20*	86306	*80115.87*
15	1983	84239	*84233.19*	86306	*86267.18*
16	1984	66239	*66237.21*	92117	*92099.50*
17	1985	81203	*81202.11*	75821	*75815.16*
18	1986	71496	*71495.70*	83677	*83674.32*
19	1987	82526	*82525.86*	84363	*84360.30*
20	1988	62426	*62425.96*	85391	*85390.53*
21	1989	100121	*100120.97*	105479	*105478.76*
22	1990	109848	*109847.99*	99486	*99485.91*
23	1991	134278	*134277.99*	116954	*116953.95*
24	1992	111564	*111563.99*	102842	*102841.98*
25	1993	85627	*85626.99*	88470	*88469.99*
26	1994	94580	94580	76816	76816
27	1995	80857	80857	60005	60005
28	1996	102660	102660	87978	87978
29	1997	183517	183517	103335	103335
30	1998	141594	141594	121105	121105
31	1999	161146	161146	109794	109794
32	2000	190467	190467	167596	167596
33	2001	198778	198778	176641	176641
34	2002	222865	222865	165778	165778
35	2003	232920	232920	141663	141663
36	2004	248393	248393	177938	177938

Adeyanju (2011)

The proportion of adoption which is considered as the theoretical value is estimated by using the equation I above. The logistic curve is used to determine the saturation or the equilibrium stage in adoption of an innovation. Considering the

table above, import traffic of container between 1968-1975 can be adjudged to fall within the take off stage considering the proportion of adoption (P) which is far below than the actual traffic. However, from 1976-1993 is considered as the diffusion stage, while 1993-2005 witnessed saturated or equilibrium stage due to the fact that the logistic values are the same with the actual values from 1993 upward. Export traffic is not totally different from import traffic the only different is that there was a short period of take off between 1973-1977 after which the diffusion stage took off between 1978-1993. Saturation or equilibrium stage started from 1994 just like the import container traffic.

The result of the least square regression is indicated for import and export containers in table 8.4. Comparing the regression co-efficient on individual ports, AP MOLER at Apapa terminal had the lowest value, followed by Tin Can Island port, Rivers port, Calabar and Delta ports. The result obtained for AP MOLAR indicated a smooth growth of import container over the 11 years used for the study, while the result at Apapa Bulkship terminal and RO-RO port indicated high value of 1.359 and 1.037 respectively which confirmed that there was slow build up initially but later in the middle the container traffic had explosive in- flow and later there was a serious decline in the traffic at these ports. This further confirmed the low traffic of containers experienced at these port between these period. However, comparing the value for all ports in Nigeria which hitherto had low value of 0.927 suggested a smooth growth of import container innovation over the last 35 years.

TABLE 8.4 :REGRESSION CO-EFFICIENT FOR LOGISTIC CURVE ESTIMATION.

		IMPORT		EXPORT	
S/N	**NIGERIAN PORTS**	**b_1**	**a.**	**b_1**	**a.**
1	**APAPA BULKSHIP TER.**	**1.359**	**3.94**	**1.257**	**4.03**
2	**AP MOLAR TERMINAL**	**0.862**	**2.91**	**0.886**	**3.0**
3	**RO-RO TERMINAL**	**1.037**	**1.12**	**1.079**	**1.21**
4	**TIN CAN ISLAND**	**0.964**	**8E+026**	**0.965**	**2E+027**
5	**DELTA PORT**	**0.974**	**1E+019**	**1.253**	**3.8**
6	**RIVERS PORT**	**0.983**	**5E+010**	**1.121**	**5.72**
7	**CALABAR PORT**	**0.967**	**3E+026**	**0.746**	**3.0**
8	**ALL NIGERIAN PORTS**	**0.927**	**3.4**	**0.881**	**1.1**

Adeyanju (2011)

The regression of Logistic- curve estimation as shown in table 8.4 for export container traffic is not totally different from import containers. As expected, AP MOLER had the lowest regression co-efficient value of 0.886 when compared with other Nigerian ports, this was followed by Calabar port (0.746) and Tin Can port (0.965). These values indicated smooth growth in the innovation of export container traffic over the years, However, it is interesting to note that Delta and Rivers ports which had lower regression co-efficient values for import containers recorded higher values of 1.253 and 1.121 respectively which indicate slow build up, increased traffic at the middle and now experiencing decline. This further confirmed that shipping activities in Nigeria is over concentrated in the Lagos area.

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Chapter Nine
Spatial And Economic Basis for Container Transport In Nigeria.

J.A. Adeyanju

9.0 Introduction.

The reasons for transport is spatial differentiation and going by Ulman (1953), places must complement each other before movement can take place. Nigeria is a big geographical entity with population of over 160million people, considered as the most populous black African, south of Sahara. In this chapter, the justification for recent increases in container transportation is examined.

9.1 Nigeria: Its Geography, People and Economy

Nigeria has a land area of 924,000 sq. km including the controversial Bakassi Peninsula. It is located in the Gulf of Guinea between Benin and Cameroon. The southern border covers a coastline of 853 km, while the Northern border with the Republic of Niger has a length of 1,497 km, the North- East border with Chad Republic has a length of 87 km. The Western border with the Republic of Benin has a length of 773 km and the Eastern border with Cameroon has a total length of 1,690 km.

The most southern point, near Brass in the area of Niger Delta is about 4^0N of Equator, while the Northern boundary is approximately at 14^0N. The western frontier runs nearly north and south along the 3^0 East meridians. The Eastern frontier reaches nearly to the 15^0 E. meridian, south of Lake Chad, then runs in a south – west ward direction to the Cross Rivers Estuary in the Gulf of Guinea. The map of Nigeria in figure 10.1 indicate its political entity.


Nigeria
Sokoto
SOKOTO
ZAMFARA
Gusau
Birnin Kebbi
KEBBI
Katsina
KATSINA
Kano
KANO
JIGAWA
Dutse
YOBE
Damaturu
BORNO
Maiduguri
Kaduna
KADUNA
BAUCHI
Bauchi
Gombe
GOMBE
NIGER
Minna
Jos
ADAMAWA
Yola
KWARA
Abuja
FCT
Lafia
PLATEAU
Jalingo
TARABA
Ilorin
OYO
NASARAWA
Lokoja
Osogbo
Ado Ekiti
Ibadan
OSUN
EKITI
KOGI
Makurdi
BENUE
Abeokuta
Akure
EDO
OGUN
ONDO
ENUGU
Enugu
Ikeja
LAGOS
Benin City
Asaba
Awka
Akakaliki
ANAMBRA
EBONYI
CROSS RIVER
IMO
Owerri
ABIA
Umuahia
Calabar
DELTA
AKWA IBOM
Uyo
Yenagoa
RIVERS
BAYELSA
Port Harcourt

The 2006 population census of Nigeria estimated the population figure at about 140 million people with annual growth rate of 2.2% (NPC 2006). Among the densely populated cities are Lagos, Kano, Ibadan, Kaduna, Port-Harcourt, Benin, Maiduguri, Abuja, Sokoto, and Jos. These cities have an annual urban growth rate of between 3 – 7.27%.

Nigeria is endowed with many resources, but the economy depends on two major resources which are Oil/ Gas and Agriculture, including livestock. The proven oil reserve in Nigeria is put at 22.5 billion barrels while Natural gas reserve is estimated at 3.5 trillion cubic metres. In 2010, the Oil and Gas sector contributed 42.68% to the Gross Domestic product, while the Agricultural sector including livestock, forestry and fishery contributed an equal share of 30.34%. Oil and Gas remain the major foreign earning in Nigeria, it is responsible for about 80% of the Government revenue (IMF,2001). The contribution of each sector of the economy to the Gross Domestic Product from 2010-2013 is presented in table 9.1 below.

TABLE 9.1: GDP OF KEY SECTOR OF NIGERIAN ECONOMY.

SECTOR	2010	2011	2012	2013
AGRICULTURE	30.34	30.99	33.08	21.97
CRUDE OIL & GAS	42.68	40.86	37.01	14.40
MANUFACTURING	1.89	1.86	1.88	6.83
INDUSTRY	46.08	44.29	40.59	25.77
SERVICES	23.58	23.72	26.33	52.26
TELECOMMUNICATION & INFO SERVICES	0.77	0.78	0.82	8.69
MOTION PICTURE, SOUND RECORDING & MUSIC				1.42

SOURCE: National Bureau of Statistics (2014)

Apart from oil/gas and agriculture which contributes significantly to the GDP, industry also contribute significantly to the Nigerian economy. Trading in

Nigeria include the importation of goods such as computer accessories, electronics, fabric etc. For example in 2010,industry contributed about 46.08% to the GDP at factor cost and most goods and raw materials that were used in the industries were transported in or out of the country were packaged in containers. The large scale enterprises involved in trading activities were located in major towns and cities especially in State Capitals.

On regional scale, Nigeria is endowed with different resources, while the North, and South West are known for their agricultural products, the South especially the Niger Delta region is endowed with Oil and Gas resources. Figure 9.1 is the map of Nigeria showing some mineral and agricultural resources.

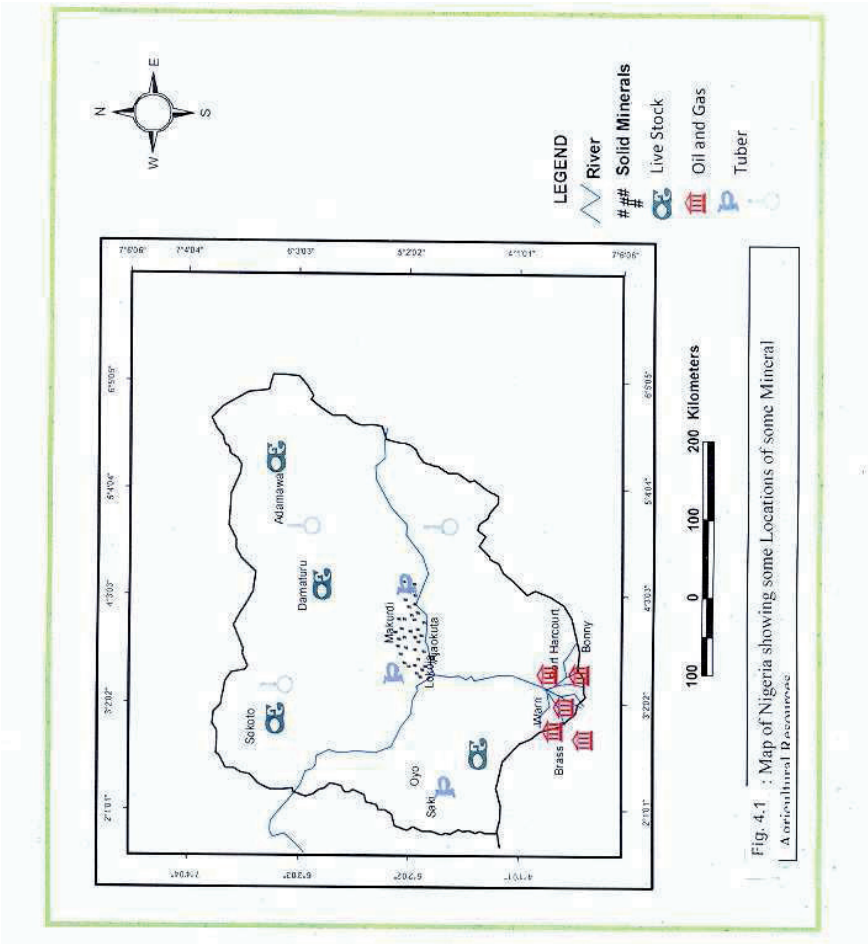

Fig. 4.1 : Map of Nigeria showing some Locations of some Mineral Agricultural Resources

9.2. Transport System In Nigeria

Nigeria operates all the transport modes although still at the developing stage. The rail line has a length of 3,557 km of which 95% are narrow gauge. The goods that are transported by rail in Ton- Km hauled per US $ of GDP measured by purchasing power parity (PPP) in 2001 were estimated at 4,843 ton – km

(World Bank 2001). The roads Networks in Nigeria are about 200,000km of which approximately 55,000km are paved. About 90% of internal commodities are transported by road with heavy duty haulage vehicles and this has led to constant destruction of the road network in Nigeria. Also, Nigeria is endowed with 3,000km of navigable water-ways, of which the main arteries are rivers Niger and Benue. The utilization of inland water transport has declined in the recent times due to geographic constraint, for example, most of the rivers are not navigable throughout the year and this prevent optimal utilization of the inland waters.

The contribution of sea transport to Nigerian economy is a vital especially in international trade. Shipping in Nigeria is responsible for about 75% of both export and import trade. Nigeria presently has a total of thirty-five ports including on and off shore oil terminals, jetties, wharves and container depot. The country's exports are made up of machinery and vehicles, chemical products and manufactured goods. The Nigerian economy in the last decade has been benefiting from trade surplus. The average growth of Nigerian economy between 2004-2012 was 7.1% and this is driven by booming agricultural and construction activities (NBS 2013).

