

OPPORTUNITIES AND CHALLENGES OF INLAND WATERWAYS TRANSPORT IN THE SOUTHWEST COASTAL BELT OF NIGERIA

BY

OWOPUTI, Emmanuel Adetose

B. sc. OSU, M.sc LASU.

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CERTIFICATION

This is to certify that this thesis was carried out by Adetose Emmanuel OWOPUTI (B.Sc. OSU; M.Sc., LASU) has been examined and approved as meeting the requirement for the award of Doctor of Philosophy (Ph.D) Degree in Geography, in the Department of Geography and Environmental Management, Faculty of Social Sciences, University of Ilorin, Ilorin, Nigeria.

Dr. U . A. Raheem
Head of Department

Signature and Date.

Dr. I. P. Ifabiyi
Supervisor

Signature and Date

Internal Examiner

Signature and Date

External Examiner

Signature and Date.

DEDICATION

This Thesis is Dedicated to GOD ALMIGHTY, the giver of life, knowledge and Vision. And in memory of my Mother, Olori Oluwafolakemi Beatrice OWOPUTI
(May her Soul rest in peace).

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ABSTRACT

Nigeria has 853 kilometers of coastline, 450 kilometers inland waterways and a sovereign right to 200 nautical miles (370.4km) exclusive economic zone. In spite of these, water transport has a share of 1.6% of Nigeria's domestic product; suggesting that this resource has not been effectively harnessed for development. This study examined the opportunities and challenges of waterway transportation in the coastal area of South Western Nigeria. The objectives were to: (i) evaluate the potential of the area for inland water transport development; (ii) examine the contribution of inland waterway transport to passenger and freight movement; (iii) identify the factors determining the impacts of inland waterway transportation on socio-economic development; and (iv) identify the problems of inland waterway transportation in the study area.

Both primary and secondary data were used to elicit information on basin morphometry, capacity of jetties, inland water operations, contributions of inland waterway and on the challenges facing inland waterway transport in the study area. Purposive and systematic random sampling techniques were employed based on stakeholder theory. Two types of questionnaire were used consisting of 415 copies administered to eight relevant government agencies and 570 to residents in the southwest coastal area. The analytical tools employed were orthogonal factor analysis, multiple regression analysis and post-hoc analysis.

The findings of the study were that;

- i. Inland waterway has high potential in the study area. The results of basin morphometry analyses confirmed that the study area is highly riverine in nature (stream frequency = 1.58, drainage density = 1.10 km / km², number of river basins = 48, total numbers of streams = 873);
- ii.. waterway transportation is largely underutilized. The example from Lagos for which secondary data were available showed that in 2015, there were only 318 registered boats as against 298,319 road vehicles. An average of 2 million of the over 20 million Lagosians travel by water monthly. Most of the residents still depend on other modes of transportation;
- iii.. the factors determining the impacts of inland water way on socio-economic development vary among the three coastal states. In Lagos, they are: waterway underutilization, improvement in income, poor jetties facilities, improvement in education, provision of job opportunities and poor terminal infrastructure ($R^2 = 68.9\%$). In Ogun state, they include improvement in average income, relatively maintained terminal facilities, relatively functional port facilities, relative access to port facility and provision of employment ($R^2 = 69.1\%$). In Ondo state they are: waterway underutilization, political interference, poor jetty infrastructure, improvement in income, and job opportunities ($R^2 = 78.9\%$); and
- iv.. financial constraints, congestion at the jetties, insufficient jetty facility, and political influence were found to be the major challenges of port utilization

The study concluded that inland waterway have high potential for transportation, but it is largely underutilized. The study recommended the need to connect these jetties to other modes of transportation and the encouragement of private-public participation as a way of injecting the required capital for development in the coastal area of south west Nigeria.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Inland waterways transportation is one of the oldest, economically and environmentally sustainable modes of transportation for passengers and cargo; in some areas it is the only means of mobility and access to basic services. The sector encompasses vessels ranging from simple non-motorized boats to highly automated pushers, operating on waterways ranging from small tributaries to major rivers. Inland waterways play a vital role in economic development, especially in remote areas while the potential impact for this sector depends considerably on the specific regional context such as geographical conditions, level of road development and socio-economic conditions. Inland waterways include all rivers, lakes, inland channels, canals deep enough for water borne traffic and protected tidal waters. The welfare of the inhabitants of the remote rural areas who are usually among the lowest of low income groups in the region. In the absence of river and other forms of inland waterways transport, many remote underprivileged communities would be inaccessible or too costly to service by other means.

Transportation, throughout history had been important to the economic wealth and military power of the people or any Nation. Transport has been closely tied to efficient methods of transportation and movement of people and goods from one location to another. It has generated more increase in transport demand for social activities, exchange of products and services. Ogundana (1992) concluded that transportation provides access to natural resources and promotes trade, allowing the nation to accumulate wealth and power. Edward (2006) reported that transportation is a vital activity in moving both freight and passengers around the world. Transport is essential to the life of mankind.

As society, economic organization have become complex, so the need for transport has expanded and men have found it essential to use other forms of transport services. Inland water transport is probably the oldest and earliest means of transport used by man, in fact since ancient times; water transportation has played a significant role in feats which man has made to date. For instances the ancient Babylonian's, Mesopotamians and ancient Chinese relied on the use of water or ocean as a means of communication, transportation and physical distribution.

Traders have been using rafts, canoes, barges and ships to move goods since man began to travel over water. Badejo et al (1996) 'explained that a country like Nigeria that is predominantly external dependent and also rely on the exportation of raw material, no doubt will benefit tremendously from

maritime and inland waterways transportation system. Over the years, ocean freight has been responsible for over 90% of the physical carriage of Nigeria's external trade. There is no doubt that quite a substantial volume of freight and cargoes are handled daily in the inland waterways transport industry. Ogundana (1990) viewed the ability to compete in a global economy as depending on maritime transport system as well as a vast array of supporting service activities. These supporting services include distribution based activities such as a multimodal and intermodal freight transport systems composed of modes, infrastructure and terminals. In addition, the regulation based activities are needed such as the customs procedures, tariffs, regulations and handling of documentation. He concluded that 'the quality, cost and efficiency of these services influence the trading environment as well as the overall costs linked with transport of internationally traded goods. Ogundana (1998) examining the situation of Nigeria inland waterways with overview of Rivers Niger and Benue concluded that there are a lot of potentials and most promising emerging economics, if developed and the river conference in Lokoja could be an Industrial zone, with ability to remain the local point of Hub and port of distribution of the increased economic activity that can be fully used for unique natural resource as the ideal medium for cargo transportation. Okeke et. al (2012) reported that an evaluation of the effectiveness of the Cabotage Act 2003 on Nigeria Maritime Administration, indicates that first the Nigerian Maritime Administrative and Safety Agency (NIMASA) institutional incapacity to monitor compliance adversely affects the enforcement of the Cabotage Act 2003 in Nigerian coastal and inland Shipping. Secondly the inability of the Nigerian Maritime Administrative and Safety Agency (NIMASA) to bridge capacity gap results in poor compliance with the Cabotage Act 2003 in the Nigerian coastal and Inland Shipping. Thus, he concluded that the character of the Nigerian state has adversely affected the capacity of the NIMASA to monitor and enforce the Cabotage Act 2003 as well as its ability to bridge the capacity gap in the maritime industry leading to poor compliance.

Usono (2003) and Biu (2007) reported that despite the fact that Nigeria has about 3000 kilometres of inland waters, six major ports and ten crude oil terminals, and several inland ports in Onitsha, Oguta, Opobo, Lokoja, Baro, Jebba, Ayietoro, Epe, and so on in the year 2000, only 139 indigenous marine vessels (less than 6%) were involved in this traffic with a cargo throughput of 441,031 tons (about 1%). They concluded that indigenous shipping companies do not own any vessel for deep-sea trade and the few that participate operate the vessels on charter. Consequently, Igbokwe (2006) identifies some of the challenges and problems of enforcing the Cabotage Act to include:

exclusion of Indigenous Shippers Association of Nigeria (ISAN) from ministerial consultation process in granting waivers; inadequate implementation and monitoring of inter-ministerial and inter-agency/inter-unit wrangling and uncooperative attitudes; high cost of enforcement and monitoring; lack of political will and determination; lack of confidence; and local / Foreign operators' dichotomy and several resolution of Sabotage disputes/differences by the court. Studies in Maritime Industry and inland waterways transport in Nigeria have been limited to river Niger and Benue. Comparatively, little studies have been done on inland waterways in the coastal belt of Nigeria and its implication on transport development.

It is against this background therefore, that this study seeks to examine the role of inland waterways on transport development in the coastal belt of Nigeria.

1.2 Statement of Problem

Nigeria has the second longest length of waterways in Africa with 853 kilometers of inland waterways and an extensive coast land of about 852 kilometers; it has a total land and water area of 923,768 sq.km. The area of the land is 910,768sq.km, while that of water is 13,000sq.km. Nigeria has sovereign rights in a 200 nautical miles exclusive economic zone (EEZ). The biggest rivers, in Nigeria are Rivers Niger and Benue, which cuts the country into the cardinal east west and north sections. The two rivers run into each other at Lokoja and flow into the Atlantic Ocean. The coastal waterways extend from Badagry region through Lagos Epe-Olokola, Ilaje , Igbokoda , Ayetoro, Eso-odo in Ondo State to Burutu,- Warri, in Delta State to Patani- Bomadi of River State and from Bayesia State to Oroni, Ibaka of Akwa-Iborn State, through Calabar in Cross River State. Water transport scores a distant second to road transport with an average share of about 1.6% of Nigeria gross domestic product (Obeb et al 2013).

The problems and questions facing inland waterways transportation operation and management today which needs solutions and answers are:

- i. What is the actual capacity of Inland waterways in south west coast of Nigeria?
- ii. What is the actual situation of the inland waterways transportation in Nigeria and what are their contributions to the National economy currently?
- iii. What are the problems affecting the utilization of these waterways?
- iv. How can inland waterways be developed for opening-up the treasures hidden in the Nation's inland waterway business for those intending to tap the benefits, 'the likely impacts that inland waterways can contribute to the Nation?

- v. How can inland waterway be developed, managed and be improved to generate job opportunities, revenue and promote agricultural and other social economic activities?
- vi. How can inland waterways contribute significantly to the reduction of congestion, accidents and armed robberies on the roads?
- vii. What are the major problems facing inland waterways operations in relation to jetties and types of vehicles, used on the waterways?

Nigeria is generously endowed with navigable inland waterways, in form of canals, rivers, and lagoons. Some form parts of the Delta Rivers, and others are found inland. The hydrology of Nigeria is dominated by two great rivers systems, the Niger-Benue and Chad Systems. With the exception of a few rivers that empty directly into the Atlantic ocean (Cross river, Ogun, Oshun, Imo, Qua Iboe and a few others), all other flowing waters ultimately find their way into the Chad-Basin or down the lower Niger to the sea.

The coastline is generally considered to be the edge or margin of land next to the sea or ocean. Various technical definitions of coastline are used by different coastal management and regulatory agencies but most coastal zone researchers describe the coastline as interface between land and water (Dolan et al, 1980). Coastlines are dynamic and are therefore areas of constant change (Boak & Turner, 2005). The changes in the coastline largely depend on its geology and geomorphology; the nature of tidal waves impacting the coastline; changes in sea- level; and sediment transport by long shore currents (Carter and Woodroffe, 1994; Cowell and Thorn 1994; Pidwirny, 2006) Coastline changes often result in erosion of coastal areas or accretion of sediments, depending on the dominant processes acting on the coastline (Pidwirny, 2006).

The high numbers of rivers, creeks, lakes, canal and coastal water across the nation which could be used for fishing, agricultural production, distribution of goods, and movement of passengers from one location to another that will reduce tension on road infrastructure has not been developed. The development of jetties, ports and ship building yard will lead to economic advancement from which more revenue could be derived. This will also reduce the high rate of road accidents and damage to road transport infrastructures. Nigeria aspires to be amongst the 20 largest economies by the year 2020 according to Vision 2020. A successful development and operations of the inland waterways through implementation of the enacted cabotage laws in Nigeria is important to the development of the country because of the indispensable impact that shipping plays in not just the

movement of goods and services around the country but as well as revenues collected as tax from the various actors in the industry.

The Maritime / inland waterways transportation in Nigeria is also saddled with a lot of problems. These include:-

- a. Poor participation of indigenous private sector in shipping business.
- b. The dearth of ships that can guarantee lifting of cargoes as enunciated in the UNCTAD cargo sharing formula.
- c. The clearance of cargoes and distributions from the Nigerian ports is still very cumbersome,
- d. Many Nigerian ports and Jetties do not have adequate serviceable plants and equipment for major port operations
- e. Excessive and too many port charges have encouraged the shipment of cargoes to other ports of West African countries, away from the Nigerian ports / Jetties. And lastly
- f. The available maintenance facilities for ships are inadequate.

The Cabotage Act 2003 has not made the desired impact, largely because of the dwindling fortunes of Nigeria, which has affected owners of shipping companies, and the extent of shipping activities. The fluctuations in the water volume regimes of inland waterways, silting of rivers, and occurrence of rapids and falls on some large rivers, obstruction of waterways by wild weeds such as the water hyacinth, inadequate funding of public water authority and prohibitive costs of water vessels as well as their spare parts, are also parts of these challenges.

The rainfall in the coastal belt allows waterways transportation throughout the year, as the channels leading to most of the ports have relatively constant flow. The major seaports of Nigeria are Lagos, Port Harcourt, which together handle about three-quarter of the Federation's imports and export, other ports like Burutu, Calabar, Warri, Sapele, Bonny, Degema, with more than fifty jetties along the coast serving as feeder to the bigger ports and means of movement to the communities along the coast, means of communication and governance with which social amenities are provided. These allow the distribution and forwarding of agriculture products and civilization development. About 150 different water-car / vehicles are on operation in the coastal water of Nigeria which can be increased. If properly managed it will provide job opportunities, create recreation, improve insulter and relaxation centre with easy distribution of cargoes and serve as industrial development area long the sea side.

Trade and commercial activities will grow, and revenue generation for both public and private organizations will increase.

Inland water transport should not be considered less important because on broad environmental grounds waterways transport produces little noise, relatively low level of atmospheric pollution and vibration, it also serves to reduce heavy vehicular traffic on roads system which in many places are already congested or costly to maintain. The threat of climate change with its accompanying violent weather is a challenge for Nigeria in the near future. Seasonal weather conditions, including unusually prolonged droughts and recurrent flooding, have been experienced in the recent pass and this has serious implications for water security, agricultural areas adjacent to rivers and fishing on which millions of Nigerians depends for their survival. The changes are also affecting Nigeria's demography with more and more formerly rural Nigerians moving from the coastal regions and cities in search of employment .This places stress on urban economics.

The availability of many rivers, canal, dam, creeks made inland waterways to be easy and comfortable, cheap and safe for both freight and passenger movements. The fact that the coastal belt area of Nigeria has the highest concentration of industrial estates with the combined high population, skilled manpower, and centre of oil and gas industries plus allied business organization makes operation of inland waterways transportation easy available to both international and national users and products consumers.

In the light of the foregoing, therefore, the pertinent research questions are:

- i. How effective is inland waters and rivers in the coastal area of Nigeria as a mode of transport
- ii. How efficient is inland water transportation be developed to complement and compete with other modes of transportation in Nigeria.
- iii. How inland water transportation contribute to the economy of the Nation
- iv. How could the operations of inland waterways transport system be improved to create job, generate revenue, facilitate easy distribution of agricultural produce, trade commodities
- v. How will improved technology assist inland waterways transportation development in Nigeria
- vi. How inland waterways transportation improve the synergizing, social, cultural, political, trade distribution and transfer of products, goods, services to a wider market for value for products and labour.
- vii. How will inland waterways transportation improve Maritime services within the Maritime Industry in a nation?

1.3 Aim and Objectives

The focus of this study is to examine the opportunities and challenges of inland waterways transportation and measures capable of developing and improving inland waterways in the western coastal area of Nigeria.

The specific objectives of this study include to:-

- i. evaluate the potentials of the area for inland waterways transport development;
- ii. examine the contributions of inland waterways transport to passenger and freight movement;
- iii. Identify the factors determining the impacts of inland waterways transportation on socio-economic development; and
- iv. identify the problems of inland waterways transportation in the study area..

1.4 Justification of the Study

A study of inland waterways transportation is desirable in respect of the following:

- i. Inland waterway transportation is largely underdeveloped and underutilized Ogundana (2006) identified that inland waterways has not been fully developed and utilized in the country's transport sector.
- ii. Inland waterway transportation is strongly related to maritime trade in Africa, The importance of maritime trade to the economy of African states and its potential contribution to economic development through employment generation can be demonstrated by the fact that almost 91% of continental trade by volume went by sea in 2008.
- iii. An examination of inland waterway transportation will impact on the need for development of ports and jetties, dredging, and provision of water vehicles.
- iv. Maritime transport sub-sector is a major part of the wider transport sector which in itself is a key component of the holistic economic configuration of the world.
- v. The shipping and the maritime trade are major sources of invisible earnings for any country.
- vi. Nigeria has an abundant waterway which is still largely underutilized. The waterways is unique, Nigeria has about 10,000 kilometres of coastline and nearly 4,000 kilometres of navigable waterways.

1.5 Study Area

1.5.1 Location

The study area for this research is the south west coast of Nigeria and coastal creeks of Lagos, Ogun and Ondo state coastal belt. It has many rivers that empty directly into the oceans. This is found between latitude 4° 10' -6° 20' N and longitude 2° 45' -8° 35' E (figure 1.1 and 1.3). It comprises of the following States (see figure 1.1 and 1.3). The project area falls within the southern part of Nigeria which is located between Latitude 6° 30' and Longitude 4° 30' and 5° 05' E in the Southern part of Nigeria. The project area has boundary with Benin Republic in the West and Edo state in the East, the Atlantic Ocean in the South, and the Yoruba's hill in the North. Generally, the topography rises from sea level to 15 meters elevation over a distance of 20 kilometer upland.



Figure 1: Drainage Map of Southwest Coastal Areas,

Source: www.Theodora.com/maps.

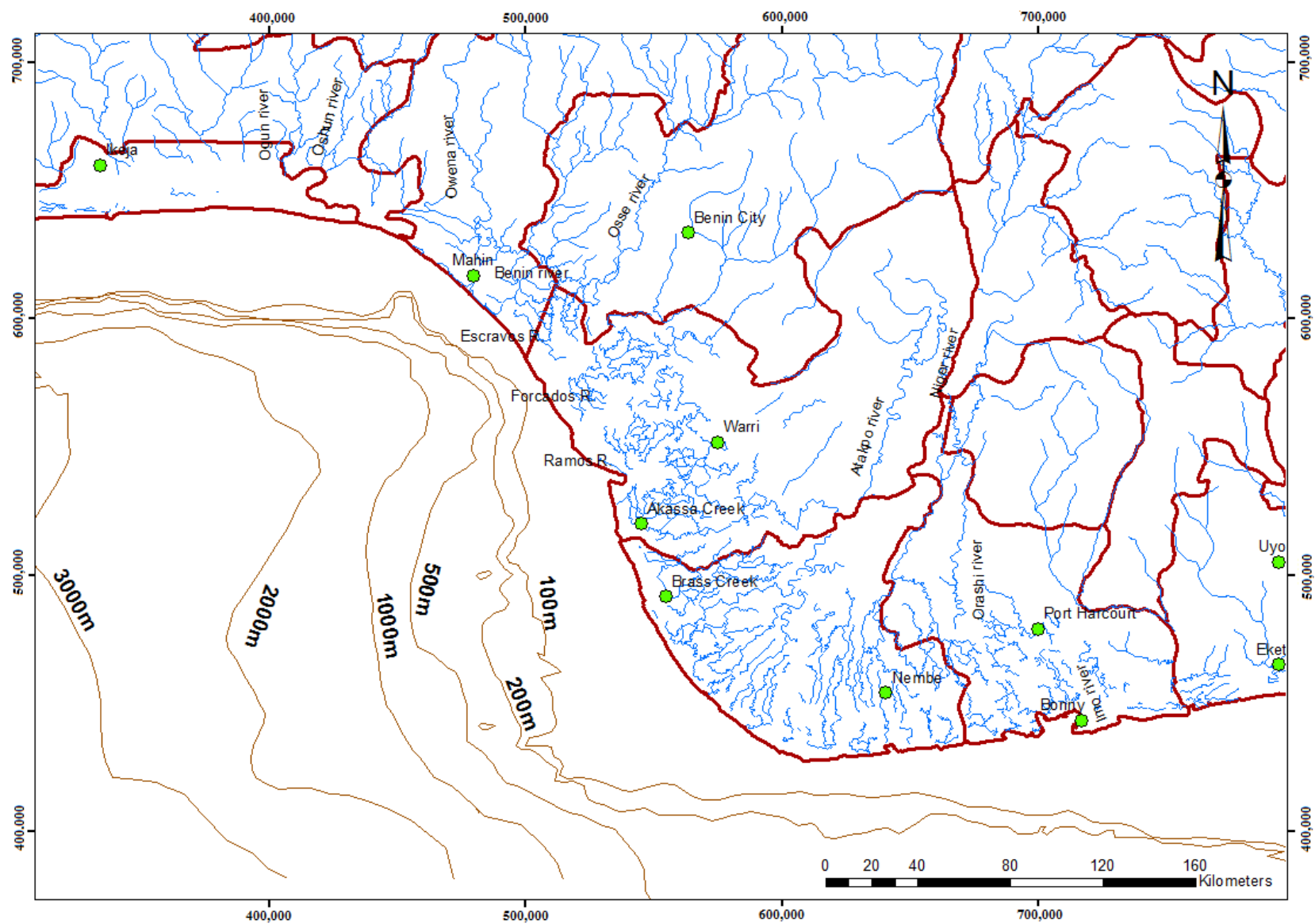


Figure 1.2: Bathymetric Characteristics of Southwest Coast, Nigeria.

Source: Nwilo & Badejo 2006 .

In the communities, construction of roads are almost impossible because of the terrain, hence creeks and lagoons provide the only mode of transportation among the numerous fishing communities in the area. The coastwise movements between towns in different states are also possible between Lagos to Igbekoda in Ondo state. There are various interstate movements for example between Lagos –Epe - Ikorodu in Lagos and the Ilaje -Igbokoda, Ayetoro, Ese -Odo o Ondo State (see figure 1.2)

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1.5.2 Drainage and Relief

The Coastal area lies on lowland which rises from the coastline part of the Southern part to less than fifteen meters above sea level. The geomorphologic units of the Creek and riverine areas include Swamp flats, sand ridges, creeks, lagoon and rivers. The coastal strip is primarily lagoon marshes and abandoned beach ridges. The Central area is however mangrove swamp and swamp forest. The main rivers and creeks include River Osun, River Ogun, River Osse, River Ogbese, and River Oluwa, River Ope (Ondo state rivers) with many rivers, Oluwa, Awoye, Molume, Igbkola, Aiyetoro Rivers, and creeks, Lagoon area of the coastal belt of Ondo State.

The shoreline of the Bright of Benin is also subjected to continuous coastal erosion by the action of the tidal waves of the sea. Salinity rises during the dry season when low river flows allow greater salt water intrusion upstream. The high rainfall and river discharge during the rainy season combined with the low, flat terrain and poorly drained soils result in extensive flooding and erosion. This flooding and erosion, water accumulation and sediment deposition, the area is constantly reshaped. In general, a dynamic equilibrium between flooding, erosion and sediments deposition is the defining characteristics of the coastal belt ecosystem. However, since the end of the canalization of most rivers in this area, peak discharge volume has declined thereby disrupting the hydrological balance (figure 1.3).

1.5.3 Climate

The climate of the study area is the lowland Tropical rain forest type, with distinct wet and dry seasons. The wet season commences in April and ends in September. There is a gradual progression in flooding commencing in early season and reaching its peak in the months of May through July. Houses are often built on silts in the region during wet season the whole area is flooded. In this area the mean monthly temperature is 26.4 °C with a mean monthly temperature ranges of 2 °C, while mean relative humidity is over seventy five per cent. The average annual rainfall in the region is about 2046.8 mm. The most remarkable characteristic of the study area, coastal upwelling is the absence of correlation between local wind stress and coastal temperature, at least during the boreal summer season. The coastline of the region is generally low-lying and interspersed with Marshes, lagoons and mangrove swamps. A number of estuaries interrupt the barrier beaches that separate mangrove swamps from the sea.

The coastal zone experience a tropical climate consisting of a rainy season (April to October) and dry season (November to March). Temperatures are high reaching an annual mean of 28°C. Relative humidity is high throughout the year and rarely goes below 60% the month of June receives the highest rainfall. Total annual rainfall of between 1,500mm and 3,000mm is also experienced with a short dry break in August. The dry season which lasts from November to March is characterized by the northeast trade winds with speeds of up to 0 – 2m per second. During this period, low visibility and relatively cold conditions are experienced at sea ranges from 161 to about 190 degrees in direction.

Coastal Geomorphology of the coastal and marine area consists of a narrow coastal strip of land bordered by the Atlantic. The coastal area stretch inland for a distance of about 15km in Lagos to about 140km in Ilaje Ondo State. All these factors has an impacts on the coastal Inland waterways Transportation of the study area in terms of Operations, Type of Ships, Vessels that can move at a particular time and season of the year due to the weight, sizes and cargo carried.

1.5.4 Vegetation and Land Cover

Vegetation, simply defined, is the plant cover of the earth consisting of assemblages of plants, together with its physiographic. It constitutes the most observable

element of the landscape. Vegetation expresses and reflects environmental conditions, particularly climate.

Based on figure 1.4, there are three major forest in the study area, these are:- Saline water Swamp, Fresh water swamp and the Tropical evergreen rainforest. The vegetation of the oil producing area of Nigeria falls into major categories, the mangrove swamp forest and the fresh water swamp/riparian forest.

1.5.4.1 Mangrove Swamp Forest

Mangrove swamp forest is typical of the study area especially in Epe – Lagos State, Aiyetoro, Orioke Iwamimo, Araromi to Awoye in Ondo State. The typical mangrove species in the area include the Red mangroves, *Rhizophora*, *Racemosa*, *Rhizophora Mangle* and the white mangrove *Avicennia Africana* which in many areas occurred in narrow inter-tidal zones ranging between 0.5 and 1km wide the mangrove swamp forest is shown as the Coastal Swamp. These mangrove trees in the creeks of the coastal area are in high demand for firewood by the large rural communities along the coast. This phenomenon is largely the main cause of coastal erosion and unabated sea incursion which now constitute a treat to the communities. At the back swamp, large quantities of salt fern, *Acrostichum aureum* are found in association with the salt grass, *Paspalum Vaginatum* The supratidal zone (slightly higher areas of the swamp) bear shrubby plants and small trees like *Alcornoque cordilia*, *Conocarpus cretensis*, *Syzygium guineense*, *Dalbergia ecastaphyllum*, *Hibiscus tiliacea*, *Chrysobalanus icagara* and *Baphia nitida*.

1.5.4.2 Freshwater Swamp/Riparian Forest

The freshwater swamp/riparian forests are the swamp forests in seasonally flooded depression and those along river edges. They appear to be better developed at the coast area than the inland river area.

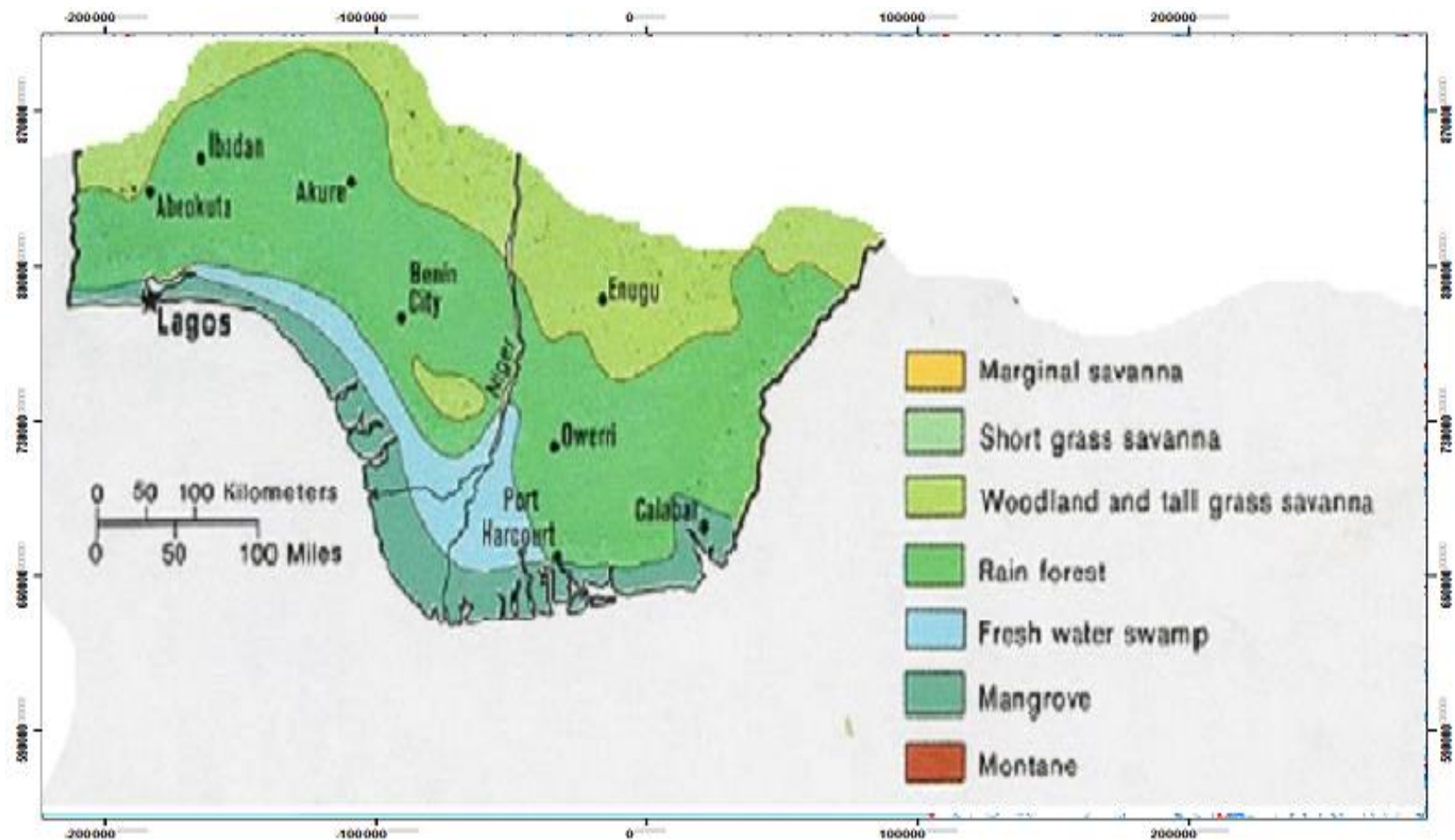


Figure 1.4: Vegetation of the Study Area,
Source: Perkin and Jasper (2010).

1.5. Transportation and Communication Infrastructure.

Transport and communication constitute important keys in the development of any society. The functioning of any regional economy relies on the use of transport. As economy appreciate, certain specialized production increases, requiring development of more communication channels. However, one significant product of this complex interaction is the demand for trip making within and among various modes of transportation for connectivity.

The physical expansion of this region is accompanied by increasing demand for transport. Only few communities are accessible by road. Inter- communal mode of transportation is by boat and needs infrastructures like jetty, water motor (Ferry). The climate and hydrological nature of the area make road construction and maintenance prohibitively expensive. Most movements in subsistence societies were over short distances and on foot through walkways or foot bridges. These networks are created primarily for the purpose of interaction and to facilitate expansion and collection of manufactured goods and other domestic needs. Transport for the local population is expensive: for instance, a return trip between Awoye and Igbokoda cost ₦2, 000.00 and indication of a costlier fare for the distant communities. Boat operators in the area purchases petroleum products at higher price (between ₦150.00 and ₦180.00) this is more than the control price.

Various transport infrastructure can be found in the study area, They include :- Highways Terminals , transport Futuniture, harbour, jetties are in:- Ikorudu, Ijede, Badore, Baiyeku, Ajah- Langbasa, Oworonsoki, Ebute-Ojo, Ijegan Egba, Falomo, Ibeshe, Egba-waterside, Lekki, Osborne and Oke- Afa,

1.6 Economic Setting

The region is drained by the Atlantic Ocean and the Lagoon. For several centuries now the main link between the region and the outside world is water. Having located in swampy surroundings, the area has abundant surface water. The condition has resulted in the linkage of most of the settlements with artificial canals. The region is favoured by high crude oil accumulation the reason why oil is the major non-renewable resources exploited by the oil companies in the area. Most of the oil wells are found within the coastal communities while several others are located offshore. These oil wells are connected through a network grid of pipelines to the flow stations of the various oil companies at the offshore. The leakage of these

pipelines, in most cases affects water quality, it equally raise environmental issues and associated pollution- concerns such as oil spills. Over 90% of the communities reported that river bank erosion usually occurs at the end of the annual flood when saturated river bank soils become unstable and collapse into the river. When dry, the soils contract and crack, but remain cohesive.

The economy of the region is of fundamental concern in this study. It helps to consider options for the most efficient allocation of resources, balanced by the needs and products of the people. By virtue of the environmental endowments in terms of the sea water this area enjoys, a number of economic activities are carried out, ranging from fishing and farming to trading. All these are to determine the economic value of the ecosystem.

The sea and ocean water of the region have for decades presented a picture of coastal landscape, where some activities occur in accordance with the nature of the environment. Fishery and fishing remain the most lucrative economic activities in which all the people are engaged. The business has facilitated commerce tremendously in the region, and the ability of the people to continually perform their traditional roles as major fish in Nigeria. Fish pond is kept by many households with different fish species in various compounds, in both domestic and commercial quantities.



