INLAND WATERWAYS TRANSPORTATION SYSTEM AND PROMOTION OF BUSINESS ACTIVITIES IN LAGOS STATE, NIGERIA

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Abstract
In light of the pressing need to move people and goods from one point to another, with the least possible energy expenditure, this study examined the inland waterways transportation system in Lagos state, Nigeria, in promoting business activities. The Survey research setting was adopted in this study. The population of this study covers both operators of ferry in Lagos State and their customers. These operators make use of jetties in Lagos. These jetties are Marina jetty, Apapa jetty, Maroko jetty, Majidun jetty and Metro jetty all in different parts of Lagos. The purposive sampling was used to compliment the simple random sampling technique. The study used regression model to analyse the research hypotheses. The findings revealed that inland waterways transportation system serves as alternative transportation system to ease traffic congestion system which directly promotes business activities in Lagos State. It was discovered that the integration of inland waterways transportation system in Lagos which cut across all location where there are waterways could reduce the heavy traffic congestion on the roads. The study concluded that investment in the water transport system could unlock a host of energy and cost savings as well act as a sustainable solution to infrastructural needs. There should be long-term gestation investment in the sector to enhance continued business activities in Lagos State. Also, there should be more collaboration between the private and public participation in the sub-sector.

Keywords: Waterways, Transportation, Performance, Integration, Congestion

Introduction
In Nigeria, Inland waterways are made up of navigable rivers, lakes, coastal creeks, lagoons and canals (Aderemo & Mogaji, 2010). Water transport is characterized by many features which predispose it to play a much more important role in the transport system of both goods and passengers (Smolnik, 2016). This means of transportation is reputed to be economical, energy efficient and environmental friendly (Ojile, 2006). Inland waterway transport is characterized by low cost of transport, high energy efficiency and low adverse environmental impact, especially in terms of noise and vibration, low emissions of air pollutants; relatively low water pollution; the ability to significantly reduce congestion on the roads as a result of the adoption of freight road transport; the lowest external costs (Smolnik, 2016; Collins, 1984). Despite these perceived benefits, authorities of the Inland Waterways Transport (IWT) in Nigeria continue to raise concerns over the use of this means of transportation. There has been a growing concern over the sharp decline in the use of Inland Waterways Transport (IWT) in Nigeria (Obed, 2014).

There are huge potentials for Nigeria economy to be boosted through its naturally endowed waterways. Nigeria’s inland waterways spans over 10000 kilometers and over 80000 kilometers of these inland waterways are navigable (Ilojie, 1984). If the economic potentials of these inland waterways are maximized, this will technically put Nigeria in an advantage position as the largest growing economy in Africa. This is chiefly because Nigeria IWT has more than enough waterways and capacity to service most landlocked countries in West Africa sub region. Specifically Nigeria has the capacity to service trading opportunities in Burkina Faso, Chad, Mali and Niger Republic (Udo 1970). This capacity is enhanced by the federal government efforts in the dredging of the River Niger for adequate navigation with river ports (NIWA, 2013). Established by Decree No.13 of 1997, the National Inland Waterways Authority (NIWA) is a Nigeria’s Federal government parastatal (agency) saddled with a vision to uplift Nigeria in the development and management of Inland waterways transportation and a mission to further develop the waterways system in the provision of an efficient and safe mode of transport of both people and goods (NIWA Annual report, 2006). There are two main federal inland waterways in Nigeria, these are the River Niger and the River Benue and they both dissect in the east – west direction finally meet in Lokoja which is the central part in Nigeria. The river Benue is said to have originated from the highlands of Cameroon Republic while the River Niger originates from Guinea. (IWT master-plan-Nigeria, 2010).

Nigeria’s transportation infrastructure is in a disappointing state and cannot be compared to other countries that are developed (Igwe, Oyelola, Ajiboshin & Raheem, 2013). The economic and social waste from congestion of roads which results to traffic necessitates the need that water transportation lives like a full time support to
development of Lagos. Lagos is known not only as a centre of commerce and investment but also for severe traffic congestion problems. Transportation in Lagos State is extremely disorganized. This is because six million passengers engage in different activities daily between Lagos mainland and island. Motorized transportation accounts for more than 90% of passenger and freight traffic. With the enormous growth in car traffic in recent year, there is need for alternative transportation system (Adejare, Nwilo, Olusina & Opaluwa, 2011).