9.3. Indusrialisation In Nigeria

Manufacturing in Nigeria has suffered years of neglects due to various problems. However, the 2013 rebased GDP put its contribution at 6.83% of the total GDP, at factor cost to the overall economy. The distribution of industrial establishment in Nigeria is shown in figure 9.2.

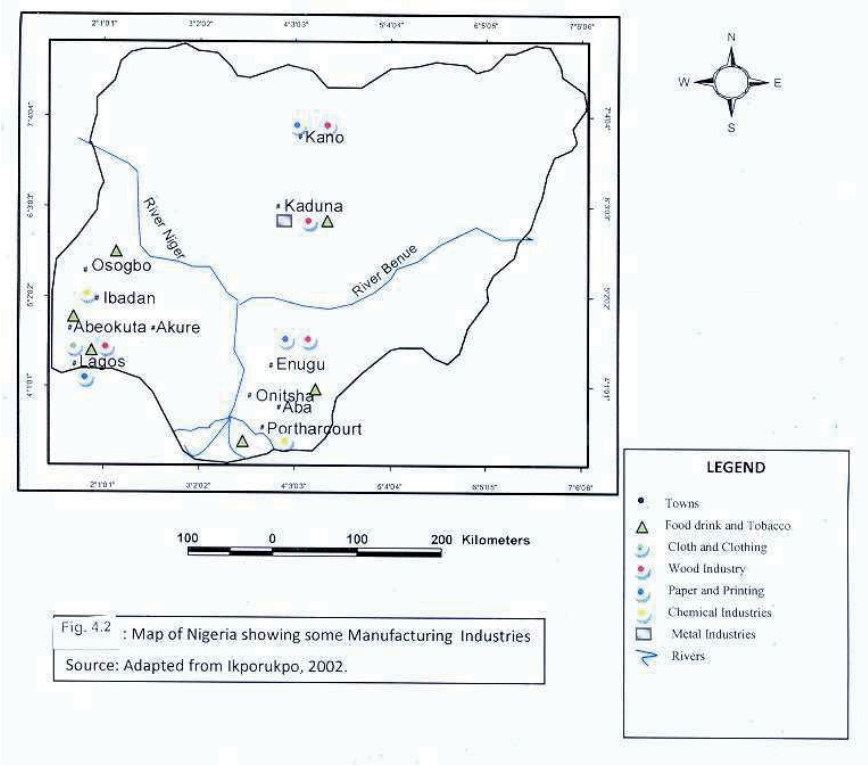

Fig. 4.2 : Map of Nigeria showing some Manufacturing Industries

Source: Adapted from Ikporukpo, 2002.

Among the problems facing the industrial sector include deficient infrastructural facilities especially the energy and transport facilities. This has resulted in the high production cost due to the necessity of the establishment to provide alternative source of energy to substitute the epileptic power supply from Power Holding Company Of Nigeria. Also, low investment by both national and international investors is another serious problem facing the manufacturing sector. The problem is attributable to many reasons such as the instability in government economic policy, insecurity, fraudsters, corruption etc. In the same vein, low volume of production for export has been identified as another problem facing the manufacturing sector.

This has been attributed to weak raw materials base, obsolete machinery and equipments, dependence on imported goods etc. However, the manufacturing sectors of the Nigerian economy cannot operate without Nigerian Ports. This is because ports as the gateway to the national economy have been identified to play significant role in industrial and manufacturing sector

9.4. The Nigerian Port Authority

The Nigerian Port Authority (NPA) was established by the Port Act of 1954 (cap 155) of the laws of the Federal Republic of Nigeria and Lagos. The Authority commenced operation on 1st April, 1955 after assuming responsibilities for some ports and harbour activities.

The Nigerian Port Authority has about 35 ports, on and off shore terminals, container depots etc, which are grouped into four port complexes. These are Lagos, Rivers, Delta and Calabar Port complexes.

The Lagos Port Complex comprises of the Apapa, and Tin Can Island ports. Apapa port is the largest and the most important port which comprises of Apapa fish wharf, Lily Pond Container depot at Ijora, Apapa Petroleum Wharf, and Atlas cove oil terminal. Tin Can Island port comprises of the main port, the Kirikiri and Ikorodu Lighter terminals. The Container terminal at Apapa is one of the important ports in the history of Containerization in Nigeria. The terminal has four operational depots located at the New Terminal, Adekunle Way, Bull Nose and Lily Pond.

The Rivers Port Complex is the largest port in the Eastern Nigeria and the third largest port in Nigeria. It comprises of the Port Harcourt Wharf, Onne port, Okirika Petroleum Jetty, Bonny on and off shore Terminal, Brass off shore Terminal, and Degema/ Abonema ports. The Onne Port is the Oil and Gas zone due to its strategic location which provide marine support for oil and gas sector of

the Nigerian economy. The port consists of the Federal Lighter Terminal (FLT), Federal Ocean Terminal (FOT) and the National Fertilizer Company of Nigeria (NAFCON) Jetty.

The Delta Port Complex comprises of the Warri, Koko, Sapele and Burutu Ports. It also comprises of crude oil terminals of Escravos, Forcados, Pennington and Ukpokiti. The Calabar Port Complex is the Nigerian Premier Export Processing Zone (EPZ). The complex consist of Millerio berth, Jackson and Calcemo Wharf. It also consists of Eket, and Antan crude oil terminals as well as Aluminum Smelter Company of Nigeria (ALSCON) Jetty. Fig 4.3 shows the location of major Nigerian Seaports.

Most of the ports are under the Nigerian Ports Authority and these ports handle bulk cargoes and containers apart from oil
terminals. However a huge traffic of containers are being handled at AP Molers terminal under Lagos Port Complex.

9.5. Conclusion

The realization of the above discussed economic indicator bring to the fold the importance of transportation which has been described as the catalyst to economic growth of any nation. Today, more than 50% of the cargoes leaving the port areas to the hinterland are packaged in containers which has gained acceptability over the years.

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Chapter Ten
Transport Coordination and Containerisation in Nigeria

J.A. Adeyanju

10.0 Introduction

Seamless transport system requires effective transport coordination. One of the identified problem of transport in Nigeria is effective coordination of the different modes. In this chapter, issues on transport coordination is discussed.

10.1 Freight Coordination

There are many studies which focus on freight co-ordination in Nigeria in the past. The earlier attempt was the study carried out by Stanford Research Institute in 1961. Before then, it was noted that the issue of transport co-ordination was of serious concern to the government. This was due to wasteful competition observed in the transport networks (Oshosanwo, 1973). The Institute thereafter suggested that co-ordination of transport requires that passenger and freight be carried by that form of transport which incurs the least true economic cost.

As a follow-up to the Institute's study, various studies have identified rate differential between road and rail transport in Nigeria over the years. These include Iwayemi(1987 p.87) who observed the rate charged on transportation of fertilizer to be N24.25(twenty- four naira, twenty-five kobo only) for rail and 60 Naira for road. This was further complemented by the work of Alokan(1995) who observed similar differences.(also see Ikporukpo et al, 2000). Many reasons have been given for issues of the un-cordination in freight transport in Nigeria. These are disparity in public investment profile in transport, discriminatory modal subsidies, inherent problems of monopoly as observed by Ikporukpo et al, (2000) among others.

One important condition for an efficient container co-ordination is the provision of an Integrated Center for Transshipment, Storage, Collection and Distribution of goods (TSCD). This centre according to Konings(1996) involves the spatial and functional integration of container handling, storage and business,

having intensive container transport within a specially designated area. This supplies logistic support for container traffic (see Kreutzbergar 1992; Rutten 1995;). The spatial dimension is essential for proper co- ordination when businesses are in the immediate vicinity of a terminal which obviously reduces the initial and final transport distance. The benefits of Transshipment, Storage, Collection and Distribution of goods (TSCD) are reduction in transit times, and the reliability of the modal split. The functional dimension is the internal transport system used for the collection and distribution of containers to the companies on site. This is related to terminal planning and cargo handling techniques which make the transport system more efficient at the initial and final transport phase. Quitin(1993) likened the Transshipment, Storage, Collection and Distribution of goods (TSCD) to the European "distrikpark" found near important motorway, while Nea et al (1992) likened it to freight villages of United Kingdom and inter-port of Italy.

Obiozor (2000) observed that dry ports are closely associated with the container's Transshipment, Storage, Collection and Distribution of goods (TSCD) concept which in turn developed from the container revolution of 1960's. In this wise, containerized goods are shipped to the port under multimodal transport documents so that the cargo only transits through the seaport and after discharged from the ship into rail –wagons or trucks, is transported to the inland port under customs bond, custom examination, duty payment etc. Dry port or inland container depot (ICD) is a common user facility, equipped with fixed installations which offer services for handling temporary storage of any kind of goods (including containers) carried under customs transit by any applicable mode up transport. It can also be referred to as a designated site to which imports and exports can be consigned for inspection by customs which can be specified as the origin or

destination of goods in transit accompanied by documentation such as the Combined Multimodal Transport document.

In order to evaluate container coordination in Nigeria it is important to assess the components especially the different modes of transport as well as interface point i.e. seaport which are involved in the co-ordination.

10.2.Transport Components

10.2.1 Road Component

The integration of road transport into the transport system is important because among all the transport modes, road has an advantage in terms of flexibility of routing. In his observation, Button (1993) explained that road freight transport is a derived demand which arose as an input for production and delivery of finished products by firms.

Road transport planning is an integral feature of freight transport efficiency. Proper road planning requires as a basis, an inventory of existing roads and vehicles. The inventory should take into account the length of roads and number of vehicles as well as complementary facilities necessary for multimodal co-ordination. Vehicles used in road freight transport are classified into two. These are lorries and trucks. In his own assessment of modal functionality, Ogunsanya (1981) observed that lorries are more suitable for intra – urban movement, while trucks are best for long distance freight movement. Equally, Miline and Light (1963) classified both lorries and trucks in terms of their sizes and whether the motive power unit is physically combined with the cargo unit. The lorry is a total transport unit because the cargo unit is combined with the motive power unit, while the trailer have their engines separated from the cargo unit.

Apart from considering the types of vehicles used in road freight transport, a quantitative inventory of road will involve the length of road and number of

vehicles, while qualitative inventory will assess the type of road (paved, classified, number of lanes etc) and vehicle type. It is of course important to stress that both the length and network quality of road are important tools for container co-ordination. It can also be assumed that the earth and gravel road may not be the best quality road for container movement to any significant extent. In the same vein, a qualitative inventory of road transport involved establishing the degree to which the existing infrastructure is used, and this may require a complex collection of traffic information. (UNCTAD 1996 p.51)

In economic analysis of container transportation by different modes, UNCTAD (1998) observed that the cost of road transport relative to other modes is not a constant factor but varied according to a number of conditions. The report identified conditions such as, length of haul, type, size weight of consignment, condition of infrastructure, traffic density among others..

Another important condition for container freight efficiency is the modal competition. All the integrated modes available in multimodal functionality should be favorably competitive in such a manner as to guarantee continuous flow of the traffic. In this regard, the choice of modes is often influenced by criteria of cost and service quality.

Magee (1948) examined the relative performance of road freight in Canada and compared it with that of rail, especially its relative contribution to freight transportation. It was speculated that the break-even point between road and rail can be found through cost analysis, and that freight rates will effectively change the traffic market between truck and rail. Based on this, it was assumed that the role of trucks will be relegated to short and medium - haul services. The distance beyond 36 miles is estimated to possess a cost advantage above road freight. (Magee 1948; Ojekunle 2006).

Among the advantages of road freight transport above others are availability and flexibility. These are qualities relating to both technical and organizational aspect of road transport. Given that any door – to – door transport is possible, the road hauler will ideally be able to provide the shippers with a transport option geared to the need of the shipper. Ojekunle (2006) explained that the flexibility in road freight enables road transport to respond quickly to the increased transport demand of rural markets most displaced throughout the country.

The ultimate concept of containerization in transport is to guarantee door–to–door through transport of sealed containers on the road networks without stoppage. This is achievable if the road networks as well as vehicles for transportation are carefully integrated to the entire total transport chain.

10.2.2. Rail Component

In multimodal transport efficiency rail transport has distinguished itself especially in respect of inland transfer of cargo from the terminal to the hinterland. Rail transport has advantage over other modes of transport in the areas of comparatively low energy consumption per ton/km, potentially high level of safety, economic viability of carrying large volume of bulky cargo (UNCTAD 1998). The introduction of containers in multimodal freight transport has given rail transport a better advantage modal split position, leaving the trunk haul to the railways and further distribution to road operators.

Mckenna (1977) explained that an indication of the feasibility of rail transport can be given by comparing its cost structure to other competing modes. To this end, the relationship between the transport cost and the length of journey has been established. The high fixed cost of rail transport has therefore made it unattractive for short distance haul. Rail freight transport planning is required for an effective transport co-ordination. The starting point for rail transport planning is the inventory of the existing infrastructure and rolling stock. The inventory

include length of tracks, number of locomotives and wagons as well as the qualitative features such as the state of the infrastructure. Adler (1967) observed that there can be no reasonable planning unless the basic data on the supply and demand for railway services are available. The economic viability of rail networks is evaluated through sets of indicators i.e tons transported per kilometer of networks or ton-kilometer performed per kilometer of networks. These however differ from country to country.