Plates 1. 5: Showing the Dredging Equipment along the Southwest Coastal Inland Waterways at Ilaje.

Source : Author's Fieldwork & NIWA Project (2015)

CHAPTER TWO

CONCEPTUAL / THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1. Conceptual Issues.

2.1.1 The Concept of Transportation

Various scholars have varying definitions of transportation, for operation and management purposes. In general transport is essential to the life of mankind. As society and economic organization have become more complex, so the need for transport has expanded and men have found it essential to use other forms of transport services. Transportation is a vital activity in both freight and passengers around the world (Edward, 2006). Transport can be defined as a system for carrying people or goods from one place to another using Lorries, Trucks, Trains, Pipes, Ships, Canoes, Planes and Motor Vehicles. The demand for transport and consequently, the supply to cope with the growth of demand is derived from the need of every other activity located in space, be it social, economic, political, education or recreational activities. Transportation facilitates the formation of a wider variety of spatial patterns of human activities (Akadiri, 1996). One could see why Lord Lugard summed up the problems of Africa as being the singular element ‘transport’ as far back as 1922. The concepts of transport, maritime and inland waterways development and operations are basic to this work and hence their explanation is the main concern of this section. Transport constitutes the link between the points of production and points of consumption in space. It consists of modes and links, which are derived from the need to interact in space. Hoyle and Knowles (1998) described transport as a measure of the level of interaction between areas, a derived need resulting from the need to interact.

Transport consists of various modes such as air, water, road, pipelines and rail (Hoyle and Knowles 1998) Transport also consists of certain basic elements irrespective of the mode or level of operation (Hilling 1996). These elements include the “ways” such as water, roads, steel lines e. t. c. “terminal” such as railway stations, or bus stops, “vehicles” such as cars, buses and aero -planes, and “ energy” which is the means of propulsion of the mode of transport.

This study is therefore hinged on some fundamental conceptual and theoretical issues in geography. An attempt is made to examine these frameworks around which the study problem is woven.

2.1.2 Spatial Interaction Theory

Ullman's (1953, 1974) stated that conditions for spatial interaction are often used to explain the theoretical basis for movement in space. The theory stipulates that three conditions; Complementarity, Intervening opportunity and Transferability are important for movement to take place. He postulated three conditions which affects conditions of movement. These are complementarity, intervening opportunity and Transferability.

2.1.2.1 Complementarity

This implies that for two places to interact there must be a demand in one place and supply at another and these demands and supplies must be specifically complementary. Complementarity alone would guarantee interaction if and only if there are no intervening opportunities between the two places. If the intervening opportunity constitutes an intervening origin or an alternative destination, interaction between the two original places will reduce or decrease. The intervening opportunity therefore acts as a "Sponge" soaking up potential interaction between places (Abler et.al 1971). The concept of complementarity was used to explain the basis for spatial interaction, which arises from aerial differentiation in resource endowment or in the social and cultural system between regions, or from operation of economy of scale. This is so because places are not ubiquitous in resource endowment.

2.1.2.2 Intervening Opportunity

When there is emergence of alternative areas to satisfy the demand of initial area, there will be reduced movement or the movement can stop completely. According to Abler, et al (1972) intervening opportunity is a spatial sponge soaking up potential interaction between two complementary places; Complementarity among places can generate interaction only in the absence of intervening opportunities. Stouffer (1940) explained that the number of movements from an origin to a destination is proportional to the number of opportunities at that destination and inversely proportional to the number of intervening opportunities between the two areas.

2.1.2.3 Transferability

The third condition necessary for interaction to take place is Transferability. That is the friction of distance which is measured in terms of Time and Money Costs. Transferability is a

very critical condition as it determines the level of allowable interaction between places. Even if the other two conditions are met, the monetary cost of traversing distance is too high or the time is very long, the level of interaction will reduce drastically. Transferability differs from one mode to the other and from one place to another. Improvement in transport infrastructure such as waterways may reduce time and money costs to traversing distance, thereby increasing accessibility i.e the level of interaction between places.

The Spatial interaction theory of Ullman's has offered explanations to the trend and structure of interaction in inland waterways and transportation as well as freight and passenger movements across the water. The relevance of Ullman spatial interaction theory in freight transportation especially goods and services demand can be seen from the fact that places are not endowed with the same resources. Freight movements across regions foster spatial interaction, the trend and pattern of which can be identified through the volume of container traffic exchange among the various economic regions of the world through the water transportation. Spatial theories are essential framework in establishing relationships between the location of products and their pattern of distribution.

2.1.3 Concepts of Mobility and Accessibility

Mobility refers to the ability to move between any two points in space. Transportation is a web of connected systems meeting particular needs through the interrelated and interdependent activities of its many component units irrespective of size or scope or area of concern. This applies to individuals and their ability to move between activity sites (Lioyle, 1998). Also a related concept is that of accessibility which refers to the ease of movement between two activity sites (Hanson 1995). It is a measure of the cost of movement between places and the more accessible an activity site is, the more the propensity of interaction between that area and the other site area. This accessibility is measured in terms of money and time costs. These definitions hold the material evidence with which to understand the underlying principle behind any industry. Every interface element within the industry is usually one and at the same times a separate entity as well as an interacting element existing on its own and working in conjunction with others toward ensuring the continuous flow of the process. Without demeaning the importance of other sectors, transportation, remains the only industry, and the wheel that keeps all other elements as well as the entire system of a country in constant motion (Adeniyi, 1981). Unequivocally, the world is yet to come up with an alternative to transportation (Filani 1981).

Before and after 1914 there was inter-regional trade along trans-Saharan routes and between the neighbouring communities with relatively higher transport demand. At that period, the Camel or the “beasts of burden” were used in the savannah grassland. Human porters were used in the forested south region, canoes were used at creeks and rivers in the riverine areas but the movement and the rate of transport were limited due to both the low level of economic activities and slow means of transport. Transport modes started to grow as the need for transport increased and this called for all various modes of transport via Water, Road, Pipeline and Air transportation.

Ocean freight or water transport is probably the oldest and earliest means of transport used by man, in fact since the creation, water transportation have played a significant role in feats which man have made to date. Traders have been using rafts, canoes, barges, and ship to move goods since man began to travel over water. It is now generally recognized that the maritime sector could, if properly harnessed play a critical role in view of the growth pole potentials of ports inland waterways and ancillary industries. (Hanappe and Savy 1980).

2.2. Theoretical Issues.

2.2.1. The Theory of Isolated State:

Inland waterway transport plays a complementary role to road transport and can carry bulky goods at low costs. This is discussed here using the theory of isolated state propounded by Von Thunen, The theory was postulated in 1826. It states that land use model was one of concentric rings of land use around the central isolated city. It resulted from increasing distance and therefore increasing transport cost. The theory postulated a flat plane with travel uniform soil conditions and all products being transported by horse drawn carts along radial roads into the city. Thus any point equidistant from the city will have equal production costs, lower than places further out and higher than places in but any improvement in transport facilities along any radial, for example a navigable river, will reduce transport costs from any point on the radial below those of any other point on a similar distance along any other radial. This will tend to elongate the land use zones, along the line of improved transportation and thereby lower the cost of transport.

2.2.2 Travel Demand Models:

It can also be used to explain the basis of movement using inland waterways. Travel demand models consist of four sub- models or the so- called four-step process:

- * Trip generation: Estimation of the number of trips, thus mode choice is the cost involves in selecting modes e.g highway transit, cars pooling rail and ferry.
- * Trip distribution: This is the next stage of the travel demand models. It is performed after trip generation is completed, and it consists of the distribution of the trip origin across the various trip destinations.
- * Mode choice: This is the third stage in the model, which is typically performed after trip distribution. Each of the origin destinations volumes obtained in the trip distribution phase are now “split” or distributed into the alternative modes. Mode choice models are in three categories e.g. integrated trip frequency and mode choice modes which predict the distribution by mode choice models (White and Senior 1983). The last two models are derivatives of the gravity models. This model is useful in ascertaining travel demand using inland waterways mode of transportation.

2.2.3 Freight Demand:

Freight demand has been linked with trade theory in explaining the pattern of commodity flow across regional and international markets. John (1980) explains that basic provision of trade theory is the explanation of the demand for freight transport services which is further explicated to provide a comprehensive model of factor of flow as a productive activity.

The concept of freight demand can be explained with trade theory arbitrage model, which was proposed by Enke (1951) and has been used, in different studies (Samuelson 1962; Enke 1951 and Ogwude 1997) The dispersion of prices in two locations for an otherwise identical goods is bounded from above by the cost of arbitrage between the two markets when trade volumes are unfettered and bounded from below and also when volumes reach some ceiling values. The model proposed by Enke and Samuelson, has a generalized equilibrium condition of equation:

$$\begin{aligned}
 &\leq P^1 + T^{10} \text{ if } q^{10} = 0 \\
 &P^0 = P^1 + T^{10} \text{ if } q^{10} \in (0, q^{-10}) \\
 &\geq P^1 + T^{10} \text{ if } q^{10} = q^{-10}
 \end{aligned}$$

Where p^0 and p^1 are the prices in two markets, 0 and 1, respectively, T^{10} is the cost of moving the goods from market 0, q^{10} is the physical flow of trade from market 1 to market 0, and q^{-10} is a maximal trade volume permitted between the two markets (e.g. due to quota or trade barrier).

Trade theory arbitrage is generalized problem of interspatial market. It provides an insight into the fundamental nature of economic pricing. The trade arbitrage model has been used variously to analyze spatial transport flow in terms of export and import and to determine the excesses and surpluses of commodity flow within a region or regions (Berry 1966; Holsman 1979; Ogwude 1997 p.13) for example, Holsman (1979) used the model to explain the nature of the linkage between cities and resource location and the principal manufacturing area. The result of his work shows the importance of variables such as total employment in the industry, manufacturing workforce, retail turnover and distance as freight production and attraction factors in interspatial market. However, this model has been criticized for paying undue emphasis on trade and traffic policy with less emphasis on the large movement of cargo that occurs within nations and the need for transport policy. The issue of location and trade flow has also been suggested as an integral part of the theory (Losch, 1963 and Bertil, 1933).

2.2. 4 Model Choice Theory

Modal choice is defined as choosing between two or more modes of transport which are hitherto competing for freight. Modal utility in freight transport is a function of many factors which are related to the characteristics of the competing modes and the nature of the cargoes. The characteristics of the modes include door- to – door service, transit time, reliability, capacity, frequency of service, freight rate, avoidance of damage or deterioration, loss or theft etc. (Young et al, 1982; Allen 1976; Daugherty, 1979). The nature of the goods is the attributes of goods which must be compatible with the chosen modes for easy transport flow. For example the choice of mode for perishable goods such as dairy product, ice fish, fresh agricultural products etc, should be mode served with refrigerated facility and has reduced transit time to prevent spoilage.

The mode choice theory of shipping firm is based on the assumption that the firm has utility functions and their behaviour is guided by that function. This theory is more relevant in the inland waterways and physical distribution of goods within the market areas, and as such can serve as a framework to identify the various externalities which can be constraints to effective transportation of containers across mode. Ogwude (1997 p48), in his study of customer behaviour in making choice of mode assumed that shipping by a given mode is an activity in which modal qualities are input, the outputs are the amount of consignment shipped or delivered. The theory has been criticized based on its empirical application which results in considerable

aggregations that obscure the analysis of the behaviour of individual shipping firm. For developing countries like Nigeria, most of the attributed variables are uncertain due to other transport situations such as unsafe roads, unreliable driving behaviour etc, and these are plausible reasons why an attitude towards risk is given as a probabilistic effect on profit of service attribute of a mode.

2.3 Empirical Issues

2.3.1. Empirical Issues in Maritime Transport Development Operation and Management.

Empirical studies in maritime transportation are researches carried out to draw conclusion from field observations, and they are discussed under the following sub-titles:-

2.3.2 The Effectiveness of Maritime Transportation

The effectiveness of maritime transportation depends largely on the development, operations and its managements. Past studies have revealed that maritime transportation is the cheapest and environmental the most friendly. Ogunsanya (1989) examined the trend of inland waterways development in Nigeria and the study revealed important implication for port planning, which he outlined the efficiency of inland waterway's infrastructural services are necessary for maritime transportation and freight distributions management in the seaport. He carried out a study on Lagos inland waterways with the aim of examining the spatial waterways infrastructure equipment that are available for maritime operation and shipping activities. The major findings of his study are that:

- i. The factor influencing maritime transport development in Nigeria are such as historical, political, socio-economic and technological which are responsible for water transportation development in Nigeria.
- ii. That financial problem in acquiring necessary water transportation operation equipment for maritime activities,
- iii. Lack of proper planning for maritime transportation activities that can accommodate inland waterways to aid international shipping operations.
- iv. Lack of warehousing, barges, good road network and easy access to and from the jetties, seaport,
- v. That modern infrastructural facilities were not available in the jetties and seaports,

- vi. Efficiency in infrastructural services increases the operation activities of maritime transport operation where its available.
- vii. That seaport planning depends largely on the physical state of the environment conditions and the socio-economic characteristics of the area with inland waterways as feeder

He therefore concluded that an important component of maritime transportation for efficiency, international trade and shipping activities should be environmental friendly, have to access roads, rail, inland waterways and that has modern infrastructure equipment for operation, warehousing, should be available.

2.3.3 The Cabotage Law

Igbokwe (2003) conduct a survey and submit a comprehensive report which critically examine the issues concerned in Cabotage Services under Cargo Support Programme and Cabotage and Indigenous Maritime Capacity Enhancement under Indigenous Vessels Expansion and Acquisition Programmes, this was to assist the NMA in carrying out its statutory functions including its promotional and regulatory roles and measures designed to facilitate the development and sustenance of the growth of the nation's maritime industry, some of the objectives therefore include :-

- i. The determination of the viability, sustainability and defensibility of a national cargo support programme which would be designed to meet current practices and must seek to promote, encourage and deepen indigenous participation in sea-borne cargo carriage,
- ii. The development of a feasibility plan for a credible fleet expansion programme and which shall build up indigenous tonnage based on a phased and demand- driven scheme.

The first objective above is broadly viewed as encompassing domestic waterborne trade within the coastal and inland waterways, To carry out this study, Igbokwe (2003) main research methods employed in the execution of the project were by framing and forwarding questionnaires to relevant stakeholders in maritime industry in Nigeria in order to obtain the volume of domestic maritime trade, current data on their past and current capacities, their current views and opinions, and generally carrying out a survey of the workings, implementation and results of the cabotage principles. The forwarded questionnaires was followed up with several visits, telephone calls and interviews with the organizations concerned and Data collection was

from many organizations among the following received questionnaires from and were visited and interviewed :-

- Nigerian Ports Authority
- Nigerian Shipping Companies Association,
- Ocean Fisheries Department of the Federal Ministry of Agriculture,
- Marine Inspectorate Division,
- The Government Inspector of Shipping Registrar of Ships,
- Shipyards in and outside Lagos including Nigerdock Limited, Damen, Ocean Fisheries, Westminster, Port & Marine, Continental Shipyard, Underwater Engineering and Naval Dockyard.
- Jetties in and outside Lagos including Atlas Cove, Ibru-Warri, Port Harcourt and Burutu.
- Oil terminals outside Lagos including Port Harcourt axis (Brass, Bonny, Okrika, Tuma)Warri axis (Forcados Escravos, Pennington, Odudu, Ukpokiti) and Calabar area.
- The Nigerian National Petroleum Corporation
- Nigeria LNG Limited
- Marine Transportation Division of the NNPC / Pipelines and products Marketing Company Limited,
- Nigerian Inland Waterways Authority Lokoja, and
- International Maritime Organization for papers on non- convention Vessels.

Igbokwe's data evaluation was to the relevance of the work or business of the Organizations to which questionnaires were send and / or which were visited and interviewed with a view to collecting or receiving data, are in particular as touching the type, quality or volume of cargo and their movements within the domestic axis and the types, sizes of vessels and their nationalities operating within the domestic axis and the capacity of the shipyards to build and repair vessels and the duration and arrangements for indigenous capacity building. Learning from the experiences of countries which had for long instituted and operated cabotage policy and to use such learning and experience to work out a beneficial cabotage policy, Cargo support and indigenous ship expansion and acquisition programmes for NMA implementation.

To discover the current trends and global views on cabotage regimes and find out what the general consensus is at the international Bar Association Conference on whether to or not to abolish the cabotage policy. The Scholar recommendations and suggestions are made for the determination of the viability, sustainability and defensibility of a National cargo support programme designed to meet current practices and seeking to promote, encourage and deepen indigenous participation in sea-transportation, cargo carriage as well as provide the way forward. The study recommended the following:

- i. That NMA should continue to support Cabotage policy since a cabotage law can be used to give cargo support to indigenous shipping companies and facilitate the expansion of their fleet and national tonnage.
- ii. That Nigeria should go for the cabotage policy which requires the vessels to participate in cabotage trade to be owned by Nigerian and either built in Nigeria or bought abroad.

The cabotage regime to be adopted by Nigeria should, in addition to excluding foreigners from participation, be extended beyond the Nigerian territorial water of 12 nautical miles to the exclusive economic zone of 200 nautical miles and non-transportation of off- shore commercial activities in order to ensure adequacy of cargo and passengers for indigenous carriers which should be the basis for indigenous capacity enhancement, vessels expansion and acquisition. He also recommended the type and sizes of vessels to be employed, among many recommendations.

Ogundana (1973) carried out a study on ‘problems and prospects of river transport in Nigeria, to identify the freight flow on rivers Niger and Benue with the aim of finding their seasonal variation of freight flow, variation in the volume of traffic on Nigeria’s inland waterways and to account for the factors responsible for the variation, and to examine the implications of the results for regional transport development and planning in Nigeria.

Based on this, the data used for the study are:-

- i. Characteristics of traffic on the inland waterways
- ii. Volume of traffic on the inland waterways overtime,
- iii. Vessels in traffic movement on the inland waterways,
- iv. Current and past status of inland water port in terms of their infrastructures and superstructures as a determinant of their ability to handle traffic,

- v. Identification of traffic problems, and
- vi. Identification of factors responsible for the variation in traffic volume.

Data was collected from National Inland Waterways Authority (NIWA) and National Maritime Authority (NMA). The result that seasonal flow of Nigeria's rivers affect its traffic flow with the changing water levels of the Niger-Benue, the river fleet cannot be used all the year round especially during May and June. Thus creating periods of navigability, and that there is lack of correspondence between the periods when the rivers are navigable, especially river Benue, and the period in which product are available for shipment. He said "only the harvesting of bean seed fits in with the navigation season, that other produce might need to be stored for up to seven months" such traffic will normally keep to river route only when there is no alternative. He explained that outlook for freight traffic on the Benue is not bright, because it has no feeder transport, and will continue to depend on traffic close to the river if there are no plans to extend the catchment area.

2.4. Literature Review

The literature on both maritime and Inland waterways transportation is vast and varied. The literature was discussed on the following sub- themes:- The growth and development of waterway, effects of water transportation as well as its contributions to economy.

2.4.1 An Overview of Transport Modes in Nigeria.

Robinson and Banford (1987) defined pipeline as a line or conduct of pipes of varying diameter and length but sometimes hundreds of kilo meter long which are traditionally used for carrying liquid or gas from the point of supply to the point of consumption, in the same vein Murray (1976) also defined pipeline from a functional perspective, as a steel metal with diameter capable of conveying oil and gas from the heart of the continent to the ports for example in the case of North America pipeline transportation accounts for one-fifth of the inter-city freight in (ton) Also Aldeman (1974) who is an economist viewed pipeline in terms of its monopoly as pipeline maybe a decreasing cost industry if and only if it is an industry entire to itself. Palterson (1962) also regarded pipeline has having the capacity of carrying large tonnages enjoy lower cost of any overland that has no form the scattered wells of the typical oil to large inland refining centre's that is economical and valuable for transporting refined products

to large consuming areas and that pipelines, even small one can be justified when alternative means of transport are lacking.

In Nigeria, pipeline is defined under the section 11 (20) of 1965 Oil Pipeline Act, as a system of pipes for the conveyance of anything other than air, water, water-vapour and steam and not being a drain, A server or pipes for heating, cooling or for domestic purpose. This definition is similar to that of Bamford (1978) as discussed earlier. Rail transport provides the most economical means of carrying bulk materials over long distances and is also the best as a common carrier. The availability of train services made it possible for some towns to grow due to the mobility of passengers and the professionals. It also narrowed down the social and class distinction of the society.

Motor vehicles move relatively high value light weight products of a general merchandise nature. The road transport has the widest geographical coverage of any society and it is a mode that can be readily expanded, it is therefore being used by vast majority of the population, Road advantages includes;- Flexibility of service, origin to destination service, without necessarily requiring trans-shipment, ability of vehicles to use all part of the network which usually includes roads of varying standard and capacity ability to use off road space in order to penetrate certain areas and to operate on step gradient, door-to door services and it also provides the initial and the ultimate transport service for other modes, thus complimenting them.

Air transportation which is the latest is considered the fastest growing and it is of great importance where speed of travel is paramount. Human activities that are distributed in spaces make air transportation the bridging of space necessary which in turn demands expenditure of time. The goods of human activities which necessitate space .Bridging relevant that demanding for transport are living, schooling, relaxing, commercial, shopping and maintaining human. Contacts of which their distribution over space is dynamically changes, a fast reliable and efficient transport network, inter-linking different parts of a nation to different parts of the world. Through history, the economic wealth and a military power of people or a nation have been closely tied to efficient methods of transportation. Transportation provides access to natural resources and promotes trade, allowing a nation to accumulate wealth and power. Transportation also allows the soldiers, equipment and supplies so that a nation can wage war. Transport system and routes are greatly influenced both how and where people live. Reliable transportation allows a population to expand through a country's territory and to live comfortably in remote areas far

from factories and farms. Transportation is usually classified by medium in which movement occurs, such as by air, water, land or pipeline. Within each of the first three media, many different methods are used to move people from place to place. Pipelines are used mainly to transport liquid and gas over long distances (Michael, 2009).

A number of policies and institution have been developed to assist inland waterways transportation some of them include:

1. Nigerian Port Authority
2. Government Coastal Agency
3. Nigerian Maritime Administration and Safety Agency
4. National Inland Waterways Authority.

Maritime transport is composed of maritime shipping and the port dimensions. Areas of focus include establishing a vision for future of maritime transport, policies that will drive changes; overcoming barriers to innovation, and establishing governance structure at the global and national Levels to foster the innovation that our societies will need for a more sustainable and better performing future transport system. Badejo (2002) concluded that it is a means of carrying goods and persons by water be it inland waterways which includes rivers and oceans, it can be domestic (Inland and coastal) supported with boats, ferries, coastal vessels of less than 500 gross tonnage or ocean transport of a vessels of over 500gt. In sizes and types which support international trade, Over 96% of the transportation of Nigeria's external trade is by maritime transport. Ogundana (1973) explained that although it was assumed that the Nigerian rivers would provide a cheap means of moving bulk goods at a relatively cheaper rate, those early hopes placed on water transportation have not materialized but have suffered a decline.

Ogunsanya (1986) examined the importance of Port development has hub for maritime transportation system in international trade. Oni (2010) concluded that Nigeria need to develop maritime transportation, mostly their inland waterways system to encourage multimodal transport in Nigeria. Gbadamosi (2008) worked on the social and economic impact of port development and port administration in developing country using Nigeria as study case, which he enumerate the benefits of port development in job creation , industrial development, distribution of goods and services. Ogundana (1966 and 1973) examined the 'Patterns and Problems of seaport evolution in Nigeria and suggested that its a solution to economic

development. Identify the problems and the prospects of river transport system in Nigeria, stating the numerous inland waterways that are available within the country and along the coastal belts.

a. The Nigeria Ports Authority:

The Nigerian ports Authority (NPA) assumed sole responsibility for providing ports facilities and services in Nigeria by the enabling port Act 1954 which created the Authority as an autonomous public corporation. The Authority commenced operation on April 1, 1995, when it acquired all previously operated ports and harbour activities from eight arms of the government which had hitherto been responsible for them. The statutory functions of the authority are:-

1. Provision and operation of such cargo handling and quay facilities as may appear to the Authority to best serve the public interest in all Nigerian ports.
2. Maintaining, improving and regulating the harbours and approaches to all the ports of Nigeria currently open to ocean-going vessels, and in such other ports as may be designed from time to time by the Honourable minister of transport.
3. Dredging to desired depths and providing as well as maintaining pilot age services, lighting, light-houses, buoys and other navigational aids in all Nigerian sea ports.

The Nigeria Port Authority has passed through many developmental stages. The stages are guided by the programme in the National Development plans of the country. The unbroken nature of Nigeria's coastline and the continuous situation activities along the estuaries of the rivers that pour their waters into the sea, not only hindered ports development in the country, but also made them prohibitive in cost. In spite of this hindrance however, maritime communities have found parts of the coastline suitable for berthing purposes.

b. The Government Coastal Agency (Cargo Handling Industry)

The Government Coastal Agency (GCA) was founded in 1954 with the main objective of handling all travel arrangement of government personnel and to act as clearing and forwarding agency for the government. This noble role of the agency has placed it on the threshold of operating at the gateways of the National economy, with large-scale diversification of the

company's operations into other viable economic activities at both the seaports and the airports. The GCA, which started operating only at Apapa in 1954, later has branches in Port-Harcourt in 1956, Sapele 1965, Kano airport 1970, Calabar 1970, Ikeja Airport 1970, Warri 1972, Burutu 1972 and Tin-can Island 1977.

c. The Nigerian Maritime Administration and Safety Agency

The Nigerian Maritime Administration and Safety Agency formerly the National Maritime Authority (NMA) was established by the shipping policy decree of II may 1987 and was supervised by the federal Ministry of Transport. Its mandate was to ensure orderly development, protection and manpower training in the shipping industry. The NIMASA was also given a responsibility for regulations relating to Nigerian shipping, maritime labour and coastal water. NIMASA undertakes inspections and provides search and rescue services, it also responsible for monitoring marine pollution and spillage in Nigerian waters. In 1988, the NMA granted six Nigerian shipping lines, "National Carrier's" including the state-owned Nigerian National shipping line. NMA had plans to extend this status to move domestic companies so as to reduce control of trade by foreign-owned lines. For reasons of National pride the NMA did not encourage domestic shipping lines to engage in feeder services. Bringing goods to a distribution point for direct onward shipping, preferring direct-line service "An NMA official said in 1989, "the development of feeder services is not at the moment consonant with the regions maritime development. In June 2011, the agency was to act as the approving authority and guarantor for beneficiaries of a new Cabotage Vessel Finance Fund. The Ministry of Maritime Affairs, Transport and Infrastructure deals with administrative and other tasks related to the following:-

- i. Measures for the protection of the sea, Islands, and coastal regions and their sustainable development, including the establishment of a integrated system for the planning, management and financing of development projects, traffic, utilities and social infrastructure, analysis and management of marine resources, coastal land and other natural resources.
- ii. Control over business concessions for domestic and international marine, boating, road, rail, air, postal and telecommunications and river transport.
- iii. Strategy for development of all forms of transport.

- iv. Protection of the sea from pollution from ships
- v. Seaports, maritime domain and establishing maritime boundaries, marine insurance and maritime agencies.
- vi. Ports on the inland waterways
- vii. Inland freight transportation centre's
- viii. Airport for multimodal connectivity's.
- ix. Vehicles other than those activities falling within the jurisdiction of other ministries.
- x. Telecommunication and post
- xi. Development of technical terms and conditions of use of facilities, technical equipment and installation of Telecommunication and radio communication.
- xii. Enactment of legislation on concession for services in public telecommunication
- xiii. Navigational safety at sea, internal and international road traffic and road operation except from the scope of the Ministry of Interior, railway safety, safety of air navigation, safety of navigation on inland waterways.

d. National Inland Waterways Authority.

The National Inland Waterways Authority also provide skeletal inland water transport services in few locations across the country, but recently, government are refocusing attention on the development of inland waterways and the dredging of a portion of river Niger, as well as the development of river ports at Lokoja, Borno, Idah, Nembe, Patani, Calabar, Ilaje and Olokola.

The basis for inland water transportation was borne out of the desire for inland locations to enjoy the same commercial advantages as the ports, which were more fortunately situated at the sea. It enjoys the singular advantage of transporting goods and people to the interior places far away from the sea. It is cost effective, and can transport large volumes over a great distance. The mode involves the use of lakes, creeks, naturally navigable inland rivers, boats, ferries among others as means of transportation. The initial impetus in the development of the inland waterways as its true of other modes such as rail and road was the colonial interest in opening up the interior for resources exploitation and to ease administration. Indeed, as initially conceived by the British, the rivers were expected to be part of the multimodal system with rail, road and air acting as tributaries to one another. The efforts by the Federal government to develop the country inland waterways transportation through the National Inland waterways Authority (NIWA) with the dredging of the lower river Niger, has yielded little or no positive results after

54years of conception. Over the years, the maritime sector of the Nigerian economy has grown to become one big industry with many separate, yet inter-related activities being undertaken by different agencies to keep the hub of the business of haulage through the sea in perpetual motion. Among this broad range of activities are those involving shipping operation, stevedoring activities, clearing and forwarding. Inland waterways play a vital role in the economic development of remote rural area and in the welfare of their inhabitant, who are usually among the lowest of low-income groups in the community or state. In the absence of river and other forms of inland waterway transport, many remote underprivileged communities would be inaccessible or too costly to service by other means. There are many countries where IWT plays a significant role in transportation.

Nigeria Cabotage regime was introduced by the Coastal and Inland Shipping (CABOTAGE) Act No 5, 2003, Laws of the Federation of Nigeria. The aim of the Act is to empower Nigerian Shipping Industry and give the indigenous ship-owners the competitive edge over their well-established foreign competitors. However, after Ten years of signing the act into law (since the act took effect from 2004), it is not clear whether the act has taken off or it is yet to take off. It has become one of the criticized Nigeria's Act in recent times; so much so that NIMASA, the administrative home of Nigeria's maritime industry has not only condemned the Act but has contributed to the call for its amendment. Cabotage means short distance trading and haulage within a country. It could be via water transportation, rail, air or road. Thus, in the maritime sense, it is shipping between ports of the same country. It is usually exclusive to the shippers of that country with limited waiver if any. They are common throughout the world, and are used to protect trade between two points in a single country.

Nigeria Cabotage Act is modeled along the US Cabotage Act. The Act is an economic instrument which is flexed depending on which area of the economy needs attention. Thus, as a protectionist law, economic consideration is its highest priority; hence it is subject to frequent adjustment for the benefit of those it stands to protect. The Act is both important and timely; there is never a better time for industrialization which naturally comes with hitches. The Act is hinged on two main parts which are part II and part III of the Act. Part II of the Act (sections 3-8) contains the Cabotage pillars, particularly at:

- Section 6, whole ownership by Nigerian citizen
- Section 7, exclusive manning by Nigeria citizen and
- Section 8 building or assembling the vessel in Nigeria.

While part III of the Act (sections 9 -14) contains the waiver clauses particularly

- Section 9, waiver on wholly Nigeria ownership
- Section 10, waiver on manning and
- Section 11, waiver on Nigerian built or assembled vessel.

2.4.2 Inland Waterways Transportation and Socio Economic Development: Case Studies across the World

‘Through effective planning and strategic investment, the USA has inland waterways and ports on the West coast (Los Angeles, Long-Beach, Oakland, Seattle /Tacoma and east coast (New York, Baltimore and Hampton Road) expected to be ready with post-panama channels in 2014, there is currently a lack of post-panama capacity at US Gulf and south Atlantic ports, the very regions geographically positioned to potentially be most impacted by the expected changes in the world fleet. The project is estimated to cost \$652 million dollars US. ‘Army corps of Engineers (2013).

a Bangladesh

Out of an overall 2400km- long net work of rivers, canals, creeks, and bodies of water occupying about 11 per cent of the total area of the country only about 600km is currently navigable by large mechanized vessels, of note is the fact that 72 per cent of the navigable length of the inland waterway system provides for vessel drafts of 0.91m or less during the dry season. In effect this means that navigation of the major part of the system is limited in the dry season to small vessels of 100 weight tons or below. Inland waterways are estimated to carry approximately 14 percent of the country’s annual passenger volume and 35 per cent of its annual freight volume of the three surface modes; IWT has the lowest share of the passenger transport task and the second lowest share of the freight transport task.

b. China

China with an inland waterways system comprising more than 5,600 navigable rivers and a total navigable length of 119,000 km, has the most developed IWT subsector in the region. The majority of the total country's length of navigable waterways is located within the course of the Yangtze, Pearl, Huanihe, and Helongjiang rivers. The Yangtze has a navigable length of 58000km or 50 percent of the national total, of which 3,000km is suitable for navigation by vessels of 1000 dwt or more. In addition to the major rivers there is the ancient Beijing - Hanzhou Grand canal, with a navigable length of 1.747km. but is expanding annually as a result of channel regulation work within the waterways network, there are about 2,000 inland ports, including 85 leading ports which provide 52 berths capable of accommodating vessels of up to deadweight tonnage of 10,000. Seven of these ports each have been an annual cargo through put of at least 10 million tons. The network has some 900 navigational structures such as ship-locks and ship-lifts.