There are abundant water bodies that could be used but these are neglected and grossly unutilized. Insufficient information with respect to depths of the water bodies and desirable route for the boat perhaps inhibits aspiration and willingness for potential investor in water transport system. It is in view of this perennial oversight even by state government with riverine areas that prompted this research. Also Anyam (2003), was of the opinion that inland waterways transportation has not been properly utilized. He established that despite her huge potentials, inland water transport is yet to become an alternative means of transportation to road and air such that passengers and cargo can sustainably and efficiently by moved to their destination through water. Similarly, Adams (2004), lamented that inland water transport is yet to receive the attention it deserves from the federal government particularly in the twin areas of funding and infrastructural development. He outlined the physical impediments to improved performance in the sector to include non channelization and dredging of navigable rivers, inadequate construction and rehabilitation of river ports, limited water transported infrastructures (comfortable boats, jetties and bouys) and safety and security concern along the navigable waterways.

Ezenwaji (2010) focused on the poor use of inland rivers as transport routes in Nigeria. He compared the percentage share of that transport mode to others in Nigeria and elsewhere. He noted that in Bangladesh water transport constitutes 32% of the transport sector (Rahmam, 1994); 20% in Philippines (Fellinda, 2006); 3% in Sierra Leone (Kimba, 2008); 0.15% in India (Raphram, 2004) and only 0.08% in Nigeria despite the country’s rich endowment of inland waterways (that cover over 8,575 kilometers) and some innovative initiatives introduced by the Nigerian Inland Waterways Authority (NIWA). He established, like earlier researchers (Aderemo and Mogaji, (2010)), that several natural factors negatively affect the utilization of inland waterways as transport routes in Nigeria. Research and publications on inland water transport dates back to the 1970s (Obeta, 2014). Several researches such as Adams (1998, 1999, 2004) Ologunorisa (1999); Douglas (2001); Anyam (2003); Ojile (2006) cited in Obeta (2014) have studied various aspects of inland water in Nigeria. Their studies cover such as the origin, merit, problems, constraints and future trends of inland water transportation.

This study will investigate the concern of previous researches on the decline use of IWT in Nigeria with a view to finding out factors responsible for this sharp decline, if any. Most importantly, the study will evaluate the effect of inland waterways transportation system on business activities in Lagos State, Nigeria. The study will also, examine whether integration of inland waterways transportation system can greatly reduce traffic congestion in Lagos State and how IWT can be economically maximized to drive Nigeria’s economy growth with attention on Lagos State waterway.

**Literature Review**

**Conceptual Clarifications**

Inland waterways are made up of navigable rivers, lakes, coastal creeks, lagoons and canals (Aderemo & Mogaji, 2010 cited in Obeta 2014). The movement of goods and services along inland waterways is one of the oldest means of transporting commodities from point to point (Fellinda, 2006). This is base on the fact that inland water transport (IWT) enhance the most economical, energy efficient and environmental friendly means of transporting all types of goods from place to place (Ojile, 2006). It also offers safer and cheaper rates in areas where water exist naturally. This facilitates commerce, promotes wealth creation, poverty alleviation, and creates job opportunities for youths within such regions. The ancillary sector of boat building industry also generates employment through active engagement of the youths in welding and fabrication process (Gray, 2004).

Water Transportation dates back to the old days when there was little or no means of communication. Communities, especially those surrounded by bodies of water used it as a means of trade as goods where moved from one place to another. A waterway or water which is a river, lake, lagoon or a canal is said to be navigable if a water craft or vessel preferably one not less than 50 tonnes, can pass through. The water is expected to be wide and deep enough.

Inland water transport operation has merits in terms of costs of moving heavy traffic; especially where speed is not put in consideration than cost, instance, a single 15-barge tow is equivalent to above 225 rail- road cars or 870 tractor-trailer trucks. This would be of more optimum benefits in the transportation of tonnes of agricultural products from the middle belts areas to the Delta areas via this medium and vice-versa; hopefully bringing about a fall in food prices in the regions, likewise other coastal generated cargo and passenger movements from and to
where they are of more value and demand. This mode of transport will equally play an important role in the export and import of raw materials such as materials importation via Delta area ports for use at the Ajaokuta steel complex, which is a major industrial centre on the Niger and will likewise benefits from the importation and use the same route to export its products.