Another aspect of planning is rail line capacity which is determined by the number of trucks and the gauge. It is generally accepted that a double track can raise the capacity of a line to about four times that of a single – track line. Quedraogo et al (1975) identified series of reasons why double tracked line is preferable. These include increase in average operating speed due to elimination of train crossing, better possibilities of using mechanical maintenance appliances, less interruption of services during maintenance etc. The issue of rail gauges and container compatibility has been viewed seriously in recent times, and this has serious effect on the efficiency of multimodal transport. It has been identified that metre gauges of 1,000 and 1,067mm are predominant in the developing countries of Africa, Latin America and South – East Asia. However, there has not been a sufficient reason to question the compatibility with the ISO standard containers. Instead of container compatibility with track gauges, more reasons have been given with respect to load gauges, which must naturally be sufficiently wide to allow for the outside dimensions of ISO containers. Another serious issue in rail transport planning is the axle load requirement. For instance, axle loads, together with traffic density, will determine the minimum construction requirement for the permanent way.

In Nigeria, rail transport has suffered in the past due to continuous dominations of road haulage in the freight transport. The Nigeria rail network has

about 3,505km length (NRC 1997). The two main lines include Lagos – Kano and Port Harcourt – Maiduguri with two branches, one to Jos and the Ajaokuta – Aladja. One of the reasons attributed to the failure of rail freight service in Nigeria is inflexibility. (Oshinubi 1993). The rail lines are only adaptation of the existing lines, and over the years there has not been any serious attempt at inter connecting all the different parts of the country with rail lines. For example, there is no direct connection between Lagos and Port Harcourt including the South Eastern axis. The implication of this is that any freight destined for Port Harcourt by rail will have to link Kaduna before coming to Enugu and Port – Harcourt. Other reasons attributed to rail freight failure in Nigeria include, disinvestments in the single lane 1067mm track gauge, no distinction between freight service lane and passenger lane and general inability to cope with certain areas of railway technology and operations i.e operating integrity, railway cost function, competitiveness with other modes (Okoro 1995; Osinubi 1993).

10.2.3 Inland Waters Component

Inland water transport is the oldest means of transporting large quantity of cargo to and from inland destinations. Rivers formed the primary media for inland water transport, and these have given rise to a distinctive mode of water transport. Inland water transport is important in transport co-ordination especially between sea transport and other inland modes i.e road and rail. Traditionally, inland water transport has been used to provide cheap transport of large volume of low valued bulk commodity such as ores, coal, fertilizers, grain etc. Geographically, inland waters are distributed across the world. For example in the United States, except for the desert areas of the West, waterways systems extend almost unbroken 2,407 miles from Bangor, Maine to Brownsville, Texas. In Western Europe, the widening of the 229km canal between the saone and the Rhine river links Rotterdam in Netherland (John 1980). In the same vein, the opening of the Rhine – Maine-

Danube canal in 1985 made possible the access of Rotterdam to Black Sea (Gerhardt 2000). In Asia, the 1290 Nautical Mile river Yangtze otherwise known as Chian Jiang river in China, links the east China sea of the pacific Ocean. (Lloyd Maritime Time 1984).

In Nigeria, inland waterways enjoy about 3000km of navigable water course in its natural form and access to the coast from hinterland (NIWA 1998). According to Ikporukpo (1994), about a third of the river Niger's length of about 4,200km traverse the country. The principal networks of inland waterway in Nigeria are; Niger and Benue. The most important outlets of Niger are Escravos, Forcados, Brass, Ramos and Bonny, while the main tributaries of Benue are Gongola, Taraba, Donga, Katisna Ala. Figure 10.1 is the map of Nigeria showing the inland waterway network in Nigeria.


NATIONAL INLAND WATERWAYS AUTHORITY
DECLARATION OF PRINCIPAL WATERWAYS
IN NIGERIA.
REFERENCE
International Boundaries
NIWA Gauging Stations
State Capitals
Other Towns
Rivers
Navigable Aug. - Nov./Dec.
Navigable 6months of the year Jul-Dec
Navigable during wet season only Jun /Jul. - Oct / Nov.
Navigable throughout the year with restricted depth between April - July.
Man made Canal.
Navigable throughout the year.
River Port (Proposed)
River Port (Completed)
Note: Navigable considered for draught of about 1·2m.
Scale: 1: 4,000,000
PRODUCED BY: SURVEY DEPARTMENT, N.I.W.A.
N I G E R
C H A D
LAKE CHAD
C A M E R O O N S
B E N I N   R E P U B L I C
BIGHT OF BENIN
KAINJI DAM
JEBBA DAM
BENUE R.
NIGER R.
FEDERAL CAPITAL TERRITORY

The Geographic distributions of navigable rivers in the world are inexhaustible. But the fact remains that inland water transport contributes in no small way to effective co-ordination of freight transport. It has also aided the industrial growth of the world and since the mode is a relatively cheap means of moving bulky goods, many industrialized nations of the world are now making full use of its potentials. For instance, more than 64% of all cross border freight transport from and via Netherland is by inland shipping (Ministry of Transport, Netherland 2002).

Flexibility and reliability are the core concepts in inland water transport. The inland shipping fleet is made up of a variety of vessels which transport both liquid and bulky cargoes. The most common type of service rendered by inland shipping is the barge services. John (1980) describes the service as specialized carriers employing diesel tows to push barges load of bulk commodity in integrated tows over the inland rivers. Although barge services are low in cost, but slow in speed and may be less flexible if the inland rivers are not well distributed.

Planning for inland water transport differs from place to place because the natural waterways are tied to specific locations. This planning in some countries is an aspect of water resource planning with transport variables as an input (see ESCAP series No. 41,1993). Apart from river channels improvement planning, other inventories necessary include length of waterways, number of vessels and also the state of infrastructures and vessels and most importantly the transport performance (UNCTAD 1996 P. 41-47). Different problems arise in planning inland water transport. These were identified as trade flow and performance indicators, which are taken care of through long-time planning by considering pattern of production, exports, imports and consumption and transformed into transport variables. (UNCTAD 1996 P.41)

Many studies have confirmed the potentials of inland waters transport in Nigeria especially in moving bulk commodities. Ekong (1984), revealed that prior to the nation's political independence, the movement of goods and people by private integrated expatiate companies along the nation's inland waterways was substantial. Before the civil war, the total inland water traffic was estimated at 30,000 tonnes of cargo (Ogunsanya 1995). The utility of inland water transport has however declined in recent times (see Badejo 1995; Ogundana 1973; NIWA 1998). Among the reasons responsible for the decline include, decline in investment by government, inaccessibility to other modes due to lack of proper modal co-ordination. Perhaps the most critical of the above listed reasons is the under – investment in the waterways transport in Nigeria which has resulted in the neglect of this mode and the resultant inability to tap the abundant resources

10.2.3. Sea Transport Component

Sea transport remains one of the oldest means of transportation in the world. It has been used to linked countries of the world. For example, the Mesopotamian trade depend on sea transport across the Mediterranean and around the Nile river. Sea transport therefore refers to transportation across the oceans of the world. In analyzing the economic characteristics of deep sea shipping, John (1980) identified a number of economic considerations which influence the cost and character of ocean shipping to include the following:-

- The long period required to build a ship
- The existence of a high level of fixed ownership cost.
- The growing level of daily ship operating cost
- The persistent and growing involvement of nations in promoting their own flag of convenience.
- The high level of ship to shore cost.

These influences have been moderated by the changes brought about by global emerging technologies such as containerization (Gerhardt 2000 p.33). However, the trading patterns of the developing countries have not justified these influences. The basic technology in shipping in the recent time is the introduction of containers as a loading unit. It was a concept conceived as a means of combating ever increasing port cost, pilferage and quick turn around at port. According to Owusu (2000), containerization has established itself as a form of unitization of break bulk cargoes, which provide general superiority and high cost-saving potential over intermediate forms of unitization such as pre-slinging, palletization etc. An UNCTAD report of 1988 identified 3 factors, which can positively influence the operation of shipping in a region. These are changes from break bulk to containerized shipping; relevance on chartered tonnage or slots and entering into consortia or any form of co-operation with other shipping companies. The above factors especially containerized shipping have affected transport coordination in Nigeria.

10.3 Conclusion.

Freight transport is a catalyst to industrial development and also economic growth of any nation. In this age of globalization, an effective and efficient transport services are needed to meet the increasing demand for goods across borders and also within a country. These services must be rendered in an integrated manner which enables connectivity of modes. Containerisation as a packaging method offers this integrated approach. Apart from being an efficient method of packaging which guarantee inter-connectivity of modes, it can also be used as surrogate method of measuring the effectiveness of Multimodal Transport Operation in a country.

To this end, the study served as a basis to assess the level of multimodal transport implementation in a developing country like Nigeria. This is because container packaging is compatible with all modes of transport excluding pipeline.

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Chapter Eleven
Inland Ports and Containerisation in Nigeria Emerging Logistics Platforms

K.O. Dominic

11.0 INTRODUCTION

This chapter reviews the nature, characteristics, structural operations, operational modalities and strategies for improving Inland Container Deports in the Nigerian shipping industry. Inland Container Deport is a place where containers/cargo is aggregated for onward movement to and from the ports. It is a also a common-user facility with a public authority status, equipped with fixed installations and offering services for handling and temporary storage of import/export laden and empty containers carried under customs control. The paper will examine strategies that will improve operational performance/productivity of ICD's in the context of Nigerian shipping Industry. ICD's originally is meant to decongest the port ab-initio but the concept over the years has been truncated due to the Government Policy inconsistencies. Therefore, effort shall be made in this paper to explore ways and synthesized strategies of improving Inland Container Deports (ICD) performance/productivity in a Nigerian Maritime Environment.

The word 'inland' means in or relating to the part of a country that is not near the coast, port city or a border', while a container means a large box of standard size into which goods are packed so that they can be transported securely and efficiently from departure point to destination by road, sea, or rail, without having to be repacked; a depot means a warehouse or other place used for storing things. Thus, inland container is a house for storing metal containers that transported from sea or air, to the interior (hinterland) of a country. ICDs or CFSs are transit facilities which offer services for containerization of break- bulk cargo and they

are, to a large extent, served by rail or road transport. It is expected to note that, a dry port located in the hinterland is called an ICD, while that located within the confines of the port city is called a CFS-Container Freight Station. But all dry ports are 'hubs' which facilitate the aggregation and transportation of export of containers from the hinterland to seaports.

Also, they act as receiving hubs for import containers meant for the hinterland. Other functions include cargo consolidation, stuffing and destuffing, warehousing, customs clearance and duty collection centers, processing of customs documents, cargo and container handling. Therefore, an ICD is a place where containers/cargo are aggregated for onward movement to and from the ports. It is pertinent to note that, an inland container depot may be defined as a common- user facility with a public authority status, equipped with fixed installations and offering services for handling and temporary storage of import/export laden and empty containers carried under Customs control. Customs and other competent agencies due clear the goods from ICDs for home use, warehousing, temporary admission or storage for onward transit, re-export, or an outright export. More so, a CFS is a place where containers are packed and unpacked and also, aggregation/ segregation of cargo takes place. An ICD may have a CFS attached to it. But ICDs are generally located outside a port town/city, where no site restriction applies to a CFS.

11.1 CONCEPTS OF INLAND CONTAINER DRY PORTS AND BONDED WAREHOUSE

The concept of bonded warehouse and inland container dry ports over the years is a reflection of Government policy. The historic development of bonded warehouse and ICDs is a panacea to the port congestion problem, which had overwhelmed port operations, thereby leading to reduced productivity and underutilization of the port system. There is also clear cut socio- economic justifications of the establishment of bonded warehouse and ICDs, in terms of increased productivity,

cargo throughput, and the economic development of the general society and national economy at large. The development of bonded warehouses and inland container dry ports (ICDs) in ports located in the six geopolitical zones of the country is part of the current port reform agenda of government. Here, a port constitutes the lifeline of and/or gateway to a port's- maritime based economy. It could be noted that, the collapse of such a port system would mean the collapse of the entire economy. The Nigerian port's system has been in dire need of reforms. The problems and complications of the 2001 congestion saw the ports at an operational standstill, calling for urgent attention with regard to resolving the problems caused by government policy inconsistencies.

The terms "ICD" and "CFS" are often used interchangeably, as there is not much difference in their operational modalities and functioning. Mainly, CFSs are off-dock facilities located near servicing ports and which are used as means of port decongestion, as cargo and customs- related activities are moved out of the port area (that is to CFS). CFSs largely deal with break-bulk cargo originating/ terminating in the immediate hinterland of a port and which may also deal with rail-borne traffic to and from inland locations. The development of inland container depots (ICDs) or dry ports (DPs) or container freights stations (CFSs) is key component to the success of current ports reforms effort. The problem of port congestion suggests that, there is an evidently urgent need for inland container deports as prelude to decongesting the ports.