China is concentrating its IWT development thrust on 5 specific areas namely, Yangtze River, Pearl River, Beijing Hnagzhou Grand canal. The ship lock has two lines and five steps each line. The chamber dimension of each step are 280m long 34m wide and 5m deep for passage of pushing convoy with carrying capacity of 10,000 tons. Total length of the lock is 1,607m. overall difference of upper and lower water level is 113m with the highest upper water level of 275m. total investment of the ship lock is US\$ 947 million. In year 2009-2010, the cargo volume carried on the inland waterways of china reached 790 million tons, and the total cargo task, measured in ton-km, reached 185 billion (giving an average trip distance of 212km) while the cargo volume and task has been increasing, the passengers and 8.35 billion passenger-km in 2010 -2011, the growth of container traffic has dominated overall traffic growth on the inland waterway system. The volume of containers carried to or from major river ports grew by 38.6 per cent per annum from 200,000 TEU in 2000 to 98 million TEU in 2010 alone, this volume increased by 84.1 Per cent.

c. India

India has inland waterways with a navigable length of 15,544km. only 37 per cent of the length (5,700km) is currently used for navigation by mechanized vessels. Three of the navigable waterways, the Ganges Rivers from Haldia to Allahabad (1.620km) the Brahmaputra river from

Dhubri to Sadiya (891km) and West coast canal from Kottapuram to Kollam, including the Chamakara and Udyogmandal canals (205km).

Table 2.1.Changes in traffic on major waterways of India.

Nature of waterway	1997 – 1998	1998 – 1999	1999–2000	2000–2001	2001 – 2002
National waterway No					
Gang–Bhagirathi Hoghly	998	841	715	335	411
Brhamputra	17	19	22	50	41
West Coastal canal	752	1,027	1112	1085	1,164
The Goa	18,284	15,369	14,868	18,047	15,693
The Barak	1	1	8	8	2
TOTAL	20,052	17257	16725	19525	17312

Source: Economic commission for Europe (2005)

The government of India has greatly increased its national budget to support IWT development in the Ninth National Five-Year plan [1997 – 2002] the budget for IWT was increased to US\$ 88million from US\$52 million in the previous budgetary cycle (1992-1997). The budget for the Tenth national Five-year plan [2002 – 2007] was US\$ 173 million.

Civilization has brought us to a speed like never before, we live in a world where we have so much to finish and time remain the same, where the call for need to review the way we have been doing things and adopt more associative, sensitivity philosophy, human ingenuity has provided this age with formidable technology including the information that can help us with the question of the time. While being sensitive to everything that concern the environment, transportation industry, should not be left out in this. Suliaman, et al (2011) look at inland waterway transportation from the efficient and innovative manner on how it link cities with existing transportation by providing quality time-save journey plan, facilities and services for people at affordable rate through system hybridization and integration.

Joan, (2010) in his work on inland waterways transportation on Hazards to Navigation (Encroachments) Encroachment of hazards to navigation creates operational inefficiencies that impede commerce in the shipping, who rely on the waterway for movement of goods are impacted greatly, he suggest that the problems of location and construction of structures along the waterways, that its necessary to address two major categories of stakeholders:- (a) those who build the structures and those who permits the structures prior to their construction. He then conclude that ‘Hopefully, there will be better cooperation between government agencies on

permitting development and a focus on the agglomeration clustering and density of development on the waterway. He did not include the inhabitant along the waterways that might have influence or the other on the waterway course like ports or jetty and guideline for developer's structures on or along the water ways –Bridges

d. **Europe**

Inland navigation Europe (2005) revealed that with the strong growth of passengers and goods on Europe's roads result in more traffic jams, longer and less reliable journey times for commuters, transporters and distributors. Costs to business and society start to escalate since traffic grinds to a halt, and the competitiveness of Europe is at stake. Building one's way out of road congestion will not put an end to increasing traffic volumes; only smart growth making effective use of multi-modal solutions will combine economic development with sustainable mobility. They stated that a framework on inland waterway shipping sector that consists for a large part of small and medium sized enterprises should be innovated under the pressure of tightening lending and crippling regulation. They stated that the sector has jobs to offers and provides genuine opportunities to keep goods flowing; setting the right framework conditions will help it to pursue longer-term goals important to increase competitiveness and make an excellent contribution to sustainable mobility.

Donald Bean (2012) works on inland waterways business development, he stated that commercial vessels like other materials such as fishing vessel, tugboat, towboat and barge industry materials need safety requirements for the business to grow, he identify fund and financial issues with insurance cover as major problem. Roland (2012) carried out research on the impact of terminal and ports in the inland waterways or maritime activities and concludes that most modern inland waterways terminal should be able to serve as barge planning, truck plans and customer services departments, which the shippers, shipping agents, ship-owners and his counterparts in the operation will lead to economic development.

Fabienne (2012) in her research work, she want a charge of the hinterland approach of the port with the ambition to double the market share of river transport in pre and post carriage of Traffic, setting up a close cooperation with the network of inland waterways platforms whereby she want a good coordinating and cooperation between the seaport and the jetty or smaller ports for movement and distribution of cargoes. Teunis (2012) concluded that only the improving, partnership and involvement of transport policy on operational performance of inland shipping

container chain and handling can improve transport system. Tom (2010) research on the legal issues in maritime transportation and mostly on legal operation and management of inland waters, he stated that the regulations and rules for operating, funding, management and coordinating should be well stated, he noticed that due to lack of specific rules and regulation in rural inland waterways has become hindrance and problem for their development and operation which lead to poverty, jobless, neglect untapped mineral resources of some areas. He also stated the shipping operation and coastal management are not regulated.

2.4.3 Impact of Inland Waterways to Socio-Economic of the Study Area.

This is the appraisal of the potentialities and inherent attributes of inland waterways transportation and its economic prosperity on the socio- economic activities of the area. It has become a veritable tools for finding solutions and movement to the general economic development, some of the notable positive impacts and significances of inland waterways transportation to the economic development are:-

- i. Mobility for the communities along the coastal area,
- ii. Employment opportunities and job creation
- iii. Revenue generation and improved income opportunities
- iv. Increase trading activities and commerce
- v. Improved positive economics of scale
- vi. Industrial development and Urbanization
- vii. Accelerated socio- infrastructural development
- viii. Socio-cultural co-existence and peaceful harmony
- ix. Sustainable International relationship.

The inherent attributes and potentialities identified above have serious impacts effect on the development of the study area. The area 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 23 billion barrels while Natural gas reserve is estimated at 3.5 trillion cubic meters. Apart from oil/gas and agriculture which contributes significantly to the GDP wholesale and retail trade also contribute significantly to the economy. Trading in Nigeria include the importation of goods such as computer accessories, electronics, fabric, equipment and goods and cargo that were transported in and out of the country were through water transportation and packaged in containers.

The large scale enterprises involved in trading activities were located in Lagos State, the commercial centre of the country and many industrial location are along the coast of southwest belt of Nigeria due to access to waterways transportation and international sea-port activities for freight operations. The southwest especially the Ondo state is endowed with oil/gas, Bitumen and agriculture products. The contribution of sea-water transport to the economy is also vital especially in international trade and inland waterway contribution to shipping in distribution and redistribution of cargoes and goods, services and people are very important. Shipping is responsible for about 75% of both export and import trade. Nigeria has over thirty-five sea-ports including on and off shore oil terminals, jetties, wharves and container depot

Industries and Resources Endowment in the study area: The study area hosts majority of the Nigeria revenue sparing industries. Industrialization and port/jetties location and majority of the manufacturing industries are located in the southwest of Nigeria due to nearest of the sea-port and coast where shipping are easily available for transportation.

There are many industries in Lagos state i.e. Apapa, Matori, Mushin oyinbo, Ikeja and Sango Otta, Badagry. In Ogun-waterside area of the coastal waterways, a lot of fishing firms are located along the coastal riverine area. Some of the Industries are Shell Nigeria Exploration & Production Company, Schlumberger oil field Services Group, Sea Petroleum & Gas Company, South Atlantic Petroleum Ltd., Total E & P Nig. Limited, African Petroleum Plc, Chevron Texaco Nig. Ltd. OMEL Energy Nig. Ltd., Portland Cements Pls. Kabelmetal Nig. Pls. Chemical and Non Metallic Products, Continental Iron & Steel Ltd., International Sea-Ports, Flour Mills Industries, Iwopin Paper Mill and International Airports

The Nigeria Port Authority (NPA) was established by the Act of 1954 (cap.155) of the law of the federal republic of Nigeria and Lagos. The 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 Terminals and Jetties: These are Apapa Bulk Terminal, EML Consortium, APM Moller Greenview Development Nig.Ltd., Eko Support Services Ltd. LADOL FREE ZONE which some of the jetties are: Standard Flour Mills Jetty, BOP Jetty, Petroleum Wharf Apapa (PWA) Jetty, Lister Jetty, Folawuyo Jetty, Atlas Cover Jetty, Fishery Wharf, Ijora Coal Wharf Jetty. Tin can Island port comprises two major jetties (a) Kirikiri and (b) Ikorodu Lighter terminals.

The new Adekunle Bull Nose and Lily Pond are operational depots jetty. Most of the ports and jetties are under the Nigerian Ports Authority and these ports handle bulk cargoes and containers apart from oil. However, a huge traffic of containers are being handled at AP molar's terminal under Lagos port complex which is been serviced by the Inland waterways transportation in the southwest coastal area of Nigeria the study area.

2.4.4 Inland Waterways Transportation and Freight Development in Nigeria.

The spatial operational efficiency of seaport and inland waterways transportation is an integral part of maritime business operation being used as a measure of the development of water transportation of any country. With advancement in Global trade technology, it has become necessary to study inland waterways spatial operational efficiency contribution to maritime operation and sea-port development with its impact on economic activities of the Nation. A seaport is an interface between sea transport and land transport or inland waterways transport system. Hoyle (1983) said, it is a central place of economic and cultural interchange and its essential function is transport integration. The evolution of inland waterways transportation has come a long way in history of the Nigeria before the arrival of the European traders into the shore of the geographical entity of Nigeria; there were traditional fishermen who were using rivers and creeks along the coast for transportation and trade.

The National Inland Waterways Authority (NIWA) was established by Degree No.13 of 1997 with a clear mandate to manage Nigeria's vast inland waterways resources. The Degree vests in NIWA the power of exclusive management direction and control on the Nigeria inland waterways.

This power is exercised on Nigeria's 3000km, navigable waterways from Nigeria into use before its Concession within the Nigeria/Cameroon borders to the Atlantic Ocean. Nigeria is blessed with a river configuration very suitable for southwest movement of people and goods. Nigeria's natural endowment in Inland Water Transport (IWT) system is over 10,000km of navigable waterways. This water wealth comprise: rivers, creeks, lagoons and lakes and intra-coastal waters. With inland navigable waterways of about 3,000km and an extensive coastland of about 852km. Nigeria has the great potential in the movement of goods from the coast to coast and from coast to the hinterland by water transport

2.4.5 Pattern of Coastal Inland Waterways Freight

The movement and pattern of freight in the coastal inland waterways in the study area are:-

A

- * Cost analysis of Transport options
- * Consolidation of specific cargoes for added cost saving
- * Site surveys
- * Determine the best suitable and competitive transportation solution

B.

- * Out of gauge shipping
- * No matter the size or weight steder Group will take care of your cargo and will offer the best cargo from door to door safety and timely shipping solution

C.

- * Warehouses with inside storage
- * Bonded warehouse facilities
- * Excellent waterway connection to all container terminals with the coast jetties and port area.

The coastal inland waterways freight is not a well planned component of the mode of transportation in Nigeria. Most of the operator are private organizations and individual engaged in Self-employment. The few Agencies in the coastal inland waterways are to protect security immigration environment. The objectives are to improve capabilities for:

- Detecting and forecasting oceanic components of climate variability.
- Facilitating safe and efficient waterways operation by removing water Henson along the marine,
- Ensuring public health,
- Identify and develop users base and jetties

Environment monitoring for needs are Tidal gauge placement, Anemometer placement biological data and sensors or wave data. At present, the entire freight system handles of about a thousand – million- tone - kilometer. The freight demand will possibly double in the next decade. Coastal trade as an integral part of the national trade needs be a

feeder to the national parts for international career and distribution channel for imported cargos to easy cargo carried over long distances in bulk and captive cargo with general cargo

Lagos port handle 75 percent of the Nigeria cargo and this is within the study area. Many of the coastal inland waterways aid in the distribution of cargo along the industries in the coastal area .which are largely made up of crude oil, agriculture products, general goods. Jetties between them handle break-bulk and door to door services of coast trade consignment like cement, building material, iron ore ,consumable goods, health and education material.

Table 2.2: The Flow of Inland Freight Trade Consignment, Inland Water Services in Nigeria Commodities, Volume and Years.

Commodity	Volume /	Year	Volume/	Tear	Volume /	Year	Volume	/Year
Iron steel	33735	2010	10726	2011	626009	2012	607338	2013
Crude oil	907172	2010	489767	2011	17563951	2012	29670387	2013
Cement	9545	2010	18434	2011	1054856	2012	727670	2013
Food grains	1088	2010	367	2011	100443	2012	11847	2013
Petro pet	2724007	2010	2134050	2011	59068844	2012	81173429	2013

Sources: NPA Apapa Data office (2014)

Out of total Lagos seaport annual coastal mode movement about 16 million tones were through inland waterways feeder pattern movement , off share coastal shipping.

The growth of coastal trade within the study area are means to a larger development of the economy itself .The tremendous cost-advantages afforded the coastal trade coupled with the immense benefits of energy savings to the economy. The trans-shipment thereby enhancing increase in export activities and increasing the ports potentials to develop as hub-ports leading to increased revenues and opportunities for generating both direct and in-direct employment; Infrastructure development, role of major jetties in coastal trade, inland waterways development that transportation of bulk cargoes at low cost. Inland waterways gives a natural advantage to part of an intermodal transport chain linking other transport modes the commodities movement are generally from jetty to port and from port to jetties of the several factor contributing to the coastal trade availability of long haul bulk commodity traffic and its safety of movement are factors influencing it economic viability.

Characteristics of the commodities in terms of quantity and suitability for water transportation play vital role in this sphere. Movement of bulk commodity traffic through coastal shipping is viable over long distance. Small volumes of all these commodities;-iron, steel, cement, fertilizer petroleum products and containers are moved through inland waterways to industries in the coastal area . All these facilitates, commerce, Promotes wealth creation, poverty alleviation and create job opportunities for youths within such area. Spatial structure pattern of inland waterways transportation of the study area. Field investigation revealed that IWT is far important and consequently has a much more popular appeal among resident of the coastal area of southwest Nigeria (Lagos, Ogun, and Ondo states). The variations in the level of patronage is shown in table 2.3

Table 2.3: Summary of the Spatial Freight of Inland waterways Transportation in Southwest of Nigeria.

NO	Jetties	State	Mean weekly volume of passengers	%	No observed commercial vessel on the busiest day	Mean(x) weekly waterways	observed motorized boat on the busiest day	No observed canoes on the busiest day
1	Lekke	Lagos	156	0.77	4	2	0	24
2	Ilaje	Ondo	152	.75	6	3	0	11
3	Olokola	Ondo	194	0.96	8	3	2	9
4	Lekke	Lagos	1675	8.3	23	14	7	70
5	Lekke	Lagos	2512	12.5	46	16	8	103
6	Epe	Lagos	6230	30.9	148	22	9	126
7	Ibeju	Lagos	3850	20.2	68	14	14	77
8	Aiyetoro	Ondo	1865	9.2	9	2	0	19
9	Badore	Lagos	170	0.81	21	2	5	46
10	Ibeshe	Lagos	1856	9.2	8	8	0	22
11	Ajah	Lagos	1287	6.3	38	9	8	112
12	Ijebu-watersid	Ogun	150	0.60	17	7	2	76
	Total	20,097	20,097	100	396	102	55	695

Source:- Author's computation (2015).

2.4.6 The Problems of Freight Movement along Waterways in the Southwest Coast of Nigeria

Global maritime transport has considerably changed in the last decade, maritime transport is growing at a high pace. As a result of increased competition, mergers and take over, innovation, Technology, professionalism and Financial investment in infrastructure

of maritime development have taken place in the recent years to establish a modern “mega – Carriers” in advanced countries which is yet to be adopted in Nigeria and mostly in the development of coastal inland waterways transportation and management. In the coast inland waterways area of Southwest of Nigeria there are too many challenges facing the Freight movement, these are the Ship size, especially for commercial activities which continue to increase in the region with subsequent demands on port/jetty efficiency and infrastructure.

The lifting of 40 – 40 – 20 rule and the cabotage regulation has led to increase competition, which has ultimately led to decreased water motor transport services in inland waterways freight movement along coast. Lack of skilled manpower and effective policy on inland waterways transportation as a feeder services to the ports became an hindrance to development. International commitment on maritime security and environment protection are neglected. The issue of private sector participation in inland waterways freight movement, jetty management, especially in fund raising, terminal management, security and training is a problem.

Transport system has been defined by Badejo (2002) as a group of interrelated objects called Sub- system, or Sub components interacting together to form an holistic relationship in which each sub-system depends on the other in order to survive. It can be either a closed system (i.e. which goes on and on in a circle without new entrance or alternative or a particular way of doing something or a group of things, pieces of equipment that are connected or work together as transport system or ecosystem.

Poor operation and management skilled manpower in the inland waterway services and freight handling, jetty security and safety dominate the problems in freight movement along the waterways in the coast of Nigeria. The inability of effective government rules and regulations with its political appointment influence which lead to appointment of non- professionals as Directors and Managing Director of maritime operation and Utilization of equipment account for major problems of freight movement. In 2014 the conference hold at Lagos State on Maritime Management concluded that the little available shipping equipment are underutilized leading to limited shipping services and freight distributions. The observation on the field shows that a multitude of private and unregistered

private owned small water motor vehicle, jetties affects freight security and movement along the coast waterways.

With inability to accessible spare- parts, professional and skilled maintenances manpower, the cost of freight movement are higher and these affects freight movement in the study area. Also the cost of operation fuel and security along the costal waterway hindered freight movement. With the level of income of users and operators along the southwest coast resulted into inefficiency and marginalization of water motor vehicles, jetties that are available in the area, which resulted in the physical constrains, cumbersome procedure and poor linkage to the sea-port which reduces the freight services efficiency. Due to seasonal rainfall in the study area the sizes of water vehicles for trading activities and cargo movement are compatible to the cargo available all the year round in the coast. The inability to have multimodal transportation system has hindered collaboration between ports, jetty and operators of water motor vehicles these reduced freight movement and utilization of the inland waterways..

With the settlement pattern along the coast, the problem of linking-jetties to hinterland users due to isolation, neglect hindered freight movement of door to door services and poor economic activities. Poor facilitating procedures and loading and off-loading equipment, with un-controls system in coastal waterways affects turn-around time of vessels. Since engines need to be maintained and serviced for good performance, lack of shipping yard for repair and maintenance of water motor engines affect freight movement. The rigged cabotage rules and lack of financial capability of private owners of motor vessel are another problems in the freight movement. It also lead to constraints in freight growth due to poor financial investment input. The inability to use modern infrastructure equipment and adequate technology maintenance method along the coastal waterways hindered commercial activities.

CHAPTER THREE:

Methodology

3.1 Types of Data Used.

The following data were used for the study

- i. Information on Bathymetric characteristics of the waterways such as depth and elevation of the coastal waterways.
- ii. Multi-temporal inventory of shipping / movement activities,
- iii. Inventory of waterways characteristics.
- iv. Socio- economic aspects of inland waterways transportation activities on transport service, distribution, operation and management.
- v. Information on causes of neglect of coastal waterways transportation.
- vi. The contribution of inland waterways transportation to community development, trade, commerce, income generation and employment of labour.
- vii. Information on freight/cargo movement along the coast (types, capacities, destinations etc.)
- viii. Information of types/number/capacities of Jetties and platform.
- ix. Nature/size of water vessels.
- x. Information on the contribution of inland waterways to the economy.

3.2 Source of Data

The data outlined were obtained through both primary and secondary sources.

a) Primary data

These are first- hand information generated directly for use in this study. Three forms of primary data collection were used and these are observational methods, survey method and qualitative data. The observation covers, among other things, the behavior of operators of inland waterways in the coastal area, the roles of interactions between operators and user as it occurs, through structured questions and direct, field observation.

Information's on operator's and user's activities on the waterways were obtained by the use of the questionnaire, interview, field observations and focus group discussion and oral interview that complement the information gathered from the administration of questionnaire which was distributed. The survey methods which the administered questionnaire of a total 985 questionnaire were distributed and 940 respondents were recorded for data processing. Personal interview was also used inform of face to face interpersonal interview asking respondents questions designed for elicit answers pertinent to the research hypotheses. The Focus Groups Discussion (F G D) on the inland waterways transportation are the Users who are also the communities and the operators who operate water motor vehicles, organizations or Agencies along the southwest coastal inland waterways of Nigeria. These group were interviewed during their community development meeting where unstructured and related questions were asked with enough focus on the research topic.

b) Secondary Sources

The data obtained from secondary sources are from the published works of various organizations like Lagos Inland waterways Authority, Nigeria Port Authority, National Inland waterways Authority, Reputable Journals, Statistical year book and statutory publications by government, Federal Bureau of Statistics, Monographs from Libraries and Topographical and Cadastral Maps from Atlas . Information from the Internet, E-Library and electronic media, and relevant information from management systems were used in this study. Topographic maps from Macmillan Nigeria Secondary Atlas, Operation–Vehicles, Shipping data and operation management from Lagos Inland waterways Authority, data on ridership, Unregistered Fiber communities taxis, Information on open ferries fiber taxis, data on ferry route strategy, data on travel time between major routes, data on capacity of terry taxis and average speed of water ferry taxis on Lagos waterways.

3.3 Sampling Frame Work

The sampling frame work for this study covered the jetties in the southwest coastal waterways. Population and sample was on a systematic approach whereby; population can be defined as set of person/ subjects having a common observable characteristics. A statistic can be defined as any subset of the population. The characteristic of a sample are called a statistic. The sample used

in this study was to be more accurate. Since it is too costly to test the entire population and it often produce error, and may be impossible to test the entire population. It sometime result into destructive.

Sampling approach was used in this study, whereby jetties was used in the study area; namely Ogun, Ondo and Lagos state. In addition a multistage sample was adopted; whereby sample were taken at different levels such; as government agencies; National Inland Waterways Authority, National maritime administration and safety agency, Nigeria shipper's council, Nigeria port Authority, Lagos Inland Waterways Authority, Ondo State Oil Producing Area Development Commission, The security agent (NAVY), and Formal and Informal waterways operators. The communities along the coastal waterways that were sampled and passengers, traders using the waterways as means of movement.

3.4 Method of Data collection.

Two sets of questionnaires were administered in this study. A total of 415 copies of (A) were for operators while 570 questionnaires (B) were meant for users. The questionnaires were administered in the listed agencies.

- The National Inland Waterways Authority (NIWA)
- Nigerian Shippers Council (NSC)
- National Maritime Administration & Safety Agency (NMASA)
- Nigeria Port Authority (NPA)
- Lagos Inland Waterways Authority (LIWA)
- Ondo State Oil Producing Area Development Commission (OSOPADEC) and
- Formal & Informal Waterways Operators and Users. Lagos, Ogun, and Ondo states coastal areas, which form the study area for this study.

Sample size calculator were used to derive the sample size

(Creative Research System) that was used in this study.

Table 3.1: Questionnaires Administered per state in the Study Area along Coastal Inland waterways (S/W Nig.)

STATE	Total Distr.	Total Received			Proportion of respondents(%)	Proportion of operators(%)	Proportion of users(%)
		Operators	Users	sub-total			
OGUN(Ijebu)	80	50	20	70	12.96	9.26	3.70
ONDO(Ilaje)	190	80	95	175	32.41	14.81	17.59
LAGOS (Lekki)	300	150	145	295	54.63	27.78	26.85
TOTAL	570	280	260	540	100.00	51.85	48.15

Source: Author's Computation 2015.

Figure 3:1 shows the details of Questionnaires distributed along the coastal communities and their respondents data. showing % distribution of respondents of the Questionnaire in the three states along the coastal waterways in the southwest of Nigeria.

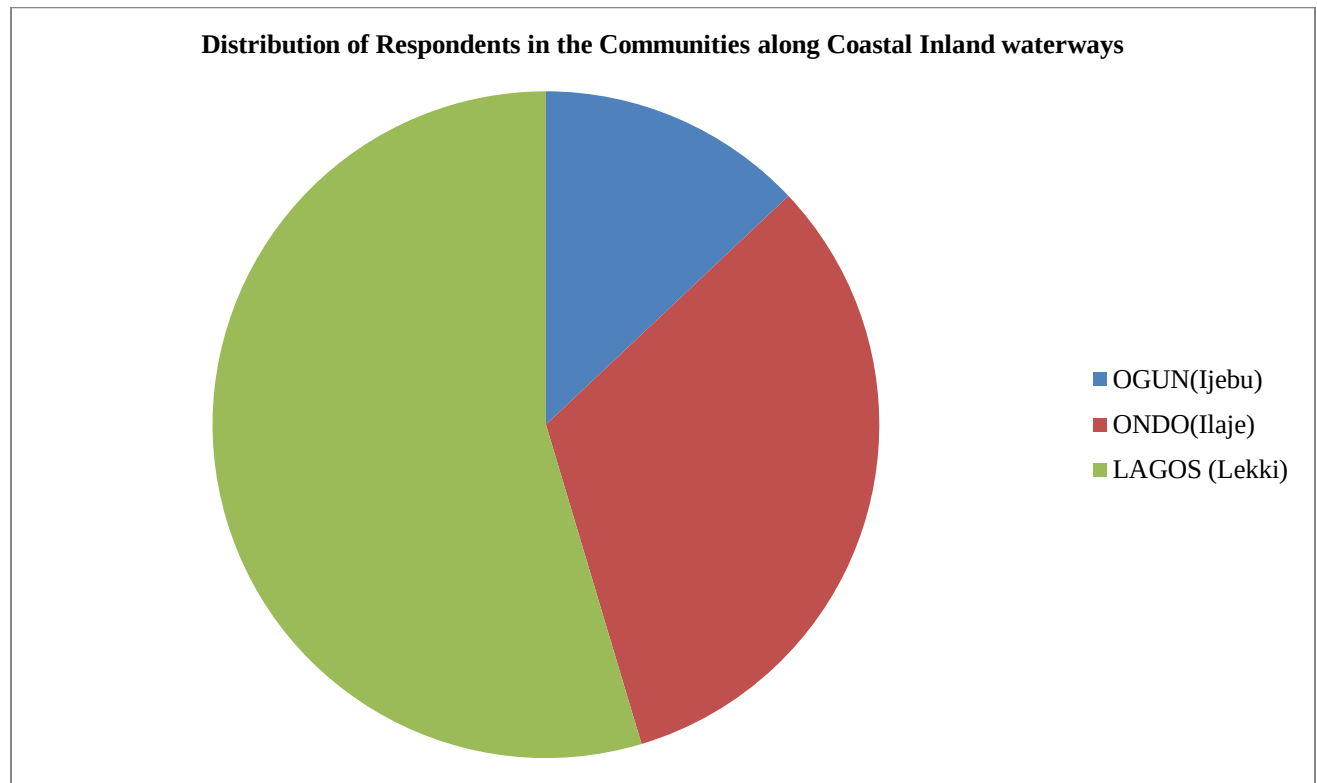


Figure 3.1: Distribution of Respondents in the Study Area

Source: Author's Computation , (2015)

Figure 3.2 shows histogram the respondents of both Users and Operators of the waterways in the three states along the southwest coastal area.

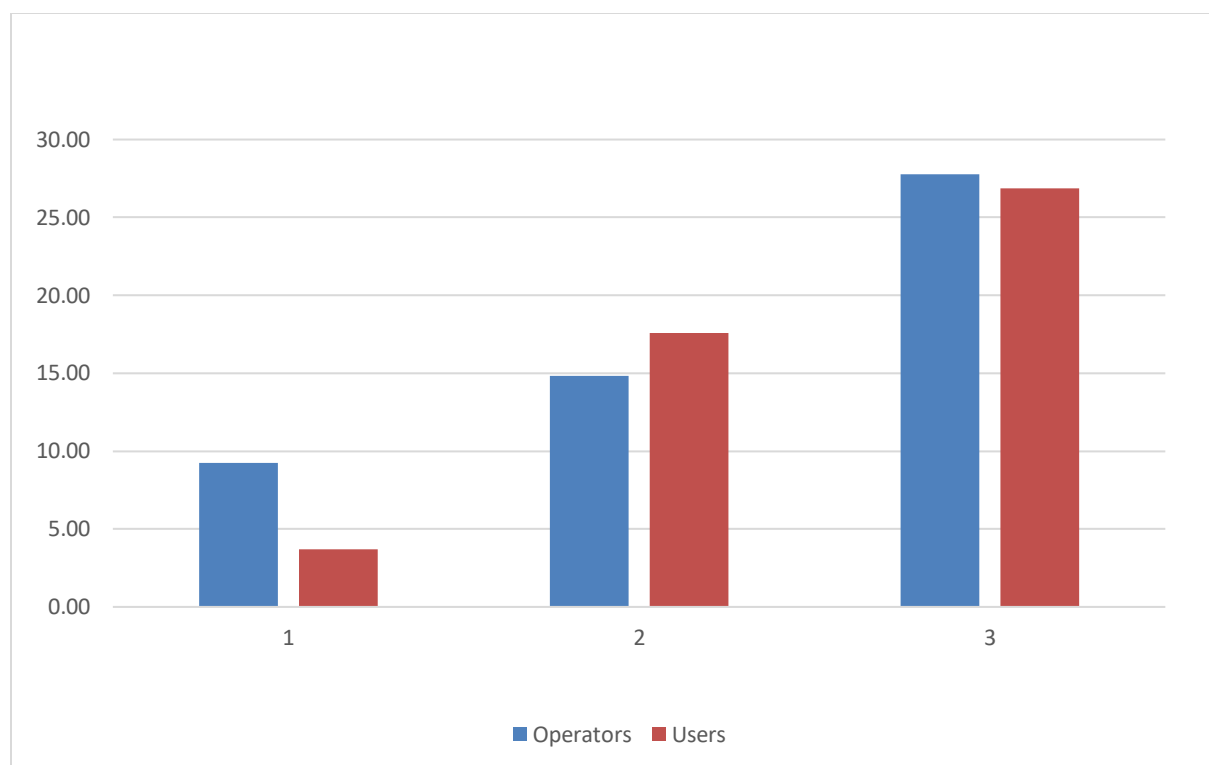


Figure 3.2: Respondents of Users and Operators

Source: Author's Computation (2015).

Table 3.2: Administered Questionnaires per Government Agencies in the Study Area.

STATE	Total Distr.	Total Received			proportion of respondents(%)	proportion of operators(%)	proportion of users(%)
		operators	users	sub-total			
NIWA	70	40	30	70	17.50	10.00	7.50
NIMASA	85	30	50	80	20.00	7.50	12.50
Shippers Council	80	50	30	80	20.00	12.50	7.50
NPA	60	20	35	55	13.75	5.00	8.75
LAIA	40	30	10	40	10.00	7.50	2.50
OSOPADEC	60	30	30	60	15.00	7.50	7.50
NAVY	20	15	0	15	3.75	3.75	0.00
TOTAL	415	215	185	400	100.00	53.75	46.25

Source: Author's Computation (2015).

Table 3.2 shows the percentage of the respondents of the Questionnaire in the different organization / Agents along the coastal waterways in the southwest of Nigeria

Figure:3.3: Respondents of both Users and Operators for the different Organizations and Agents in Coastal Waterways of Southwest of Nigeria.

Source: Authors Computation (2015)

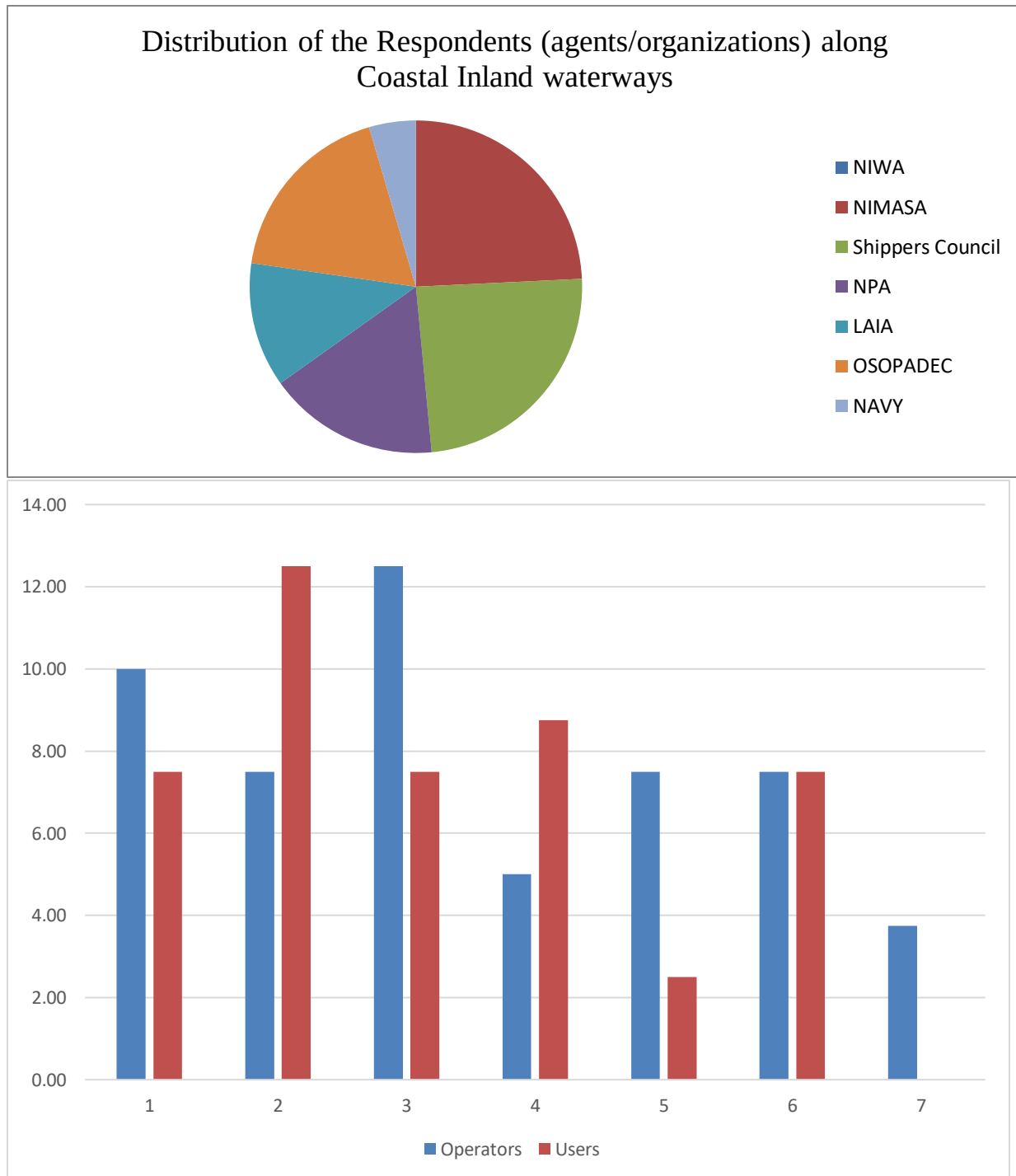


Figure 3.4: Respondents of Users and Operators

Source: Author's Computation (2015).