**Nigerian Inland Waterway routes/navigable waterways**

Established by Decree No.13 of 1997, the National Inland Waterways Authority (NIWA) is a Federal government agency saddled with a vision to uplift Nigeria in the development and management of Inland waterways transportation and a mission to further develop the waterways system in the provision of an efficient and safe mode of transport of both people and goods. (NIWA Annual report, 2006). NIWA was set up to act as a beacon for Nigeria to regain and also revitalize.

The Authority commenced full operations in 1998 with its headquarters in Lokoja, Kogi State. It has 13 area offices and a Liaison office in Abuja the Federal Capital Territory. The area offices include that of Lagos, Lokoja in Kogi State, Markurdi in Benue state, Eket in Akwaibom State, Calabar in Cross River State, Onitsha in Anambra State, Yenegoa In Bayelsa State, Warri In Delta State, Port Harcourt in Rivers State, Yelwa/Yauri in Kebbi State, Igbokoda in Ondo State, Baga in Borno State, and Kaduna in Kaduna State. (NIWA Annual report, 2006)

The main functions and objectives of NIWA include:

- To Provide regulations for inland Waterways navigation in Nigeria
- Ensuring that infrastructural facilities for an Inland waterways network are developed adequately. Network connecting rivers and creeks using river ports as nodal points
- To design routes for ferries, survey inland watercrafts, control and issue licences for navigation on inland waters, undertaking hydrographical and hydrological surveys, undertaking both capital and maintenance dredging.
- Granting licences to inland waterways operators (for private investors), and also approval of designs and construction of inland water crafts. (NIWA, 2014)

There are various routes where Inland waters pass through. The federal navigable waterways in Nigeria cited in NIWA ACT 2004, include:

- The River Niger which comes from the Nigerian/Niger/Benin border and flows through Nun and Forcados straight into the Atlantic Ocean.
- The River Benue which is from the Nigerian/Cameroon border up until its confluence in Lokoja with the River Niger.
- The Cross River which is also from the Nigerian/Cameroon border straight to the Atlantic Ocean with all its distributaries.
- Rivers Anambra, Ogun, Taraba, Donga, Sokoto, Katsina-Ala, Oluwa, Imo, Gongola, Kwa Ibo.
- Intra-Coastal route along Badagry creek from Badagry to Lagos through the Lagos Lagoon to Epe. The Canal from Araromi through Aiyetoro River,
- Along the Forcados River, the Waterways from Warri through Frukana, Siam, Bomadi, Patani to the Niger/Nun/Forcados bifurcation down to River Nun, then Agberi, Kiamas,and Gbaran creek into Ekole creek, Brass River, Eastern Niger Delta then crosses Rivers St Nicholas, Sambreiro, new Calabar, Bonny River then to Port Harcourt.
- From Port Harcourt the Waterways goes through Amadi creek to the Bonny River and into the Opopo channel through Andoni flats to Andoni River, Tellifer creek, Shooter creek, Widenham creek, Kwa Ibo creek and River, to Cross River estuary to Oron as well as Calabar.
- The creeks of Nembe, New Calabar, Egbedi, Kolo, Ikane-Bakassi, Krakama, Agamaama Tora, Omu, Ikebiri as well as the Hughes and Crawthorne Channel.
- The River Benin, Bonny, Mbo, Ossiomo, Warri, Ramos, Middleton, Onne, Fishtown, Uruan, Dodo, Santa Barbara, Taliya, Es'avos
- The River Orashi which is from the Oguta Lake down to Ebocha, Okariki, Omoku, Egbeama, Moina, Sambreiro River.
- Lakes Oguta, Osiam Ethomu, Mahin and the part of Lake Chad within Nigeria.

**Challenges of Transportation and IWT in Lagos**

IWT can be capital intensive as cost of equipment is expensive. For this reason, private participation has been low. Investors need to be encouraged to invest in this sector with the help of government and assured of return on investment. Over the years however, there has been problem of lack navigational charts, and river maps,
navigational guides e.g. buoys on waterways as well as lack of trained personnel or manpower. Channels are usually blocked by aquatic weeds (water hyacinth) and waterways were heavily polluted by faeces and refuse and industrial wastes. Conflict of jurisdiction between some agencies in the state and the authority mandated by the Federal government (i.e. the National Inland Waterways Authority) in the entire country.