Ports constitute the lifeline of a maritime –based economy. Obviously, when dry ports, which are synonymous to inland container depots, are fully developed and integrated, Nigeria will link landlocked countries and states. Here, it is of the international multi-modal transport system and a key player in the global logistics chain. It is needful therefore that, the Federal government approved the full development of inland container depots and freight stations, which have remained

only on the proposal table since 2001, during the problematic port congestion era. The development of these ICD projects is scheduled on the platform of public-private partnership.

There is a wide variety of terms that have been used to refer to inland freight facilities both in the academic and commercial literature. The reason for this lies in the multiple shapes, governance, functions and network positions these nodes can have. The nodes in the hinterland networks of ports have been referred to as dry ports, inland terminals, inland ports, freight villages, inland hubs, inland logistics centers, among a few. Thus, there is no clear consensus on the terminology to be used to describe such facilities, but the terms dry port and inland port have become the most prevalent terms. This leads to a multiplicity of claims by stakeholders involved in the development and promotion of facilities or business plans that their project is essentially an inland port.

This chapter does not claim to mitigate the apparent confusion about what an inland port should be since they can take shapes ranging from a consortium promoting the development of freight real estate within its region (often a metropolitan area) to a specific intermodal rail facility developed in co-location with distribution centres. Yet, it is observed that in North America, inland ports were developed as inbound logistics platforms trying to better coordinate a variety of stakeholders such as railways, importers, exporters, levels of government and real estate developers.

11.2 The Value Proposition of Inland Ports

In Nigeria, the next step involves the setting of inland ports as cargo rotation platforms to reconcile inbound and outbound logistics, as the regional export potential grows. The viability of each inland port depends on a number of considerations including, modal availability and efficiency, market function and intensity, as well as the regulatory framework and governance. The emergence of

inland ports reflects some deficiencies in conventional inland freight distribution that need to be mitigated. These deficiencies include35:

Land value. Many deep sea terminal facilities have limited land available for expansion. This favours the intensification of activities at the main terminal and the search of lower value locations supporting less intensive freight activities, such as transloading. Inland ports are dominantly developed in suburban settings a good distance from central areas, which confers the availability of a sufficient land base at a lower cost.

Capacity and congestion. Capacity issues appear to be the main driver of inland port development since a system of inland terminals increases the intermodal capacity of inland freight distribution. While trucking may be sufficient in the initial phase of the development of inland freight distribution systems, at some level of activity, diminishing returns such as congestion (e.g. terminal gate access), energy (fuel consumption) and empty movements become strong incentives to consider the setting of inland ports as the next step in regional freight planning. This is particularly the case for locations that are within a day or two by truck from a port facility.

Hinterland access. Inland locations tend to be less serviced by intermodal transportation than coastal regions. Through long distance transport corridors, inland ports confer a higher level of accessibility because of lower distribution costs and improved capacity. These high-capacity inland transport corridors allow ports to penetrate the local hinterland of competing ports and thus to extend their cargo base. In such a setting, the inland port becomes a tool for commercial and trade development that jointly increase imports, exports and intermodal terminal use.

Supply chain management. In addition to standard capacity and accessibility issues in the hinterland, an inland port is a location actively integrated within supply chain management practices, particularly in view of containerization. This takes many forms such as the agglomeration of freight distribution centres, custom clearance, container depots and logistical capabilities. The inland port can also become a buffer in supply chains, acting as a temporary warehousing facility often closely connected to the warehouse planning systems of nearby distribution centres. Purchasers can even be advantaged by such a strategy since they are not paying for their orders until the container leaves the terminal, delaying settlement even if the inventory is nearby and available.

The modal availability and capacity of regional inland access have an important role to play in shaping the emergence and development of inland ports. Each inland market has its own regional potential for imports and exports requiring different transport services and modes of operation.

11.3 Reconciling Inbound and Outbound Logistics

Export-based containerized cargo tends to include commodities where the origins are a function of resource density. They have a high level of concentration, but their location characteristics are very different than import flows. Export-based containerized cargo has a much lower value than inbound cargo, implying that its carriage has a lower priority for managers of containerized assets. This cargo has however the advantage of being less time constrained, unless related to the cold chain (e.g. perishables). The success of export-based containerized logistics is consequently dependent on the availability of containers inland and their repositioning.

Reconciling the availability of containers in a distribution system where imports and exports logistics are very different, faces the enduring problem of finding available maritime containers inland as repositioning costs are high. The hybrid

solution that has been discussed involves using conventional bulk transport systems to bring commodities to the port where they can be transloaded into maritime containers. This hybrid solution may be transitory once sufficient intermodal volumes are generated inland, thereby negating the need for transloading at the port.

11.4 Factors Influencing The Establishment of ICDs/CFSs In Nigeria.

The maritime industry is a highly technical, professional, competitive and complex industry, but which, over the years, has been bedevilled the world over by serious unwholesome practices (Ndikom, 2004). The industry is a critical national infrastructure that is labour and capital-intensive. Over the years, operations of the Nigerian port system have been run in a much haphazard manner, leading to complications and problems related to congestion. These problems, to a large extent, have led to uncoordinated operational systems, and low port output and performance. These all make the establishment of ICDs and CFSs imperative. However, certain factors influence the establishment of ICDs/CFSs, and these include:

1. Seaport problems culminating in congestion, cargo clearance delays, high demurrage, sharp practices
resulting in increased cost of ship business operation.
2. High rate of government policy inconsistencies, especially on banned imported items, which often lead
to port congestion and allied problems.
3. The fact that Nigeria is a coastal country with a large hinterland and expanse of inland waterways.
4. Multiplicity of agencies at the ports, leading to tollgate extortions and corruption.

The establishment of ICDs and CFSs is expected, therefore, to achieve the following results, among others:

- It would bring shipping services to the doorsteps of shippers across the nation
- It would assist greatly in port decongestion, and make ports more user / investor-friendly.
- Help revive and modernize the railways system as a primary mode for long-distance haulage of cargo to ICDs.
- Enhance the development of rural and hinterland areas were all ICDs are sited.

  Increased job opportunities for the nation's teeming youths.
- Assist in the reduction of overall cost of cargo

An effective ICD project needs efficient rolling stocks, wagons, coaches and locomotives with other modern

units like piggybacks, double-stacking wagons and so on. After the railways are fully developed and equipped by government, we can then confidently say that ICDs have commenced operation and, thus, have come to slay. Besides, the government must ensure that there is good road network linking ICDs with major federal highways. This will make it easier for trucks to take imported/exported goods to their final destinations, in a seamless manner and safely too.

Cargo handling includes stuffing/de-stuffing the same into/from containers to cargo sheds/trucks,

placement/removal of cargo into/from a warehouse, shifting of cargo within the terminal, loading/unloading of cargo in/from road vehicles with or without mechanical equipment, using computer-automated operation system to maximize terminal productivity and vessel stowage planning and also to increase quality of

service. Technical Operations of ICDs/ CFSs The main functions of ICDs/CFSs include the provision of transport and related services, cargo cam be transported to ICDs through rail or road mode.

Activities and operations of ICDs can be divided into the following main groups.

a. Transit operations by rail/road to and from servicing ports

b. Consolidation of LCL cargo

c. Reworking of containers

d. Temporary storage of cargo and containers

e. Unit for maintenance and repairs of containers

f. Receipt and dispatch of containerizable cargo

g. Operations by road

h. Loading and offloading of containers to and from train

i. Stuffing/destuffing, aggregation and de-aggregation of containers

j. Custom's clearance

k. Gate checks and security

l. Storage of cargo and containers and their safety

m. Disposal of unclaimed/uncleared cargo

n. Storage of destuffed cargo and empty containers

o. Information flow and communication

p. Record keeping and data storage

q. Billing and cash collection

r. System operations through electronic data interchange (EDI)

Operations of ICDs/CFSs revolves around the followings;

1. *Rail siding*: This is the place where container trains are received, dispatched and handled in a terminal. Similarly, the containers are loaded on and unloaded from rail wagons at the siding through overhead cranes and/or other lifting equipment.

2. *Container yard:* Basically, a container yard occupies the largest area in an ICD/CFS. It is the stacking area where the exported containers are aggregated prior to dispatch to ports; import containers are stored till Customs clearance and documentation exercises are carried out. It is also where empty containers await forward movement to the main port. It is regarded as a trans-shipment site for most containerized cargo (Ndikom, 2004). Likewise, some stacking areas are earmarked for keeping special containers such as refrigerated, hazardous, overweight, overlength, etc containers.

3. *Warehouse facility: A* warehouse facility is a covered space/shed where export cargo are received and import cargo stored/delivered. Here, containers are stiffed/stripped or reworked. The LCL container exports are consolidated and import LCLs are unpacked and cargo here are physically examined by Customs. Export and import consignments are generally handled either at separate areas in the warehouse or in different nominated warehouses/sheds.

4. *Gate complex:* The gate complex regulates the entry and exit of road vehicles carrying cargo and containers through the terminal. It is a place where documentation, security and container inspection procedures are undertaken. 11.6.

11.5 Benefits of ICDs/ CFSs

1. Improved communication and information flow.
2. Saving time required for paperwork at distant ports.
3. Reduction in the intermediate service costs in terms of handling of goods.
4. Elimination of storage, demurrage and late documentation fees.
5. Elimination of clearing and forwarding agents' fees at seaports.
6. Possible elimination of the need to extend periods of marine insurance.
7. Benefit to seaport/airport in terms of efficient circulation of good and decongestion.
8. Saving inventory buildups in factories.

9. Reduction in overall transport cost per box.

10. Provision of concentration points for long distance cargo and its unionization.

11. Serves as a transit facility.

12. Customs clearance facility made available near centres of production and consumption.

13. Reduced level of demurrage and pilferage.

14. Elimination of Customs check at gateway ports.

15. Issuance of clean bill of lading by shipping lines, who would then assume full liability of shipments.

16. Reduced overall level of empty container movement.

17. Competitive transport costs.

18. Reduced inventory costs.

19. Increase trade flow.

20. Optimal use of road and rail transport and better capacity utilization

21. Lower door-to-door freight rates.

22. High safety of cargo.

23. Clearance of goods near the place of equipment and loading near factory of production

24. Decongestion of seaports, transforming them into transitory ports.

25. Promotion of importation through the country's ports instead of neighbouring countries, which Nigerian importers have resorted to in recent times.

26. Reduction in long distance haulage to the hinterland, which importers have to cover

27. Accelerated development of supportive economic and transport infrastructure in the areas of rail, road and water transport.

28. Stimulation of economic growth and job creation, stemming the tide of mass urban migration and

facilitating easy access to port transit services for the northern landlocked boarders of Burkina Faso, Central African Republic and Chad.

11.6 Advantages of ICDs/ CFSs

- Increased trade flows
- Enhanced clearance and collection of goods at the port
- Employment creation
- Stimulation of the development of rural areas, especially ICD locations and their environs
- Reduced transport externalities, such as traffic congestion, road accidents, and air and noise pollution, as containers are transferred to depots by rail
- Reduced theft and pilferage, as containers are mainly carried from ship to rail via ICD ports.
- Reduction in intermediate service costs in terms of handling of goods.
- Elimination of storage, demurrage and forwarding fees at seaports.
- Improved information and communication flow.
- Reduced prices of commodities.
- Reduction in the overall transport cost per box.

11.7 Disadvantages of ICDs/ IFS

- Absence of economically sound goods.
- Loss of revenue to government as private operators may collude with government agencies to defraud

government.

- Loss of cargo, which could be due to accident as they are being transferred from seaports to the dry ports through road or uncoordinated rail tracks.
- Increased transit costs of cargo.

- Traffic congestion both in towns and highways, as cargo are being transferred to their destinations.

11.8 Challenges of ICD/CFS Operation in Nigeria

- Non-availability of carrying units, especially the 'rolling stock' of the Nigerian railways
- Non-availability of a developed integrated intermodal facilities, which means failure for the project
- Multiplicity of government agencies at the ports, which lead to cargo delay
- Government policy inconsistencies, as these affect ICD operations
- Lack of railway connectivity.