3.5 Methods of Data Analysis:

In this study both descriptive and inferential methods were adopted in this study,

a. Descriptive Methods:

Graphical methods were used in interpretation and presentation of monthly income and questionnaire administered. Tabulation were used in products and cargo transportation or freight movement while Pie charts were employed to describe characteristics and summary of respondents on each subjects of the questionnaires. This allow the researcher to see how variables differ from case to case. Also percentages and frequency distribution were displayed in tables which gives values of occurrence, and the graphs used were to show the trend, spread of values in large or small. These give combinations of values from two series for the purpose of determine their relationship.

b. Inferential Methods

i Time Series

A time is a collection of observations of well-defined data items obtained through repeated measurements over time. For example measuring the value of turn-around time of vessels at ports each month of the year would comprise a time series. This is because vessel revenue is well defined, and consistently measured of equally intervals. Data collected irregularly or only once are not time series. Time series analysis comprises method for analyzing time series data in order to extract meaningful statistics and other characteristics of the data. Time Series forecasting is the use of a model to predict future values based on previously observed values. It has at least systematic pattern. This was used to determine the trend and the periodic components of series of time when vessel/ferries turn-around at jetties /ports Loading and Off-loading which have effects on revenue generation and value at a particular time interval.

The formula is thus presented below

$$q(x) = Q_n(x) = a_0 + a_1x + \dots + a_nx^n$$

The norm or mean square error will be a minimum.

$$\|f(x) - Q_n(x)\|_2 \equiv \sqrt{\int_a^b [f(x) - Q_n(x)]^2 dx}$$

For each appropriate function $f(x)$, there is a unique least square polynomial approximation of degree at most n which minimizes.

ii Factor analysis

This is a statistical methods used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. It is a tool for investigating variables relationships complex concepts such as socio-economic status, since multiple observed variables have similar patterns of responses because they are associated with a latent variable. Since people may respond similarly to questions about education, income and occupation which are all associated with the latent variable socio- economic status. It is a statistic approach that can be used to analyzed large number of interrelated variables and to categorize these variables using their common aspects. The observed variables are modeled as linear combinations of the potential factors pull ‘error’ terms.

Since the study examined impact of inland waterways transportation in the coastal area of southwest of Nigeria, the factor was used to represent variables with similar aspects which describe a collection of observed variables in terms of a smaller. The formula is presented according Grice (2001). This method of creating factor scores is equivalent to using the equations below:

$$F1 = b_{11} X_1 + b_{12} X_2 + b_{13} X_3 + b_{14} X_4 + b_{15} X_5$$

$$F2 = b_{21} X_1 + b_{22} X_2 + b_{23} X_3 + b_{24} X_4 + b_{25} X_5$$

And assigning the value 1 to b coefficients for variables with loadings /correlations greater the 4 and zero to the b- coefficients for variables with loadings /correlations equal to or less than 4. The factor analysis was used for highlighting the problems and hindrances facing inland waterways full utilization in the study area.

CHAPTER FOUR

PRESENTATION, DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1. Characteristics of Inland Waterways and Freight in the Study Area.

The southwest coastal waterways have a land area of 910.768 sq.km. It is located in the Gulf of Guinea, between Benin Republic and Edo-State Nigeria. The Southern border covers a coastline of 540km. This coastline is found in three states, namely: Lagos, Ogun and Ondo states. The most southern point near Ilaje in the area of Ondo state is about 4°N of Equator while the Northern boundary is approximately at 7°N.

The Ogun State coastal inland waterway area is so shallow that it cannot take any ship particularly at Egba-water side. Only ferries and small motor boats can move in that part of the coastal area. It is 2.5m deep, with bottom width of 60.00m, while the top width is 80.00M line at Chart Datum. (C D). In Ondo State coast line, the width varied from 8.5m to 85.2m bottom width, while the top width ranges from 100 – 150m at Chart Datum (C D). In Lagos area the depth is 12.5m – 18m, The bottom width is 100.m and over 120 – 180m Top width at line Chart Datum (C D). The above data shows that ships cannot call at Egba water Side jetties as they can only accommodate local boats and ferries. The depth of water at Olokola in Ondo- State coast and that of Lagos State waterways can accommodate various classes of ships, vessels and ferries for local and international commercial services. These is the reason why Lagos state has more seaport terminals and Jetties than others areas. Ondo State is now developing the Natural Harbour port at Olokola coastline for big seaport activities.

4.2 Basin Linear Morphometric Properties in the Coastline of Southwest of Nigeria.

The characteristics of the coastal inland waterways of the southwest area of Nigeria are of drainage. The basic analysis in Table 4.1 shows the influence on the water levels at different course of the water flow which indicated the depth of the water at a particular level and season. The basin linear morphometric properties of the rivers and stream along the coastal waterways of the study area that has impact on the level, depth and weight and length of the coast that influence the type of boat, vessel and ship that can be on the water at a particular time in the different area within different season of the year.

Table 4.1: Basin Linear Morphometric Properties in the Coastline of Southwest of Nigeria

No	Basin	Basin Area	Stream Order				Total Stream	Stream Length			
			1	2	3	4		I	Ii	Iii	Iv
1.	Ibasa	371.64	19	24	3	0	46	45.38	45.41	5.49	0
2.	Ajah	296.73	13	9	4	0	26	30.95	27.91	14.28	0
3.	Agaja	1020.21	50	27	26	24	127	118.75	64.61	65.01	16.58
4.	Odo-nla	143.85	69	24	19	0	112	150.43	68.81	69.54	0
5.	Irewe	1564.24	75	23	50	3	151	171.74	100.64	139.88	8.41
6.	Igbokoda	1513.31	71	37	23	19	150	239.93	91.76	40.89	49.21
7.	Alawo	39.22	98	50	4	0	152	194.83	112.97	17.59	0
8.	Oworonsoki	29.19	11	6	0	0	17	43.51	16.25	0	0
9.	Ijegun-Egba	13.32	59	29	1	0	89	67.87	56.01	7.05	0
10.	Awoye	68.59	70	39	1	0	110	127.05	94.32	1.71	0
11.	Aiyetoro	2912.46	190	2	49	51	292	431.02	172.08	152.94	72.24

Source: Author's Field Computation Survey, (2015)

Agaja, have basin area of (1020 .21) with a length of 118.75. Irewe has (1564.24) with length of 171.74. Igbokoda (1513.31) with length of 239.93 and Aiyetoro (2912.46) with length of 431.02. The greater area and length of these basins allow easy movement of motor boats and transportation of passengers and goods. However, during the dry season fewer motor boats are able to operate due to low water levels. Higher capacity boats cannot be accommodated at the jetties during the dry season.

Table 4.2: Basin Areal Morphometric properties of the Rivers and Streams in the Study area.

No	Basin	Total Sum Length km	MSL	Drainage Density	Drainage Intensity /River	Length of flow	Stream Frequency
1.	Ookola	96.28	2.093043	3.860022282	0.477773162	0.518132	8.079194
2	Itegbin	73.14	2.813077	4.057017635	0.355482636	0.492973	11.4127
3	Esofin	264.95	2.08622	3.850585601	0.479335724	0.519402	8.033171
4	Oluwa	288.78	2.578393	0.4981469	0.387838493	4.01488	1.284418
5	Badore	420.67	2.785894	3.718449786	0.358951197	0.537859	10.35921
6	Araromi	421.79	2.811933	3.587829683	0.355627208	0.55744	10.08874
7	Ijede	325.39	2.140724	0.12053385	0.46713175	16.59285	0.25803
8	Egbawater side	59.76	3.515294	0.488428521	0.284471218	4.094765	1.71697
9	Ugbe	130.93	1.471124	0.101746643	0.67975254	19.65667	0.149682
10	Ikorodu	223.08	2.028	0.307471921	0.493096647	6.504659	0.623553
11	Ogogoro	828.28	2.836575	3.516276146	0.352537789	0.568784	9.974182

Source: Author's computation Survey, (2015).

Table 4.2 shows the basin area morphometric properties of the rivers and streams in the study area. It shows the total stream length and its drainage density. The total stream length has effect on the waterways and influence the transportation of goods, persons, and services available in the study area.

Egba-water side is 59.76 km in total length and with 0.488428521 drainage density experience very little activities and can not accommodate any vessel or ship in its jetty but can only accommodate flying boats and locally made canoes due to the size of the coast. On the other hand, Igbokoda, Aiyetoro, Ajah, Ibaso all have greater depth and are wide enough to accommodate variety of water motor vehicles.

Araromi, Badore, Ogogoro and Ijede area consist principally of mud/sandy ridges having a maximum elevation of 1 to 3 meters above mean high tide. Over 90% of the communities reported that river bank erosion usually occurs at the end of the annual flood when saturated river bank soil become unstable and collapse into the river. When dry, the soil contract and crack but remain cohesive. This prevents free flow of water motor vehicles and negatively affects transportation, trading and movement of people in the area.

In areas like Olokola, Esopin, Ikorodu, Oluwa and Odonla the climate and hydrological nature of the area make road construction and maintenance prohibitively expensive. Most movements are over short distances and on foot through walkways of foot-bridges to jetty sites. The region is drained by the Atlantic ocean and the Lagoon for several centuries now the main link between the region and the outside world is water. The swampy nature of the area ensures the presence of abundant surface water. This has allowed the linkage of most of the settlements with artificial canals and man made jetties like the one at Egba-water side.

Table 4.3: Basin Analysis of Streams in the Study Area.

Stream Order (Strahler)	Stream Number	Stream Length (km)	Mean Stream Length (km)
1	451	414.75	0.91962272
2	291	235.66	0.809823317
3	129	139.48	1.081231034
4	2	1.92	0.958713002

Source : Author's Field Survey, (2015).

Table 4 .4: Summary of Basin Analysis of Morphometric and Drainage

Basin Area	1375.09
Total stream no	873.00
Total Stream length	791.80
Drainage Density	1.7366633
Drainage Intensity	1.10
Length of overland Flow	1.15
Stream Frequency	1.58

Source: Author's computation (2015).

Table 4.4 shows the summary of Basin Analysis shows that the physical expansion of the region is accompanied by increasing demand for transport. Only few communities are accessible by road. Inter- communal mode of transportation is by boats (water). The high rainfall and river discharge during the rainy season combined with the low flat terrain and poorly drained soils result in extensive flooding and erosion. This has impact on the hydrological balance in the study area.

4.2 Inland Waterways Ridership in the Lagos State Coastal Area.

Although the three states under study are endowed with inland water services, it is only Lagos State that has official records of ridership. Ogun and Ondo States are yet to develop their inland water resources and data base. The information for Lagos is presented in Table 4.5.

Table 4.5 revealed that in 2010 between the month of June and December, a total ridership of 4,375,112 was recorded in Lagos State waterways transportation while in 2011 between January and December a total ridership of 14,481,240 while in the same period in 2012 the ridership was 13, 487,95. In year 2013 there was an increase in the ridership of coastal inland waterways service of Lagos State to 19,109,514 and 2014 recorded the highest in the five years data of ridership with 21,768,813 riders in Lagos State inland coastal ways which has reduced road traffic.

Table 4. 5: Inland Waterway Ridership in Lagos State.

	2010	2011	2012	2013	2014	TOTAL	MEAN
January	NR	987,256	481,745	1,103,567	1,798,343	4,370,911	1,092,728
February	NR	1,210,046	892,456	1,471,325	1,794,421	5,368,248	1,342,062
March	NR	1,327,523	1,212,768	1,545,183	1,794,848	5,880,322	1,470,081
April	NR	1,135,810	1,560,182	1,671,225	1,789,212	6,156,429	1,539,107
May	NR	1,269,754	1,238,905	1,852,653	1,790,899	6,152,211	1,538,053
June	495,010	1,255,641	1,269,754	1,862,767	1,788,315	6,671,487	1,334,297
July	475,024	978,098	1,729,712	1,788,370	1,787,478	6,758,682	1,351,736
August	525,078	1,210,049	1,135,856	1,737,157	1,788,487	6,396,627	1,279,325
September	568,484	1,327,523	1,328,002	1,711,285	1,788,036	6,723,330	1,344,666
October	648,984	1,135,021	1,355,769	1,733,544	1,879,098	6,752,416	1,350,483
November	787,269	1,318,372	1,327,984	1,365,803	1,867,045	6,666,473	1,333,295
December	875,263	1,326,147	1,327,863	1,366,635	1,902,631	6,798,539	1,359,708

Source: Lagos State Waterways Transport Authority. 2015.

*NR = No Result.

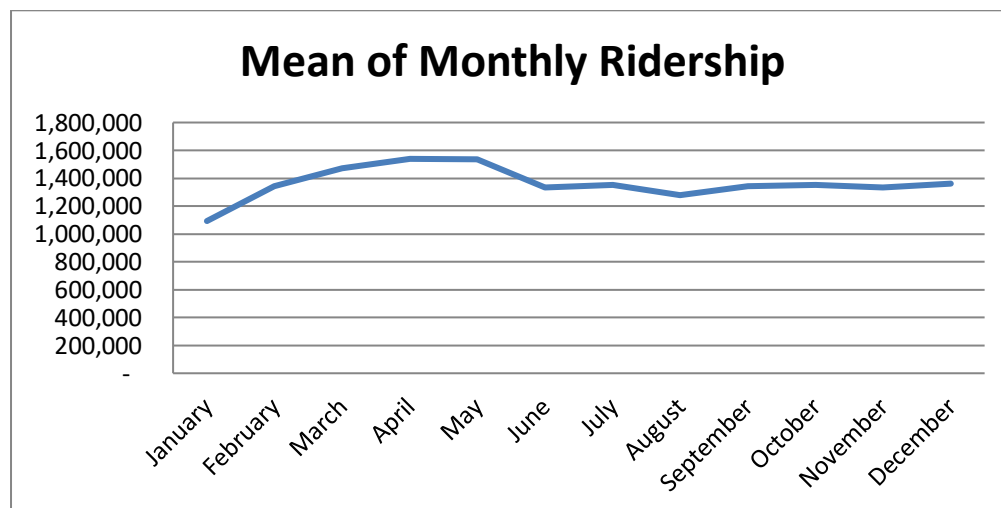


Figure 4.1: Mean Monthly Inland Waterways Ridership in Lagos Coastal Area

Source: Author's Computation (2015).

Table 4.6 revealed that the movement of riders from one location to another in the privately owned and unregistered open fiber boats operating in communities along Ojo and Badagry routes. It shows the member of passengers that each open fiber taxis could carry. This also indicated the movements from some communities to other communities within the

Lagos coastal area. It could be seen from Table 4.6 that there is a total of 318 unregistered open fiber boats with capacity of between one to 12 passengers at a time. It also shows the movement from one community to another with the number of Passengers capacity of open fiber taxis boats on the Ojo, Badagry routes. This route has few communities but aid trading and movement around sixteen local jetties for commerce and other activities. The open fiber taxis boats are privately owned by individuals in the community as means of employment and income generation. There are 318 unregistered open fiber community water motor boats.

Table 4. 6: Unregistered Open Fiber Commuters Taxis

SN	Communities Ojo / Badagry	Passenger Capacity	Number of Open Fiber taxis
1.	Irewe	10 & 12	72
2.	Agaja	10	42
3.	Ikare	8, 10 & 12	38
4.	Igbo Alejo	8	8
5.	Ibeshe	10	54
6.	Ilase	10 & 12	14
7.	Igbologun	10	11
8.	Ibasa	12	24
9.	Imore	10	18
10.	Alawo	8	5
11.	Tomaroo	8	5
12.	Esofin, Etegbin & Egan	10	11
13.	Slave route	8 & 10	16
14.	Apa	10	10
	Total		318

Source: Lagos State Waterway Transport Authority (2015)

Table 4.7 showed the routes along which the unregistered open fiber taxis boat operate. The jetties are usually used by local fiber taxis on charter services by communities around Ijegan- Egba to Ibasa, Irewe, Apapa, Tin Can lave route, Badagry and Ebure ojo for Trading, Bunkering and other activities. Ebute Ojo jetties has more because communities in this area have to rely more on water transport than road transport. This jetty serves about sixteen communities.

Table 4.7: Routes for Unregistered Open fiber Taxis

SN	From Ijegan Egba to		From Ebute Ojo to
1.	Ibasa	1.	Tin can
2.	Irewa	2.	Irewa
3.	Apapa	3.	Apapa
4.	Tin can	4.	Ijegan egba
5.	Ivabe Route	5.	Ibeshe
6.	Badagry	6.	Agaja
7.	Ebute Ojo	7.	Ikare
		8.	Ilase
		9.	Esofin
		10.	Agbara
		11.	Igbo Alejo
		12.	Igbologun
		13.	Itegbin
		14.	Etegbin, Egan
		15.	Alawo
		16.	Tomaro

Source: Lagos State Waterways Transport Authority (2015)

In addition to the old routes, some new routes were approved and registered in 2014 and 2015. These new routes are shown in Table 4.8. Table 4.8 shows the newly registered routes along the Lagos coastal inland waterways. This indicates that the Lagos State inland waterways Authority has improved its coastal inland waterway transport services.

Table 4.8: Recently Registered Routes in Lagos State.

SN	2014		2015
1.	Oworonshoki – Ikorodu	1.	Oke Afa – Festac/Mile 2
2.	Sabokoji – Alex	2.	Ajah – Five cowrie/Marine
3.	Coconut – Igbologun	3.	Ekpeme – CMS/Marine
4.	Liverpool – Igbo Elejo	4.	Ekpeme – Ebute – Ojo – Ijegan Egba
5.	Liverpool – Otua Igan	5.	Agboyi Ketu – Five Cowrie/Marine
6.	Liverpool – Olodi Apapa	6.	Agboyi Ketu – Oworonshoki
7.	Liverpool – Marine	7.	Mile 12 – Agboyi Ketu
8.	Tolu Ajegunle – Marine	8.	Osborne – Oworonshoki
		9.	Osborne – Ikorodu
		10.	Osborne – Lekki Free Zone
		11.	Ajah – Osborne/Marine
		12.	Lekki Free Zone – Epe
		13.	Lekki Free Zone – Ajah – Five cowrie
		14.	Lekki Free Zone – Marine
		15.	Lekki Free Zone – Ikorodu

Source: Lagos State Waterways Transport Authority (2015).

4.3 Travel Time along Major Inland Waterway Routes and Capacity of Boats used in the Jetties in Lagos State.

The travel time along the routes served by the 12 major jetties were also examined. Table 4.9 shows the Travel Time between major coastal inland waterways in Lagos State and its terminals within the 12 major jetties. The table 4.9 shows the average travelling time between major routes in the coastal waterways in Lagos State, some move in a speed of 25miles in 30mins. While some are on a speed of 20miles in 28mins while some on 60 miles in 70mins. This shows that from Ebute Ojo to Marina is only 17 miles but it takes 25 mins., Oworonshoki to Five Coweries Marina is just 10 miles and it takes 17mins which is faster than any road motor vehicles and cost less. It is time saving, comfortable and economical in usage.

Table 4.9: Travel Time along Major Routes

SN	Terminals	Average Time
1.	Ikorodu – Five Cowries/Marina	28 mins
2.	Ijede –Badore West & East	10 mins
3.	Baiyeku– Ajah/Langbasa	10 mins
4.	Mile 2 – Marina/Five Coweries	25 mins
5.	Badore – Five Coweies/Marina	25 mins
6.	Oworonshoki – Five Coweries/Marina	17 mins
7.	Ebute Ojo – Marina	21 mins
8.	Ijegun Egba – Ebute Ojo	30 mins
9.	Baiyeku – Langbasa	17 mins
10.	Falomo – Badagry	70 mins
11.	Ibeshe – Five Cowrie/Marina	28 mins
12.	Ijede – Five Cowrie/Marina	30 mins

Source: Laswa-ng.com. (2015).

The Table4.10 below revealed the total capacity of passengers and number of taxis boats that are registered operators with a total of 131 water motor vehicles taxis in Lagos State. It has different carriage capacity between 20 to 60 carriage capacities. The table 4.10 revealed the total capacity of taxis boats that were register and the number of boats in the coastal inland waterways of Lagos State. The total boats were 131.With these number of taxis boats only 16 of the boats that can carry 20 passengers, while 78 of the boats can carry 22 passengers at a time. 18 of the boats has capacity for 24 passengers at a time. 2 of the boats can carry 28 passengers, while 11 of the boats has capacity for 30 people. There are 2 other taxis boats that has the capacity to carry large number of people, 2 of such boats can carry 54 and 4 of the boats taxis can carry 60 people a time. Since Lagos is a Mega- coastal city, a national commercial centre with an international sea-port, air—port

and many coastal towns surrounding it, movement to and from the city for trading activities, business centre, social life, exchange of goods and services and occupational mobility increases the usage of the water motor vehicle, showing the impacts of water transportation in the study area. These show the reason while a lot of boats are on the coastal inland waterway in Lagos than any of the other states. Their major routes are within the state inland waterways which are Ikorodu to Ebute-Ero, Ikorodu to Five Crowries, Ikorodu to Marina, while some move from Ajah to Five-Crowries, Badore to Ijede, Marina to Apapa, Ajah to Five-Crowries. Ebute-Ojo -Five Crowries, Ebute-Ero-Bayeoku, Langasa to Okeri-nla, Oworoshoki to Marina, Oworoshoki to Five Crowries, Langasa to Bayeoku and Ebute-Ero to Ikorodu.

Table 4.10: Members Boats

CAPACITY	MEMBER BOATS
20	16
22	78
24	18
28	2
30	11
54	2
60	4
Total	131

Source: Author's Computation (2015)

4. 4 Social – Economic Characteristics of Respondents.

The primary characteristics of respondents of Operators in the 3 states: - Ogun, Ondo and Lagos with other Seven Agents and Organizations in the study areas, showing the Frequency and Percentage distribution of sex, age, marital status, educational status, job description and monthly income levels of operators among the respective categories.

Table 4.11 shows the characteristic of respondents of operators in Frequency and percentages. The respondents gender shows that 69.8% are males, while 30.2% represents the female. This implies that the men are predominantly involved in inland water transportation than

women. Further more, the survey shows that 68% of the respondents are married while 25.7% are single, 5.4% and 0.9 are Divorced and widowed respectively. This is an indication that majority of the respondents are individuals saddled with family (personal) responsibilities, thereby makes them to take their job serious. Considering the educational background of the respondents in the study area, 46.3% have Tertiary education while 43.5% have secondary/technical education 3.0% and 7.2% are in category of no formal education and primary education respectively. This means that majority of the respondents are well educated, and were trained in their area of specialization.

The survey shows that 37% of the respondents are in income bracket of N 50,000:00 – N 100,000 monthly income, while 25% are between N 20,000:00 - N 50,000:00 monthly income, those above N100,000:00 monthly income are just 5.8% of the respondents. Those in monthly income of N5,000:00 – N10,000:00 and N10,000:00 - N20,000:00 are 14.6% in each group respectively. Only 3.0% of the total respondents are in less than N5,000:00 monthly income.

This is an indication that inland waterways transportation is an important means of life hood and economic sustainable asses to the communities along the coastal waterways of southwest of Nigeria.

4.5 Characteristics of Inland Water Transport Services in the Study Area.

The survey revealed that among 5categories of cargo type carried in the study area indicate that Fish has the highest percentage of 40%,this is the main job of the most communities along the coastal area in the southwest of Nigeria, followed by farm produce that account for 25.0% while is a second primary occupation in the coastal area, since there is no other major means of carrying goods. Water transportation accounts for the carriage, while wet cargo accounts for 15% of goods transported by water mode in the study area. Dry cargo and contraband goods has equal percentage of 10% each of the total goods movement along the coastal waterway transportation in the study area.

Furthermore, the research shows the frequency of trips that are being made by the ferry / boats of trips that are being made by the ferry /boats along the coast, with daily record of 4 trips accounting for 19% while majority of the boats made 2 trips accounts for 37%. 3 trips is 21% and the second largest frequency which is one trip has 23% with

108 boats having a trip per day. This is to show that all the boats/ferries are engaged daily and the newer they are the more trips they could make and since most of these boats are fairly old and its services are not always satisfied, could not be fast as that of new ones. This also has impact on congestion at jetties or terminals.

The study revealed that mode of charging cargo varies with different point. Some cargo is charged using per kilo and this accounts for 16%. Since the weight of cargo has much impact on the boats/ferry. While some use size occupied by the goods to decide on the charging which accounts for 22%. Value of goods are a factor to be considered when charging cargo in the study area which is 24% of the respondents view. The most common largely used mode of charging cargo is the travelling distance of cargo and these account for 38% of the total respondents. The main reason for high cost is fuel, loading and off-loading, boats maintenance and security reasons.

The survey shows that the percentage distribution of the average rent cost of a boat are N50,000- N100,000 and that is 36% of the total respondents which are for old boats / ferries, while N250,000 - N450,000 record 21% of the total distribution. Only 11% are for N1, 200,000 – N2, 500,000. It shows that average rent of a boat have to do with size of the boat, age of the boat, capacity and operators of the boat or ferry are put into consideration on renting out a boat or ferry in the study area, which is known as cost of operation.

The duration of rental value show that there are four various duration within which a rent can be agreed upon. These are between 1 -5 days usually for old boats / ferry due to old age of the engine and these account for 21% of the total respondents. The majority of boats / ferry rental duration is over 2 weeks with 60% of the respondents and the one week or 1 – 2 week rental duration is 8% and 11% respectively out of the total respondents. Its observed that rental duration of boats or ferry should be over – 2 weeks to be able to make profit or break through in terms of operation cost and other services incurred. It also brings good inter –relationship between operators and users in the area.

The results gotten from the respondents signify that many people in the coastal area needs water transport mode to continue their operations within the study area. This is because the utility they derive from this operations cannot be over emphasized as

coastal water transport services provide more benefits for them and they can successfully boast of this fact anywhere. It's cheaper than road mode. The type of cargo carried along the coastal waterways shows that 10% of respondents revealed that piracy, smuggling which is identified as contraband also include bunkering which are illegal transportation of oil goods, material has become a sophisticated operation and its no longer requiring the collaboration of oil company or the federal government approval. Its theft of crude oil, goods without custom paper, drug trafficking which do not necessarily follow the most direct routes between sources and destination. All these are part of security challenges.

The finding on loading and off-loading methods shows that 45% of the respondents revealed that most of this activity is a manual methods which indicate that there are no enough loading or off-loading equipment only 20% indicate that mechanical method is being used while lift magnet is very few within the terminals, these account for 18% and lack of Electric power supply in the jetties reduce the rate at which electrical loading or off loading is effective, only 17% of the respondents identify the usage of electrical for loading. It shows that there are no enough equipment infrastructure at the terminal for usage which reduce the performance and activities at each jetties and manual loading and off-loading are always in use.

Further more, the survey shows that duration in loading and off-loading of boats/ferry is directly influenced by the Method of loading and off-loading. The duration varies with 38% the respondents indicate 2 hours while 26% signified 4 hours duration in loading and off-loading 21% and 15% signifies that shipping activities of loading and off-loading are 5hours and 8hours respectively. Basically, they explained that most loading and off-loading are manually handled which consume more time and that different type of goods or cargo needs different loading system, with variation in time used in loading and off-loading time.

The survey further revealed that higher percentage of the respondents agreed that duration in loading and Off-loading a ship is different from that of boats / ferry which is 53% duration time for ship to be less than 24 hours but 14% and 15% above 48 hours. This implies that there would be some terminals using lift magnet while others use mechanical, and it depend on the size of the ship, type of cargo and method of loading

and off-loading. They were also of the opinion that if the terminal are well equipped, loading and off-loading would be faster and timely.

According to the finding and previous analysis made on duration of time and methods used for loading and off-loading cargo, we can deduce that some operations will be delayed and could lead to congestion at the terminals/jetties. To confirm if congestion is experienced at the Terminals, table 4.11 shows that majority of the sampled respondents affirmed that the terminals experience congestion. In other out the causes of the congestion, respondents opinion were sought and this revealed that congestion at terminals could be attributed to various reasons such as limited space, mechanical /electrical faults, manual operation and bottle neck procedure in clearing of goods to mention a few. 72% affirm that there are congestion at terminals with 53% strongly agreed and 19% agree while 22% disagree. Only 6% strongly disagree on congestion. The limited space implies that the ware housing facilities at the terminals are not enough and available ones are over stretched.

On cabotage law effects, the result gotten from the finding signify that majority of the people in the study area did not have knowledge of the cabotage law, some did not know the importance of the law as related to coastal shipping activities. Only 26% of the respondents agree that cabotage law have effects on inland water transportation, while 28% could not decide on cabotage law effects. 19% agree while 18% disagree and 9% strongly disagree. This part of the data deals directly with legislative actions, policies and regulations dealing with coastal shipping in Nigeria. Majority of the people did not have full knowledge of cabotage law that restricts the coastal and inland water trade in the country to vessels flying its national flag. It is basically a protective law that safeguards the interest of local shipping in the carriage of locally generated cargo (Ajiye 2013). The cabotage law was enacted to be used as an economic tool because the Nigerian government realized that they were losing revenue to overseas companies. The law mandated that Nigerian labour will be used in the carriage of goods by vessels from one place in Nigeria to another terminals within the country waters.

The act would only succeed if there are enough indigenous ships to undertake the task. However, like all major policies enacted in Nigeria, the implementation of the Act have not been effectively handled. No infrastructure that would allow the shipping to

compete on an even playing field with foreign investors and foreign companies. Government did not perform their role as stake holders in the coastal water transportation, the coastal waterways are dirty and clogged up with algae and water hyacinth, These are having a profound negative effect on the coastal water transportation activities.

Table 4.11 Percentage Distribution of Operators among Different Study Groups and categories in the Study Area

CHARACTERISTICS	OGUN		ONDO		LAGOS		NIWA		NIMASA		SHIPPERS		NPA		LAIA		OSOPADEC		NAVY		Total	%
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%		
GENDER																					470	100
Male	16	80	55	57.9	10.7	73.8	26	65	31	62.0	24	80.0	15	42.9	10	100	22	73.3	13	86.7	319	67.9
Female	4	20	40	42.1	38	26.2	14	35	19	38.0	6	20.0	20	57.1	0	0	8	26.7	2	13.3	151	32.1
AGE																						
20-30	12	60	52	54.7	50	34.5	10	25.0	25	50.0	6	20	11	31.4	4	40.0	12	40.0	6	40.0	188	40
31-40	1	5	29	30.6	43	29.7	12	30.0	11	22.0	12	40	16	45.7	2	20.0	15	50.0	6	40.0	147	31.3
41&Above	7	35	14	14.7	52	35.8	18	45.0	14	28.0	12	40	8	22.9	4	40.0	3	10.0	3	20.0	135	28.7
MARITAL STATUS																						
Single	10	50	32	33.7	35	24.1	15	37.5	14	28.0	4	13.3	12	34.2	4	40.0	10	33.3	6	40.0	142	30
Married	9	45	44	46.3	99	68.3	19	47.5	31	62.0	21	70.0	15	42.9	6	60.0	18	60.0	5	33.3	267	57
Divorced	1	5	6	6.3	7	4.8	6	15.0	4	8.0	3	10.0	5	14.3	0	0.0	2	6.7	3	20.0	37	7.9
Widowed	0	0	13	13.7	4	2.8	0	0	1	2.0	2	6.7	3	8.6	0	0.0	0	0	1	6.7	24	5.1
EDUCATION																						
NO-Formal education	2	10	5	5.3	18	12.4	12	30.0	9	18	6	20.0	3	8.6	1	10.0	3	10.0	4	26.7	63	13
Primary edu.	3	15	24	25.3	37	25.5	6	15.0	17	34	7	23.3	13	37.1	3	30.0	5	16.7	2	13.3	117	25
Secondary/Tech	9	45	45	47.4	54	37.3	10	25.0	11	22	8	26.7	13	37.1	4	40.0	15	50.0	4	26.7	173	37
Tertiary	6	30	21	22.0	36	24.8	12	30.0	13	26	9	30.0	6	16.7	2	20.0	7	23.3	5	33.3	117	25
OCCUPATION																						
Trading	4	20	13	13.7	16	11.0	12	3.0	5	10	5	10	6	17.1	0	0.0	5	16.7	7	13.3	68	14.5
Fishing	1	5	4	4.2	23	15.9	4	10.0	4	8	2	6.6	9	25.7	3	30.0	2	6.6	0	0.0	52	11
Water motor opera	12	60	54	56.8	52	35.9	12	30.0	31	62	18	60.0	12	34.3	5	50.0	18	60.0	11	74.4	225	48
Civil servant	3	15	24	25.3	54	37.2	12	30.0	10	20	5	16.7	8	22.9	2	20.0	5	16.7	2	13.3	125	26.5
MONTHLY INCOME																						
<#5,000	0	0.0	7	7.4	6	4.1	2	5.0	0	0.0	2	6.7	8	22.9	0	0	3	10.0	1	6.6	29	6
#5,000-#10,000	4	20.0	17	17.9	26	15.9	8	20.0	8	16.0	4	13.3	3	8.5	3	30.0	7	23.3	4	26.7	84	18
#10,000-#20,000	6	30.0	26	27.4	47	32.4	17	42.5	27	54.0	9	30.0	14	40.0	2	20.0	8	26.7	4	26.7	160	34
#20,000-#50,000	2	10.0	30	31.6	40	27.6	6	15.0	8	16.0	13	43.3	8	22.9	1	10.0	8	26.7	3	20.0	119	25
#50,000-#100,00	5	25.0	30	31.6	40	27.4	6	15.0	3	6.0	2	6.7	0	0.0	2	20.0	1	3.3	1	6.6	53	11
Above 100,000	3	15.0	0	0.0	11	7.6	1	2.5	4	8.0	0	0.0	2	5.7	2	20.0	3	10.0	2	13.4	28	6

Source: Author's Computation (2015)

Table 4.12: Average Length of Time Spent Using Waterway by Operators

Year of patronage	#	Minimum	Maximum	Mean	Standard Deviation
Year of patronage Valid (luis/wise)	411 # 411	1.00	32.00	9.1265	7.56265

Source: Author's computation 2015

Table 4.12 shows the average length of time spent using the waterway by the operators 9.127 years with minimum one year and maximum of 32 years. This implies that majority of the operators depend on the water motor operation as permanent job and source of revenue for their life hood.

