Assessment of commuters' perception of water transportation safety and patronage in Lagos Metropolis, Nigeria

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Abstract

Water transport being among the oldest mode of transport is crucial to the development of any nation. It provides means of transportation for both rural and urban dwellers, particularly along the coastal areas and inland waterways. It is a known fact that water transportation has been neglected for a long period by both the government and the private sector, particularly in the area of safety of passengers on Lagos waters. This paper examines the perception of safety and the use of water transportation among passengers within Lagos metropolis. The jetties were purposively determined. Using a random sampling technique, a structured questionnaire focusing on socio-economic characteristics of passengers, use of water transport, reasons for the use of water transport, perception on safety and frequency of water transportation usage were administered to 1050 passengers across the selected four jetties (Liverpool, Falomo, Bayeku, and Ijegun Egba) within the metropolis with a response rate of 86.3%. The step-wise multiple regression results show that passengers' perception of poor safety of water transportation predicted a significant 78.1% of reluctance to travel by water within Lagos metropolis ($F = 27990.685$, $p<0.05$). This study, therefore, recommends that the state government should provide adequate safety measures that could repose confidence in passengers in order to increase patronage of water transportation. This singular act could help to reduce the incessant traffic congestions on Lagos roads.

Keywords: water transportation, perception, passenger safety, jetties, Lagos metropolitan waters

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Introduction

The development of transportation and improvements in the various modes have impacted not only economic and socio-cultural activities, but also played a major role in spatial organization, spatial ordering and spatial process. Inland Waterways Transport (IWT) is the movement of people and goods along waterways (Felinda, 2006; Obeta, 2014). Inland waterway transportation plays an essential role in the socio-economic development of any nation. Inland waterways in Lagos metropolis comprise navigable rivers, coastal creeks, canals and lagoons (Aderemo and Mogaji, 2010). Statistics from the National Inland Waterways Authority (NIWA) show that 22 out of 36 states in Nigeria use water as a means of transportation (Azenda, 2014). This shows that water transportation has come to occupy a strategic place in the economy of the nation, especially with the intricacies of road transportation.

However, water transport is still a distant second to road transport, with an average share of about 1.6 per cent of Nigeria's gross domestic product (NBS, 2014). This is largely due to the low investment in water transportation infrastructure and lack of proper policy to regulate the mode. Water transportation in Lagos has suffered severe infrastructural and human capacity neglect, a situation that propelled boat mishaps and increased fatality rate on Lagos waters (LBS, 2017). Lagos State Waterways Authority (LASWA), the agency saddled with the responsibility of managing the water ways, has been under-funded and mismanaged (LBS, 2017). There is no regular monitoring of water ways, use of obsolete equipment and staff are not equipped with the requisite skills to man the facilities (Adeniyi, 2017). As a result of the inefficiency in management and personnel, the water is no longer safe for the movement of people and goods; many people have lost their lives and goods to boat mishaps in recent times (Tally et. al., 2001). The dangerous nature of water transportation in Lagos also included the ignorance of boat riders

and passengers on safety measures, which has proven to be worse. For example, boat riders rely on their over-rated knowledge of the water ways to convey passengers and goods to different destinations without adequate training and certification in safety measures and navigational techniques. Also, the boat riders do not always follow the required maximum loading capacity of their boats and they usually overload their boats with goods and passengers, a situation that compounds incidents of boat mishap (Tosin, 2014).

Water safety refers to the state of being certain that adverse effects will not be caused by some agent under defined conditions. Many passengers are of the view that government is not taking safety issues seriously. Some passengers who ply the Lagos waterways have accused the state government of lacking necessary safety measures needed to save lives while on water (Adeniyi, 2017). Overloading of boats, jetties, canoes or ferries was recognized as a major problem in Lagos waterways (Tosin, 2014). The passengers on the other hand are not aware of the safety measures or fail to heed safety measure and mostly prefer not to use live jackets during journeys.

Although inland waterways provide the fastest means of transport, which is devoid of traffic congestion, within Lagos metropolis, its usage within the metropolis is still very low compared to road transport (LBS, 2017). Several other studies (Tally et al.; Anderson and Tally, 1995; Ogwude, 1993; Nze, 2013; Nowakowski, 2015) have been carried out on water transportation. Nze, (2013) quantified the boat and ferry accident fatality rates on Inland waterways in Nigeria, with a special focus on the waterways of Port Harcourt. Other studies have investigated the determinants of the vessel accident oil spillage of oil-cargo vessel (Tally et al, 2001; Anderson and Tally, 1995). According to Ogwude (1993), the advent of mechanized transport has both increased our mobility and enriched our lives by widening our experience; but it has also increased the price of transport usage in terms of human lives and sufferings due to accidents.