11.9 Conclusion

The government current zeal to rehabilitate the rail way cooperation for public transportation meant for socio-economic transformation should be extended to the operations of ICD's/CFS's as a total overhaul of our national economic emancipation at the end. Good reasons hold of the fact that, government in her wisdom should invest wisely in the reconstruction of abandoned rail lines and extend same to these six identified concessioned ICDs operational terminals in the country. Also, they should invest in modern locomotives that will stand the test of time in the operationalised the business of ICDs/CFSs, which is cardinal and key to economic growth and development. Effective Operation of Inland Container Depots

The establishment of inland container depots in the six geopolitical zones of the country is, no doubt, a welcome development. ICDs are transit facilities located in the hinterland and equipped with fixed and movable installations for handling and storage of cargo; they have public authority status and are operated under the landlord port management model, such as is practised at the Onne Port Complex,

Rivers State. However, for ICDs to achieve the desired objectives, government must provide integrated intermodal transport facilities in the country. As mentioned earlier, the Nigerian government is involving the Nigerian Railways Corporation in the project alongside the Nigeria Ports Authority (NPA), Nigerian Maritime and Safety Agency (NIMASA), and the Nigeria Shippers Council (NSC). Without an effective integrated transport system, the project would fail, as rail transport is pivot to inland container depot operations. The operation involves large and extra-large containers and other equipment being conveyed from ports to ICDs areas through rail lines. However, considering the current condition of Nigerian Railways Corporation, one doubts if it has the capacity to meet up with its obligation towards the smooth takeoff of ICDs across the country. This is where the government should come in, to put this infrastructure in place; it should provide rail tracks, rolling stocks, terminals, marshalling yards, running sheds/mechanical workshops, etc. Moreover, the existing rail lines at various ports must be rehabilitated.

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Economics of Port and Shipping Operations

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12.0. INTRODUCTION

The field of maritime economics is very broad and includes the integrated study of ocean transportation (shipping) and port operations within a global supply chain management context. Shipping refers to physical movement of goods and passengers to the port of demand from the port of supply. Shipping operation includes all related activities required to support and facilitate movements. The movement of goods by sea is the economic life blood of nations. This is because roughly three-fourth of the earth's surface is covered with water, thus shipping plays an important role in world trade. In this chapter, the economics of ship and port in the global sea trade is examined.

12.1. World Shipping and Maritime Trade

Many of the commodities that are transported by sea are usually raw material which are heavy, dense and have low economic value such as the like of coal and iron ore. Transporting these goods over vast distances by ships is cheap and economical. Ocean transport costs are relatively cheaper in comparison to other means of transport and there are no substitute to shipping. On the other hand, shippers of finished/manufactured goods take advantage of the comparatively inexpensive rates charged for ocean transport. Ships have a lot of cargo space and are reasonably free of capacity constraints. Moreover, ships have acceptable transit times. Because of all these, 90% of global trade is done by sea, the operation of cargo ships brings an annual income of about US Dollar 3800 billion in freight. This amount is about 5% of the total world economy.

The situation in world shipping is closely connected to the development of the international seaborne trade which it serves. The theory of trade is connected

with the question "why do countries trade? At first sight this seems too obvious to deserve very much attention, but in reality trade cannot be taken for granted in a world of politically motivated nation states. If countries do not believe that trade is in their interest they can close their borders. China, the USSR and Japan have followed this policy in history. A policy of not trading or limiting trade by tariffs or quotas is known as protectionism sum or in its extreme isolationism. Against this backdrop, United Nations Conference on Trade and Development (UNCTAD) was established in 1964 as the principal organ of the United Nations General Assembly dealing with trade, investment and development issues. The organisations goals is to maximize trade, investment and development opportunities of developing countries and assist them in their effort to integrate in the world economy on equitable basis. An important aspect of UNCTAD activities is aimed at a more orderly development of the world fleet, equal participation of all countries in international shipping, the creation of possibilities of further cooperation of countries with different economic and social systems, and also better understanding between sea carriers and shippers. As at October, 2012, 194 states are UNCTAD members. In the same vein, the World Trade Organisation (WTO) deals with global rules of trade between nations. Its main function is to ensure that trade flows as smoothly, predictably and freely as possible:

The proof that international trade is beneficial to trading countries was provided by Adam Smith theory of absolute advantage. He argued that countries are better off if they specialize in trading their surplus production for the other goods they need. Specialisation allows them to become more productive and everyone benefits because the world's limited economic resources (factors of production) are used more effectively. David Richardo filled the gap left by Adam Smith Law of Absolute advantage by propounding the theory of comparative

advantage by proofing that trade is beneficial even if one country is more efficient than its trading partners at producing all goods.

12.2. Economic of Shipping Operation

The main issues to be discussed here include;

- Demand for shipping services
- Supply of shipping services
- Pricing and Output decision in the shipping market.

12.2.1. The Demand for Shipping

Customers of sea transport have special requirements which are expected to be met by shipping companies who provide a range of tailor made services and solutions. Some of the criteria that may affect shipper decision making when it comes to the choice of mode of transport include:

1. Price
2. Speed
3. Reliability.
4. Security
5. Substitutability for the mode

1. Price:

Shippers of cargo pay greater attention to the freight cost depending on the percentage that it makes up of the CIF (Cost, Insurance and Freight) Cost. For example the cost of transporting a barrel of oil from the Persian Gulf to Europe Cost about 49% of the CIF cost in the 1950s. Because of this the oil majors had their own tanker fleet so as to have greater control over the cost of ocean transport. But today the cost of sea borne transport is only about 2.5% of the CIF cost and therefore the oil majors prefer to charter tankers. Also, in the 1950s the cost of transporting a ton of coal from the Atlantic to the Pacific was about USA 10-15 per

ton on a 2000 DWT vessel. Today the same coal is transported at similar rates on 150000DWT vessel. This has been achieved by economic of scale.

2. Speed

Transit times are key for shippers of high value goods. Average speed of deep sea going container vessel ranges from 17 knots in 1985 to 22 knots in 2007. In comparison to cost of holding inventories in warehouse, it is cheaper to ship smaller quantities as and when required. Although, the freight rates will be higher as it is still smaller in comparison to the overall cost of stocking.

3. Transport Reliability

Shippers are ready to pay premium freight for shipping services which provide Just In Time (JIT)/Kanban deliveries. Container ships are nowadays being used as floating warehouses. Speeds can be increased or decreased in order to deliver product exactly when needed.

4. Security:

The safety and security of ships, cargo and personnel is critically important to the liner shipping companies that are members of World Shipping Council. There is need to safeguard maritime transport system and offshore facilities from terrorism and unlawful interference.

12.2.2. The Variables in the demand for shipping

The demand for shipping is measured in ton miles of cargo. Ship demand is mercurial and quick to change, sometimes as much as 10-20 percent in a year (Stopford, 2003). The variables that determines the demand for shipping include:

- The world economy
- The trade elasticity of world economy
- The nature of seaborne commodity trade

- Political disturbances and the Geopolitical scene
- Transport cost
- Globalisation
- Dispersed manufacturing
- Increased global demand for commodities and consumer goods
- Technology
- Demographic shifts
- New regulations to increase safety and to reduce environmental pollution
- Congestions and delays.
- The effects of speculation

1. The world economy

The demand for shipping is a derived demand and the world economy is the greatest influence of the demand for shipping services. This happens through the import of raw materials and the export of finished commodities. There is a strong relationship between industrial production and growth in maritime fleet. Therefore shipping business is cyclical as it is also affected by the fluctuations in the world economy. The sources of this business cycle include:

a. The multiplier and accelerator effect: This is the interaction between consumer demand and investment. Growth in local investment gives rise to consumerism. Workers, in growing industries have surplus cash to spend. This is referred to as investment multiplier. This extra circulation of cash in the economy causes growth and this is known as income accelerator. This In turn causes even more demand for consumer goods. Conversely, when the economy heats up the reverse happens and the economy goes into a slump. This causes instability.

b. Time – Lags: Usually when ship owners make a lot of money in a buoyant market they start placing orders for new buildings. These new buildings are usually delivered when the market is in a slump which further depresses the market. At this stage the owners don't place any more orders with the yards and they too run out of business. So the delays in the time taken between placing new buildings orders and the arrival of new vessels also cause ups and downs in the cycle.
c. Stock building: During an economic down turn manufacturers reduce their inventories and this further depress the demand for shipping. However when the economy shows signs of recovery, there is a rapid increase in the demand for sea transport as manufacturers increase stock. This leads to a sudden and explosive boom period for the shipping industry.
d. Random Stocks: These events stand alone and are not like cycle. For example change in weather and wars which can have profound effects in the demand for shipping.

2. **The trade elasticity of the world economy**: This is the long-term relationship between seaborne trade and world economy.

$$\text{Trade elasticity} = \frac{\%\text{ growth of sea trade}}{\%\text{ growth in industrial production}}$$

For most of the last 30 years, the trade elasticity has been positive, average 1.4 i.e sea trade grew 40% faster than world industry (Stopford, 2003). Trade elasticity of different regions will change due to some reasons. Firstly over a period of time the source of domestic raw materials begin to get exhausted and

then countries have to start importing from other countries. Secondly, as economies become very developed they begin to import less of raw materials as their activity tends to become less resources intensive and more service oriented. Last but not the least over time some countries loses their economic importance whereas others gain in economic importance: for example in the 1960s steel mills in Europe started importing iron ore from abroad.

3. The nature of seaborne commodity trade:

Due to the seasonal nature of some of the agricultural commodities it is difficult for shippers to plan ahead their transport requirements and hence they prefer to work more to spot markets which tend to be more volatile and unstable. An example was the increase in demand for oil in Europe in winter time. Secondly, trade patterns change with changes in the source of supply. When local sources are depleted then countries have to rely on imports and this affects the demand for sea transport. An example is the import of iron ore by European steel mills from Australian and Brazil. Thirdly, relocation of the processing of raw materials can also have a direct effects on vessel type/size and the quantities transported. As raw materials like Bauxite are refined, it provides Alumina which is lower in volume and therefore needs a smaller tonnage than Bauxite.

4. Political disturbances and the Geographical Scene

Political events such as wars, revolution, coups, hostilities, political nationalization of foreign assets and strikes can all have an indirect effect on the demand for shipping. After 11 September 2001 terrorism and piracy negatively affected shipping on the account of growing concern for the cost of security.

5. Transport Cost

Seaborne transport cost have progressively decreased in the last 50yeras. Ships have become bigger in size, greater efficiency at port and more efficient organization of shipping operations have all contributed to lowering of transport

cost on account of the economies of scale and better and higher quality of service. This has led to an increase in demand for sea transport.

6. Globalization

On account of globalisation markets around the globe have increased in size and progressively become bigger. Many homogenous trading blocs such as European Union (EU), North American Free Trade Agreement (NAFTA) and Association of South East Asian Nations (ASEAN), Economic Community of West African State(ECOWAS), African Union(AU) have been established. These have facilitated increased cross border trade and remove barriers to free movement of goods among members states. This promoted the demand for shipping.

7. Dispersed Manufacturing

In the past Japan was the biggest manufacturer of durable consumer goods. Later on with economic prosperity the cost of manufacturing went up so that other low cost manufacturing centres were established in countries like Taiwan and South Korea. Today China is the biggest manufacturer of consumer goods and one third of the world's container traffic goes to and from China. A future manufacturing hub is Vietnam. Since these low cost manufacturing centres are developing further and farther away from the major consuming areas the demand for shipping is going up as the ton per miles goes up.

8. Global Demand for Commodities and Consumer goods

With increased economic prosperity, the low cost manufacturing centres of the world are investing heavily in their own domestic infrastructure. This leads to an increase in global demand of raw materials such as iron ore and coal. The new found wealth of developing countries is playing an important role in increasing the demand for shipping. It has been predicted that in the nearest

future the purchasing power of certain Asian countries will soon surpass that of the USA and Western Europe and other most developed countries of the world.

9. Demographic Shifts

Today the world's population is concentrated in Asian countries. India and China are the two most populous countries in the world. Other South Asian countries are also catching up. On the other hand the industrialized countries in Europe and North America are having ageing populations. So the demand for shipping in the future will definitely be focused on Asia.

10. Technology

Technological advancement in navigational equipment, less friction hulls, less polluting and more efficient engines, and better propulsion systems have all contributed to making shipping safe and more environmentally friendly. This has in turn increased the demand for shipping service.

11. New Legislation to improve safety and to reduce environmental pollution

With high profile maritime accidents such as Exxon Valdez, Prestige and Erica incidents the governments of the USA and Europe have passed mandatory legislations to phase out single hull tankers for double hulls. This has increased safety but on the other hand has resulted in the scrapping of single hull tankers which in turn reduce supply and therefore increase demand for shipping.

12.Congestion and delays:

Port congestion in bulk cargo loading ports like that of Australia and Brazil and discharging ports like that of China also help in increasing the demand for shipping in the short run. This is because on account of severe congestion vessels have to anchored mid sea for 2 to 3 weeks before they can berth. This decreases the supply in the market of free tonnage and therefore increase demand for ships in the short run.

13. Effect of Speculation

Predictions, projections, forecasts and expectations of shipping gurus and pundits in the industry can sometime increase and decrease demand of seaborne transport (the case of irrational exuberance). As an example in 1970 there was prediction that Japan steel production would double in 5 years. This motivated Japanese steel mill charterers to chartered more ore in large quantities. This frenzy led to about 40% of the world bulk fleet (19000 ships or 40 million diot) being chartered simultaneously. This led to sharp increase in the demand for bulkers and freight rates went up. Then in the winter of 1970-71 the same charterers withdrew from the voyage market and suddenly there was surplus of unemployed tonnage in the market. This sent demand spiraling and with it the freight rates.