Table 4.13: Job Types and Monthly Income.

		JOB TYPES				Total
Monthly Income		TRADING	FISHING	WATER MOTOR OPERATOR	CIVIL SERVANT	TRADING
BELOW N5,000.00	Count	8	9	10	7	34
	% within JOBDES	11.8%	17.3%	4.4%	6.0%	7.4%
N5,000.00 - N10,000.00	Count	17	13	44	14	88
	% within JOBDES	25.0%	25.0%	19.5%	12.1%	19.0%
N10,000.00 - N20,000.00	Count	16	21	82	35	154
	% within JOBDES	23.5%	40.4%	36.3%	30.2%	33.3%
N20,000.00 - N50,000.00	Count	11	7	58	32	108
	% within JOBDES	16.2%	13.5%	25.7%	27.6%	23.4%
N50,000.00 - N100,000.00	Count	6	2	25	16	49
	% within JOBDES	8.8%	3.8%	11.1%	13.8%	10.6%
ABOVE N100,000.00	Count	10	0	7	12	29
	% within JOBDES	14.7%	.0%	3.1%	10.3%	6.3%
Total	Count	68	52	226	116	462
	% within JOBDES	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Author's computation (2015)

***JOBDES = JOB Description**

4.6: Pattern of Job Types and Monthly Income of Operators

Table 4.13 Showed in a cross tabulation of Job types and Income per monthly.

Majority of traders (48.5%) fall within the income bracket of N5, 000.00 and N20, 000.00 per month while 16.2% fall in the range N20,000.00- N50,000.00. As much as 14.7% earn above N100,000.00 per month and 11.8% earn below N5, 000.00 in a month. Also majority of people who engage in fishing (65.4%) have found in the income bracket of N5,000.00- N20,000.00 only 13.5% have found in N20,000.00- N50,000.00 a month and while were some above N100,000.00 level. But a high percentage, (17.3%) earn less than N5, 000.00 a month. In the case of water motor operators, majority fell in the income bracket N10, 000.00- N50, 000.00 per month, 19.5% fall in the bracket N5, 000.00-N10, 000.00 and 11.1% fall in N50, 000.00 in a month. The civil servants like the water motor operators fell mainly in the income bracket of N10,000.00- N50,000.00 (57.8%), 12.1% of them earn between N5,000.00 and N10,000.00 in a month, while 13.6% earn between N50,000.00 and N100,000.00. are 10.3% earn above N100,000.00 also 6% earn below N5,000.00 per month..

Table 4.14 : Monthly Income and Educational Status

MONTHLY INCOME		EDUCATIONAL STATUS				Total
		NO FORMAL EDUCATION	PRIMARY EDUCATION	SECONDARY/ TECHNICAL	TERTIARY	
BELOW N5,000.00	Count	6	7	14	6	33
	% within ESTATUS	9.0%	6.0%	8.6%	5.5%	7.2%
N5,000.00 - N10,000.00	Count	15	25	29	20	89
	% within ESTATUS	22.4%	21.6%	17.8%	18.2%	19.5%
N10,000.00 - N20,000.00	Count	18	42	61	30	151
	% within ESTATUS	26.9%	36.2%	37.4%	27.3%	33.1%
N20,000.00 - N50,000.00	Count	23	17	43	24	107
	% within ESTATUS	34.3%	14.7%	26.4%	21.8%	23.5%
N50,000.00 - N100,000.00	Count	5	20	9	12	46
	% within ESTATUS	7.5%	17.2%	5.5%	10.9%	10.1%
ABOVE N100,000.00	Count	0	5	7	18	30
	% within ESTATUS	.0%	4.3%	4.3%	16.4%	6.6%
TOTAL	Count	67	116	163	110	456
	% within ESTATUS	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Author's Computation (2015).

4.7 Educational Status and Monthly Income of Operators.

Table 4.14 shows the pattern of monthly income and education status. For the 4 levels of educational status, majority of the people fall into the income bracket N 5,000.00-N50,000.00. No formal education has 83.6% of people in this category with 9 % in below N5,000.00 level and 7.5% in N50,000.00 - N100,000.00 categories. It has nobody earning above N100,000.00 levels. Primary education level has 75.5% in the category but has as much as 17.2% in N50,000.00- N100,000.00 category also. Those who earn below N5,000.00 a month are 6% and 4.3 % earn above N100,000.00 a month, secondary technical education level has 81.6% in the category, 8.6% of the people earn below N5,000.00 a month, 5.5% earn between N50,000.00 and N100,000.00 and 4.3% earn above N100,000.00. Tertiary level has 67.3% in the category, 5.5% below N5,000.00 a month, 10.9% between N50,000.00- N100,000.00 and 16.4% earn above N100,000.00 a month.

Geographical Characteristics of Inland way Transport Service

The distribution of the type of goods carried by the water motor vehicle showed that fish has the highest percentage of 40% followed by farm produce 25%. The total of 65% of the goods carried in the study area indicate their primary activities which is neither farming or fishing, while wet cargo account for 15% and dry cargo is 10%, but contraband goods also account for 10%. Majority of the inhabitant in the area are fisher men and farmers.

Their finding further shows that majority of the boats / ferry made 2 trips daily with 39%. That about 22% of the boats made one trip per day. It means that every boat made a trip or more per day, which is a source of monthly income. From the research finding it was agreed that the most mode of charging cargo is distance, which was 38% of the respondents, while 24% agreed that the value of the cargo is put into consideration for charging cost of carriage. The use of size of cargo for determining the charges has 22% of the total respondents. When considering the average rent cost of boats, many factors come to play, some are the size of the boat, its weight, the age of that vehicle. If the boat is new with large capacity for carriage, it could be as high as N1200,000 - N 2,500,000. 11% account for this in the rental system, and the more trips it could make. This also has an impact on duration of boats rental system, some are for

over 2 weeks, which is 60% of the total, it also reflects on the age of the water motor vehicle, the newer it is the longer the duration of rental system, showing that between 1 – 5 days rents is 21% these are the old or aged boats which the risk is high for maintenance and operations. The research finding shows that loading and off-loading Method and duration of loading at terminals reflect the level of infrastructure and equipment in the jetties and terminal in which most of the terminal in the study are has little or no modern loading equipment this resulted into Manually loading system with 45%, while Electrical loading method is 17% and Mechanical loading is 20%, which reflect on duration of loading of cargo is within 2 hours. But where its manually loaded it takes 8 hours in boats/ferry but if its loading or off-loading a ship its shows that its less than 24 hours, if its Lift-Magnet equipment its 53% of the respondents that agree on this. While 18% affirm that 24 – 48 hours would be needed to load or off-load a ship with Mechanical methods. Also the finding shows that Congestion at terminal/jetties are high with 53% . which implies that that lack of loading and off-loading equipment are not available and that storage are also not enough at the terminals, while in the issues of Cabotage law effective was like a low that was not in enforcement with total respondents of 73% showing that it was not know in the study area, while only 27% agreed that its effective. Since most of the carbotage law stated that indigenous operators should own its ship for carriage with National Flag, which non of the indigenous operators can afford to have a ship of their own, nor the section of the law that operator should handle 60% of the local cargo along the nations coastal water. This is to enrich local shippers and generate revenue to the operators.

Table 4.15: Characteristics of Inland Waterway Transport Service in the Study Area.

Characteristics	Freq.	%	Characteristics	Freq.	%
Cargo Types			Loading Loading Methods		
Wet Cargo	70	15.0	Manually	212	45.0
Dry Cargo	45	10.0	Mechanically	96	20.0
Farm Produce	120	25.0	Electrically	79	17.0
Fish	190	40.0	Lift magnet	83	18.0
Contraband goods	45	10.0	Duration loading/ Offload Ship		
Trip made day			Less than 24 hrs	248	53.0
4 Trips	88	19.0	24 -48 hours	84	18.0
3 Trips	100	21.0	Above 48 hours	66	14.0
2 Trips	174	37.0	Other	72	15.0
1 Trip	108	23.0	Congestion at Terminal		
Mode Charging Cargo			Strongly agree	247	53.0
Per Kilo	77	16.0	Agree	90	19.0
Size Occupied	102	22.0	Disagree	103	22.0
Value of Product	115	24.0	Strongly disagree	30	6.0
Distance	176	38.0	Loading offloading Boat .		
Average Rent of boat			2 hours	180	38.0
₦50,000-₦100,000	170	36.0	4 hours	120	26.0
₦100,000-₦200,000	150	32.0	5 hours	98	21.0
₦200,000-₦450.000	100	21.0	8 hours	70	15.0
₦1,000,000-₦2,500,000	50	11.0	Cabotage Law effect Ship		
Duration of boat Rent			Strongly disagree	120	26.0
1 - 5days	98	21.0	Disagree	90	19.0
One Week	38	8.0	Undecided	130	28.0
1 – 2 Weeks	54	11.0	Agree	86	18.0
Over 2 weeks	280	60.0	Strongly agree	44	9.0

Source: Author's Computation (2015)

4.7 Primary Characteristics of Respondents of Users

Table 4.16 shows the percentage distribution of age, sex, marital status, educational status, job description and income levels of users among the respective categories. Table 4.16 shows that 69.8% are male and 30.2 % female. In table 4.16, 34.6% of users are above 40 years while the remaining percentages are below 40 years. 65.4% of users are male, Table 4.16 shows married users constitute 74.3%, singles are 25.7%, divorced users are 5.4% while 0.9% are widows. Table 4.16 revealed that tertiary education has the highest percentage of 46.3% among the users, followed by secondary/Technical education with 43.5% Primary education has 7.2% among users and the remaining 3% of users have no formal education. Table 4.16 revealed that in the job category Fishing take the highest percentage of professions of users. It has a percentage of 28.5%, followed by civil servants 27.4% and trading 23.0 %. Water-motor

operators have a percentage of 21.1%. Majority of users fall in the income bracket of N50,000.00– N100,000.00. This group constitutes 37.0% of users, 25.0% fall into the income group of N20,000.00 – N50,000.00, 14.6% belong to the group N5,000.00 – N10,000.00 while N10,000.00 – N 20,000.00 has a percentage of 14.6% among users. The income group of below N5,000.00 and above N100,000.00 have 3.0% and 5.2% respectively among users.

Table 4.16: Primary Characteristics of Users or Respondents

CHARACTERISTIC	OGUN		ONDO		LAGOS		NIWA		NIMASA		SHIPPERS		NPA		LAIA		OSOPADEC			
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	Total 460	%
GENDER																				
Male	44	88.0	47	58.8	10.6	70.7	16	53.3	21	70.0	40	80.0	11	55.0	23	76.7	13	65	321	69.8
Female	6	12.0	33	41.2	44	29.3	14	46.7	9	30.0	10	20.0	9	45.0	7	23.3	7	35	139	30.2
AGE																				
20-30	7	14.0	27	33.8	47	31.3	16	53.3	9	30.0	11	22.0	8	40	11	36.7	13	65.0	149	32.4
31-40	7	14.0	44	55.0	38	25.3	12	40.0	6	20.0	23	46.0	6	30	13	43.3	3	15.0	152	33
41 &Above	36	72.0	9	11.3	65	43.4	2	6.7	15	50.0	16	32.0	6	30	6	20.0	4	20.0	159	34.6
MARITAL STATUS																				
Single	5	10.0	20	25.0	47	31.3	11	36.7	4	13.3	9	18.0	5	25.0	8	26.8	9	45.0	118	25.7
Married	44	88.0	59	73.8	87	58.0	16	53.3	25	83.4	37	74.0	14	70.0	20	66.6	11	55.0	313	68
Divorced	1	2.0	0	0.0	15	10.0	3	10.0	0	0.0	4	8.0	0	0.0	2	6.6	0	0.0	25	5.4
Widowed	0	0	1	1.2	1	0.7	0	0.0	1	3.3	0	0.0	1	5.0	0	0.0	0	0.0	4	0.9
EDUCATION																				
No-formal education	0	0.0	4	5.0	5	3.3	1	3.3	0	0.0	1	2.0	3	15.0	0	0.0	0	0.0	14	3.0
Primary	2	4.0	12	15.0	5	3.3	2	6.7	1	3.3	4	8.0	4	20.0	2	6.7	1	5.0	33	7.2
Secondary/tech	8	16.0	34	42.5	75	50.0	8	26.7	10	33.3	31	62.0	11	55.0	15	50.0	7	35.0	200	43.5
Tertiary	40	80.0	30	37.5	65	43.4	19	63.3	19	63.4	14	28.0	2	10.0	13	43.3	12	60.0	213	46.3
OCCUPATION																				
Trading	6	12.0	31	38.8	18	12.0	9	30.0	7	23.3	12	24.0	5	25.0	8	26.7	10	50.0	106	23
Fishing	36	72.0	19	23.8	33	22.0	5	16.7	13	43.3	9	18.0	7	35.0	7	23.3	2	10.0	131	28.5
Water motor operator	3	6.0	13	1.62	48	32.0	6	20.0	2	6.7	16	32.0	3	15.0	5	16.7	1	5.0	97	21.1
Civil servant	5	10.0	17	21.2	51	34.0	10	33.2	8	26.7	13	26.0	5	25.0	10	33.3	7	35.0	126	27.4
MONTHLYINCOME																				
<#5,000	0	0.0	1	1.2	11	7.3	1	3.3	0	0.0	0	0.0	0	0.0	0	0.0	1	5.0	14	3
#5,000-#10,000	0	0.0	12	15.0	30	20.0	6	20.0	3	10.0	6	12.0	4	20.0	3	10.0	3	15.0	67	14.6
#10,000-#20,000	4	8.0	13	16.2	19	12.7	6	20.0	4	13.4	7	14.0	3	15.0	3	10.0	3	15.0	67	14.6
#20,000-#50,000	1	2.0	31	38.8	46	30.7	9	30.4	1	3.3	13	26.0	6	30.0	3	10.0	3	15.0	113	25
#50,000-#100,000	44	88.0	21	26.3	33	22.0	7	23.0	21	70.0	19	38.0	7	35.0	15	50.0	5	25.0	172	37
Above #100,000	1	2.0	2	20.5	11	7.3	1	3.3	1	3.3	5	10.0	0	0.0	6	20.0	0	0.0	27	5.8

Source: Author's Computation,(2015)

Table 4.17: Distribution of Job categories among Sexes

JOBS		SEX	
		Male	Female
Job description	Trading count	46	56
	% within sex	15.1%	40.0%
	Fishing count	102	19
	% within sex	33.4%	13.6%
	Water motor operator count	94	7
	% within sex	30.8%	5.0%
	Civil servant count	63	58
	% within sex	20.7%	41.4%
	Total count	305	140
	% within sex	100.0%	100.0%

Source: Author's computation (2015)

Table 4.18: Distribution of Income among Sexes

INCOME		SEX	
		Male	Female
Income below #5,000 count		2	10
	% within sex	0.7%	7.1%
#5,000 - #10,000 count		30	36
	% within sex	9.8%	25.5%
#10,000 - #20,000 count		36	27
	% within sex	11.7%	19.1%
#20,000 - #50,000 count		74	34
	% within sex	24.1%	24.1%
#50,000 - #100,000 count		1.41	25
	% within sex	45.9%	17.7%
Above #100,000 count		24	9
	% within sex	7.8%	6.4%
Total count		307	141
	% within sex	100.0%	100.0%

Source: Author's Computation, (2015)

Table 4.17 and 4.18 shows the distribution of income and jobs among the sexes. Highest percentage of male fall into the income groups N50, 000- N100, 000 with the least income groups of below N5, 000 having only 0.7% of males. On the other hand, the highest percentage of females fall in the income group of N5,000- N10,000 and as many as 2.7% are in the lowest group of below N5,000. Both sexes have almost equal percentage (7.8% and 6.4% respectively) in the highest income group of above N100, 000. Majority of male users (33.4%) belong to the fishing category, followed by water motor operator (30.8%) and civil servants (20.7%). Only 15.1% of male users are engaged in trading. Majority of female users are civil servants (41.4%) followed by trading (40.0%) and fishing (13.6%), only 5.0% are engaged in water motor operator.

Table 4. 19: Facilities at the Jetties and services available for users

i.	Boats calls jetties	Freq.	%
	Once daily	172	37.0
	Weekly	154	35.0
	Monthly	40	09.0
	Randomly	74	20.0
ii.	Adequacy of Facilities		
	Strongly agree	70	15.0
	Agree	62	13.5
	Undecided	62	13.5
	Disagree	243	53.0
	Strongly disagree	23	05.0
iii.	Navigation tools		
	Surveillance radar	69	15.0
	Total radar coverage	238	52.0
	Navigation equipment	98	21.0
	Communication tools	55	12.0
iv.	Methods of Charging Cargo		
	Weight	188	41.0
	Volume	60	13.0
	Size	72	16.0
	Distance	140	30.0
v.	Types of Cargo		
	Bulk cargo	94	20
	General Cargo	232	50
	Roro cargo	30	7
	Specialized cargo	54	12
	Containerized cargo	50	11

Source: Author's Computation (2015)

4.8 Facilities at the Jetties and Services Available for Users

In order to determine the factors affecting facilities at the Jetties, factor analysis was used. The services and facilities at terminal and jetties made available to her staff and users vary. These include loading/off- loading equipment, ware housing, navigation tools, surveillance radar, total radar coverage, communication equipment, facilities for maintenance of these boats / ferry. The research finding revealed that lack of navigation tools in all the jetties and terminal account for the poor usage of the coastal area by big shipping vessels. It also resulted into inadequacy of facilities at the jetties. Old and unserviceable communication equipment hindered users of the coastal waterways. Total radar coverage is 52%

while communication equipment is 12%. 53% shows that respondents disagree that there are adequacy of terminal facilities and 15% for strong agree, while 37% shows that daily berth of boats at the terminal, 35% is weekly experience of berth , Also the finding shows that surveillance radar is 15%.

Table 4.20:Components of Assessment of Facilities at the Jetties

Factors	COMPONENT		
	1	2	3
Jetty Infrastructure.	-.344	.654	-.024
Utility	-.864	.170	.219
Under. Utility	.898	.003	-.065
Jetty facilities	.120	.790	-.280
Accessibility. Facilities	-.042	.629	.331
Politics	.660	-.022	.437
Equipment	-.175	.605	.402
Skilled labour	.076	.127	.849
Finance	.884	-.102	.123
	Under utility	Jetty facility	Skilled Labour

Source: Author's Computation (2015)

: The principal component method was used for the extraction and three factors were extracted using SPSS. The factors and their components after rotation are shown in Ttable 4.20

Factor 1 has high positive loadings on the following variables: Jetty under utilization (.898), politics (.660) and finance (.884). Utility of Jetty (-.864) loads highly, . Factor 1 can therefore be referred to as the effect of government policies.

Factor 11 loads positively and highly on the following variables: Jetty infrastructure (.654), Jetty facilities (.790), accessibility to infrastructural facilities by users (.629) and Jetty equipment(.605).This component can be referred to as facility component..

Factor 3 loads highly only on skilled labour (.849), it is also fairly high on equipment (.402) and politics (.437).This factor may be called jetty management.

Extraction Method: Principal Component Analysis. Rotation Method: Quart IMAX with Kaiser Normalization a Rotation converged in 5 iterations. The factor scores were obtained and a

comparison is made among the various jetties using Analysis of Variance. Table 4.21 shows the results.

Table 4. 21: Comparison of factor effects on the various jetties

		Sum of Squares	Df	Mean Square	F	Sig.
REGR factor score 1 for analysis 1	Between Groups	219.816	8	27.477	53.438	.000
	Within Groups	224.184	436	.514		
	Total	444.000	444			
REGR factor score 2 for analysis 1	Between Groups	16.962	8	2.120	2.165	.029
	Within Groups	427.038	436	.979		
	Total	444.000	444			
REGR factor score 3 for analysis 1	Between Groups	55.673	8	6.959	7.813	.000
	Within Groups	388.327	436	.891		
	Total	444.000	444			

Source : Author's Computation (2015).

The hypotheses to be tested are stated as follows:

For factor 1,

H₀: Effect of factor 1 is same across all the different jetties

H₁: Effect of factor 1 is not the same across the different jetties

The test is carried out at 5% ($\alpha=0.05$) level of significance. The result on table 4.22 shows that the test is significant at 0.00 alpha level. We therefore conclude that the effect of factor 1 is not the same across all jetties.

For factor 2,

H₀: Effect of factor 2 is same across the different jetties

H₁: Effect of factor 2 is not the same across the different jetties

Table 4.22 shows that the test is significant at 0.029 which is less than the alpha level of 0.05. Therefore we reject H₀ and conclude that factor 2 has different effects on the jetties.

Factor 3

H₀: Effect of factor 3 is same across the different jetties

H₁: Effect of factor 3 is not the same across the different jetties

The significant level for this test as show in table 4.22 is 0.00, which is less than the alpha level of 0.05. We therefore reject the null hypothesis and conclude that the factor has different effect on the jetties. The effects of the 3 factors are not the same on the various locations. Using LSD, a post hoc analysis is carried out to determine the jetties that are affected equally by the factors. The result is shown in table 4.22. Pairs that carry (*) are different

Table 4. 22: **LSD results of Multiple Comparison**

Dependent Variable	(I) LOCATION	(J) LOCATION	Mean Difference (I-J)	Std. Error	Sig.
REGR factor score 1 for analysis 1	Lagos State Inland Waterways Coastal	Ondo State Inland Waterways	.07357353	.10173131	.470
		Ogun State Inland Waterways	-1.81153402(*)	.11824487	.000
		Shippers' Council	.36137299(*)	.12005623	.003
		Lagos State Inland Waterways Authority	.30223058(*)	.14873312	.043
		NIMASA	-1.20991964(*)	.14657296	.000
		NIWA	-.75045134(*)	.14452769	.000
		NPA	-1.19041434(*)	.17181752	.000
		OSOPADEC	-.76479421(*)	.17181752	.000
	Ondo State Inland Waterways	Lagos State Inland Waterways Coastal	-.07357353	.10173131	.470
		Ogun State Inland Waterways	-1.88510755(*)	.13071582	.000
		Shippers' Council	.28779946(*)	.13235663	.030
		Lagos State Inland Waterways Authority	.22865705	.15882795	.151
		NIMASA	-1.28349317(*)	.15680692	.000
		NIWA	-.82402487(*)	.15489684	.000
		NPA	-1.26398787(*)	.18062679	.000
		OSOPADEC	-.83836774(*)	.18062679	.000
	Ogun State Inland Waterways	Lagos State Inland Waterways Coastal	1.81153402(*)	.11824487	.000
		Ondo State Inland Waterways	1.88510755(*)	.13071582	.000
		Shippers' Council	2.17290701(*)	.14543338	.000
		Lagos State Inland Waterways Authority	2.11376459(*)	.16987910	.000
		NIMASA	.60161437(*)	.16799108	.000

	NIWA	1.06108268(*)	.16620957	.000
	NPA	.62111968(*)	.19041699	.001
	OSOPADEC	1.04673981(*)	.19041699	.000
Shippers' Council	Lagos State Inland Waterways Coastal	-.36137299(*)	.12005623	.003
	Ondo State Inland Waterways	-.28779946(*)	.13235663	.030
	Ogun State Inland Waterways	-2.17290701(*)	.14543338	.000
	Lagos State Inland Waterways Authority	-.05914241	.17114485	.730
	NIMASA	-1.57129264(*)	.16927094	.000
	NIWA	-1.11182433(*)	.16750305	.000
	NPA	-1.55178733(*)	.19154707	.000
	OSOPADEC	-1.12616720(*)	.19154707	.000
Lagos State Inland Waterways Authority	Lagos State Inland Waterways Coastal	-.30223058(*)	.14873312	.043
	Ondo State Inland Waterways	-.22865705	.15882795	.151
	Ogun State Inland Waterways	-2.11376459(*)	.16987910	.000
	Shippers' Council	.05914241	.17114485	.730
	NIMASA	-1.51215022(*)	.19068480	.000
	NIWA	-1.05268192(*)	.18911720	.000
	NPA	-1.49264492(*)	.21070909	.000
NIMASA	OSOPADEC	-1.06702479(*)	.21070909	.000
	Lagos State Inland Waterways Coastal	1.20991964(*)	.14657296	.000
	Ondo State Inland Waterways	1.28349317(*)	.15680692	.000
	Ogun State Inland Waterways	-.60161437(*)	.16799108	.000
	Shippers' Council	1.57129264(*)	.16927094	.000
	Lagos State Inland Waterways Authority	1.51215022(*)	.19068480	.000
	NIWA	.45946831(*)	.18742307	.015
	NPA	.01950530	.20918990	.926
	OSOPADEC	.44512543(*)	.20918990	.034
NIWA	Lagos State Inland Waterways Coastal	.75045134(*)	.14452769	.000

REGR factor score 2 for analysis 1	NPA	Ondo State Inland Waterways	.82402487(*)	.15489684	.000
		Ogun State Inland Waterways	-1.06108268(*)	.16620957	.000
		Shippers' Council	1.11182433(*)	.16750305	.000
		Lagos State Inland Waterways Authority	1.05268192(*)	.18911720	.000
		NIMASA	-.45946831(*)	.18742307	.015
		NPA	-.43996300(*)	.20776197	.035
		OSOPADEC	-.01434287	.20776197	.945
		Lagos State Inland Waterways Coastal	1.19041434(*)	.17181752	.000
		Ondo State Inland Waterways	1.26398787(*)	.18062679	.000
		Ogun State Inland Waterways	-.62111968(*)	.19041699	.001
		Shippers' Council	1.55178733(*)	.19154707	.000
		Lagos State Inland Waterways Authority	1.49264492(*)	.21070909	.000
		NIMASA	-.01950530	.20918990	.926
		NIWA	.43996300(*)	.20776197	.035
		OSOPADEC	.42562013	.22759183	.062
	OSOPADEC	Lagos State Inland Waterways Coastal	.76479421(*)	.17181752	.000
		Ondo State Inland Waterways	.83836774(*)	.18062679	.000
		Ogun State Inland Waterways	-1.04673981(*)	.19041699	.000
		Shippers' Council	1.12616720(*)	.19154707	.000
		Lagos State Inland Waterways Authority	1.06702479(*)	.21070909	.000
		NIMASA	-.44512543(*)	.20918990	.034
		NIWA	.01434287	.20776197	.945
		NPA	-.42562013	.22759183	.062
		Ondo State Inland Waterways	.04781768	.13977306	.732
		Ogun State Inland Waterways	.04728680	.16246176	.771
		Shippers' Council	-.14931050	.16495047	.366
		Lagos State Inland Waterways Authority	-.37988048	.20435089	.064
		NIMASA	.46013379(*)	.20138296	.023
		NIWA	-.10247608	.19857287	.606
		NPA	.45753849	.23606755	.053
		OSOPADEC	-.28688798	.23606755	.225

Ondo State Inland Waterways	Lagos State Inland Waterways Coastal	-.04781768	.13977306	.732
	Ogun State Inland Waterways	-.00053088	.17959615	.998
Ogun State Inland Waterways	Shippers' Council	-.19712818	.18185052	.279
	Lagos State Inland Waterways Authority	-.42769815	.21822062	.051
	NIMASA	.41231612	.21544384	.056
	NIWA	-.15029376	.21281950	.480
	NPA	.40972082	.24817100	.099
	OSOPADEC	-.33470566	.24817100	.178
	Lagos State Inland Waterways Coastal	-.04728680	.16246176	.771
	Ondo State Inland Waterways	.00053088	.17959615	.998
	Shippers' Council	-.19659730	.19981723	.326
	Lagos State Inland Waterways Authority	-.42716728	.23340427	.068
Shippers' Council	NIMASA	.41284699	.23081023	.074
	NIWA	-.14976288	.22836255	.512
	NPA	.41025169	.26162217	.118
	OSOPADEC	-.33417478	.26162217	.202
	Lagos State Inland Waterways Coastal	.14931050	.16495047	.366
	Ondo State Inland Waterways	.19712818	.18185052	.279
	Ogun State Inland Waterways	.19659730	.19981723	.326
	Lagos State Inland Waterways Authority	-.23056997	.23514334	.327
	NIMASA	.60944430(*)	.23256870	.009
	NIWA	.04683442	.23013972	.839
Lagos State Inland Waterways Authority	NPA	.60684900(*)	.26317483	.022
	OSOPADEC	-.13757748	.26317483	.601
	Lagos State Inland Waterways Coastal	.37988048	.20435089	.064
	Ondo State Inland Waterways	.42769815	.21822062	.051
	Ogun State Inland Waterways	.42716728	.23340427	.068
	Shippers' Council	.23056997	.23514334	.327
	Lagos State Inland Waterways Coastal	.37988048	.20435089	.064
	Ondo State Inland Waterways	.42769815	.21822062	.051
	Ogun State Inland Waterways	.42716728	.23340427	.068
	Shippers' Council	.23056997	.23514334	.327

	NIMASA	NIMASA	.84001427(*)	.26199013	.001
		NIWA	.27740440	.25983633	.286
		NPA	.83741897(*)	.28950237	.004
		OSOPADEC	.09299249	.28950237	.748
		Lagos State Inland Waterways Coastal	-.46013379(*)	.20138296	.023
		Ondo State Inland Waterways	-.41231612	.21544384	.056
		Ogun State Inland Waterways	-.41284699	.23081023	.074
		Shippers' Council	-.60944430(*)	.23256870	.009
		Lagos State Inland Waterways Authority	-.84001427(*)	.26199013	.001
		NIWA	-.56260987(*)	.25750869	.029
	NIWA	NPA	-.00259530	.28741509	.993
		OSOPADEC	-.74702178(*)	.28741509	.010
		Lagos State Inland Waterways Coastal	.10247608	.19857287	.606
		Ondo State Inland Waterways	.15029376	.21281950	.480
		Ogun State Inland Waterways	.14976288	.22836255	.512
		Shippers' Council	-.04683442	.23013972	.839
		Lagos State Inland Waterways Authority	-.27740440	.25983633	.286
		NIMASA	.56260987(*)	.25750869	.029
		NPA	.56001457	.28545318	.050
		OSOPADEC	-.18441190	.28545318	.519
	NPA	Lagos State Inland Waterways Coastal	-.45753849	.23606755	.053
		Ondo State Inland Waterways	-.40972082	.24817100	.099
		Ogun State Inland Waterways	-.41025169	.26162217	.118
		Shippers' Council	-.60684900(*)	.26317483	.022
		Lagos State Inland Waterways Authority	-.83741897(*)	.28950237	.004
		NIMASA	.00259530	.28741509	.993
		NIWA	-.56001457	.28545318	.050
		OSOPADEC	-.74442648(*)	.31269830	.018
	OSOPADEC	Lagos State Inland Waterways Coastal	.28688798	.23606755	.225

REGR factor score 3 for analysis 1	Lagos State Inland Waterways Coastal	Ondo State Inland Waterways	.33470566	.24817100	.178
		Ogun State Inland Waterways	.33417478	.26162217	.202
		Shippers' Council	.13757748	.26317483	.601
		Lagos State Inland Waterways Authority	-.09299249	.28950237	.748
		NIMASA	.74702178(*)	.28741509	.010
		NIWA	.18441190	.28545318	.519
		NPA	.74442648(*)	.31269830	.018
	Ondo State Inland Waterways	Ondo State Inland Waterways	.56867989(*)	.13323789	.000
		Ogun State Inland Waterways	.20726734	.15486577	.181
		Shippers' Council	.21481550	.15723812	.173
		Lagos State Inland Waterways Authority	.11703245	.19479635	.548
		NIMASA	-.30497301	.19196719	.113
		NIWA	-.33114781	.18928849	.081
		NPA	-.64232579(*)	.22503008	.005
		OSOPADEC	-.82435075(*)	.22503008	.000
		Lagos State Inland Waterways Coastal	-.56867989(*)	.13323789	.000
	Ogun State Inland Waterways	Ogun State Inland Waterways	-.36141255(*)	.17119903	.035
		Shippers' Council	-.35386438(*)	.17334799	.042
		Lagos State Inland Waterways Authority	-.45164744(*)	.20801759	.030
		NIMASA	-.87365289(*)	.20537065	.000
		NIWA	-.89982770(*)	.20286900	.000
		NPA	-1.21100568(*)	.23656762	.000
		OSOPADEC	-1.39303063(*)	.23656762	.000
		Lagos State Inland Waterways Coastal	-.20726734	.15486577	.181
		Ondo State Inland	.36141255(*)	.17119903	.035

		Waterways			
		Shippers' Council	.00754816	.19047466	.968
		Lagos State Inland			
		Waterways Authority	-.09023489	.22249132	.685
		NIMASA			
			-.51224035(*)	.22001857	.020
		NIWA			
			-.53841515(*)	.21768533	.014
		NPA			
			-.84959313(*)	.24938987	.001
		OSOPADEC			
			-1.03161809(*)	.24938987	.000
	Shippers' Council	Lagos State Inland			
		Waterways Coastal	-.21481550	.15723812	.173
		Ondo State Inland			
		Waterways	.35386438(*)	.17334799	.042
		Ogun State Inland			
		Waterways	-.00754816	.19047466	.968
		Lagos State Inland			
		Waterways Authority	-.09778305	.22414908	.663
		NIMASA			
			-.51978851(*)	.22169482	.019
		NIWA			
			-.54596331(*)	.21937940	.013
		NPA			
			-.85714129(*)	.25086995	.001
		OSOPADEC			
			-1.03916625(*)	.25086995	.000
	Lagos State Inland Waterways Authority	Lagos State Inland			
		Waterways Coastal	-.11703245	.19479635	.548
		Ondo State Inland			
		Waterways	.45164744(*)	.20801759	.030
		Ogun State Inland			
		Waterways	.09023489	.22249132	.685
		Shippers' Council			
			.09778305	.22414908	.663
		NIMASA			
			-.42200546	.24974063	.092
	NIMASA	NIWA			
			-.44818026	.24768753	.071
		NPA			
			-.75935824(*)	.27596652	.006
		OSOPADEC			
			-.94138320(*)	.27596652	.001
		Lagos State Inland			
		Waterways Coastal	.30497301	.19196719	.113
		Ondo State Inland			
		Waterways	.87365289(*)	.20537065	.000
		Ogun State Inland			
		Waterways	.51224035(*)	.22001857	.020
		Shippers' Council			
			.51978851(*)	.22169482	.019
		Lagos State Inland			
		Waterways Authority	.42200546	.24974063	.092
		NIWA			
			-.02617480	.24546873	.915
		NPA			
			-.33735278	.27397683	.219
		OSOPADEC			
			-.51937774	.27397683	.059

NIWA	Lagos State Inland Waterways Coastal	.33114781	.18928849	.081	
	Ondo State Inland Waterways	.89982770(*)	.20286900	.000	
	Ogun State Inland Waterways	.53841515(*)	.21768533	.014	
	Shippers' Council	.54596331(*)	.21937940	.013	
	Lagos State Inland Waterways Authority	.44818026	.24768753	.071	
	NIMASA	.02617480	.24546873	.915	
	NPA	-.31117798	.27210666	.253	
	OSOPADEC	-.49320294	.27210666	.071	
	NPA	Lagos State Inland Waterways Coastal	.64232579(*)	.22503008	.005
		Ondo State Inland Waterways	1.21100568(*)	.23656762	.000
Ogun State Inland Waterways		.84959313(*)	.24938987	.001	
Shippers' Council		.85714129(*)	.25086995	.001	
Lagos State Inland Waterways Authority		.75935824(*)	.27596652	.006	
NIMASA		.33735278	.27397683	.219	
NIWA		.31117798	.27210666	.253	
OSOPADEC		-.18202496	.29807791	.542	
OSOPADEC		Lagos State Inland Waterways Coastal	.82435075(*)	.22503008	.000
		Ondo State Inland Waterways	1.39303063(*)	.23656762	.000
	Ogun State Inland Waterways	1.03161809(*)	.24938987	.000	
	Shippers' Council	1.03916625(*)	.25086995	.000	
	Lagos State Inland Waterways Authority	.94138320(*)	.27596652	.001	
	NIMASA	.51937774	.27397683	.059	
	NIWA				
		.49320294	.27210666	.071	
	NPA	.18202496	.29807791	.542	

* The mean difference is significant at the .05 level. **Source:** Authors Computation, (2015)

CHAPTER FIVE

Factors Determining the impact of inland waterway on Socio- Economic Development

5.1 Lagos State Coastal Area.

In this chapter, the spatial and economic impact of inland waterways transportation on Socio-economic development in the study area is examined. The study area is southwest coastal area of Nigeria. The various micro- economic attributes which necessitate the development of inland waterways transportation are examined. This chapter focuses on the variables which are years of water ways usage, Adequate terminal facilities, Port functional facilities, Criteria for cargo payment, Types goods transported, Other mode of transportation, Jetties infrastructure assessment, Waterways over utilized, Waterways underutilized, Sufficient jetties facilities, Facilities easily accessed by users, Political influence, Facilities properly maintained and Professional skilled employed. These variables were considered which were subsequently reduced to six (6) orthogonal variables. Variables where greater than 0.70 and was selected as defining variables. The results of the factor analysis after vari-max rotation show some underlying factors. These six (b) factors altogether gives 68.54% in the explanation of the variation on the impacts of inland waterways on socioeconomic development of the coastal area.