Safety is considered as the most important ingredient of any mode of transportation, water transport inclusive. Although overall safety knowledge can be considered good, some differences still exist between groups of passengers. However, several studies have shown that safety is considered to be most important to transport users and managers. There have been diverse interests in the study of safety in water transport. Some studies have focused on the operational characteristics. Others focused on accidents, safety of the water bodies, and low investment in water transportation by the respective authorities. However, there still exists a paucity of information on the perception of passengers on safety as a factor responsible for low patronage of water transportation. The work of Bayode and Ipingbemi, (2016) found that safety of water transport has been compromised due to operators' misbehaviors and government inattention. Similarly, Sigurd et al., (2016) opined that younger passengers and passengers on shorter trips generally have less safety knowledge than older passengers and passengers on longer trips. Also, Nze (2013) analyzed the fatality rates of boat and ferry accidents on inland waterways in Nigeria and found that more fatal accidents occurred with the use of boats than ferries on the waterways. However, this study did not provide information on the perception of people on the high rate of boat accidents on the waterways.

In contrast, other studies (Anyam, 2003; Ojile, 2006; Sulaiman et al., 2011) observed that inland waterway transport was the most efficient, cost-effective and safest mode of transport compared to other modes. Similarly, Obeta (2014) noted that inland waterway transport was more developed in the deltaic areas of southern Nigeria compared to the hinterland areas. This may be due to the fact that water transport remains the main mode of transportation in that region. However, because of the existence of other modes (road, air and rail) in the hinterland areas, the water transport is neglected thereby leading to serious safety issue. In the work of Ezenwaji

(2010), he identified four groups of constraints to effective water transportation in some riverine communities in old Anambra local government area of Nigeria. These constraints, according to him, are environmental, economic, boat and rural market. In terms of accidents on the waterways, Lawal (2012) identified dilapidated jetties, ill-equipped marine police, nonfunctional vessels and wrecks as the main factors responsible for marine accidents in Nigeria.

On perception of water transport safety and accidents, studies suggested that safety knowledge differs among groups of passengers. Imran, Newaz & Shahrior, (2017) identified different causes of waterways transportation accident, which include collision, storm, overloading, stability failure, excessive current, bottom damage, structural failure, pirate, and passenger assault of the captain.

Various studies (Adetola, 1971; Ogwude, 1993; Badejo, 1995; Abams, 1998, 1999, 2004; Anyam, 2003; Ojile, 2006; Ezenwaji, 2010; Sulaiman et. al., 2011; Lawal, 2012; Obeta, 2014; Bello, 2018) were carried out on the potential and problems of water-based transport as well as its origin and management of water. In addition, Ademiluyi, Afolabi & Fashola (2016) in their study "Analysis of intra-city water transportation in Lagos State" found that the state of water transportation system in Lagos was very bad. The study identified the following problems as responsible for the poor state of the sector: poor jetty and ferries construction, poor safety and security management, exorbitant transport fares. Just as Aderemo & Mogaji, (2010); Ezenwaji, (2010); and Obed, 2013 found in their various studies that most jetties in Nigeria and indeed Africa are poorly built. Tzannatos (2010) had a different view as he stated in his study that building well-constructed jetties are the first necessary work to do before establishing the maritime industry. Toffoli, Lefevre, Bitner-Gregersen and Monbaliu, (2005) indicated that poor lighting systems can lead to severe risks, especially during bad weather, early evenings or

rainfall. This leads to accidents, especially when compounded by inadequate signs along major navigational routes. In Oyadongha, (2014); Iheamnachor, (2014) and Akogun, (2014), they asserted that poor safety practices are perceived to be responsible for the high accident rate in water transport.