12.3. Supply of Sea Transport

In the short term, the merchant fleet represent the fixed stock of shipping capacity. At a point in time only part of the fleet may be trading some ships may be laid up or used for storage. Supply of ships services is slow and ponderous in its response to change in demand. Merchant ships take several years to build and this in itself introduce a time-lag into the response to an upsurge in demand. Once built, ships have a physical lifespan of 15-30 years. So responding to a fall in demand is a lengthy business, particularly where there is a large surplus to be removed.

The surplus of ships are controlled or influenced by four groups of decision-makers, namely:

ship owners,

shippers/charterers,

the bankers who finance shipping and

the various regulatory authorities who make rule for safety.

Ship owners are the primary decision-makers, ordering new ships, scrapping old ones and deciding when to lay up tonnage. Shippers may become ship owners themselves or influence ship owners by issuing time charters. Bank lending influences investment and it is often banks who exert the financial pressure that leads to scrapping in a weak market. Regulations affect supply through safety or environmental regulations which affect the transport capacity of the fleet.

Number of Ships in the world merchant fleet as of January 1, 2013, by type

Bulk Carriers = 17,400

General Cargo ships = 10, 000

Crude oil tankers = 74, 000

Container ships = 5,000

Chemical tankers = 4,990

Round/passengers ships = 2,700

Liquefied natural gas tankers = 2,200

Source: Stastica, The Statistical Portal.

12.4. Relationship Between Demand, Supply and Freight Rate in Shipping

Supply and demand are the forces that makes market economics work. The inter play of supply and demand in shipping determines the freight rate. According to Stopford, 2003 “Ship owners and shippers negotiate to establish a freight rate which reflects the balance of ships and cargoes available in the market”. As supply of tonnage in the market goes up demand falls and so does the freight rates. On the other hand as supply of tonnage in the market fall demand increase and so do freight rate. This induces ship owners to provide more transport. Demand, however, rarely exceed supply for long: rather, there

tend to be relatively short peaks of prosperity in the freight markets, followed by longer slumps, Lorange, 2010. The supply of shipping services change very slowly to a response to change in demand. On the other hand demand for shipping services changes very rapidly. Ships take several years to build and more over ships have a life span of between 15 to 30 years. So when demand falls the fall in supply will take a very long time to catch up. As an example in the mid 1970s tankers demand fell drastically by 60%. It took more than 10 years for supply to adjust to the fall in demand. Although there was no demand for tankers in the period supply continued to increase as new building ordered during the good times were delivered. So demand fell further and freight rate hit the bottom. This forced owners to start scrapping the vessels.

12.5. Substitutes for Shipping

There is no perfect substitute to shipping because of the following reasons

- Cost effectiveness: Shipping is the most cost effective mode of transport per TEU or per ton or per cubic metre of cargo carried. As an example seaborne transport is just about 10-15% of the total costs for road transport.
- Space: Ships come in various size. So there are no space constraints. The bigger the ship the lower is the freight cost due to economies of scale. This is very important when it comes to shipping of raw materials which are actually shipped in large volumes.
- Environmental Pollution: Shipping is one of the least polluting forms of transportation. This is especially of importance in the container shipping where green shippers like IKEA, Starbucks and Wal-Mart pay very close attention to the emissions in seaborne transport which will increase in the demand for shipping.

- Safety: Shipping also has a reasonable safety record in terms of accidents, spills and collisions. Regulations, fines and public opinion have resulted in shipping becoming safer means of transport.
- Accessibility: 75% of the world is covered with water thus shipping permits access even to remote located countries except they are land locked.

12.6. Port Economics

Port like other physical infrastructure, are often difficult to justify in economics terms at the time when the planning for them should really be carried out. That is before the existing facilities become overloaded and are clearly incurring additional congestion costs in passing cargo through. The benefits of port developments are invariably derived from reduction in the cost to ships using the port. One can argue that this reduces the freight costs of the cargo (in practice, the often means that the freight costs do not rise as rapidly as they would otherwise have done) and that these cost reductions are eventually passed on to the consumers in cheaper prices for the goods. The port gains if it is able to accommodate greater quantities of cargo that might otherwise be diverted to other ports-or not move at all- thereby increase its financial revenue.

The benefits of ships fall into three principal categories, usually the largest of these is that reduction in costs of ships' time wanting to use the port. While ships are queuing to use port facilities they cost almost as much as if they were steaming and it is all wasted expenditure. The appropriate solution to relieve the problem is not always to build more berths, for these may stand idle when there is not an influx of ships and fail to recover their cost. Waiting time may be reduced by other methods, such as:

- Longer Shift working
- Quicker Landing
- Agreement to schedule services so that shifts do not “bunch”, and hence make more efficient use of the available facilities.

Selection of the optimum approach would normally involve a detailed analysis of trade patterns, ships, queuing and the capacity of existing facilities.

Ships also incur costs while their cargo is being worked, during their services’ time. Service time costs also apply to other transport units and facilities such as:

- Road transport awaiting collection and deliveries
- Stevedoring labour costs
- Transport shed and storage area space.

The use of more efficient and higher capacity handling plant will reduce service time and it is again a matter of analysis to determine whether the benefits are likely to outweigh the costs of the plant or alternatively, what scale of new equipment provision is likely to be justified by the polluted benefits.

Furthermore, port development may reduce ships’ cost by permitting the use of large ships, which have lower unit freight costs. Major benefits of the nation are usually obtained from increase in the permissible draught but there may also be length or width limitation that could be ceased. Such benefits are not always fully or easily realizable. For example, deeper draught may require disproportionate cost in maintenance dredging. A port may increase the permissible size of ship but ship owners may not wish or be able to change their present fleet composition because they do not believe that additional trade will be forthcoming. Also larger ships may imply larger consignments which incur higher costs in financing the inventory of

goods while they are in transit. Manning operations, in particular are often not able to increase consignment sizes because of additional stock piling costs and the limitations of facilities at the other end of the route.

Finally, establishment of a new port or relocation of an existing port may make little difference to the marine transport costs but considerably alter the costs of inland transport serving its hinterland. This must be taken into account in any evaluation of the likely economic consequences.

12.7. Pricing of port services

Pricing of ports services by the operators is considered quite a complex and un transparent matter and as such it is sometimes perceived as archaic. This often led to debates about subsidies, capital market and the dredging and deepening of maritime access routes, which raises questions of potential competition and/or abuse of monopolistic power.

When a ship calls at a port, it may be liable for a charge, for example, a conservancy charge, even in the approach channel. It has as a rule to pay for aids to navigation and pilotage. In the harbor basin a mooring charge may be payable. A dock entrance fee and dockage would be levied upon entering an enclosed dock. Then the berthing operation may require tonnage. At the berth, a berth occupancy charge is likely to be charged. On top of this, or sometimes as a substitute for some aforementioned charges, a general port due on the ship is payable for the discharge of cargo, shore cranes are hired, which involves cranage. When cargo is being unloaded the stevedoring charge has to be met by the ship owner.

At quay, the cargo becomes the object of port charge. Port dues on the cargo, wharfage, or quayage, as these charges also are called to indicate that they are imposed on goods that pass over the wharf or quay. Normally these charges are

recovered directly from ware owner, but it also happens that port dues on the cargo are paid by the ship owner.

Before the cargo is transferred to land vehicles, considerable additional cargo handling is required and a general handling charge will be levied on the ware owner. Specific services like reconditioning of the cargo, weighing, measuring and marking may also be separately charged for. Last but not the least, transit storage rent will be paid normally after a free period of transit storage.

The aforementioned charges do not exhaust the wide assortment of port charges found in different port of the world. In addition, there is a number of charges for specific services like pilotage, tonnage and fire protection.

The following outlines the classification of prices for the transfer of goods between sea and land transportation

- Port facilities user charge (port charge for short)
- Occupancy charge levied per unit of time of use of berths, cranes and storage facilities.
- Port dues levied on ship tonnage or cargo tons
- Prices for specific services
- Cargo handling charge
- Stevedoring charge
- Other cargo handling charge.

12.7.1. The Value – of – Services versus the cost – of – service pricing principle in seaport operation

The objective to obtain equity by charging port users prices that are as close as possible to the relative costs can be referred to as cost-of-service principle of pricing. In ports, as well as elsewhere in the transportation business, this principle is challenged by value of service principle of pricing.

However, the policy of seaport includes ingredient of both principles. The proportion of the two ingredient varies from one country to another and (to a less extent) from one port to another within a country. The basis for the cost of service principle is that port users are different and put different demand on the facilities. For instance a fully loaded ship of deep draft requires deeper water. Also a long ships require wider berths.

Furthermore cost of service principle is premised on the believe that misallocation of resources will be the result unless cost responsibility is exacted. For example, it is claimed by economists that ships will be too long if ship owners, are not responsible for the cost of port investment caused by the growth in ship size.

The value of service goes under a number of different names. The benefit principle is a common name in public finance literature. “Charging what the traffic will bear”, is often used in transportation industries to refer to value-of-service pricing principle. A possible difference in meaning is that charging what the traffic will bear indicates outright revenue maximization; whereas value of service principle does not necessarily go further than a differentiation of charge for a given service according to individual benefits as revealed by individual abilities to pay.

In the port value of service principles is the underlying principle of port dues on cargo. Like other transport enterprise, port charge are applied on different goods or what markets can bear. Unit value of commodities plays a similar role for port dues as for freight rates. Port operators commonly justify value of service by arguing that the capital costs, which the dues are meant to recover, cannot be allocated meaningfully between traffics. Therefore, it is better to maximize throughput. This will keep up the capacity utilization which keeps down the capital cost per ton of throughput.

Percentage distribution of Port Charge

Basis of Charge	GRT	NRT	Length of Ship	Draft of ship	Other	
Port due of ship	21	68	5	-	6	100
Aids to navigation	8	82	-	-	10	100
Pilotage	28	38	-	17	17	100
Berthing/unberthing	25	20	5	-	50	100
Berth Occupancy	18	42	30	-	10	100

Source: Port Pricing Report by the UNCTAD Secretariat (United Nation, 1973)

12.7.2. Price Differentiation

The great variety of port charges is not just due to a number of different parties on the supply side, but also to the great variety of ships and cargoes demanding service. This variety makes the equitable differentiation of charges an extremely complicated matter. The resource requirement of different customers are almost infinitely variable. Any simple system of port charge is therefore bound to cause some complaint of unjust treatment.

It is even possible to claim that each individual customer makes virtually unique demands on port resources. To produce a water tight tariffs listing the separate charge for each individual customer is out of the questions. In order to produce reasonably slim tariffs of port charge and stevedoring charge, equity has to be renounced. The question however is what is the proper balance between simplicity and faithful reflection of cost?

12.8. Conclusion

This paper has attempted to look at economics of shipping and port operation from the key economic issues of demand, supply, costing, pricing and market structures in the maritime industry. The determinants of demand for and supply of maritime services both by shipping companies and port operators have been discussed. The difficulties of and complications in applying purely economic

principle of user charge in the pricing of maritime transport service were also demonstrated.

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Chapter Thirteen
Perspectives Of Maritime Safety And Security In Nigeria.

O. E Hilary

13.0. Introduction

Maritime industry is typically a global business; it contributes more than 70 percent volume of the world trade. The open nature of the business itself has attracted both the local and international concerns for further economic prosperity; this however also renders the business exclusively vulnerable to various maritime threats.

In the past decades, the sea was acknowledged to be a more secured mode of transport. In the recent time it has become the den of robbers, violent men create fears in the heart of the seafarers and make navigation difficult and unsafe especially each time ships sail into violent hub areas.

Efforts to reduce these perils at sea are being taking by International Maritime Organization (IMO) and other related United Nation agencies, which their conventions and resolutions are enforced and implemented by coastal state and the flag state. Among the key conventions and codes made hitherto include the International Safety Management(ISM) embedded in SOLAS Chapter IX and the International Ship and Port Facility Security (ISPS) code (SOLAS Chapter X-2, as amended) that emerged after the dreadful terrorists attack on the World Trade Center (WTC) on 9/11. These two codes have brought about a turning point in the shipping industry, the former deals on measures to enhance the safety standards of ship operation with respect to ashore-base and shore-base safety management approaches while the latter promotes measures enhancing ship and port security.

In this chapter, the author focuses on understanding the key components of maritime safety and security by providing detail definitions in each case. The

awfully acts that causes insecurity in the maritime industry and measures adopted at the local and international level to minimize their effects are also discussed.

13.1. Concepts Of Maritime Safety And Security

There are no generic definitions of maritime safety and security; however there exist some contextual definitions, which few experts and authors attempted to relate to their functions.

The words 'safety' and 'security' are fundamentally synonymous, but in the shipping industry, it makes sense to distinguish between maritime safety and maritime security. For instance, SOLAS convention relates to safety of lives and properties at sea while International Ship and Port Security code and Suppression of Unlawful Acts against the Safety of Ship Navigation of 1988 (SUA convention) relates to security of lives and properties at both port and sea. The concepts are easy to understand as soon as the reader figures out exactly what each of the conventions promotes (Mejia, 2002). For example, SOLAS focuses on measures to protect humans from accident caused by hazardous or substandard ships while the latter is designed to protect humans against fellow humans with criminal intent.