Table 5.1: Characteristics of Inland Waterway Transport Service in the Lagos Coastal Area.

Characteristics	Freq.	%
Years of Usage		
1 - 5 years	56	37.3
6 - 10 yrs.	39	26.0
11 - 15 yrs.	31	20.7
16 - 20 yrs.	00	00.0
21 - 25 yrs.	24	16.0
Adequate facilities		
Strongly disagree	7	4.7
Disagree	79	52.7
Undecided	26	17.3
Agree	26	17.3
Strongly Agree	12	8.0
Functional Facilities		
Surveillance Radar	8	5.3
Total Radar coverage	83	55.3
Navigation	46	30.7
Communication	13	8.7
Criteria for payment		
Weight	61	40.7
Volume	13	8.6
Size	13	8.6
Journey distance	63	42.1
Type of goods Carried		
Bulk cargo	25	16.7
General cargo	65	43.3
Roro cargo	11	7.3
Specialized cargo	38	25.4
Containerized cargo	11	7.3
Other Mode Transport		
Yes	65	43.3
No	85	56.7
Infrastructure Assess		
Very poor	2	1.3
Poor	23	15.3
Fair	92	61.4
Good	23	15.3
Excellent	10	6.7
Fac. Properly Maint.		
Strongly disagree	4	2.7
Disagree	39	26.0
Undecided	56	37.3
Agree	43	28.7
Strongly Agree	6	5.3
Waterways over Utilized	Freq.	%
Strongly disagree	55	36.7
Disagree	28	18.7
Undecided	24	16.0
Agree	38	25.3
Strongly agree	5	3.3
Waterway under Utilized		
Strongly disagree	1	0.7
Disagree	32	21.3
Undecided	16	10.7
Agree	26	17.3
Strongly agree	75	50.0
Sufficient Jetties		
Strongly disagree	19	12.7
Disagree	35	23.3
Undecided	67	44.7
Agree	23	15.3
Strongly agree	6	4.0
Jetties Facilities aged		
Strongly disagree	24	16.0
Disagree	31	20.7
Undecided	35	23.3
Agree	60	40.0
Facilities Easily Access		
Strongly disagree	6	4.0
Disagree	23	15.3
Undecided	89	59.4
Agree	23	15.3
Strongly agree	9	6.0
Politics Influence		
Strongly disagree	18	10.7
Disagree	17	11.3
Undecided	40	28.7
Agree	26	17.3
Strongly agree	51	34.0
Professional S Employed		
Strongly disagree	11	17.3
Disagree	46	30.7
Undecided	69	46.0
Agree	19	12.7
Strongly agree	5	3.3

Source: Author's Fieldwork, (2015)

Factor I: Waterways Utilization has the highest number of loadings, with high loadings on waterways underutilized control variables. This factor contributed 16.55% of explanation to the variance on the impacts of inland waterways on socioeconomic development and has an Eigen value of 2.97. In other words, the utilization of inland waterways transport is the most important factor that determines the variation in the impacts of inland waterways on socioeconomic development in Lagos coastal area.

Factor II: Monthly Income has an Eigen value of 2.188 and contributed 12.15% to the variance on the impacts of inland waterways on socioeconomic development of Lagos coastal area. It has the highest loading on average monthly income. This suggested that monthly income is the second most important factor that explains the variation in socioeconomic development that can be attributed to inland waterways in the study area.

Factor III: Sufficiency of Terminal facilities is a third factor that determines the variation in socioeconomic development that can be attributed to inland waterways has the highest loading on sufficient Jetties facilities. This factor has an Eigen value of 2.078 and explained 11.55% of the variance in socioeconomic development of the coastal area of Lagos. This can be attributed to the impact of inland waterways activities in this area.

Factor IV: The fourth factor with the highest loading is Educational Status with an Eigen value of 1.908 and which explained 10.60 % of the total variance in the socioeconomic development of the Lagos coastal area that can be attributed to inland waterways. In other words, educational status is the fourth factor that determines the variation in socioeconomic development that is attributed to inland waterways usage in Lagos coastal area.

Factor V: Occupational Status has an Eigen value of 1.659 and contributed 9.22 % to the variance in the socioeconomic development of Lagos coastal area. This suggested that the occupational status of the people of the Lagos coastal area is the fifth factor that explained the variation in the socioeconomic development that can be attributed to inland waterways usage

Factor VI: Terminal/Jetties Facilities is the sixth factor that determines the variation in socioeconomic development that can be attributed to inland waterways has the highest loading on terminal/Jetties facilities assessment. This factor has an Eigen value of 1.526 and explained 8.48 % of the variance in socioeconomic development of the coastal area of Lagos that can be attributed to inland waterways.

This analysis was based on the variance:- Co-variance matrix of the original variables. The method grouped the original variables together which we called Factors, and the proportion of variability's accounted for by each factor indicated. This has to do with variance of the original data.

Table 5.2: Impacts of Inland Waterways on Socioeconomic Development of Lagos Coastal Area (Rotated Component Matrix^a)

<i>SN</i>	<i>Parameters</i>	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>	<i>Factor 4</i>	<i>Factor 5</i>	<i>Factor 6</i>
1	Educational Status	-0.187	-0.204	-0.243	0.712	0.212	-0.169
2	Occupation	0.043	0.114	-0.074	-0.022	0.787	0.276
3	Average Monthly Income	0.121	0.845	-0.086	0.195	0.091	-0.055
4	Years of Waterways Usage	0.643	0.522	-0.059	0.26	0.167	0.011
5	Adequate Terminal Facilities	0.023	-0.637	-0.101	0.219	-0.065	0.391
6	Port Functional Facilities	-0.069	-0.151	-0.153	0.357	0.065	0.562
7	Criteria for Cargo Payment	0.645	-0.197	0.202	0.213	-0.068	0.234
8	Types of Good Transport	0.557	0.004	-0.022	-0.477	0.23	-0.252
9	Other Mode of Transport	0.643	0.064	0.262	-0.272	0.167	0.135
10	Terminal/Jetties Infrast. Assess	-0.07	-0.028	0.326	-0.16	0.074	0.784
11	Waterways Over Utilized	-0.762	-0.322	0.097	-0.046	-0.02	0.243
12	Waterways Under Utilized	0.818	0.112	-0.035	-0.125	-0.151	-0.121
13	Sufficient Jetties Facilities	0.132	0.091	0.801	-0.151	-0.04	0.081
14	Facilit Easily Accessed by Users	0.054	-0.12	0.731	0.195	0.001	0.164
15	Political Influence	0.278	0.688	-0.017	-0.154	-0.458	0.158
16	Facilities Properly Maintained	-0.069	-0.023	0.731	-0.177	-0.214	-0.122
17	Professional Skilled Employed	-0.044	0.077	0.173	-0.316	-0.745	0.152
No of Ship(s) Berthing at Terminal/Jetties		0.103	0.234	0.056	0.733	0.156	0.162
<i>Factor defining Variable</i>		Waterways Under Utilized	Average Monthl Income	Jetties Facilities	Educational Status	Occupation	Terminal Infrastructure
<i>Factor Description</i>		Waterways Utilization	Monthly Income	Sufficiency of Terminal Facilitie	Educational Status	Occupational Status	Terminal/Jetties Infrastructure assessment
<i>Total Eigen value</i>		2.979	2.188	2.078	1.908	1.659	1.526
<i>% Variance</i>		16.549	12.153	11.547	10.602	9.217	8.479
<i>% Cumulative variance</i>		16.549	28.702	40.249	50.851	60.068	68.547

Source: Author's Data Analysis (2015)

The method does not reduce number of variables, one can describe the variables grouped together with a factor name and the percentage contribution to total variance

indicated. In this analysis the method is not used to just group variables that are similar but to extract factors that have impact on the environment where the research was conducted.

5.2 Relationship between Inland Waterways and Socioeconomic Development in Lagos Coastal Area

The six (6) factors identified as the underlying factors that explains the impacts of inland waterways on socioeconomic development in Lagos coastal area, were subjected to multiple regression analysis to model the impacts of inland waterways on socioeconomic development in the study area and the results is presented in Table 5.2. The dependent variable was number of ship berthing at the terminal while the independent variables were the identified socioeconomic development (waterways utilization, monthly income, sufficiency of terminal facilities, educational status, occupational status, terminal/jetties infrastructure assessment) variables

Table 5.3: Relationship between Number of Ship Berthing and Socioeconomic Development Indices in Lagos Coastal Area.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	2.159	.038		56.661	.000
Waterways Utilization	.077	.038	.103	2.017	.046
Monthly Income	.175	.038	.234	4.566	.000
Sufficiency of Terminal Facilities	.042	.038	.056	1.104	.272
Educational Status	.548	.038	.733	14.321	.000
Occupational Status	.117	.038	.156	3.054	.003
Terminal/Jetties Infrastructure assessment	.121	.038	.162	3.174	.002

a. Dependent Variable: Number of Ship(s) Berthing

Source: Authors Computation, (2015)

Table 5.2 show the results of the multiple regression analysis with an R^2 of 0.657, which signifies that six identified socioeconomic development factors accounted for 65.7% variability in the number of ship berthing at the terminals in the study area. This is expected because of the relationship that existed between the identified variables and the number of ship berthing. For example, waterways utilization is the most dominant factor, followed by monthly income; this

suggested that the level of income of the people of the Lagos coastal area determines their usage of inland waterways, which has direct influence of the number of ship berthing. Also, sufficiency of the terminal facilities also influence inland waterways usage which influence the frequencies of ship travel as well as the number of ship berthing every day. The relationship between number of ship berthing and socioeconomic development indices in Lagos coastal area is presented in table 5.3

Table 5. 4: Model Summary of Inland Waterways and Socioeconomic Development in Lagos Coastal Area

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.810 ^a	.657	.641	.448

a. Predictors: (Constant), Waterways Utilization, Monthly Income, Sufficiency of Terminal Facilities, Educational Status, Occupational Status, Terminal/Jetties Infrastructure assessment

From Table 5. 4, for every 1% increase in waterways utilization, monthly income, sufficiency of terminal facilities, educational status, occupational status, terminal/jetties infrastructure assessment, there is 0.077%, 0.175%, 0.042%, 0.548%, 0.117% and 0.121% increase in variation in the number of ship berthing in Lagos coastal area. Based on the results in Table 5.3, the relationship between number of ship berthing and the identified socioeconomic development factors can be written as shown in equation 5.1. Mode of waterway

$$NSB = 2.159 + .077_{WaterwaysUtilization} + .175_{MonthlyIncome} + .042_{STF} + .548_{EducationalStatus} + .117_{OccupationalStatus} + .121_{TJIA} \dots \text{Eq. 5.1}$$

Where NSB= number of ship berthing, STF= sufficiency of terminal facilities, TJIA= Terminal/Jetties Infrastructure assessment.

5.3. Ogun State Coastal Area

To examine the impacts of inland waterways on socioeconomic development, eighteen (18) variables were collected which were subsequently reduced to five (5) orthogonal variables. Variables with loading greater than 0.70 was selected as defining variables. The results of the factor analysis after vari-max rotation show some underlying factors. These five (5) factors altogether gives 78.93% in the explanation of the variation on the impacts of inland waterways on socioeconomic development of Ogun State coastal area (Table 5.5)...

Table 5.5: Characteristics of Inland waterway Transport service in the Ogun coastal Area.

Characteristics	Freq.	%			
Years of Usage			Waterway under Utilized		
1 - 5 years	25	50.0	Disagree	4	8.0
6 - 10 yrs.	06	12.0	Undecided	2	4
11 - 15 yrs.	-	-	Agree	3	6.0
16 - 20 yrs.	19	38.0	Strongly Agree	41	82.0
Adequate facilities			Sufficient Jetties		
Strongly disagree	1	2.0	Strongly disagree	2	4.0
Disagree	44	88.0	Disagree	6	12.0
Undecided	2	4.0	Undecided	3	6.0
Agree	1	2.0	Agree	39	78.0
Strongly Agree	2	4.0	Jetties Facilities aged		
Functional Facilities			Strongly disagree	1	2.0
Total Radar coverage	49	98	Disagree	3	6.0
Communication	1	0.2	Undecided	2	4.0
Criteria for payment			Agree	44	88.0
Weight	27	54	Facilities Easily Access		
Journey distance	23	46	Strongly disagree	3	6
Type of goods Carried			Disagree	2	4
Bulk cargo	3	6.0	Undecided	38	78
General cargo	33	66.0	Agree	7	12
Specialized cargo	12	24.0	Professional Skilled Employed		
Containerized cargo	2	4.0	Disagree	3	6.0
Other Mode of Transport			Undecided	40	80.0
Yes	4	8.0	Agree	2	4.0
No	46	92.0	Strongly agree	5	10.0
Infrastructure Assessment			Facilities Properly Maint.	Freq.	%
Poor	42	84	Strongly disagree	2	40
Fair	5	10	Disagree	39	78.0
Good	3	6	Undecided	5	10.0
Waterways over Utilized			Agree	3	6.3
Strongly disagree	43	86.0	Strongly agree	1	2.0
Disagree	5	10.0			
Strongly agree	2	4.0			
Politics Influence					
Undecided	1	2.0			
Agree	43	86.0			
Strongly disagree	6	12			

Source: Author's Computation (2015)

This analysis was based on the variance:- Co-variance matrix of the original variables. The method grouped the original variables together which we called Factors, and the proportion of variability's accounted for by each factor indicated. This has to do with variance of the original data.

The method does not reduce number of variables, one can describe the variables grouped together with a factor name and the percentage contribution to total variance

indicated. In this analysis the method is not used to just group variables that are similar but to extract factors that have impact on the environment where the research was conducted.

Factor I: Sufficiency of Jetties facilities has the highest number of loading; with high loadings on sufficient jetties facilities control variables. This factor contributed 23.02% explanation to the variance on the impacts of inland waterways on socioeconomic development and has an Eigen value of 4.144. In other words, the sufficiency of jetties facilities is the most important factor that determines the variation in the impacts of inland waterways on socioeconomic development in Ogun State coastal area.

Factor II: Adequacy of Terminal Facilities has an Eigen value of 3.186 and contributed 17.70 % to the variance on the impacts of inland waterways on socioeconomic development of Ogun State coastal area. It has the highest loading on adequate terminal facilities. . This suggested that adequacy of terminal facilities is the second most important factor that explains the variation in socioeconomic development that can be attributed to inland waterways in Ogun State coastal area.

Factor III: Functionality of Port Facilities is the third factor that determines the variation in socioeconomic development that can be attributed to inland waterways has the highest loading on port functional facilities. This factor has an Eigen value of 2.862 and explained 15.90 % of the variance in socioeconomic development of the coastal area of Ogun State that can be attributed to inland waterways. In other words, the third factor that determines the variation in the socioeconomic development of Ogun coastal area is the functionality of port facilities.

Factor IV: Users Ease of Facilities Accessibility is fourth factor has the highest loading on facilities easily accessed by users with an Eigen value of 2.244 and explained 12.47 % of the total variance in the socioeconomic development of the Ogun coastal area that can be attributed to inland waterways. In other words, users' ease of facility accessibility at the jetties is the fourth factor that determines the variation in socioeconomic development that is attributed to inland waterways usage in Ogun State coastal area.

Table 5. 6: Impacts of Inland Waterways on Socioeconomic Development of Ogun Coastal Area (Rotated Component Matrix^a)

SN	Parameters	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
1	Educational Status	0.244	-0.676	-0.146	-0.04	-0.027
2	Occupation	0.091	0.365	0.307	-0.583	0.439
3	Average Monthly Income	0.761	0.032	0.425	-0.076	0.28
4	Years of Waterways Usage	0.354	-0.282	0.62	-0.404	0.433
5	Adequate Terminal Facilities	-0.124	0.868	-0.025	0.064	0.02
6	Port Functional Facilities	-0.051	0.22	0.924	0.058	-0.053
7	Criteria for Cargo Payment	0.449	0.227	0.08	0.374	0.25
8	Types of Good Transport	0.368	0.371	-0.395	-0.054	-0.126
9	Other Mode of Transport	0.755	-0.247	0.202	-0.328	-0.092
10	Terminal/Jetties Infrastructure Assessment	-0.072	0.713	0.383	-0.062	0.461
11	Waterways Over Utilized	-0.825	0.087	0.015	0.275	0.25
12	Waterways Under Utilized	0.779	-0.308	0.119	0.132	-0.38
13	Sufficient Jetties Facilities	0.84	-0.176	-0.046	0.147	-0.072
14	Facilities Easily Accessed by Users	0.007	0.153	0.149	0.917	-0.013
15	Political Influence	-0.282	0.074	-0.024	-0.015	0.888
16	Facilities Properly Maintained	-0.034	0.764	-0.27	0.369	0.06
17	Professional Skilled Employed	-0.435	0.455	-0.394	0.615	-0.065
No of Ship(s) Berthing at terminal/Jetties		0.42	-0.051	0.842	-0.019	0.013
<i>Factor defining Variable</i>		Sufficient Jetties Facilities	Adequate Terminal Facilities	Port Functional Facilities	Facilities Easily Accessed	Political Influence
<i>Factor Description</i>		Sufficiency of Jetties Facilities	Adequacy of Terminal Facilities	Functionality of Port Facilities	Users Ease of Facility Accessibility	Political Influence
<i>Total Eigen value</i>		4.144	3.186	2.862	2.244	1.771
<i>% Variance</i>		23.02	17.701	15.898	12.469	9.84
<i>% Cumulative variance</i>		23.02	40.722	56.62	69.088	78.929

Source: Author's Data Analysis (2015)

Factor V: Political Influence factor has an Eigen value of 1.771 and contributed 9.84% to the variance in the socioeconomic development of Ogun State coastal area. It has the highest loading on political influence.. This suggested that political influence in Ogun State coastal area is the fifth factor that explained the variation in the socioeconomic development that can be attributed to inland waterways usage.

5.4. Ogun Coastal Area

The five (5) factors identified as the underlying factors that explains the impacts of inland waterways on socioeconomic development in Ogun coastal area, were subjected to multiple regression analysis to model the impacts of inland waterways on socioeconomic development in the study area and the results is presented in Table 5.6. The dependent variable is number of ship berthing at the terminal while the independent variables are the identified socioeconomic development (sufficiency of jetties facilities, adequacy of terminal facilities, functionality of port facilities, users ease of facility accessibility, political influence) variables

Table 5.7: Relationship between Number of Ship Berthing and Socioeconomic Development Indices in Ogun State Coastal area

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	1.940	.021		91.739	.000
Sufficiency of Jetties Facilities	.178	.021	.420	8.347	.000
Adequacy of Terminal Facilities	-.022	.021	-.051	-1.022	.312
Functionality of Port Facilities	.357	.021	.842	16.719	.000
Users Ease of Facility Accessibility	-.008	.021	-.019	-.384	.703
Political Influence	.005	.021	.013	.257	.798

a. Dependent Variable: Number of Ship(s) Berthing

Table 5.8 show the results of the multiple regression analysis with an R^2 of 0.888, which signifies that five identified socioeconomic development factors accounted for 88.8% variability in the number of ship berthing at the terminals in the study area. This shows that the sufficiency of jetties facilities such as storage space, grabbing attachments, and cranes among others is the most dominant factor that determines the number of ship berthing at the terminals in Ogun coastal area. The relationship between number of ship berthing and socioeconomic development indices in Ogun coastal area is presented in Table 5. 9.

Table 5.9 : Model Summary of Inland Waterways and Socioeconomic Development in Ogun State Coastal Area

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.943 ^a	.888	.876	.150

a. Predictors: (Constant), sufficiency of jetties facilities, adequacy of terminal facilities, functionality of port facilities, users ease of facility accessibility, political influence

From Table 5.9 for every 1% increase in sufficiency of jetties facilities, functionality of port facilities, political influence, there is 0.178%, 0.357% and 0.005% increase respectively, in

variation in the number of ship berthing in Ogun coastal area. Also, for every 1% decrease in adequacy of terminal facilities and users' ease of facility accessibility, there are -.022% and -.008% decrease in number of ship berthing in the study area. Based on the results in Table 5.9 , the relationship between number of ship berthing and the identified socioeconomic development factors can be written as shown in equation 5.2.

Model of waterways

$$NSB = 1.940 + .178_{SJF} - .022_{ATF} + .357_{FPF} - .008_{UEFA} + .005_{PI} \dots \text{Eq. 5.2}$$

Where NSB= Number of Ship Berthing, SJF= Sufficiency of Jetties Facilities, ATF= Adequacy of Terminal Facilities, FPF= Functionality of Port Facilities, UEFA= Users Ease of Facility Accessibility, PI= Political Influence

5.5. Ondo State Coastal Area

Eighteen (18) variables were entered into factor analysis, which were subsequently reduced to six (6) orthogonal variables. Variables with loadings greater than 0.70 were selected as defining variables. The results of the factor analysis after vari-max rotation show some underlying factors. These six factors altogether gives 69.118% in the explanation of the variation on the impacts of inland waterways on socioeconomic development of Ondo state coastal area (Table 5.10).

This analysis was based on the variance:- Co-variance matrix of the original variables. The method grouped the original variables together which we called Factors, and the proportion of variability's accounted for by each factor indicated. This has to do with variance of the original data

The method does not reduce number of variables, one can describe the variables grouped together with a factor name and the percentage contribution to total variance indicated. In this analysis the method is not used to just group variables that are similar but to extract factors that have impact on the environment where the research was conducted.

Table 5.10: Characteristics of Inland waterway Transport service in the Ondo coastal Area

Characteristics	Freq.	%			
Years of Usage			Waterways Under Utilized		
1 - 5 years	51	68.7	Strongly disagree	2	2.4
6 - 10 yrs.	14	17.5	Disagree	15	18.8
11 - 15 yrs.	11	13.8	Undecided	16	20.0
Adequate facilities			Agree	12	15.0
Strongly disagree	6	7.4	Strongly Agree	35	45.8
Disagree	35	43.8	Sufficient Jetties		
Undecided	11	13.8	Strongly disagree	7	8.7
Agree	8	10.0	Disagree	23	28.8
Strongly Agree	20	25.0	Undecided	29	36.3
Functional Facilities			Agree	12	15.0
Surveillance Radar	11	13.7	Strongly Agree	9	11.2
Total Radar coverage	13	16.3	Jetties Facilities Aged		
Navigation	54	67.5	Strongly disagree	8	10.0
Communication	2	2.5	Disagree	13	16.2
Criteria for payment			Undecided	31	38.8
Weight	37	46.3	Agree	28	35.0
Volume	2	2.5	Facilities Easily Access		
Size	8	10.0	Strongly disagree	1	1.3
Journey distance	33	41.2	Disagree	19	23.7
Type of goods Carried			Undecided	29	36.3
Bulk cargo	1	1.3	Agree	25	31.3
General cargo	64	80.0	Strongly Agree	6	7.4
Roro cargo	4	5.0	Politics Influence		
Specialized cargo	7	8.7	Strongly disagree	1	1.3
Containerized cargo	4	5.0	Disagree	9	11.3
Other Mode of transport			Undecided	10	12.4
Yes	36	45	Agree	31	38.8
No	44	55	Strongly Agree	29	36.2
Infrastructure Assess			Facilities Property Maint.		
Very poor	1	1.3	Strongly disagree	2	2.5
Poor	28	35.0	Disagree	23	28.8
Fair	17	21.2	Undecided	25	31.2
Good	26	32.5	Agree	21	26.3
Excellent	8	10.0	Strongly Agree	9	11.2
Waterways over Utilized			Professional Skilled Employ		
Strongly disagree	32	40.0	Strongly disagree	1	1.3
Disagree	18	22.5	Disagree	17	21.2
Undecided	11	13.8	Undecided	23	28.8
Agree	13	16.3	Agree	21	26.3
Strongly Agree	6	7.4	Strongly disagree	18	22.4

Source: Author's Computation, (2015)

The method does not reduce number of variables, one can describe the variables grouped together with a factor name and the percentage contribution to total variance indicated. In this analysis the method is not used to just group variables that are similar but to extract factors that have impact on the environment where the research was conducted.

Factor I: Waterways Utilization factor has the highest number of loadings, with high loadings on waterways underutilized control variables. This factor contributed 19.57% explanation to the variance on the impacts of inland waterways on socioeconomic development and has an Eigen value of 2.52. In other words, the utilization of inland waterways transport is the most important factor that determines the variation in the impacts of inland waterways on socioeconomic development in Ondo State coastal area.

Factor II: Political Influence factor has an Eigen value of 2.063 and contributed 11.46 % to the variance on the impacts of inland waterways on socioeconomic development of Ondo State coastal area. It has the highest loading on average political influence. This suggested that political influence is the second most important factor that explains the variation in socioeconomic development that can be attributed to inland waterways in the study area.

Factor III: Terminal/Jetties Facilities is third factor that determines the variation in socioeconomic development that can be attributed to inland waterways has the highest loading on terminal/jetties facilities assessment. This factor has an Eigen value of 2.038 and explained 11.32 % of the variance in socioeconomic development of the coastal area of Ondo State that can be attributed to inland waterways.

In other words, the third factor that determines the variation in the socioeconomic development of Ondo State coastal area is based on the terminal/jetties facilities assessment socioeconomic development of Ondo State coastal area is based on the terminal/jetties facilities assessment of the people in this area.

Factor IV: Monthly Income factor has the highest loading on educational status with an Eigen value of 1.687 and explained 9.37% of the total variance in the socioeconomic development of the Ondo State coastal area that can be attributed to inland waterways. In other words, monthly income is the fourth factor that determines the variation in socioeconomic development that can be attributed to inland waterways usage in Ondo coastal area.

Table 5.11 : Impacts of Inland Waterways on Socioeconomic Development of Ondo State Coastal Area (Rotated Component Matrix^a)

SN	Parameters	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
1	Educational Status	-0.319	-0.007	-0.229	0.616	0.179	0.453
2	Occupation	0.102	0.102	0.07	-0.033	0.86	0.12
3	Average Monthly Income	0.321	0.174	0.085	0.766	-0.123	-0.095
4	Years of Waterways Usage	0.662	0.167	-0.204	0.123	-0.142	-0.002
5	Adequate Terminal Facilities	-0.435	0.464	0.333	0.028	0.372	-0.216
6	Port Functional Facilities	-0.069	-0.054	0.099	0.026	0.23	0.746
7	Criteria for Cargo Payment	-0.008	0.112	0.309	0.125	0.421	-0.678
8	Types of Good Transport	0.419	0.193	0.354	0.172	0.011	0.483
9	Other Mode of Transport	0.629	-0.27	-0.349	-0.058	0.343	-0.153
10	Terminal/Jetties Infrastructure Assessment	-0.248	-0.075	0.791	-0.328	-0.106	0.055
11	Waterways Over Utilized	-0.776	0.05	-0.036	-0.223	-0.046	-0.042
12	Waterways Under Utilized	0.84	0.001	-0.176	-0.109	0.041	-0.11
13	Sufficient Jetties Facilities	-0.136	-0.084	0.764	0.061	0.291	-0.052
14	Facilities Easily Accessed by Users	-0.247	0.455	0.238	-0.637	-0.008	0.004
15	Political Influence	0.31	0.791	-0.136	-0.049	-0.041	0.117
16	Facilities Properly Maintained	-0.306	0.454	0.367	-0.037	0.443	0.085
17	Professional Skilled Employed	-0.265	0.714	-0.106	0.079	0.173	-0.212
No of Ship(s) Berthing at Ter/Jetties		0.63	-0.301	-0.069	0.258	-0.069	0.093
<i>Factor defining Variable</i>		Waterways Under Utilized	Political Influence	Terminal Infrastructure	Averag. Monthl. Income	Occupation	Port Functiona l Facilitie
<i>Factor Description</i>		Waterways Utilization	Political Influen ce	Terminal/Jetti es Infrastructure Assessment	Monthly Income	Occupati onal Status	Functiona lity of Port Facilities
<i>Total Eigen value</i>		3.523	2.063	2.038	1.687	1.626	1.504
<i>% Variance</i>		19.571	11.462	11.324	9.373	9.032	8.355
<i>% Cumulative variance</i>		19.571	31.034	42.358	51.73	60.763	69.118

Source: Author's Data Analysis, (2015)

Factor V: Occupation Status factor has an Eigen value of 1.626 and contributed 9.03% to the variance in the socio-economic development of Ondo State coastal area. It has the highest loading on occupation. This suggested that the occupational status of the people of the Ondo State coastal area is the fifth factor that explained the variation in the socioeconomic development that can be attributed to inland waterways usage.

Factor VI: Functionality of Port Facilities is the sixth factor that determines the variation in socioeconomic development that can be attributed to inland waterways has the highest loading

on functionality of port facilities. This factor has an Eigen value of 1.504 and explained 8.36% of the variance in socioeconomic development of the coastal area of Ondo that can be attributed to inland waterways. In other words, the sixth factor that determines the variation in the socioeconomic development of Ondo State coastal area is based on the residents' assessment of the terminal/jetties facilities.