Three agencies are responsible for the provision of the ferry services. These are Inland Waterways Department (IWD), Lagos State Ferry Services Corporation (LSFSC) and Federal Urban Mass Transit Agency (FUMTA). Only five routes are currently being operated by these agencies. These are:

i. Marina - Apapa (Operated by IWD and FUMTA) with three vessels.
ii. Marina - Mile 2 (Operated by LSFSC, FUMTA) with seven vessels.
iii. Ebute Ero - Oyingbo (Operated by LSFSC, FUMTA) with two vessels.
iv. Marina - Ijora (Operated by FUMTA) with one operating vessel.
v. Marina - Tarkwa Bay (Operated by FUMTA) with one operating vessel.

**Empirical Review of studies on Inland Water Transport in Nigeria**

Research studies on inland water transport in Nigeria probably dates back to the pioneering works of Professor R.K. Udo in the 1970s (Obeta, 2014). Udo (1970) noted that water is one of the natural resources which Nigeria has in abundance and that the country has the opportunity to service most landlocked countries in West Africa such as Burkina Faso, Chad, Mali and Niger. Ilojie (1984) cited in Obeta (2014), also observed that Nigeria is richly endowed with surface water resources and that over 8000 kilometers of the inland waterways are navigable. Several other researchers such as Adams (1998, 1999, 2004), Ologunorisa (1999), Douglas (2001), Anyam (2003), Ojile (2006), and have written on various aspects of IWT in Nigeria such as the origin, advantages, neglect, management, problems and potentials of inland water transportation. For instance, Badejo (1995), and Adams (1998) established that the Niger River, after which the country is named, and Benue, its largest tributary, are the main rivers whose channels provide the longest waterways into the hinterland of the country. Both rivers rise outside the country but meet at Lokoja confluence and later enter the Gulf of Guinea through a large network of creeks and distributaries which form the Niger Delta.

Adams (1999), discovered that the capacity of Nigerian navigable waterways has increased to about 10,000 kilometers plus an extensive coastline of about 852 kilometers. Based on this, he identified that the country has a huge potential to move goods and passengers from the coast to the hinterland by water. Nigeria has the second longest length of waterways in Africa. It has 8,600 kilometers of inland waterways and an extensive coastland of about 852 kilometers. Nigerians centre on its longest rivers, River Niger and Benue, which cuts across 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 (Obed, 2013). The coastal waterways extend from Badagry region through Warri to Calabar; however, water transport scores a distant second to road transport with an average share of about 1.6% of Nigeria gross domestic product i.e. internally generated cargoes, although water transport is slow and while unsuitable for passenger movement, an efficient coastal and inland waterways operation and system generally can minimize the pressure on a country’s rail and road transport infrastructure (Ndikom, 2008).

Akali and Idoko (2010), quoting Douglas, (2001) and Onuche, (2007) noted that inland water transportation plays a key role in the socio-economic and political development in Nigeria as a factor of exchange, mixing of population and sub-regional integration. They noted that this mode of transport facilitates the movement of bulky goods over long and short distances and that it is better appreciated when the source and destinations are water front locations. They concluded by observing that inspite of the tremendous advantages associated with inland water transport, there has been a considerable decline in its use in Nigeria.

In the study of Obeta (2013), It was established that the viable opportunities which inland water transport offer to investors include facility management, jetty operations and boat building. He agreed with an earlier observation that security concerns discourage potential investors form tapping into the viable business opportunities, which the Nigerian IWT provides. There have also been several reports of consultancies by development agencies and firms, aspects of which have dealt with diverse IWT development issues such as river channels dredging and maintenance, private sector involvement in the water transport sector, construction and rehabilitations of river ports, acquisition of passenger ferries, security boats, building of channels buoys and other projects. The conclusions reached are that investment apathy on the part of investors and conflicts between federal and state agencies involved in supervising IWT in Nigeria are some of the factors limiting the development of Nigerian’s IWT.
Empirical evidences show that ferry service is grossly inadequate, unreliable and irregular in metropolitan Lagos, despite the abundant water ways (Egobi, 1999; Oni, 2004 cited in Atubi, 2013). With this development and other potential opportunities, private sector participants should be encouraged to develop the ferry route ways. If water - ways are fully developed and properly maintained, they would drastically reduce the chaotic transportation situation in Lagos State. According to the Lagos State Regional Plan, (2005) cited in Atubi (2013), travel by non-bus public transport (rail and water transport) has declined to less than 1.0% in Lagos despite their considerable potential. Water transport has a potential to become an attractive modes of transport for certain links (e.g. the short distance between Lagos Island terminal and Apapa - Warf) and for serving especially low-income communities such as in Makoko, and Ajegunle.