Furthermore, studies by Adejare et al., (2017); Ogunbajo et al., (2017) and Ademiluyi et al., (2016) dwelled on the existing water transport facilities in terms of size and access to commuters in Lagos State. Also, Chukwuma (2014); Bassey & Nsa (2018) noted that inadequate water transport facilities was a major factor impeding the development of inland water transport in Nigeria. In another vein, Ndikom, (2013) and Adejare et. al., (2017) focused on the neglect and undervalue of water transport in Lagos State, while the work of Edelman, (2015) concluded that the plan to integrate the Bus Rapid Transit (BRT) with light rail schemes may not solve the congestion problem in Lagos metropolis, except it also incorporates the water transport mode. Some other scholars (Bayode & Ipingbemi, 2016; Tobias *et al*., 2019; Tannum & Ulvensøen, 2019; Iamtrakul & Wongbumru, 2019; Łapko & Panasiuk, 2019; Iamtrakul, 2018) worked on the potential of water transport to help address the serious road congestion and its associated problems such as extended travel time, loss of man hour, and negative effects on the environment and human health. Although some other studies (Adejare *et al*., 2017; Ademiluyi *et al*., 2016; Ogunbajo *et al*., 2017) have been carried out on inland water transport in Lagos State, this study is different from the previous ones because it is specifically on the operation of inland water transport along the Ikorodu-Ebute Ero route in Lagos city, with a view to recommend strategies for raising its capability as a mode of transportation in the area.

Despite the numerous attempts in the literature to put water transportation in proper perspective, there is still paucity of information pertaining to the reluctance in the use of water transportation

in Lagos metropolis. However, this study attempts to put in perspective the perception of passengers on water transportation in Lagos metropolis. The specific objective is to examine the safety of passengers and boat operators by profiling the safety nature of water transport in Lagos waterways. The study further hypothesized that passengers' perception of safety significantly predicted the low patronage of water transport in Lagos waterways. This paper is organized as follows: The introduction and background to the study is presented in Section 1. Section 2 describes the materials and research methods utilized in this study. Section 3 presents the research results and findings, while Section 4 concludes.

Study Area and Research Methods

This section is divided into four sub-sections, namely: the study area, research methods, target population, sampling technique and sample size

Study Area

This study was carried out in some selected jetties within the Lagos metropolis in Nigeria. The choice of Lagos was informed by the availability of water transportation. Also, the complex nature of commuting within the metropolis, characterized by heavy traffic congestion resulting in long travel-time, was another factor considered for its choice. Lagos is located on longitudes 3° 5′E and 3° 30′E, and latitudes 6° 25′N and 6° 40′N. It is one of the 36 states in Nigeria (see Figure 1).