5.6. Relationship between Inland Waterways and Socioeconomic Development in Ondo State Coastal Area

The six (6) factors identified as the underlying factors that explains the impacts of inland waterways on socioeconomic development in Ondo State coastal area, were subjected to multiple regression analysis to model the impacts of inland waterways on socioeconomic development in the study area and the results is presented in Table 5.12. The dependent variable is number of ship berthing at the terminal while the independent variables are the identified socioeconomic development (waterways utilization, political influence, terminal/jetties infrastructure assessment, monthly income, occupational status, functionality of port facilities) variables.

Table 5.12 : Relationship between Number of Ship Berthing and Socioeconomic Development Indices in Ondo Coastal State Area

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.920	.059		32.512	.000
Waterways Utilization	.472	.059	.630	7.935	.000
Political Influence	-.225	.059	-.301	-3.788	.000
Terminal/Jetties Infrastructure Assessment	-.052	.059	-.069	-.875	.384
Monthly Income	.193	.059	.258	3.246	.002
Occupational Status	-.051	.059	-.069	-.866	.390
Functionality of Port Facilities	.070	.059	.093	1.175	.244

a. Dependent Variable: Number of Ship Berthing

Table 5.12 show the results of the multiple regression analysis with an R^2 of 0.572, which signifies that six identified socioeconomic development factors accounted for 57.2% variability in the number of ship berthing at the terminals in the study area. This is expected because of the relationship that existed between the identified variables and the number of ship berthing. For example, waterways utilization is the most dominant factor, followed by political influence, this suggested that political influence, people assessment of terminal/jetties

infrastructure among others determines the usage of inland waterways, which has direct influence of the number of ship berthing. The relationship between number of ship berthing and socioeconomic development indices in Ondo coastal area is presented in Table 5.12.

Table 5.12: Model Summary of Inland Waterways and Socioeconomic Development in Ondo Coastal Area

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.756 ^a	.572	.534	.511

a. Predictors: (Constant), Waterways Utilization, Political Influence, Terminal/Jetties Infrastructure Assessment, Monthly Income, Occupational Status, Functionality of Port Facilities

From Table 5.12, for every 1% increase in waterways utilization, monthly income and functionality of port facilities, there was 0.47%, 0.19%, 0.70 %, increase, in variation in the number of ship berthing in Ondo State coastal area respectively. On the other hand, for every 1% decrease in political influence, terminal/jetties infrastructure assessment and occupational status, there is -23%, -.05% and -.05% decrease respectively, in the number of ship berthing in the area. Based on the results in Table 5.12, the relationship between number of ship berthing and the identified socioeconomic development factors can be written as shown in equation 5.3.

Model of waterways

$$NSB = 1.920 + .472_{WU} - .225_{PI} - .052_{TJIA} + .193_{MI} - .051_{OS} + .070_{FPF} \dots \text{Eq. 5.3}$$

Where NSB= number of ship berthing, WU= Waterways Utilization, PI= Political Influence, TJIA= Terminal/Jetties Infrastructure Assessment, MI= Monthly Income, OS= Occupational Status, FPF= Functionality of Port Facilities.

CHAPTER SIX
CHALLENGES OF INLAND WATERWAYS TRANSPORTATION IN THE COASTAL
AREA OF SOUTHWEST OF NIGERIA.

6.1 Challenges of Inland Waterways in Ogun State

To determine the problems of Inland waterways, forty-eight (48) variables were entered into factor analysis model, which were subsequently reduced to three (3) orthogonal variables. Variables with loadings greater than 0.80 were selected as defining variables for the study. The results of the factor analysis after vari-max rotation show some underlying factors. These three factors altogether gives 97% in the explanation of the problems of inland waterways in Ogun State (Table 6.1)

This analysis was based on the variance; co-variance matrix of the original variables. The method grouped the original variables together which we called Factors, and the proportion of variability's accounted for by each factor indicated. This has to do with variance of the original data. The method does not reduce number of variables, one can describe the variables grouped together with a factor name and the percentage contribution to total variance indicated. In this analysis the method is not used to just group variables that are similar but to extract factors that have impact on the environment where the research was conducted.

Table 6.1: Problems of Inland waterway Transport service in the Ogun coastal Area.

i.	Characteristics	Frequency	%
	ProfessionalSkill Employ		
	Strongly Disagree	3	6.0
	Undecided	40	80.0
	Agree	2	4.0
	Strongly agree	5	10.0
ii.	Financial Constrain /Facilities Provision		
	Strongly disagree	1	2.0
	Disagree	44	88.0
	Undecided	2	4.0
	Agree	1	2.0
	Strongly agree	2	4.0
iii	SufficientJetties facility		
	Strongly disagree	2	4.0
	Disagree	6	12.0
	Undecided	3	6.0
	Agree	39	78.0
iv.	Under Utilized waterways		
	Disagree	4	8.0
	Undecided	2	4.0
	Agree	3	6.0
	Strongly agree	41	82.0
v.	FailureofCabotage Law		
	Strongly agree	120	26.0
	Agree	90	19.0
	Undecided	130	28.0
	Disagree	86	18.0
	Strongly disagree	44	9.0
vi.	Polities Influence		
	Strongly disagree	6	12.0
	Disagree	43	86.0
	Undecided	1	2.0

Source: Author's Computation (2015)

Factor I: Underutilization and Financial constraints in Infrastructures Provision is a factor that has the highest number of loadings, the strongest loadings were recorded on underutilization of inland waterways along southwest coast and financial constraints hinders inland waterways transportation infrastructures provision & maintenances control variables.

This component is also strongly loaded on 10 other variables. The factor defining variable is underutilization of inland waterways. This factor contributed 40.10% explanation to the variance and has an Eigen value of 19.249. This is an indication that underutilization and

financial constraints in infrastructures provision is the dominant problem of inland waterways in Ogun State coastal area, contributing 40.10% to the variance in the problem of Inland waterways in the area.

Table 6.2: Problems of Inland Waterways in Ogun State

SN	Variables Description	Variables	Factor 1	Factor 2	Factor 3
1	Congestion at Jetties/Port/Terminal	Strongly Disagree	0.923	0.237	0.303
2		Disagree	0.911	0.108	-0.214
3		Agree	-0.947	-0.08	0.31
4		Strongly Agree	-0.878	0.183	-0.443
5	Cabotage Law has Failed	Strongly Disagree	0.769	0.512	-0.382
6		Disagree	0.547	0.695	0.466
7		Agree	0.407	0.615	0.675
8		Strongly Agree	0.21	-0.461	0.985
9	Inland Waterways Transportation Operating at Full Capacity	Strongly Disagree	0.43	0.87	-0.242
10		Disagree	0.565	-0.151	0.957
11		Agree	-0.699	-0.358	-0.619
12		Strongly Agree	-0.29	-0.008	0.811
13	Improvement in Human Resources in Maritime Transportation Management	Strongly Disagree	-0.285	0.345	-0.894
14		Disagree	0.661	0.519	0.541
15		Agree	-0.658	-0.72	0.219
16		Strongly Agree	0.86	0.459	-0.226
17	Inland Waterways Transport Over Utilized	Strongly Disagree	-0.323	-0.906	-0.273
18		Disagree	0.117	0.123	0.862
19		Agree	0.424	0.899	0.106
20		Strongly Agree	-0.292	0.681	0.671
21	Inland Waterways along Southwest Coast Under Utilized	Strongly Disagree	0.015	0.795	0.607
22		Disagree	-0.396	0.226	0.89
23		Agree	0.972	0.328	-0.064
24		Strongly Agree	-0.434	-0.874	-0.22
25	Sufficient Jetties Facilities	Strongly Disagree	-0.263	0.939	0.916
26		Disagree	0.692	0.596	0.407
27		Agree	-0.899	-0.366	-0.24
28		Strongly Agree	0.292	0.303	0.183
29	Infrastructure Facilities easily Accessed by Users	Strongly Disagree	0.285	0.715	0.638
30		Disagree	0.814	0.555	0.172
31		Agree	0.475	0.867	0.153
32		Strongly Agree	0.413	0.842	-0.347

33	Politics Influenced Development of Inland Waterways Transportation	Strongly Disagree	-0.01	-0.568	0.179
34		Disagree	0.837	0.539	0.098
35		Agree	-0.82	0.984	-0.073
36		Strongly Agree	0.88	0.408	0.221
37	Infrastructural Facilities and Handling Equipment Properly Maintained	Strongly Disagree	0.198	0.46	0.865
38		Disagree	-0.791	-0.592	-0.155
39		Agree	0.903	0.398	0.16
40		Strongly Agree	0.283	0.856	-0.432
41	Professional Labour Handles Maintenance of Maritime Infrastructures and Facilities	Strongly Disagree	0.294	0.977	0.171
42		Disagree	0.868	0.05	-0.494
43		Agree	0.925	-0.185	0.185
44		Strongly Agree	-0.425	0.785	0.451
45	Financial Constraints Hinders Inland Waterways Transportation Infrastructures Provision and Maintenances	Strongly Disagree	0.911	0.259	-0.32
46		Disagree	0.048	0.94	-0.206
47		Agree	0.969	0.204	0.139
48		Strongly Agree	-0.526	-0.85	0.029
Factor defining Variable			Underutilization of Inland Waterways	Political Influence	Failure of Cabotage Law
Factor Description			Underutilization and Financial Constraints in Infrastructures Provision	Political Influence & Hiring of Non-professionals	Failure of Cabotage Law & Inland Waterways Transportation not Operating at Full Capacity
Total Eigen value			19.249	17.398	11.353
% Variance			40.102	36.245	20.653
% Cumulative variance			40.102	76.347	97

Source: Author's Data Analysis (2015)

Factor II: Political Influence and Hiring of Non- Professionals factor has an Eigen value of 17.398 and contributed 36.24% to the variance in problems of inland waterways in Ogun State coastal area within the study area. It has the highest loading on professional labour are not handling maritime infrastructure and facilities, politics influenced the development of inland waterways and insufficient jetties. The factor defining variable is political influence. This is an indication that political influence & hiring of non-professionals is the second dominant problem

of inland waterways in Ogun State coastal area, contributing 36.24% to the variance in the problem of Inland waterways in the area.

Factor III: Failure of Cabotage Law and Inland Waterways Transportation not Operating at Full Capacity third problem of inland waterways in Ogun State has the highest loading on inland waterways transportation not operating at full capacity and failure of cabotage law. This factor has an Eigen value of 11.353 and explained 20.65% of the variance in the problem of inland waterways. The factor defining variable is cabotage law failure.

6.2 Problems of Inland Waterways in Ondo State

To determine the problems of Inland waterways, forty-eight (48) variables were entered into factor analysis, which were subsequently reduced to four (4) orthogonal variables. Variables with loadings greater than 0.80 were selected as defining variables for the study. The results of the factor analysis after vari-max rotation show some underlying factors. These four factors altogether gives 97% in the explanation of the problems of inland waterways in Ondo State (Table 6.3).

This analysis was based on the variance; co-variance matrix of the original variables. The method grouped the original variables together which we called Factors, and the proportion of variability's accounted for by each factor indicated. This has to do with variance of the original data.

The method does not reduce number of variables, one can describe the variables grouped together with a factor name and the percentage contribution to total variance indicated. In this analysis the method is not used to just group variables that are similar but to extract factors that have impact on the environment where the research was conducted.

Table 6.4: Problems of Inland waterway Transport service in the Ondo coastal Area.

	Sufficient Jetties Faciti	Frequency	%
	Strongly disagree	7	8.7
	Disagree	23	28.8
	Undecided	29	36.0
	Agree	12	15.0
	Strongly agree	9	11.2
	Facilities Properly Maint		
	Strongly disagree	2	2.5
	Disagree	23	28.8
	Undecided	25	31.2
	Agree	21	26.3
	Strongly agree	9	11.2
	Sufficient Jetties		
	Strongly disagree	6	7.4
	Disagree	35	43.8
	Undecided	11	13.8
	Agree	8	10.0
	Strongly agree	20	25.0
	Jetties Facilities aged		
	Strongly disagree	8	10.0
	Disagree	13	13.2
	Undecided	31	38.8
	Agree	28	35.0
	Infrastructur Accessed		
	Very Poor	1	1.3
	Poor	28	35.0
	Fair	17	21.2
	Good	20	32.5
	Excellent	6	10.0
	Politics Influence		
	Strongly disagree	1	1.3
	Disagree	9	11.3
	Undecided	10	12.4
	Agree	31	38.8
	Strongly agree	29	36.2

Source: Author's Computation (2015)

Factor I: Financial Constraints and Inland Waterways Transportation not Operating at Full Capacity factor has the highest number of loadings, the strongest loadings were recorded on inland waterways transportation not operating at full capacity and financial constraints hinders inland waterways transportation infrastructures provision and maintenances control variables. The factor defining variable is financial constraints. This factor contributed 33.04% explanation to the variance and has an Eigen value of 15.86. . This is an indication that financial constraints & inland waterways transportation not operating at full capacity is the dominant

problem of inland waterways in Ondo State coastal area, contributing 33.04% to the variance in the problem of Inland waterways in the area.

Factor II: Jetties Congestion factor has an Eigen value of 12.97 and contributed 27.02% to the variance in the problems of inland waterways in Ondo. It has the highest loading on congestion at the jetties. This is an indication that jetties congestion is the second dominant problem of inland waterways in Ondo state coastal area, contributing 27.02% to the variance in the problem of Inland waterways in the area.

Factor III: Insufficient Jetties Facilities is the third inland waterways problem that has the highest loading on insufficient jetties facilities. This factor has an Eigen value of 9.59 and

Table 6.5: Problems of Inland Waterways in Ondo State.

S N	Variables Description	Variables	Factor 1	Factor 2	Factor 3	Factor 4
1	Congestion at Jetties/Port/Termi nal	Strongly Disagree	-0.503	0.826	0.106	0.231
2		Disagree	-0.185	-0.94	-0.236	0.14
3		Agree	0.147	0.974	0.196	-0.003
4		Strongly Agree	0.841	-0.335	0.121	-0.407
5	Cabotage Law has Failed	Strongly Disagree	0.085	0.852	0.004	0.517
6		Disagree	-0.051	0.808	0.586	-0.036
7		Agree	0.638	-0.374	-0.261	-0.62
8		Strongly Agree	-0.666	-0.741	-0.084	0.002
9	Inland Waterways Transportation Operating at Full Capacity	Strongly Disagree	0.584	0.727	0.264	0.245
10		Disagree	0.975	-0.585	-0.278	-0.194
11		Agree	0.489	0.401	-0.249	-0.734
12		Strongly Agree	-0.346	-0.829	0.348	0.267
13	Improvement in Human Resources in Maritime Transportation Management	Strongly Disagree	0.368	0.762	0.305	0.436
14		Disagree	0.076	0.838	0.247	-0.481
15		Agree	-0.314	-0.652	-0.173	-0.668
16		Strongly Agree	0.328	0.293	-0.324	0.837
17	Inland Waterways Transport Over Utilized	Strongly Disagree	-0.929	0.002	-0.172	0.326
18		Disagree	-0.354	-0.88	0.292	0.126
19		Agree	0.937	0.264	0.228	-0.02

20		Strongly	0.166	-0.067	0.776	-0.448
		Agree				
21	Inland Waterways along Southwest Coast Under Utilized	Strongly Disagree	0.441	0.207	0.563	-0.668
22		Disagree	-0.265	-0.737	0.619	-0.053
23		Agree	-0.045	0.832	-0.275	0.48
24		Strongly Agree	-0.94	-0.017	0.016	0.34
25	Sufficient Jetties Facilities	Strongly Disagree	0.063	-0.288	0.415	-0.861
26		Disagree	-0.374	0.012	0.957	0.82
27		Agree	-0.494	0.23	0.433	-0.36
28		Strongly Agree	-0.736	-0.252	0.122	-0.095
29	Infrastructure Facilities easily Accessed by Users	Strongly Disagree	-0.23	0.811	0.451	-0.292
30		Disagree	0.837	0.138	-0.526	0.059
31		Agree	0.881	-0.041	-0.208	-0.422
32		Strongly Agree	0.773	-0.273	-0.044	0.571
33	Politics Influenced Development of Inland Waterways Transportation	Strongly Disagree	0.263	0.39	0.853	0.225
34		Disagree	-0.152	-0.265	0.136	-0.172
35		Agree	-0.824	-0.184	0.507	0.943
36		Strongly Agree	0.639	-0.001	-0.603	-0.477
37	Infrastructural Facilities and Handling Equipment Properly Maintained	Strongly Disagree	-0.408	0.576	0.609	-0.362
38		Disagree	-0.845	-0.221	0.467	0.138
39		Agree	0.18	0.565	-0.485	0.643
40		Strongly Agree	-0.951	0.007	-0.069	0.23
41	Professional Labour Handles Maintenance of Maritime Infrastructures and Facilities	Strongly Disagree	0.703	0.529	0.375	-0.292
42		Disagree	-0.141	0.18	-0.289	0.93
43		Agree	-0.178	0.036	-0.879	0.087
44		Strongly Agree	0.346	-0.55	0.756	0.077
45	Financial Constraints Hinders Inland Waterways Transportation Infrastructures Provision and Maintenances	Strongly Disagree	0.598	0.251	-0.758	0.061
46		Disagree	0.805	0.113	0.467	0.348
47		Agree	0.499	0.156	-0.706	-0.478
48		Strongly Agree	0.981	-0.126	0.124	0.076

Factor defining Variable	Financial Constraints	Congestion at the Jetties	Insufficient Jetties Facilities	Political Influence
Factor Description	Financial Constraints & Inland Waterways Transportation not Operating at Full Capacity	Congestion at the Jetties	Insufficient Jetties Facilities	Political influence & Hiring of Non-professional Labour
Total Eigen value	15.861	12.974	9.599	9.566
% Variance	33.044	27.029	16.998	14.98
% Cumulative variance	33.044	60.072	77.07	92.05

Source: Author's Analysis, (2015)

explained 16.99% of the variance in the inland waterways problems in Ondo. The factor defining variables is insufficient jetties facilities. This is an indication that insufficient jetties facilities is the third dominant problem of inland waterways in Ondo State coastal area, contributing 16.99% to the variance in the problem of Inland waterways in the area.

Factor IV: Political Influence and Hiring of Non –Professional Labour is a factor has an Eigen value of 9.56 and contributed 14.98% to the variance in inland waterways problem in Ondo. It has the highest loading on politics influenced development of inland waterways transportation and non-professional labour handles maintenance of maritime infrastructures and facilities.

6.3 Problems of Inland Waterways in Lagos State

To determine the problems of Inland waterways, forty-eight (48) variables were analyzed using factor analysis, which were subsequently reduced to seven (7) orthogonal variables. Variables with loadings greater than 0.80 were selected as defining variables. The results of the factor analysis after vari-max rotation show some underlying factors. These seven factors altogether gives 97% in the explanation of the in the problems of inland waterways in Lagos coastal area (Table 6.6)

This analysis was based on the variance:- Co-variance matrix of the original variables. The method grouped the original variables together which we called Factors, and the proportion of variability's accounted for by each factor indicated. This has to do with variance of the original data.

The method does not reduce number of variables, one can describe the variables grouped together with a factor name and the percentage contribution to total variance indicated. In this analysis the method is not used to just group variables that are similar but to extract factors that have impact on the environment where the research was conducted.

Table 6.6: Problems of Inland waterway Transport service in the Lagos coastal Area.

Characteristics	Freq	%	Financial Constrain/ Infrastructure	Freq	%
Professional Employed			Strongly disagree	19	12.7
Strongly disagree	11	7.3	Disagree	35	23.3
Disagree	46	30.7	Undecided	67	44.7
Undecided	69	46.0	Agree	23	15.3
Agree	19	12.7	Strongly agree	6	4.0
Strongly Agree	5	3.3	Waterway under Utilized		
Adequate facilities			Strongly disagree	1	0.7
Strongly disagree	7	4.7	Disagree	32	21.3
Disagree	79	52.7	Undecided	16	10.7
Undecided	26	17.3	Agree	26	17.3
Agree	26	17.3	Strongly agree	75	50.0
Strongly Agree	12	8.0	Sufficient Jetties		
Functional Facilities			Strongly disagree	19	12.7
Surveillance Radar	8	5.3	Disagree	35	23.3
Total Radar coverage	83	55.3	Undecided	67	44.7
Navigation	46	30.7	Agree	23	15.3
Communication	13	8.7	Strongly agree	6	4.0
Facilities Properly Maint.			Cabotage Law Effective		
Strongly disagree		2.7	Strongly disagree	247	53.0
Disagree		26.0	Disagree	103	22.0
Undecided		37.3	Undecided	90	19.0
Agree		34.0	Agree	30	6.0
Political Influence			Congestion at Terminal		
Strongly disagree	18	11.3	Strongly agree	120	26.0
Disagree	17	10.3	Disagree	90	19.0
Undecided	40	28.7	Undecided	130	28.0
Agree	26	17.3	Agree	86	18.0
Strongly agree	51	34.0	Strongly agree	44	9.0

Source: Author's Computation (2015)

Factor I: Non – Improvement in Human Resources factor has the highest number of loadings; the strongest loadings were recorded on non-improvement in human resources in maritime transportation management control variables. The factor defining variable is non-improvement in human resources in maritime transport management. This factor contributed 18.05% explanation to the variance and has an Eigen value of 8.68. This is an indication that non-improvement in human resources in maritime transportation management is the dominant problem of inland waterways in Lagos State coastal area, contributing 18.05% to the variance in the problem of Inland waterways in the area.

Factor II: Underutilization of Inland waterways factor has an Eigen value of 8.55 and contributed 17.82% to the variance in problems of inland waterways in Lagos coastal area. It has the highest loading on inland waterways transport over utilized and inland waterways along southwest coast underutilized. The factor defining variable is inland waterways underutilized. This is an indication that underutilization of the inland waterways is the second dominant problem of inland waterways in Lagos State coastal area, contributing 17.82% to the variance in the problem of Inland waterways in the area.

Factor III: Infrastructure Facilities not Easily Accessed by Users is the third problem of inland waterways in Lagos State has the highest loading on infrastructure facilities not easily accessed by users. This factor has an Eigen value of 7.64 and explained 15.91% of the variance in the problem of inland waterways. The factor defining variable is infrastructure facilities not easily accessed by users.

Factor IV: Underutilization of Inland Waterways along Southwest Coast and Infrastructures not Properly Maintained has an Eigen value of 7.29 and contributed 15.18% to the variance in problems of inland waterways in Lagos State coastal area. It has the highest loading on inland waterways along southwest coast underutilized and infrastructural facilities and handling equipment not properly maintained. The factor defining variable is underutilization of inland waterways along Southwest coast.

Factor V: Political Influence factor has an Eigen value of 6.85 and contributed 12.28% to the variance in problems of inland waterways in Lagos State coastal area. It has the highest loading on politics influenced development of inland waterways transportation. The factor defining variable is political influence.

Factor VI: Congestion at Port and Cabotage Law Failure is the sixth factor has the highest loading on congestion at jetties/port/terminal and cabotage law has failed with an Eigen value of 4.96 and explained 8.33% of the total variance in inland waterways problems. The factor defining variable is port congestion.

Factor VII: Financial Constraints factor has an Eigen value of 4.02 and contributed 7.39% to the variance in inland waterways problems in Lagos State. It has the highest loading on financial constraints hinders inland waterways transportation infrastructures provision and maintenances. The factor defining variable is financial constraints.

Table 6.9: Problems of Inland Waterways in Lagos

SN	Variables Description	Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
1	Congestion at Jetties/Port/Terminal	Strongly Disagree	0.763	0.4	-0.378	0.249	-0.049	-0.171	0.144
2		Disagree	0.857	0.086	-0.352	-0.194	0.171	-0.079	0.25
3		Agree	-0.828	-0.039	0.41	0.018	0.004	-0.323	-0.201
4		Strongly Agree	0.258	-0.285	0.007	0.196	-0.08	0.898	-0.011
5	Cabotage Law has Failed	Strongly Disagree	0.842	0.002	-0.019	0.177	-0.179	-0.19	0.116
6		Disagree	0.435	-0.313	-0.682	0.407	-0.286	0.019	0
7		Agree	0.055	-0.26	-0.078	0.11	0.383	0.806	0.339
8		Strongly Agree	-0.257	0.762	-0.256	-0.104	0.054	0.522	0.047
9	Inland Waterways Transportation Operating at Full Capacity	Strongly Disagree	0.72	-0.461	-0.011	0.203	-0.379	0.18	-0.227
10		Disagree	0.044	0.63	-0.138	-0.023	-0.318	0.68	0.137
11		Agree	-0.463	-0.012	0.656	0.143	0.068	-0.447	0.361
12		Strongly Agree	0.019	0.17	-0.205	-0.118	0.866	0.397	-0.087
13	Improvement in Human Resources in Maritime Transportation Management	Strongly Disagree	0.898	-0.142	0.201	0.09	0.162	0.142	-0.28
14		Disagree	0.552	-0.059	-0.437	0.181	0.537	0.492	0.194
15		Agree	-0.887	0.089	0.137	-0.154	-0.263	-0.304	-0.041
16		Strongly Agree	0.78	0.086	0.357	-0.03	-0.023	0.161	0.253
17	Inland Waterways Transport Over Utilized	Strongly Disagree	0.191	0.904	-0.048	-0.13	0.28	-0.107	0.195
18		Disagree	-0.045	0.661	0.464	0.309	0.419	0.194	0.194
19		Agree	0.454	-0.082	0.571	0.394	0.27	0.459	0.151
20		Strongly Agree	0.067	0.046	-0.122	0.85	0.185	0.199	0.041
21	Inland Waterways along Southwest Coast Under Utilized	Strongly Disagree	0.043	-0.118	0.059	0.139	-0.046	0.138	0.245
22		Disagree	0.078	0.445	-0.013	0.339	0.387	0.708	-0.173
23		Agree	0.724	0.4	0.328	0.958	0.122	-0.11	0.402
24		Strongly Agree	0.118	0.92	0.241	-0.061	0.269	-0.068	0.037
25	Sufficient Jetties Facilities	Strongly Disagree	-0.201	0.117	-0.118	0.467	0.729	0.314	0.29
26		Disagree	-0.002	0.585	0.728	0.104	0.038	-0.33	-0.08
27		Agree	0.21	0.536	-0.198	0.777	0.046	0.154	-0.01
28		Strongly Agree	-0.002	-0.092	0.725	0.531	-0.366	0.021	0.225
29	Infrastructure Facilities easily Accessed by Users	Strongly Disagree	0.255	0.517	0.226	0.598	0.359	-0.293	0.211
30		Disagree	-0.056	0.356	0.978	0.095	0.054	-0.138	0.243
31		Agree	0.232	-0.185	0.226	0.61	-0.093	0.3	0.624
32		Strongly Agree	-0.011	0.105	0.883	-0.018	-0.109	-0.123	-0.066
33	Politics Influenced Development of Inland Waterways Transportation	Strongly Disagree	-0.004	0.18	0.334	-0.03	-0.184	-0.063	-0.132
34		Disagree	0.288	0.122	-0.127	-0.1	-0.363	0.086	0.073
35		Agree	0.027	0.733	0.019	0.533	0.913	-0.05	0.155
36		Strongly Agree	0.127	0.074	0.532	0.302	0.929	0.355	0.588
37	Infrastructural	Strongly	0.128	0.588	0.159	0.929	-0.118	-0.252	0.061

	Facilities and Handling Equipment Properly Maintained	Disagree							
38		Disagree	-0.129	0.895	0.27	0.181	0.041	-0.138	-0.235
39		Agree	0.549	0.417	0.425	0.167	0.313	0.183	0.429
40		Strongly Agree	0.106	-0.229	0.031	0.128	0.887	-0.076	0.357
41	Professional Labour Handles Maintenance of Maritime Infrastructures and Facilities	Strongly Disagree	-0.175	0.179	0.522	0.022	0.771	-0.241	0.108
42		Disagree	0.525	0.419	0.447	-0.457	0.371	0.013	-0.051
43		Agree	0.182	0.351	0.149	0.056	0.279	-0.105	0.854
44		Strongly Agree	0.071	0.032	0.155	0.98	0.021	0.046	0.087
45	Financial Constraints Hinders Inland Waterways Transportation Infrastructures Provision and Maintenances	Strongly Disagree	0.167	0.169	0.731	-0.368	0.338	0.333	0.221
46		Disagree	0.543	-0.294	0.536	0.437	0.137	0.285	-0.201
47		Agree	0.172	-0.109	0.032	0.338	0.185	0.145	0.888
48		Strongly Agree	-0.032	0.944	0.304	0.06	-0.104	-0.007	-0.044

Factor defining Variable	Non-improvement in Human Resources in Maritime Transport Mgt.	Inland Waterways Underutilized	Infrastructure Facilities not Easily Accessed by Users	Underutilization of Inland Waterways along Southwest Coast	Political Influence	Congestion at Port	Financial Constraints
Factor Description	Non-improvement in Human Resources	Underutilization of Inland Waterway	Infrastructure Facilities not Easily Accessed by Users	Underutilization of Inland Waterways along Southwest Coast & Infrastructure s not Properly Maintained	Political Influence	Congestion at Port and Cabotage Law Failure	Financial Constraints
Total Eigen value	8.666	8.556	7.641	7.29	6.857	4.962	4.029
% Variance	18.054	17.826	15.918	15.187	12.285	8.338	7.393
% Cumulative variance	18.054	35.88	51.798	66.985	79.27	87.607	95.001

Source: Author’s Data Analysis (2015).

CHAPTER SEVEN

OPPORTUNITIES OF INLAND WATERWAYS TRANSPORTATION IN SOUTH-WEST PART NIGERIA.

7.1 Opportunities of Inland Waterways

The potential of the coastal inland waterways as a multi-use tourism, trade, shipment alternative and complementary mode and as an amenity for their local communities, job creation, revenue generation for both government and operators. The south west coastal waterways have important potential for nature conservation and the industrial archaeology of waterways gaining appreciation from international investors in the export processing zone along the coastal water due to easy shipment of raw materials and manufacturing equipment to the site for industrial location. These activities acknowledge the changing uses of the coastal inland waterways and it points to the need for a wider focus in planning for the future development of the waterways.

There is the need to have some forum that will accommodate private and public interaction on cooperation in some areas of inland waterways funding, usage, protection, development and management with lay down rules and regulations to guide the association or body and management since there would be a consultation process with the communities, users, operator, and government, a process to for the monitoring should be mounted to speculate on the way forward.

Since Inland waterways were likely to be one of the cross border bodies (managing bodies) must have significant information, which will help to improve management of the waterways and made a difference to the finding of the process that had been followed.

A study of Nigeria transportation shows that the roads are over used and the rail has been out of wider usage for over fifteen years. The highways system that carries 70 per cent of domestic freight has experienced a doubling of vehicle miles travelled in the past 20 years, while total highway miles have increased by one per -cent, officials from the ministry of transport, have stated in multiple presentations that the approximate cost to construct a new mile of highway is [N400, 000,000:00] four hundred million naira and that it costs [N900, 000,000:00] nine hundred million naira for an inter-charge. Take as a whole, this evidence suggests that the Nigeria is not going to be able to afford to build its ways out of congestion without some major changes in transportation pattern and practices which is to develop the Inland water ways and the coastal water canals, channels, as inland water ways for transportation usage.

With continuing demand and growth of international trade, export development cargo distribution, passenger and Trader movement, the resulting gridlock on these networks could paralyze portions of national economic development on this trade and have substantial adverse effects on the other sectors as well. Therefore maritime / inland water ways transport should again emerged as a potential solution and outlet for interregional trade, transportation and distribution for Nigeria. The completion of the coastal belt dredging expansion and initiation of associated feeder services [other small rivers].

- a) Introduction of new operation system and infrastructure equipment with various water motor/vehicles and jetty facilities,
- b) The need to re-view and made some changes in the cabotage law, with specifically the creation of Nigeria flag for West Africa water ways and ship building, also the area of the law that affects ownership of vessels in the Law [to be amended]
- c) Some certain government measures were identified that could have indirect effect of encouraging more Inland waterways transportation and shipments by water;
- d) Tighter enforcement for overweight trucks
- e) Elimination or restructuring of the harbour maintenance tax and
- f) Addition restrictions on hazardous materials movement.

That coastal Inland waterways operation does not appear to be an important factor that will affect the capacity of the Nigeria highways system in the short to medium term. This assumes that there are no major shifts in would trading patterns and those fiscal and regulatory regimes remain fairly constant. The need for urgent changes in transport and transportation regulatory or fiscal policy associated with economic environment and social issues or modification of Nigeria export trade policy, would increase opportunities for Inland waterways transportation and similar interregional trade and should be investigated in further research as warranted:

- a) Trade flows and Trends;
- b) Intermodal concerns;
- c) Regional competitiveness;
- d) Landside access to jetties/terminals;
- e) Economic and environmental effects;

- f) International commerce/Trade network;
- g) NAF TA and GATT;
- h) Jetting and Terminal development operations;
- i) Transportation policy formulation'
- j) Security and safety rules and regulation implementation;

To sustain the Nation's globally, competitive navigation system for future generations will require leadership and partnership. The main challenges are to finance the maintenance of Inland waterways transportation, port and Jetties/Terminals. This will lead to the identification of where to expand blue water ports capacity and increase Inland waterway operation as:

- a) distribution means for sea ports,
- b) feeder to International seaports along the coast
- c) to finance it development, and
- d) the Federal government needs to develop and articulate a clear message to industry by answering these three challenges:-

The ability to ensure that NIMASA, shipping industries, the Nigeria Port Authority and operators [ship owners] work together. The development of partnership guidelines, methods and expectations for a strategy to sustain the nation's water ways operations and maritime global competitive navigation system. The health of any nation's economy depends upon the vitality and expansion of International trade. International trade depends upon the nations' navigation infrastructure, which serves as a conduct for transportation; trade and tourism connects to the global community. Water transportation is one of the most efficient, effective, safe and environmentally sound ways to transport people and goods. It is a keystone to the economy and commerce activities of the nation. A modern robust navigation infrastructure can exist without significant harm to the environment, reduce the transportation system's carbon footprint and enhance, economic growth opportunities for future generations. Sustaining a modern Inland waterways and coastal transportation system will requires a coordinated effort between government, industry and other stakeholders.