In another dimension, the word 'security', in the context of 'protection' is identical with 'safety'. Protection of ship against maritime threats is in the other way a protection for ship safety, properties and the lives of the crews. The new chapter (XI) created in SOLAS 74, on Maritime Security, considered "measures to enhance maritime safety". In annex (Chapter XI-2), it also stated "measures to enhance maritime security". The above expression clearly shows how the two subjects are closely related. It is difficult for one to say, he is safe when his security is not guaranteed and also unacceptable to say, I am secured when one is vulnerable to danger and attack.

13.2. Maritime Security

Maritime Security can be defined as those measures employed by owners, operators, administrator of vessels, port facilities, offshore installations, and other maritime organizations or establishment to protect, prevent unlawful acts such as terrorism, seizure, sabotage, violence, piracy, armed robbery, pilferage and other security incidences(Mejia, 2002).

It is also defined as the mechanisms put in place to protect ships and their crews against acts of violence at sea, this according to UN document A/63/63, paragraph 39, at p. 15 include "direct threats to the territorial integrity of a State, such as an armed attack from a military vessel".

Maritime security is concerned with the prevention of intentional damage through sabotage, subversion, or terrorism, seizure, violence, piracy, armed robbery, pilferage, and other security incidents.

Maritime Security in a wider perspective mainly concerns with:

1. The Port Security: Requires security measures for ports in order to reduce the risks and to mitigate the results of an act that threatens the security of personnel, facilities, vessels, and the public. The measures draw together assets within port boundaries to provide a framework to communicate, identify risks, and coordinate resources to mitigate threats and consequences.
2. Vessel Security: Requires measures to regulate vessel security. The regulations within such measures require the owners or operators of vessels to designate security officers for vessels, develop security plans based on security assessments, implement security measures specific to the vessel's operation, and comply with current Marine Security level (ISPS code).
3. Facility Security: A facility is defined as any structure or facility of any kind located in, on, under, or adjacent to any waters subject to the jurisdiction of

any coastal State and used, operated, or maintained by a public or private entity, including any contiguous or adjoining property under common ownership or operation. Some examples of facilities are barge fleeting facilities, container terminals, oil storage facilities, and passenger vessel terminals.

4. Outer Continental Shelf (OCS) Facilities: These are generally offshore fixed platforms in water depths ranging up to 1,000 feet deep whose primary purpose is the exploration, development, and/or product of offshore petroleum reserves. This definition also includes novel floating design such as Tension Leg Platforms (TLP); Floating Production Facilities (converted MODUs) and Floating Production Storage Offloading units (FPSO).

13.3. Maritime Safety

Conversely, maritime safety is concerned with ensuring safety of life at sea and safety of navigation. The global regime is provided in United Nations Convention Law of the Seas (UNCLOS), which establishes the rights and duties of states in respect of maritime safety (See UN document A/63/63, paragraph 161, at p. 44.) Maritime safety deals with the measures to ensure protection against accidents at sea that may be caused by substandard ships, unqualified crew, or operator error.

13.4. Threats To Maritime Security And Safety

Threats to maritime security have always been given serious concern to stakeholders in the maritime industry both locally and globally. Ships have always been under danger from different forms of unlawful acts such as piracy, armed robbery, pilferage, terrorism, criminal activities, etc. The report on pirate and armed robbery actual attacks against ships worldwide is of a high increase in the recent time. For example, between 2003 and 2013, a total of 3,877 incidences have been recorded (ICC-IMB, 2003-2013). Some of the major attack preceding 2003 include:

- The hijacked of 'Portuguese Luxury Liner' by own crew in 1961.
- The hijacked of Anzoategui (Venezuelan freighter) with thirty-six crews onboard in 1963.
- In 1970, 'Columbia Eagle', a US flag vessel was seized by two crew member while on voyage to Thailand.
- The hijacked of Achille Lauro(an Itallian cruise vessel) 1985 by four Palestine gunmen in the eastern Mediterranean sea and one passenger was killed during the incident.
- In 1988, 'City of Poros' a passenger vessel was attacked by a group terrorists and left nine people dead while ninety-eight were reported wounded.
- In 1996, Avrasya, the Panamanian flagged passenger ferry was hijacked in the port of Trabzon, Turkey, by nine men supporting their embattled Chechen comrade in Pervomayskoye.
- The attack on 'Our Lady of Mediatrix', cruise vessel in 2000, where forty people were killed and 50 wounded.
- USS Cole, a US Naval vessel was attacked by a terrorist boat laden with explosives off Aden harbour, Yemen on 12 October 2000 while she was refuelling offshore, 17 crews were killed in that attack.
- French tanker 'Limburg' was attacked by a boat laden with explosive in Yemen on October 2002 and one crew member was killed in the incident

Threat to maritime security can be in form of the following:

1. Terrorism

Terrorism is the "use of violence for political ends [including] violence for the purpose of putting the public or any section of the public in fear" (U.K. Prevention of Terrorism Act, 1976)

Terrorism is also defined as criminal acts intended or calculated to provoke a state of terror in the general public, among a group of persons or particular persons for political purposes which are in any circumstance unjustifiable, irrespective of a political, philosophical, ideological, racial, ethnic, religious or any other basis that may be invoked to justify them.

In considering the nature and experience of global terrorism Okonna, (2011) recognised that maritime industry may be at risk from:

1. Attempts to use ships as means of delivery of weapons of mass destruction or major explosive devices such as Chemical, Biological or Radiological (CBR) materials for an unconventional attack on target states.
2. Use of a "trojan horse," such as a fishing trawler, resupply ship, tug, or similar innocuous-looking vessel, to transport weapons and other battle-related material.
3. Attempts to hijack ships taken passengers and crew hostage in order to gain leverage.
4. Direct attacks on personnel and passengers within ports.
5. Direct attacks on ships where the state of registry or the operating company is deemed to be representative of a target state.
6. Direct attacks on the port infrastructure.
7. Direct attacks on industrial processes in ports and surrounding areas such as nuclear power plants and hazardous/noxious chemical and other works.
8. The release of hazardous or noxious cargo, from ships or within ports to cause widespread danger to life or marine environment.
9. Sabotage of navigational facilities and other areas vital to the operation of ports.

The National Advisory Committee on Criminal Justice Standards and Goals of USA classified terrorism into six categories:

1. Civil disorder – A form of collective violence interfering with the peace, security, and normal functioning of the community.
2. Political terrorism – Violent criminal behavior designed primarily to generate fear in the community, or substantial segment of it, for political purposes.
3. Non-Political terrorism – Terrorism that is not aimed at political purposes but which exhibits “conscious design to create and maintain a high degree of fear for coercive purposes, but the end is individual or collective gain rather than the achievement of a political objective.”
4. Quasi-terrorism – The activities incidental to the commission of crimes of violence that are similar in form and method to genuine terrorism but which nevertheless lack its essential ingredient. It is not the main purpose of the quasi-terrorists to induce terror in the immediate victim as in the case of genuine terrorism, but the quasi-terrorist uses the modalities and techniques of the genuine terrorist and produces similar consequences and reaction. For example, the fleeing felon who takes hostages is a quasi-terrorist, whose methods are similar to those of the genuine terrorist but whose purposes are quite different.
5. Limited political terrorism – Genuine political terrorism is characterized by a revolutionary approach; limited political terrorism refers to “acts of terrorism which are committed for ideological or political motives but which are not part of a concerted campaign to capture control of the state.
6. Official or state terrorism –"referring to nations whose rule is based upon fear and oppression that reach similar to terrorism or such proportions.” It may also be referred to as Structural Terrorism defined broadly as terrorist acts carried out by governments in pursuit of political objectives, often as part of their foreign policy

In principle the acts of terrorism include among others bombing, hijacking, kidnapping, arson, assassination, hostage taken, ambush, and illegal boarding.

2. Piracy and Armed Robbery at Sea

Merriam-Webster defines piracy as "an act of robbery on the high sea", "an act resembling such robbery", and "robbery on the high sea"

International Chamber of Commerce (ICC) and International Maritime Bureau (IMB) adopted the definition of piracy as follows: "An act of boarding or attempting to board any ship with the apparent intent to commit theft or any other crime and with the apparent intent or capability to use force in the furtherance of that act". The customary definitions of piracy are considered under article 101 of the United Nations Convention on the Law of the Sea (UNCLOS) of 1982 which consists of any of the following acts:

a. any illegal act of violence or detention, or any act of depredation, committed for private ends by the crew or the passengers of a private ship or a private aircraft, and directed: on the high seas, against another ship or aircraft, or against persons or property on board such ship or aircraft.
b. against a ship, aircraft, persons or property in a place outside the jurisdiction of any State;
c. any act of voluntary participation in the operation of a ship or of an aircraft with knowledge of facts making it a pirate ship or aircraft;
d. any act of inciting or of intentionally facilitating an act described in subparagraph (a) or (b)."

3. Armed Robbery Against Ships

Under the Code of Practice for the Investigation of the Crimes of Piracy and Armed Robbery against Ships (Resolution A.1025 (26), Annex, paragraph 2.2), armed robbery against ships is defined as follows:

(a) Any illegal act of violence or detention or any act of depredation, or threat thereof, other than an act of piracy, committed for private earns and directed against a ship or against persons or property on board such a ship, within a State's internal waters, archipelagic waters and territorial sea;

(b) Any act of inciting or of intentionally facilitating an act described above.." (MSC.4/Circ.147, 2010).

The definitions of piracy and armed robbery are complicated, however, it is important to communicate the salient features in the above definitions that piracy involves an act of:

(1) an illegal act of violence
(2) motivated by pirate gain
(3) committed by persons on board by a pirate ship
(4) directed against another vessel, or the persons and property on board and;
(5) committed on the high sea or outside the jurisdiction of any State

4.Stowaway

A person who is secreted on a ship, or cargo, which is subsequently loaded on the ship, without the consent of the ship-owner or the master or any other responsible person and who is detected on board the ship after it has departed from a port, or in the cargo while unloading it in the port of arrival, and is reported as a stowaway by the master to the appropriate authorities.

The significant of this text is that it differentiates between a stowaway and a smuggled migrant. If the ship-owner, the master or a crew member is aware of the stowaway's presence on board, then it is a case of 'migrant smuggling' in which case the master or crew member has committed a criminal act.

In the same vein a person who is secreted on a ship, or in cargo, which is subsequently loaded on the ship, without the consent of the ship-owner or the

master or any other responsible person, and who is detected on board the ship before departed from the port has committed attempted stowaway. The implication is that a person hiding on ships are only considered to be stowaways if they are discovered after the ship has departed from the port. If that person is found prior to departure they are merely trespassers.

5. Illicit Drug Trafficking

Drug smuggling has become one of the most serious threats to all civilized societies in modern history. One of the major methods of smuggling drugs is by ship, secreted in cargoes and shipping containers. A high proportion of drug trafficking is undertaken by sea because of the opportunities offered by the large volume of shipping movements from producing to consuming countries as drug traffickers attempt to enter the most profitable illicit markets.

Regulation concerning illicit drug trafficking as contained in *UNCLOS, 82, Article 108 Illicit traffic in narcotic drugs or psychotropic substances mandated;*

1. All States to cooperate in the suppression of illicit traffic in narcotic drugs and psychotropic substances engaged in by ships on the high seas contrary to international conventions.
2. Any State which has reasonable grounds for believing that a ship flying its flag is engaged in illicit traffic in narcotic drugs or psychotropic substances may request the cooperation of other States to suppress such traffic.

6. Maritime Violence

Model National Law on Acts of Piracy or Maritime Violence by Joint International Working Group on Uniformity of Law concerning Acts of Piracy and Maritime Violence (Section I) provide define maritime violence among others as follows:

1. The crime committed when any person or persons, for any unlawful purpose, intentionally or recklessly:

(b) Injures or kills any person or persons in connection with the commission or the attempted commission of any of the offences set forth in sub-sections I (3) (b-h); or

(c) Performs an act of violence against a person or persons on board a ship; or

(d) Seizes or exercises control over a ship or any person or persons on board by force or any other form of intimidating; or

(e) Destroys or causes damage to a ship or ship's cargo, an offshore installation, or an aid to navigation; or

(f) Employs any device or substance which is likely to destroy or cause damage to a ship, its equipment or cargo, or to an aid to navigation; or

(g) Destroys or causes damage to maritime navigational facilities, or interferes with their operation, if that act would be likely to endanger the safe navigation of a ship or ships; or

(h) Engages in an act involving interference with navigational, life support, emergency or other safety equipment, if that acts would be likely to endanger the safe operation or navigation of a ship or ships or a person or persons on board a ship; or

(i) Communicates false information, endangering or being likely to endanger the safe operation or navigation of a ship or ships; or

(j) Engages in an act constituting an offense under article 3 of 1988 convention for the suppression of unlawful acts against the safety of maritime navigation; or

(k) Engages in an act constituting an offense under article 2 of the 1988 protocol for the suppression of unlawful acts against the safety of fixed plat form located on the continental shelf; or

(l) Engages in any of the acts described in sub-section II(3) (a) – (i), to the extent applicable where such acts involve an offshore installation or affect a person or persons on an offshore installation.