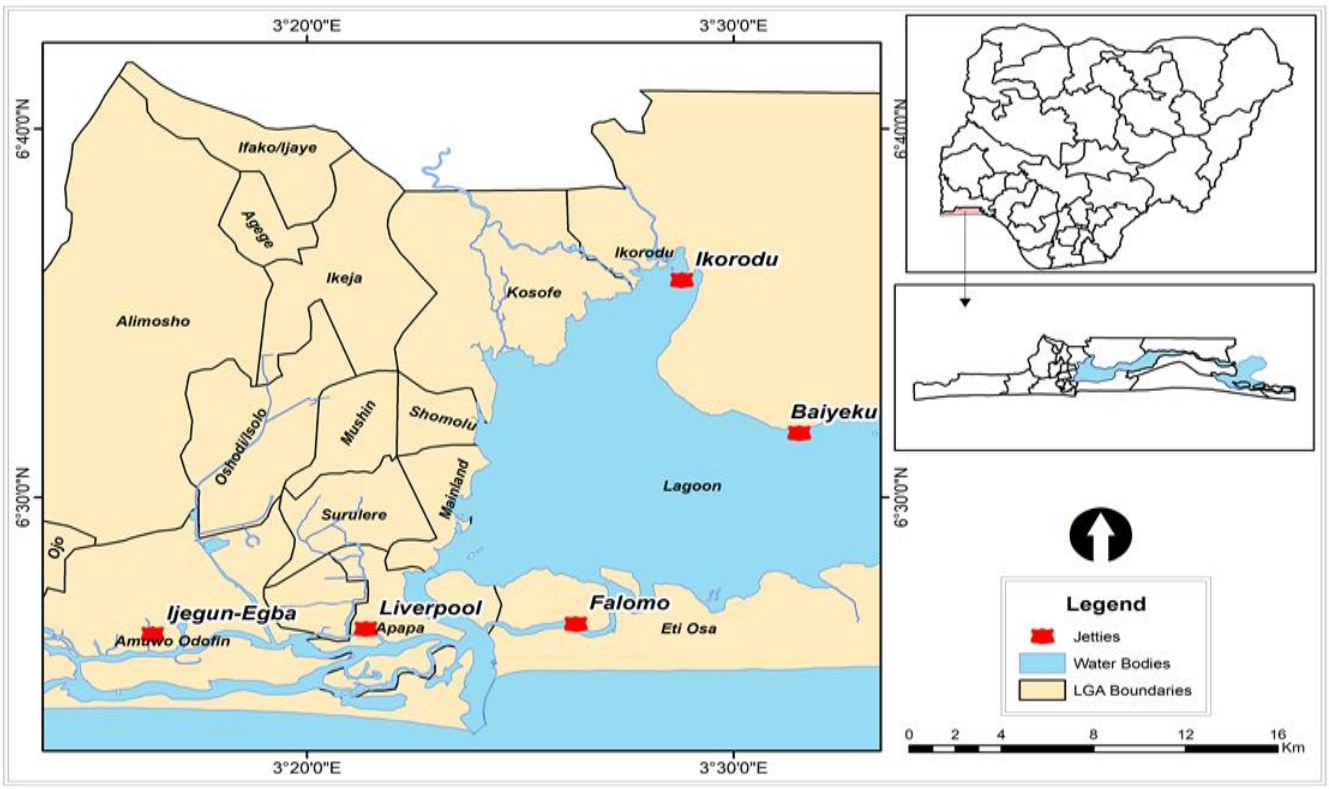

Fig. 1: Map of Lagos State showing selected jetties
Source: Author's Analysis, 2021

Research Methods

A cross-sectional survey was adopted for this study. Primary data and secondary data sources were utilized. The collection of data from the primary source was done through the administration of structured questionnaire to the passengers using a random sampling technique. The structured questionnaire focused on socio-economic characteristics (gender, age, occupation type, educational status, and income) travel by water transport, safety on waterways, reasons for using water transport, problems associated with water transportation. Secondary data included information on the average number of passengers that commutes monthly or yearly on Lagos waterways. Descriptive statistics (frequency tables and charts) and inferential statistics (stepwise multiple regression analysis) was employed to analyze the data set. The hypothesis that

passengers' perception of safety significantly predicted the level of water transport patronage in Lagos waterways was tested using the stepwise multiple regression analysis. The dependent variable (y) is the level of water transport patronage, while the independent variable (x) is the passengers' perception of water transport safety.

Target Population

The target population for this study is the operators and commuters of inland water transportation in the study area. The justification for the researcher targeting this population is that the operators and commuters are those who frequently use the inland water ways (Celik & Cebi, 2009; Tzannatos, 2010; Progoulaki & Roe, 2011).

Sampling Technique and Sample Size

The choice of jetties was purposively determined. The sampled population comprised operators and passengers across the four selected jetties (Liverpool, Falomo, Bayeku, and Ijegun Egba) within the metropolis of Lagos. According to the Lagos Bureau of Statistics (2017), an average of 18,851,837 passengers travels on Lagos waterways in 2016. The average number of passengers that uses the selected jetties in year 2016 are: Liverpool jetty (2,272,921), Falomo jetty (272,847), Bayeku jetty (1,640,588) and Ijegun Egba jetty (2,177,664) (Lagos State Waterways Authority, 2017). Based on the available information on average number of passengers, the sample size for the survey was determined using Taro Yamane's sampling technique. A structured questionnaire was randomly administered to the sampled 1,050 respondents across the selected jetties. A total of 906 questionnaire copies were retrieved from the respondents across the four selected jetties within the Lagos metropolis: Liverpool jetty 356 (39.2%), Falomo 272 (30.0%), Bayeku 140 (15.4%), and Ijegun Egba 138 (15.2%), with a

response rate of 86.3%. The Taro Yamane statistical technique was used to determine the sample size for this study using the formula below.

$$n = \frac{N}{1 + N(e^2)} \qquad (1)$$

Where:

n = the sample size
N = population size
e = allowable error (0.05)
1 = constant

Discussion of Results and Findings

In this section, a discussion of the demographic profile of the respondents, perception of passenger on safety of Lagos waterways, choice of water transportation, passenger safety and use of water transport in Lagos metropolis is undertaken in different sub-sections.

Demographic profile

Table 1 indicates that 617(68.1%) of passengers are males, 289 (31.8%) are females. Majority of the passengers (96.3%) are within the working age (20 – 55 years). A total of 711 (78.5%) respondents indicated frequent use of water transportation to shuttle between their workplace and home, 23 (2.5%) for leisure and 172 (19.0%) for other purposes.