Theoretical Framework

Accessibility and Complimentarity Theory

The accessibility and complimentarity theory was developed by Ingram (1971). He classified relative accessibility as “the degree to which two places or points on the same surface are connected” and integral accessibility as “the degree of inter-connection with all other points on the same surface”. The theory states that with the underlying conditions of supply remaining fixed the supply of possible sites in an urban area is a function of existing transport network; and given transport system, movement will be concentrated along particular lines so differentiating between sites in terms of accessibility advantages. Sites along main transport route will have relative advantage over sites that are off the route, and sites located at route intersections will possess greater relative advantage. It further states that greatest relative advantage belongs to sites at the focus of urban transport system and business users will seek the location that maximizes pecuniary profits.

Complementarity brings clustering of like and unlike uses to cluster on adjacent sites but where the site cannot be subdivided to provide a particular user with sufficiently small site that user may combine his demand with other users and locate on more accessible site than would otherwise be the case. It is possible to illustrate the way in which pattern of urban land use is determined with firms for whom accessibility is critical and who are willing to pay high prices for such sites. Thus, sites next to major roads or nodal points are likely to be more accessible than sites some distance from main roads, and demand for the advantageous sites will cause values to be higher than in the surrounding area (Soot, 1974).

According to Lean and Goodall (1977), factors like accessibility and complementarity increase the usefulness of sites to potential users, thereby increasing the demand, and in economic literature emphasis is placed on the importance of demand in determining the value of developed real property and hence the value of land. Accessibility and complementarity themselves are dependent on combination of capital and land, with land being altered to increase the factors and roads and other means of transport being built and building constructed.

From the existing literature, this study focuses on debates over the use of IWT in Nigeria. Several factors and indications ranging from government irresponsibility to lack of interest among the passengers, insecurity of the waterways arguments will be examined in greater details in the full report.

Location Theory

Inland waterway location problem opens up fresh ground as they have many differentials from expressway service areas, ports and logistics centers. The earliest facility location problem dates back to1909 when the German scholar Weber studied how to minimize the sum of the distances of the customers from the warehouse (Peng, Lu & Zhu, 2011). Weber, 1909 cited in Fan, Chen & Lu, (2014) opined that location problem has been introduced into a wider field. However, the methodologies applied are almost confined to operations research and quantitative studies. The uncertainty of the input parameters including the transport time, the demand, the spatial distribution of demand and construction cost began to be reflected in study since1980s (Fan, Chen & Lu, 2014). Later, methodologies on random location problem and competitive location problem attained a further development while application of early static deterministic models on location problem become outdated. Facility location theory achieves a wide application in manufacturing, transport and logistics.

Having considered inland waterways theories, this study was anchored on three major theories: accessibility, complementary and location theories. Accessibility theory focuses majorly on how inland waterways are integrated and interconnected for ease alternative transport system in Lagos State. This simply means that movement of goods and people with existing transport network; and given transport system, movement will be concentrated along particular lines so differentiating between sites in terms of accessibility advantages.
Complementary theory is to add value more or serves as alternative theory to road and other transport systems in Lagos State.

Although Location problem has been a popular in operations research, inland waterway area location problem has not been properly investigated and merit further research. This study tends to inculcate the location theory to accessibility of inland waterways in Lagos State, Nigeria.