3. Maritime violence is also committed when any person or persons, for any unlawful purpose, intentionally or recklessly endangers or damages the marine environment, or the coastline, maritime facilities or related interests of a State of States
4. An attempt to commit any of the offenses listed in sub-section I, (2), (3) or (4), or any unlawful effort intended to aid, abet, counsel or procure the commission of any of these offenses, or threats to commit any of them, shall constitute maritime violence.

7. Cargo Theft

The most common security threat in the maritime transportation business is cargo theft. While the term "pilferage and theft" can include equipment and supplies stolen from work stations, money taken from petty cash boxes, and other types of thievery, the vast majority of theft that occurs in port facilities and onboard ships involves the theft of cargo. Cargo theft is the oldest, most costly, and most commonly committed land-based maritime crime, encompassing everything from petty theft and pilferage of relatively few items, to recognized and sophisticated large-scale theft of entire containers. It has been estimated that theft, pilferage, and non-delivery account to somewhere around 20% of all cargo losses. While there are no accurate records relating to worldwide cargo theft, the amounts have been estimated to be in the tens, and perhaps hundreds, of billions of dollars annually.

13.5. Global Updates On Maritime Security Issues.

Since piracy became a major international problem, International Maritime Organisation (IMO) reported that a total number of incidents of piracy and armed robbery between 1984 and 1999 had amounted to 1,455 cases. In another account,

records from ICC-IMB shows that between 2003 and 2008, a total number of 1,845 cases of piracy were recorded (ICC-IMB, 2009).

The most vulnerable Regions by pirates and armed robbers are: the Far East, especially the South China Sea and the Malacca Strait; Latin America and the Caribbean; the Indian Ocean; and West and East Africa.

In African waters, we have the Barbary Coast in North Africa (Morocco, Algeria, Tunisia and Libya) as "the notorious areas for piracy" between the 17th century and the early 19th century. Recently there are emergences of three major areas, which include: the Gulf of Aden, the Somali Coast, Nigerian Coastal waters and the Mozambique Channel / Cape sea route in Southern Africa.

Since the incident of 2001, September 11's terrorist attack, the world have witnessed several changes not in maritime security laws alone but also in the mode of operation by pirates and armed robbery against ships. The criminals at sea have now gone beyond mere stealing of cash, cargo etc. to making high demand for ransom before the victims on board could be released. Their operations have much extended to the high sea with highly professional gangs, which sometime involve the use of smaller vessels to attack ships. The operation of the pirates has become more sophisticated and if the nearest coastal state does not have the necessary facility to intercept them immediately, then the havoc they wreck may be difficult to quantify.

13.6. Nigeria Update On Maritime Security Issues

Attacks on ships within Nigerian coastal waters occurs while ships are at berth, anchored and sailing. Table 13.1 below show an official reported incidents in 2009 by ICC-IMB. Though, the table may not account for all cases within these years due to inaccessibility to comprehensive data on all cases.

Table 13.1: Reported cases of piracy and armed robbery within Nigerian coastal sea as at 2009

Date/Time	Ship Name Type of Ship	Place of incident	Details of the incident/consequences
29th Dec.2009 21:16 LT	ANNA MARIA A Chemical tanker	Lagos Anchorage 06° 17.73' N 003° 22.70' E	Armed robbery attack: stole crew's personal belongings and ship's equipment.
28th Dec. 2009 00:20 LT	NIKOLIS Bulk carrier	Lagos Anchorage, Nigeria 06° 20.50' N 003° 26.00' E	Armed robbery with automatic weapons: Three crews were injured. The robbers stole crew personal property, ship's stores and equipment
15th Nov. 2009 21:00 LT	AMYNTOR Bulk carrier Marshall Islands	Lagos Anchorage, Nigeria 06° 12.80' N 003° 23.70' E	Robbers armed with guns and knives: Eleven crew members were injured. The crew and ship's cash were stolen, navigational equipment destroyed, and other personal properties were also stolen.
20th Oct. 2009	GLORY I Bulk carrier Panama	Port Harcourt,	Three robbers armed with knives came in tug and boarded the ship at anchor. The robbers stole two drums.
16th Oct. 2009 03:00 LT	UNION GRACE Oil tanker Panama	Lagos Anchorage	Six robbers armed with guns boarded the ship at anchor. Gas oil was stolen. They transferred it into their boat and disappear.
7th Sept. 2009 06:00 LT	JASCON 40 Supply ship Saint Vincent and the Grenadines	Offshore Bonny 03° 53.50' N 006° 47.50' E	Nine pirates armed with automatic weapons: They hijacked the offshore tug and demanded the Master to proceed alongside m/v Tramper, which was drifting at distance at about 3nm from the ship's position. Both vessels sustained damage of their sides. Several pirates jumped on board the Tramper. The pirates threatened to shoot the crew and opened fire on the Tramper when the ship started drifting away. Later on pirates disembarked to fast craft and headed forwards Barbara River / L. Nicholas River Crew's personal belongings were stolen
21/09/2009 10:48	MORNING NINNI Vehicle carrier Singapore	Lagos Breakwater, Nigeria 06° 21.90' N 003° 24.70' E	"Nine robbers in two boats came close to the astern of the ship underway. One of the robbers managed to get onto the stern ramp recess. The vigilant crew sighted the robbers and shouted at them. Upon seeing the crew alertness the robbers aborted their attempt and moved away"

03/08/2009 22:45 UTC	SATURNAS Refrigerated cargo carrier Lithuania	Escravos Anchorage, Nigeria 05° 28.44' N 005° 04.41' E	Five robbers armed with automatic guns: Five crewmembers were kidnapped. The other remaining crews decided to sail the ship to open sea.
27/08/2009 05:00 LT	VENEZIA D Chemical tanker Netherlands	No.5 Berth, Apapa Port, Lagos,	Four robbers attack the tanker at berth and threatened the duty watchman with gun. The ship's properties were stolen.
05/07/2009 20:45 LT	SICHEM PEACE Chemical tanker Singapore	20 NM off Escravos	"The ship was hijacked by pirates with six crew members on board and later released on 20 July 2009"

Source: Compiled from MSC.4/Circ.141-146 monthly reports.

Table 13.2: Comparison of Global records of piracy and Armed robbers with the specific attacks in the Nigerian waters between 2003 and 2011

Years	Global attack: Total at year end(excluding Nigeria)	Number of reported cases in Nigeria	Percentage of attack within Nigeria(%)
2011	544	11	2.02
2010	489	17	3.48
2009	406	28	6.9
2008	293	40	13.70
2007	263	42	16.00
2006	239	12	5.02
2005	276	16	5.80
2004	329	28	8.51
2003	445	39	8.76
Total	3284	233	9.60

Source: Compiled from ICC-IMB record.

PIRACY AND ARMED ROBBERY ATTACKS AGAINST SHIPS WITHIN NIGERIAN WATERS AND THE REST OF THE WORLD BETWEEN 2003 AND 2011

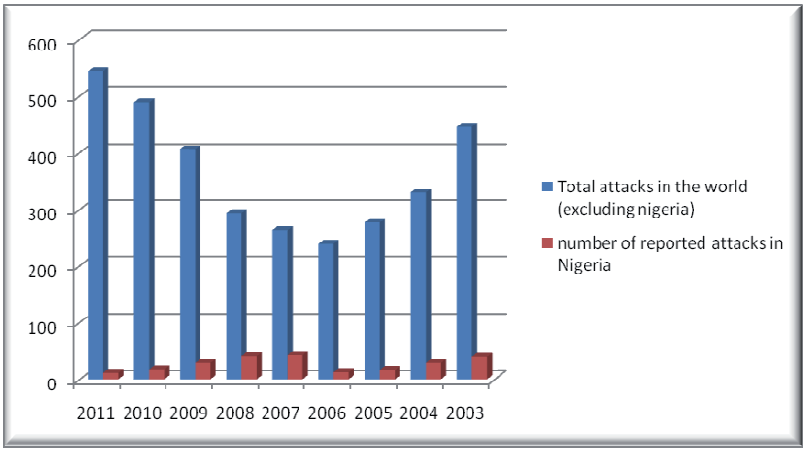

Figure 13.1 above shows that 2003 was the most dangerous year of piracy and armed robbery attack worldwide and recorded 484 occurrences followed by 2008 with a total number of 293 incidences. It is amazing to note that out 293 cases recorded in 2008 Nigeria alone had 40 incidences, amounting to 13.7%. The year 2007, makes the highest criminal records of attack within Nigerian waters with 263 cases representing 16.0% of the world total of 263. The overall number of pirates' attacks, which occurred between the year of 2003 and 2011 was 3,517, other parts of the world had 3,284 cases, while Nigeria had a total of 177 incidents making up to 7.1%.

Though, ICC-IMB originally in report, did not document Nigeria as a country with the highest incident of global piracy; for example in 2008, a total of 130 attacks were reported around Somalia's coast and the Indian Ocean making the region one of the most awfulness waters in the world, however, it is worth mentioning that 9.60% is very considerable as compared to the total number of percentage (90.40%) of attacks from the other parts of the world. Nigeria being a significance

maritime state and a major contributor of raw materials to the world economic growth makes such rate of attack a crucial case to be assessed and consider some strict measures for incident reduction.

13.7. International Regulatory Regimes and Initiatives On Maritime Safety and Security.

The regulatory regime on maritime safety and security primarily focuses on the overall codes and conventions of behavior agreed upon and set up to be implemented by IMO member states. This is to maintain a high degree of safety and security within territorial waters and on the high sea.

Since the 1980's, International Maritime Organisation has been seriously concerned with the issue of maritime security and became more focused after the horrific events of September 11, 2001. The incident has brought about series of legal developments in a swift action to proffer proactive measures to curtail the challenges of maritime threats. One of the major contributions was the proposed and eventually the revision of Chapter XI of SOLAS, preferred to be called Chapter XI-2, or the International Ship and Port Facility Security code (ISPS), which deals with special measures to enhance maritime safety and security. List of other international regimes include:

- SUA - Suppression of Unlawful Acts Against the Safety of Maritime Navigation (1988)
- UNCLOS - United Nations Convention on the Law of the Sea (1982)
- PSI - Proliferation Security Initiative - not so much a regime as a set of principles.
- SARPSCO - The South Asia Regional Port Security Cooperative (2008)

- Agreement Concerning Co-operation in Suppressing Illicit Maritime and Air Trafficking in Narcotic Drugs and Psychotropic Substances in the Caribbean Area
- The International Convention against the Taking of Hostage (New York, 17 December 1979)
- The International Convention for the Suppression of Terrorist Bombings (New York, 15 December 1997)
- The Convention on the Physical Protection of Nuclear Material (Vienna, 3 March 1980)

Apart from these regimes, IMO in principle has also embarked on other initiatives that will combat the global maritime insecurity. As reported by Bryant (2014), IMO global activities on maritime security have established advisory missions, 18 regional and 42 national seminars/workshops were held and about 3,320 people trained. The people trained were mostly from the ports of the developing regions and they are now adopting practical security procedures necessary to thwart terrorist attacks on ships and ports in their countries. Along with other things, IMO has also instigated its global technical cooperation program on maritime security with other United Nation agencies. These include the International Labour Organisation and the World Customs Organisation.

13.8. IMO Technical Co-operation with ILO and WCO

A Memorandum of Understanding was signed with the World Customs Organization (WCO) in July 2001 to strengthen co-operation in the fields of container examination, integrity of the multi modal transport chain and matters relating to the ship/port interface. The World Customs Organisation Task Force is to cooperate on the issues relating to container inspections and screening; sealing of containers; trusted agents and shippers concepts.

In addition, the technical cooperation also include collaboration with International Labor Organization (ILO) in developing and adopting a new seafarer's Identity Document, and a draft Code of Practice for the security of all port areas which was developed Jointly by ILO/IMO and is currently enforceable.

13.9. Conclusion

The potential direct cost of a terrorist attack on shipping or maritime infrastructure varies tremendously according to the scope of the attack, its target and its location. A single attack on a tanker, as in the case of the *Limberg*, could have relatively low direct costs (*e.g.* for repairs), whereas the detonation of an ammonia nitrate-carrying vessel could result in tremendous loss of life and inflict massive property damage. The direct costs of such an attack, however, would likely be dwarfed by costs linked to reactions to the attack and disruptions engendered by emergency security measures. Physical attack of some major maritime facilities such as ports and offshore installations may lead to a shutdown of the entire system and consequently create severe impact on the economy of a nation.

In conclusion therefore, the consequences of global insecurity are seen as a serious danger to the survival of human existence which must be tackled headlong. The consequences on shipping and maritime transport are enormous.

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