The critical need for capacity development and professional transporter, skilled technology manpower with sound educational background in transportation with major specialization in

water transportation development and management techniques for maintenance and expansion of water transportation modernization to accommodate large vessels, big terminals, storage facilities, loading and off loading equipment is efficiently managed.

A sustainable water transportation system must take into account the other pillars of sustainability development, like social needs including the health and safety of seafarers, as well as the economy of the shipping industry and it should be pursued through a national consultation process on issues being discussed at IMO and among multilateral, inter-governmental and international bodies should follow, with various stakeholders through the formal discussion process. The need to create awareness initiatives such as the maritime DAY, the DAY of the seafarer and the Inland waterways stakeholder forum to strive for wider understanding of the value and importance of the water Transportation system to the general public by spotlighting how they delivers so much value to National GDP and world trade at relatively minimal cost.

Water transportation system must operate in a responsible manner, adhering to best practices and applying them. The quality of life for seafarers at sea is important in order to maintain and develop the maritime transport industry as an attractive career option for talented professionals seeking a varied career involving both ship-and-shore based employments. The logistics infrastructure should allow ships to sail at optimal speeds for their chartered trajectories [e.g. cargo logistics and Terminal planning, just-in-time berthing weather routing]. All these elements would form part of a ‘HOLISTC’) energy efficiency concept for the whole system.

A coastal Inland waterway also delivers energy for all and is a life-line for trade and for manufacturing industries. It is indispensable for economic growth and sustainable development. On the social side, as the delivery mechanism for both local and global trade, it supports international maritime transport as a feeder and distributor of cargo, goods information and sustains a huge number of wealth creating and poverty-alleviating activities in developing countries and communities along the waterways. Inland waterways provides job opportunities to people the nation, over 3,000 people are employed as seafarers and if the economy continues to grow more highly trained and qualified seafarers will be needed. Selected activities such as shipbuilding, ship repair and jetty maintenance ferry recycling provide more jobs to people in developing nations and will contribute towards achieving the millennium development goals of 2020.

With regard to the environment, the discharge of oil and harmful substances from ships, vessel and boats to the marine environment is declining, the prevent air pollution from water motors and to regulate emissions of greenhouse gases regulations to stop the transfer to invasive species through vessels ballast water. Transport is an essential component of any industrial location for sustainable development, in the localization of manufacturing and product producing firm since it will need distribution or freight to meet consumers demand on different locations. The study into the future demand and availability of low sulphur fuel, taking into account

- i. Projected Inland waterway trade expansion
- ii. Expected Volume of supply of new types of water motors and fuels such as LNG, Water Bridge motors.

Assess the need for fuel terminal development with the use of clean energy or the application of on board treatment system –cost of on-board treatment system consideration of safety aspects in conjunction with the usage of fuel types as well as development of appropriate by governments, industry, seafarers’ representatives and NGOs Promote and strengthen guidance on preventive evasive and defensive measures to protect ships, vessels, boats and all water motors from security threats. Development of new capacity-building delivery mechanisms based on country manpower detailing technical cooperation needs. Interrelationship between industry, academic, research institutions for more knowledge and modern, technology development input into maritime industry create awareness of future regulations and promote financial mechanisms to ensure compliance, including existing vessels.

CHAPTER 8

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

The analysis and research finding of the impact of Inland waterways on transport development in the coastal belt of Nigeria has yield some important results from which implications and conclusion were drawn.

8.2 Summary of the Findings

The study established the characteristics of coastal Inland waterways and freights in the study area 'southwest coastal belt of Nigeria the research identified the factors that influenced the usage, operation and movement of goods and services along the coastal inland waterways in the study area. It has also examined and evaluated the social economic impact development in coastal inland waterways of Southwest of Nigeria. The study assessed the problems and hindrances of the maximum-utilization of the waterways transportation in the study area and it impact on safety, security and economic development.

The research study examined various usage of the waterways and it contribution to the communities and the nation at large. It also looks at various activities with the Local governments of each state along the coastal Inland water ways of the study area activities.

The primary and secondary sources of data were employed to achieve the objectives set for the study. The relevant review of literature on coastal Inland waterways transportation and related problems associated with Inland waterways environment, safety, security, operation ownership and regulation, with maritime laws in stripping and water ways transportation were used to find some suggestions for the way forward in development of coastal Inland waterways operations in Nigeria.

Two different questionnaires were used by employing a systematic-random sampling techniques, the first questionnaire was targeted to the users of coastal Inland waterway transportation and the communities while the second questionnaire was targeted to the operator of the water motor vehicle in the study area.

A total of 931 questionnaires were issued out while a total of 929 (99.8%) respondent was received. The respondent on the users sampling was 459 out of 460 distributed which is (99.8%) and 99.8% was also the respondent of operators water sampling was 470out of 471.

Majority of people who engage in fishing 65.4% are found in the income bracket (N5,000 – N20,000) majority of the people have formal education with 83.6% in the operator sector.

The loading and offloading method dominate the area was by manually with 45% respondent while on 16.3% was by agree that electrically method being use for vessels.

The analysis of variance indicated that there is no significant difference in the fishing and trading occupation while significant differences existed in the educational level and income. The study examined the current trade and shipment between southwest of Nigeria, and took a bottom-up approach in which existing data on trade flows/shipment within the region and the ports that participate in this trade were used to analyze the prospects for Inland waterways transportation in the area. Detailed data were examined concerning the commodities that flow between Jetties and terminal in the study area and the vessels that carry them.

Container traffic was analyzed separately from all other types due to the unique type of infrastructure and equipment employed in the container trade. The researcher also identified possible triggers that might cause an abrupt increase in Inland waterways transportation activity in the region. Researcher examined the potentials role of the southwest inter coastal waterways in handling coastwise trade and the possibility of developing a viable ocean going coastwise domestic trade in the Nigeria coastal belt. The researcher then analyzed the likely effects of Inland waterways on Nigeria transportation system in short to medium term, focusing specifically on adequacy of channels, Jetties, Terminals, docks available cranes, vessel, water motor vehicles of different dimensions and required storage space the researcher also look at a new Inland waterways transportation operation that has been announced for free-export promotion zone site for industrial development with the study area. The researcher made some suggestion for further studies and research on some area while making contributions to knowledge about what could be done to improve and increase the usage and development of coastal Inland waterways transportation in Nigeria.

8.2 Conclusion

The Nigeria inland waterways is reputed to be one of the longest in the world, Nigeria's Inland water ways extend out to about 86 000km. of this vast and extensive water, which stretches from the republic of Niger-Benin borderline down to the confluence where it joins forces with the Benue of it journey to Gulf of Guinea and with coastal line of 190km creating a rich net work of clustered waterways that stretch to the coastal line, the largest of its kind in

Africa. It is a surprise that over a half of it is yet to be exploited. 'It's Nigeria's Fallow Resources'.

Considering the many factors that limit our nation today, the untapped treasures and huge economic opportunities abound in the maritime/coastal, and inland waterways (rivers) and tributaries that transverse the entire landscape of Nigeria, with over 50 rivers and coastal water are of potential benefits to our people, if properly harnessed. Coastal inland water ways can add value to the economy in the area of mass transportation, international trade, agriculture, human capacity development, tourism and hospitality, mineral exploration, as well as provide the much sought after employment to mention but a few. And lastly with the development of the inland waterways container port/Jetties, investment opportunities are imminent in the area of haulage, ferry services, boat movements.

Fabrication and assemblage, warehousing and storage facility services, heavy material handling services, dredging services, dockyard facility provision, protocol and safety management services, hydrographical survey catering services, towage stevedoring consultancy and many others. The silent potential revolution of coastal, inland water and maritime services and resources left to fallow will be brought back to live and both state and federal government with the communities enjoy much of the awaited economic change that would take place. Huge vacuum is for both private participation and public-private partnership. It is high time every businessman start to think investment in the inland waterway.

Nigeria coastal and inland waterway plays a vital role in the economy of Nigeria, when inland waterways transportation development succeed, the navigation industry and the customer it serves face a great opportunity.

1. The continued expansion of international trade combined with the building of ever large ships is reducing transportation cost across the navigation industry.
2. These large vessels are expected to call at ports in increasing numbers, especially after the expansion of the coastal waterways.
3. The extent to which these vessels will call at our sea-ports and the increase in the opportunities to be realized to
 - a) Producers
 - b) Shippers
 - c) Traders and

- d) Consumers will increase.

The needed innovations infrastructural equipment's in the following area of

- a) Port, Jetties, channel and inland waterways, modernization strategy to accommodate large vessels for future operations
- b) Identifies possible options for implementing the vision
- c) The availability of multi-modal infrastructure for port, Jetty and vessels operation equipment.

The Nigeria transport sector, especially the maritime mode and mostly the coastal inland waterways is a haven of investment windows for both local and foreign investment. Opportunities range from infrastructure facilities provisions to service delivery and capacity building. The scope of investment opportunities is large and varied with significant market size to support large-scale operators while the local economy has robust resources base. The subsisting stability in the domestic polity, the economic and institutional reforms, the friendly investment laws the expansion and modernization of the expansion and modernization of infrastructure in Olokola export processing zone and other array of investment in Bitumen stimulating fiscal regimes, are meant to provide appropriate enabling environment as well as incentives for the development of coastal inland waterways for all categories of investors. The provision of effective transport services would therefore, require investments and development that would lead heavily towards multimodals and capacity of composite service delivery.

The performance of the inland waterways/maritime sector depends largely on the macro-economic environment as demand for transport and its allied associate services are derived from the needs of the national economy. This is to induce growth and expansion in the economy as well as to create robust demand and supply base for investment profitability

8.3 Recommendation and Contribution to Knowledge

As a maritime nation our economic prosperity is directly linked to our investments in navigation infrastructure. Just as current generations benefit from investments made in the past, the ability of future generations to prosper and grow will depend on infrastructure investment

decisions made today. A globally competitive maritime/inland water ways transportation system for the 21st century will have these characteristics.

- i. Environmentally compatible development, infrastructure and operations
- ii. Multi-modal connectivity
- iii. High – performance and reliable marine channels, turning basins and other related navigation infrastructure that are maintained to constructed depths and widths
- iv. Channels and Jetties, ports that are not the limiting component to competitive global freight movement
- v. Navigation locks that are reliable and available to pass traffic on demand with lock chambers consistently sized for efficient movement of freight.
- vi. Navigation jetties that are planned, constructed and maintained for safe, reliable and efficient freight movement.
- vii. Dredged material placement facilities that are planned, constructed and maintained to be available, when needed for navigation channel maintenance, never impeding dredging efforts.
- viii. Capital investments in locks for replacement, major rehabilitation or expanded capacity that are established through a capital investment plan that identifies and prioritizes on a system basis
- ix. Capital investment plans that are shovel-ready as investment funds are identifies
- x. An identified mechanism for the financing of operations, maintenance and capacity improvements.
- xi. The research confirms that inland waterways are and important asset that should be conserved as part of our national heritable.
- xii. It also emphasizes the need to maximize the opportunities waterways offer for leisure, regeneration, education and sustainable transport initiatives including cycling, working and the transport of freight, job creation small scale business and interactions it is an important tourist resources
- xiii. It create boat and vessel hire or building industry
- xiv. They are valuable environment resource, providing sanctuary for a wide variety of plants and wildlife as well as forming part of the country's industrial heritage

- xv. It's a catalyst for urban and rural development and increasing scope for providing transporting freight as a means of reducing road freight and road accidents.
- xvi. Procurement of inland waterway equipment accessories for maintaining the navigation
- xvii. Establishment of river port/Jetties facilities for cargo distribution, loading and of loading
- xviii. Construction of terminal building and storage facilities of goods
- xix. Construction of passenger facilities at ports, Jetties for comfort and safety of inland waterway users and operators
- xx. Construction of bus and truck terminal as a link with port/Jetties and store for loading and off-loading of goods, cargo and passengers. Inland waterways also delivers energy for all and is a life – line for trade and for manufacturing industries, it is indispensable for coastal economic growth and sustainable development.

5.3 Recommendations

The management, maintenance, development and restoration of the coastal navigable waterways system throughout the coastal, trade area, services and goods distribution and delivery safety with low cost of operation purposes. The need for strategic plan for the waterways that will include the local communities, authorities who have role for themselves in the formulation and implementation of such a plan, so that many Opportunities for Development of the inland waterways for economic and transportation services activities along the waterways corridors including; Trade, personnel movement, tourism, freight forwarding, all related projects should take into consideration potential adverse effects on the heritage of the waterways.

- i. Connecting the jetties to other modes of transportation.
- ii. Policies and guidelines are needed to ensure sustainable developments in the coastal inland waterways.
- iii. With reference to the principles of Local Agenda 21, encouragement and guidance should be given to local communities, users, fishery associations, voluntary and local

- government authorities to carry out development works on the waterways and its environments.
- iv. The voluntary sector should be encouraged to continue its involvement in waterways development and non-governmental organizations should be recognized as important partners by the new body.
 - v. Since there are some hire boats, ferry, vessels along the waterways, marketing and promotional effects need to be coordinated by a body to increase the usage of the waterways and the water motors effectively at maximum usage to encourage more investors to the waterways of the study area. .
 - vi. The issue of insufficient communication equipment in the area should be a thing of the past by purchasing new modern communication equipment for monitoring, recording both data and information along the waterways.
 - vii. Planning of 5years to 10years expansion of the waterways system strategy should be ensured and funding the projected should also be adequate towards the upkeep and operation of the navigation.
 - viii. All waterways should receive protective designation in local authority development plans to ensure that future restoration will not be jeopardized.
 - ix. Any waterway project development plan should have impact on the trader, users, freight forwarders, fishermen and all heritage of the community.
 - x. The coastal inland waterways transportation should have wider implication on job creation, revenue generating investment and industrial development with local and recreational amenity value increase.
 - xi. The coastal inland waterways should be able to play its part as
 - a. Complementary, and
 - b. Competitor with other mode of transportation.
 - xii. The improved coastal inland waterways should serve as network system in transportation and freight distribution, goods and personnel along the coast of Nigeria and West Africa in general.
 - xiii. The connection of the jetties to other modes should be made workable e.g. roads, rail so that it will be extensively used and increased GDP contribution to the economy.

- xiv. Availability of water motors of different sizes and types should be made available for hire, rent, usage and maintenance yard created for repair and fitting of parts as at needed time be developed especially in relation to the hire business.
- xv. Government offices in the coastal area would have the added advantage of providing an additional urban destination for cargo safety and security.
- xvi. Coastal inland waterways transportation should be accorded a high priority among transport modes in the national budgeting and development plan.
- xvii. States and local governments along the coastal waterways should establish a data office in their area.

A Sustainable Coastal Waterways Transportation System Requires Coordination At State, Local And National Level With International Maritime Organization.

At national level, coordination for environmental protection must always take into account the other pillars of sustainable development, safety of seafarers and shipping industries through a national consultation process on issues. The state government must take action on social needs including the health and safety of the communities, clearing of water hyacinth.

The IMO should ensure that the processes of consultation and coordination among government and other multilateral, inter-government bodies follows various formal discussion process at IMO for a sustainable trends in Coastal Waterways Transportation System which must cover a broad range of activities which include widen awareness of the importance of the system through increased understanding of the coordination opportunities the system provides at local, state, sub-region and national levels and at both industries and private levels.

In order to carry out trade business in a safe, reliable and efficient manner, coastal inland waterways transport require regulatory framework, based on IMOs multitude of conventions covering all aspect of shipping activities.

The act to promote safety framework, maximize energy efficiency and resources conservation and minimizes the pollution, while enabling seamless and reliable coastal water transport along the southwest coastal waterways. The coastal waterways system should have a culture of safety and environmental stewardship embodied in its activities of all stakeholders to ensure the sustainability of inland waterways transportation system. A coastal waterway transportation system requires properly trained and educated seafarers; such training and education should be based on inter-alia the STCW convention and includes refresher training and

upgrades, as necessary. The quality of life of seafarers at sea is important in order to maintain and develop the coastal inland waterways transport industry as an attractive career option for talented professionals seeking a varied career involving both shipping and shore based employment.

The training and education of maritime professionals must be developed and some universities should be made to create courses in maritime transportation and seafarers for upgrading professional development and capacity building. The documentation of water transportation at both sea shore and jetties through streamlining and standardization of the documentation for both the delivery and the reception of cargo. Facilities to keep the operational efficiency of waterway transportation should allow cargo logistics and jetty or port planning-Just-in-time berthing, weather routing for holistic efficiency concept for the whole system must be rigorously pursued.

Jetties and ports facilities to provide fuel to vessels, ferries, boats should be arranged, based on a proper assessment of future fuel demand and smooth functioning of quality fuel are readily available for water motors. The Inland water ways for sustainable economic development operation, as one of the oldest modes for transportation for passengers and cargo and in some areas the only means of mobility and access to basic services which is environmental friendly. The sector emphasizes vessels, ranging from simple non-motorized boats to highly automated pushers operating on water ways for small tributaries to major rivers entering the coastal. Inland water ways play a vital role in economic development, especially for remote rural area. The potential role this sector depends considerably on the specific regional context, such as level of road-development, geographical conditions and social-economic activities. They are cost advantages reduce Isolation, economically and ecologically sustainable transport solution and enhancing economic opportunities employment.

The trans-nation cargo and passenger movement would be transformed from a local maritime/Inland water ways enterprise of 19centures development to a predominantly Inland water ways transportation based enterprise with the extensive development of National coastal Inland water ways net-work in the 21st [twenty first century].There is a growing concern among shippers, cargo carriers and National transportation Agencies that these inland water ways net-works are rapidly approaching a new capacities of international designed for equal advantage

usage all over. That the volume of cargo is swelling at the coastal belt of Nigeria, and shortage of water vehicle capacity is developing [lack of vessels, ferries, ships

Formation of groups and innovative inland waterways consultants' services should include:

- i. National investment on inland waterways conference
- ii. Inland waterways stakeholders conference
- iii. Inland waterways operator's imitative forum
- iv. Inland waterways research and data information group.
- v. Inland waterways users organization
- vi. Government agencies and law enforcement
- vii. Chamber of commerce and trade for export development information
- viii. I.C.T and media organization
- ix. Education and training institution for inland water and maritime transport courses.
- x. Public- private partnership forum for maritime/inland waterways coastal transportation.
- xi. It would be necessary to set up the National action plans for inland waterways transport as it was done in Egypt, Austria and Asia which has improve, develop and increase their economic activities and contribute to the GDP of their nations.
- xii. Improve navigability of the water ways to allow an uninterrupted passage [bottle necks]
- xiii. Invest in ports and Jetties with a view to establish multimodal centres for cargo distribution
- xiv. Fund projects for integrating inland navigation into the transport chain of different modes by intermodal nods.
- xv. Government should improve custom procedure and documentation at Jetties
- xvi. Harmonies the regulative systems on coastal inland waterways operation Formation of groups and innovative inland waterways consultants service.
- xvii. The environment benefit and ecology issues as it relate to the communities should be well established.
- xviii. Coastal Inland water ways should be give higher priority in the budget of the nation, and in the transport policy to reflects the importance of the sectors contribution to the development and sustainable transportation system.

- xix. Decisively tackling the environment challenges :- clearing of aquatic- weeds, water- hyacinth in the coastal water ways and dredging of the waterways to allow bigger ships and vessels.
- xx. The adoption of new technology and infrastructure; ex-modality transport safety and security will assist the sustainability of the environmental impacts and development of the remote rural areas and the welfare of their inhabitants, who are usually among the lowest of low- income groups in the country.
- xxi. Coastal inland waterways cost-effectiveness, relative fuel efficiency, are important for the mobility welfare and development of remote communities in several coastal area of the Nation.
- xxii. Shift to coastal waterways transportation and movement of freight by coastal ship, ferry, boats and water motors with integration of coastal shipping into the transport network would supplement land based transport modes and relieve the burden on roads
- xxiii. Coastal inland waterways user's concerns should be prioritize in the frequency, reliability and consistency of services provide by operators of water motors
- xxiv. Promote greater use of coastal waterways sailings with door to door multimodal services to the remote rural areas and the welfare of their inhabitants, who are usually among the lowest of Low-income groups in the country.

REFERENCES

- Abubakar A. A. (1996) The role of water transport in an integrated mass transport system in Bolade T and Adeyemi E. O. (eds) “Enhancing the Efficiency of Mass Transport Operation in Nigeria. Rex Charles Publications..
- Abubakar. R. D, (2005) Dialogue on Power, Potentials and Prospects of the Inland Waterways. GGA publishers, Abeokuta.
- Adeniyi Kunle (2000) Transport challenges in Nigeria in the next two decades. A key note address delivered at the 5th National council on Transport meeting organized by the Federal ministry of transport, held at the ECOWAS Secretariat. Asokoro, Abuja, Nigeria. Between 29th and 31st August 2000.
- AF.Devinfo.NationalMaritimeAuthority, [<http://www.afdevinfo.com/htmlreports/org/40364.html>]
- Afolayan O (1994) Seaport development in Nigeria A case study of Apapa port Complex, an unpublished Thesis submitted to Transport Study Department of Geography and Regional Planning, Ogun State University, Ago-Iwoye, Nigeria.
- Akintayo B. (2010) Transport Economics, Applied to all modes, policy issues and logistics management, ILAGUN, Printers, Zaria, Nigeria.
- Alan H. (2007) Port and Maritime transport challenges in West and Central Africa “A working paper, at sub- Saharan Africa Transport Policy Program [SSATP] World Bank project.
- Andrew Airahuobhor (2010) ‘Controversy trails F G plan to establish new maritime training Institutions’ [http://www.independentngonline.com/Daily_Independent/Article.aspx_id_35256].
- Asit Biswas (1987) ‘Inland waterways for transportation of Agricultural, Industrial and energy products’ International journal of Water Resources Development. [<http://www.informaworld.com/smpp/>]
- Ayoade, J. O. (1976) A trend surface Analysis of Rainfall Over Nigeria, Journal of Science 18 (1) 323-340.
- Ayoade, J. O. (2008) Techniques in Climatology, Stirling - Horden Publisher ltd. Ibadan.
- Ayodeji Olukoju (2006) Maritime Policy and Economic development, ‘A comparison of Nigeria and Japanese experience since the second World war. A publication of Council for the

- development of Social Sciences Research in Africa & Associate of African Historian. No 11 & 12.
- Badejo Bamidele (2009) Unbundling the Challenges of Transportation and Development in Nigeria: 'The Lagos State Example' being a paper delivered at the Sixteenth Anniversary Lecture Organized by the Department of Geography. Faculty of the Social Sciences, University of Ibadan, Ibadan, Nigeria 10th June 2009.
- Badejo Bamidele (2010) 'Toward Achieving Effective Seaport Regulation' A presentation at a Seminar on port Terminals and Logistics, organized by Admiralty Resources Services Lagos. 29th to 30th June 2010.
- Badejo Bamidele [ed.] (1998) Maritime Transportation in Nigeria, A book of Reading, Lagos Rex-Charles Publication, Ibadan.
- Badejo Bamidele and Salau T. I (2010) Transportation and the Environment: The Lagos Example in Lagos state and the Environment, Lagos State ministry of Environment.
- Badejo Dele (2000) Financing the Nigerian maritime industry for Economic Revitalization and Prosperity' being a paper presented at the Quality maritime series Foundation seminar, organized by the Maritime Quality Services Foundation, Lagos, Nigeria held at Federal Palace Hotel, Lagos 20th Nov, 2000.
- Badejo Dele (2001) 'Privatization of Nigerian Ports Authority [NPA] The way forward'. A paper presented at the Conference of Senior Staff Association of Statutory Corporations and Government Owned Companies [NPA Tin Can Island Port Zone] Gateway Hotel, Otta 16th Aug. 2001.
- Baundelarie J, G. (1996) Port Administration and Management International, Tokyo. Associates of Port and Harbours.
- Boak E. H. and Turner I. L. (2005) Shoreline definition and detection : A review. Journal of coastal research 21. (4). 688-703.
- Carter, R.W.G. and Woodroffe, C. D. (1994) Coastal evolution: late quaternary shoreline morphodynamics.
- Chris Asoluka (ed.) (2003) Nigerian Maritime Resources development 'Issues and Challenges' Volume 1&11 Lagos. National maritime Authority Publication.
- Chris, Asoluka (ed.) (2002) Nigerian maritime Laws, Volume 1&11, Lagos, National maritime Authority Publication.

- Dolan, R, Hayden, B.P., May, P. and May, S.K. (1980) The reliability of shoreline change measurements from aerial photographs. *Shore and Beach*, 48 (4); 22-29.
- Donald Bean (2007) 'Rotterdam Port Authority Logistics and Business' A conference paper at 2007 Inland waterways project.
- Edward J. Bordi [2006] The supply chain and the economy in management of Transportation 'International student edition' Publisher Thomson by South Western.
- Ekong B. U (2000) Special report on problem and prospects of Nigeria's Shipping Policy Published by Nigerian Transport and Aviation information handbook / Directory.
- Ekong B. U. (1983) Strategy for optimum Seaport Development in the Logistics of the Nigeria External Trade in transport in Nigeria, "National Development" Onakomaiya S, O and Ekanem N.F (eds) NISER Ibadan.
- Fanos, A.M. Naffaa, G.M. Gewilli, Y. and Ali, M.M. (1995) long and short term changes of Rosetta Promontory. Egypt. Proceeding on the International Conference on the Mediterranean coastal Environment, Terragona, Spain; MEDCOAST.
- Fasona, M.J. (2007) 'Land Degradation and Environmental change in Ondo State coastline South-West Nigeria' A PhD. Thesis, University of Lagos Nigeria.
- Federal Government of Nigeria (2003) 'National Transport Policy for Nigeria – Draft Document' by Transport Sector Reform Committee, Abuja, Bureau of Public Enterprises [BPE]
- Federal Ministry of Transport (2003) Master plan for an Integrated Transportation Infrastructure Executive 'Summary, Master Plan for an integrated Transportation Infrastructure Final Reports Abuja.
- Filani, M.O. (1988) 'Mobility and survival; 'A National Dilemma' being the University of Ibadan Inaugural Lecture delivered in 1988.
- Gallo A. (2005) "International worldwide Activities" A group activities in Brazil and America Transportation Conference, [http:// bargel to business at Green modal Transport](http://bargel.to.business.at/Green%20modal%20Transport).
- Gbadamosi K.T. (2008) 'Port Development and Pattern of Industrial Landscape' in Gbadamosi K.T Oyeskiku O.O. (2008) Port Administration and Development in Nigeria. HEBN Publisher. Ibadan.
- Hanno Uitenboogaart and Bert Vermeij (2001) 'Traffic models for inland Shipping in a GIS environment' Publish by Ministry of Transport public work and water management Netherland.

- Ikporuko 1994 - The Development and Utilization of Nigeria's Inland waterways system status and ideal. The Nigerian Geographical Journal New series Vol. I pp. 187 - 202.
- Isioma Madike (2011) 'Inland waterways: Nigeria's untapped goldmine. <http://nationalmirroronline.net/index.php/mirror/big> read 239.
- Jacqueline Tammenon Bakker et al (2005) Ministerial Conference in Bucharest Sept 2005 on strengthening Inland waterways transport 'Pan – European Cooperation for progress Publication by OECD publication service. 2, rue – André Pascal 75775 Paris codex 15, France.
- Jean Paul, Claude Comtois and Brian Slack (2009) The geography of Transport systems. (Mariyime Transportation) New York, Routledge pg. 352.
- Jim Kruse (2013) Multimodal Freight Transportation, safety and security operation and logistic. [Texas A&M] Transportation Institute conference center for Ports and waterways.
- Joan P. Mileski et all (2010) Recommendations and Guidelines on shoreline development and hazards to navigation. Published Texas Transportation Institute & Texas A&M University at Galveston.
- Koning Albert II (2005) Inland navigation Europe 'A communication in inland waterways transportation creating the frame work conditions for development. info@inlandnavigation.org/www.inlandnavigation.org 'Bressels'
- Krejde and Murgan (1970) Method of Data collection, "Sample Size Calculator" Creative Research System, <http://www.survey system.com/scale.htm>.
- Laurel Gascho, Henrike Peichart and Sarah Renner (2006) A workshop and project research work for Poverty reduction, Energy and Environment Funding a 15 year development Master plan for inland waterways transportation network in Malaysia.
- Martin Van Dijk (2003) 'Inland tanker barges in Europe: Logistic cargo, container barges a paper presented at International Inland waterways organization conference in Europe by waterway Transport solution.
- Ndikom B. C. (2006) The Kernel Concept ; Shipping Management and port operations in Nigeria.
- Nigerian Maritime Administration and safety Agency, cargo allocation. National Maritime Authority Publication 2013.

- Nwilo P. C (2012) Floods in Nigeria: Causes, impacts and management. Published by Nigeria Society of Chemical Engineers, Abuja.
- Nwilo P. C . (2014) Environmental and management Issues in Nigerian Coastal and Inland waters. Published by FUTA BDC.
- Nwilo P. C. and Badejo O.T. (2006) Impacts and management of oil spill pollution along the Nigerian coastal areas. In Administering marine space: A publication of F I G Commission 4and 7 Group 4.3 International Federation of Surveyors.
- Obed, Ndikom B. C (2013) A critical assessment of the Inland waterways operations and management on the development of the Nigerian maritime industry, Greener journal of Environmental management and Public Safety.
- Ogundana B. (1970) “Patterns and Problems of Seaport Evolution in Nigeria” in Hoyle, B. S. and Hilling (eds) Op. Cit. pp. 167-182.
- Ogundana B. (1966) “Changing Port Outlets of Nigeria’s Export Commodity” Nigeria Geographical Journal Vol. 9 pp25-40.
- Ogundana B. (1973) Problems and Prospects of river transport in Nigeria. The Nigeria Journal of Economic and Social Studies.Vol. 15, pp375-390.
- Ogundana B. (1977) “The Measurement of port productivity in Nigeria, in Onakomaiya et al.
- Ogunsanya, A A. (1986) “ Port Development” in Falola T. and Olarewaju S. A. (eds) Transport System in Nigeria. Maxwell School of Citizenship and Public Affairs Syrnouse University.
- Okoko E.E [2006] Urban Transportation Planning and Modeling ‘Human porter age’ published by Millennium a reading book.
- Ola Timothy (2001) ‘Wage increase; Maritime workers threaten to pull out from ports’ <http://www.sunnews.online.com/webpage/>
- Olawepo Ademola Omotayo (2005) Port development and Hinterland connectivity in Nigeria. ‘A case study at Lagos Port complex’ A dissertation presented in partial fulfillment of the Department of Geography University of Ilorin. Unpublished.
- Oliver Klein et la (2012) Rising enhanced RIS and IT services supporting multimodal Transports involving inland waterways e-freight 2012 conference [9-10 May 2013] in Delft the Netherlands

- Omolehinwa Eddy (2014) Being a paper presented at ICAN Symposium on Federal Government of Nigeria 2014 budget at Muson Centre, Onikan Lagos on July 15,2014.
- Oni S.I (2000) 'Encouraging a Multi-Modal Transport System in Nigeria' an unpolished seminar paper of the Department of Geography, University of Lagos, Akoka - Lagos.
- Oni S.I (2000). 'Encouraging Multimodal Transport System in Nigeria' A Lagos State Ministry of transport publication, Lagos - Nigeria.
- Oni S.I (2010) Operation of Inter-modal Transport System In Nigeria. The Ondo State development plan Agenda, Government Annual publications Akure, Nigeria.
- Opara C. (2000) Essential Elements of maritime transport management in Nigeria, Wordsmiths Printing and Packaging Ltd, Lagos, Nigeria.
- Paul J. et al (1994) Environmental advantages of Inland Barge Transportation [Final report] U.S.A. Department of Transportation, Maritime Administration August 1994.
- Pidwirny, M. (2006) Fundamentals of Physical Geography. Introduction to the Lithosphere: Coastal and marine processes and landforms. University of British Columbia Okanagan.
- Radu Mircea Berceanu and Karla Peijs [2006] Inland waterways navigation 'a key elements of the future.A pan European conference on inland waterways transportation published by pan European transport system [PESTS}.
- Robert A. Pie trousky (2013).Leading paper at world international inland waterways conference, Louisville University, Louisville USA. March 2013.
- Roland Bakker (2007) Truck planning and Terminal twinkle; A conference paper at Rotterdam port authority - inland waterways project.
- Stefan Mecusean (2003) 'Cooperative of European Private - sector inland shipping companies: A working paper on Transport of dry cargo via all European waterways at NRRC conference in The Netherland Germany and Belgium. <http://bargetobusiness.eu>
- Sulaiman O.O. Saharuddin A.H. Kader S.A (2011) Review of potential of inland waterway Hybrid Transportation for sustainable Transportation capability building Terengganu. A publication of Canadian Journal on Environmental, Construction and Civil Engineering vol. 2. No. 5 June 2011.

Taunits Steenbeek 2013 'Improving the operational performance of the inland shipping container chain and handling in Rotterdam. A paper presented at Maritime 2013 (March) conference in Rotterdam.

The American waterways operations:- support the inland waterways capital development plan 'invest in America's Inland waterways transportation system.
www.americanwaterways.com/www.waterways.org/www.waterwayscouncil.org

The Brent Hurst Foundation (2010) 'Maritime development in Africa 'An Independent specialist, framework' published in June 2010 www.thebrenthurstfoundation.org

U.S.A Army corps of Engineers (2013) March 'Management and Operations' Inland waterways conference Louisville USA March 2013

U.S.A congressional Research services (2013) understudy and review the activities of inland waterways transport [March 2013]

Usoh. K. E. (1996) 'Basic Requirements for movement of cargo by sea' in Nigeria Shipping Annual Abstract.