These theories form the foundation of hypotheses of this study. Hypothesis 1 of this study was based on the accessibility and complimentary theory. The two theories help to foster relationship between inland waterways and business activities. The first hypothesis is:

\[ H_0 : \text{Inland waterways transportation system does not have significant effect in the promotion of business activities in Lagos State.} \]

The location theory is the foundation of the second hypothesis. The theory focuses on integrating inland waterways across Lagos State.

\[ H_0 : \text{Integration of inland waterways transportation system does not have significant effect on traffic congestion reduction in Lagos State.} \]

**Research Method**

Survey research design was adopted in this study. The survey research design was employed in order to infer information about the characteristics of the population of interest and a representative sample of the population. The population of this study covers both operators of ferry in Lagos State and their customers. These operators make use of jetties in Lagos. These jetties are Marina jetty, Apapa jetty, Maroko jetty, Majidun jetty and Metro jetty all in different parts of Lagos. The purposive sampling was used to compliment the simple random sampling technique. This allows the researcher to select respondents that possess requisite informative to answer the research questions. Purposive sampling technique was used to administer the questionnaire to the respondents. The major operators of ferry in Lagos State included in the sample are:

1. Metroferry Marine Services Ltd
2. Sea Coach Ferry Services Limited
3. Texas Connection Ferry Services
4. Lagos State Ferry Services Corporation
5. Tarzan Marine Enterprises
6. Citylink Marine

**Test of Hypotheses**

**Hypothesis one**

\[ H_0 : \text{Inland waterways transportation system does not have significant effect in the promotion of business activities in Lagos State.} \]

**Results And Discussion**

**Model Summary**

<table>
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<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
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<td>.804</td>
<td>.803</td>
<td>.31793</td>
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a. Predictors: (Constant), Inland waterways transportation system

**Coefficients**

<table>
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<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
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<th>Sig.</th>
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</thead>
<tbody>
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<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
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<td>(Constant)</td>
<td>.649</td>
<td>.104</td>
<td>6.257</td>
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<td></td>
<td>Inland waterways transportation system</td>
<td>.883</td>
<td>.026</td>
<td>.897</td>
</tr>
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</table>

a. Dependent Variable: Business activities
The coefficient of determination $R^2 = 0.897$ (which is a good fit) explains that the variability observed in business activities in Lagos State accounted for by inland waterways transportation system. The result implies that 89.7% of the variation in business activities in Lagos State is contributed by inland waterways transportation system.

The simple regression model is given as: $Y = a_1 + \beta_1 X_1$

Business Activities $= 0.649 + 0.883$ Inland waterways transportation system

The model implies that a unit change in inland waterways transportation system of the Lagos State will increase business activities by 0.883 units. Hence, inland waterways transportation system has effect on business activities in Lagos State, Nigeria.

**Hypothesis two**

$H_0$: Integration of inland waterways transportation system does not have significant effect on traffic congestion reduction in Lagos State.

**Model Summary**

<table>
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<tr>
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<th>Std. Error of the Estimate</th>
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a. Predictors: (Constant), Inland waterways integration

**Coefficients**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
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<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
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<td>1</td>
<td>(Constant)</td>
<td>.773</td>
<td>.123</td>
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<tr>
<td></td>
<td>Inland waterways integration</td>
<td>.859</td>
<td>.031</td>
<td>.855</td>
</tr>
</tbody>
</table>

a. Dependent Variable: reduction of traffic congestion

The coefficient of determination $R^2 = 0.855$ (which is a good fit) explains that the variability observed in reduction of traffic congestion in Lagos State accounted for by Integration of inland waterways transportation system. The result implies that 85.5% of the variation in reduction of traffic congestion is contributed by Integration of inland waterways transportation system.

The simple regression model is given as: $Y = a_2 + \beta_2 X_2$

Reduction in traffic Congestion $= 0.773 + 0.859$ Integration of inland waterways transportation system. The model implies that a unit change in Integration of inland waterways transportation system will reduce traffic congestion in Lagos State by 0.859 units. Hence, Integration of inland waterways transportation system reduces traffic congestion in Lagos State, Nigeria.

**Conclusion**

This study has investigated inland waterways transportation system in Lagos State, Nigeria. Also, the study was built on the theories of accessibility and location. Survey research study was employed in this study. The work has also evaluated travel times and travel carrying capacity on the road and water transportation system and developed a water routes network (WRN) for the proposed ferry services in Lagos metropolis. In light of the pressing need to move people and goods with the least possible energy expenditure, this study revealed that inland waterways transportation system serves as alternative transportation system to ease traffic congestion in Lagos State, Nigeria. It also concludes that investment in the water transport system could unlock a host of energy and cost savings as well act as a sustainable solution to our infrastructural needs. Therefore, there should be more integration of inland waterways transportation system in Lagos to cut across all location where there are waterways. There should be long-term gestation investment in the sector to enhance continued business activities in Lagos State.
References