Table 1: Demographic profile of passengers

Variable	Item	Response	Percentage
Gender	Male	792	68.1
	Female	289	31.9
	Total	906	100
Age	18-27	94	10.4
	28-37	285	31.5
	38-47	327	36.1
	48-57	162	17.8
	Above 57	38	4.2
	Total	906	100%
Purpose of travel	Work	711	78.5
	Leisure	23	2.5
	Other purpose	172	19.0
	Total	906	100%

Source*:* Author's Analysis, 2021.

Perception of passenger on safety of Lagos waterways

The perception of passengers on safety of Lagos waterways in order to understand passengers' willingness to use waterways for travels is explained in this section. Majority of the passengers, 840 (92.7%), acknowledged the lack of effective safety measures in the Lagos water transportation system. As shown in Figure 2, a total of 813 (96.7%) identified the availability of substandard life jackets as one of the poor safety measures in the Lagos water transportation system. Also, about 788 (93.8%) revealed that some of personnel, particularly the sailors, are untrained. 710 (84.5%) agreed that Lagos water paths are poorly monitored and not well defined. Regarding the condition of the ferries/boats, 750 (89.3%) opined that the ferries and boats are in bad shape.

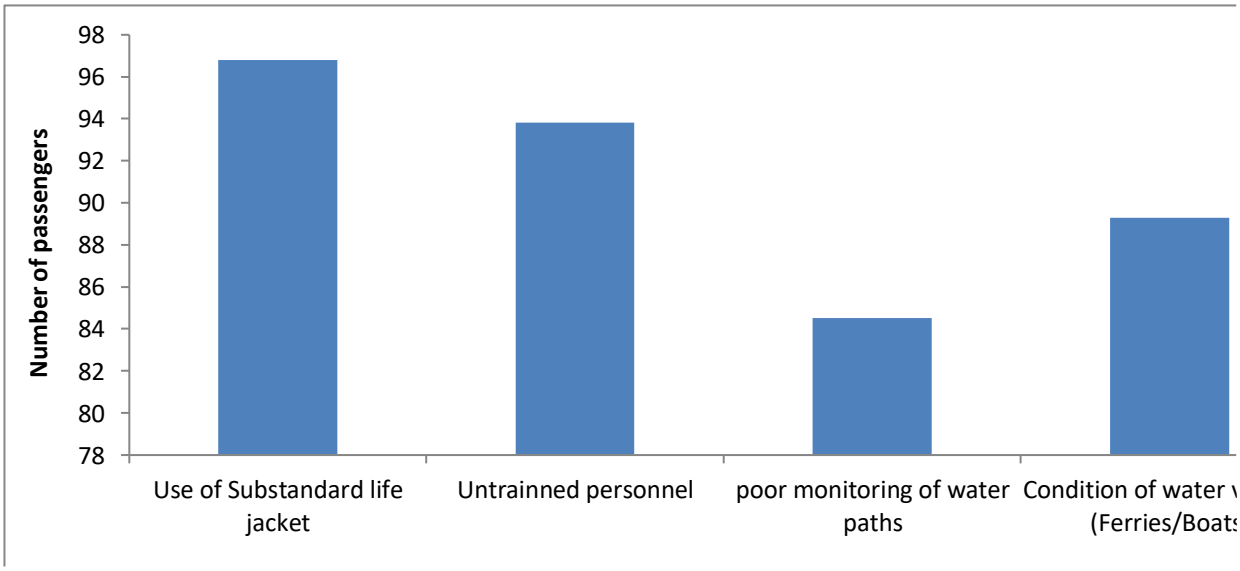

Fig. 2: Perception of passenger on safety of Lagos waterways

Source: Author's Analysis, 2021.

Water transportation patronage

This section discusses the reasons for the choice of water transportation. Figure 3 revealed that 891 (98.3%) of the passengers opted for water transportation to avoid traffic congestion on the roads but at the same time acknowledged that it is not as safe as road transport. The views of the passengers were sought to ascertain the relationships between their perception on water safety and the willingness to always use water transport as a means of commuting within Lagos metropolis. A total of 770 (85%) of the passengers agreed that water transport is fast and saves time in moving around the metropolis. About 701 (77.3%) of the passengers also agreed to the convenience compared to bus mass transit. This they attributed to the fact that the hustling and bustling at the bus-stops is non-existent at the jetties. In terms of cost, 788 (87%) opined that it is more expensive than road transport and 824 (91%) held that it is not as flexible and accessible as road transport.

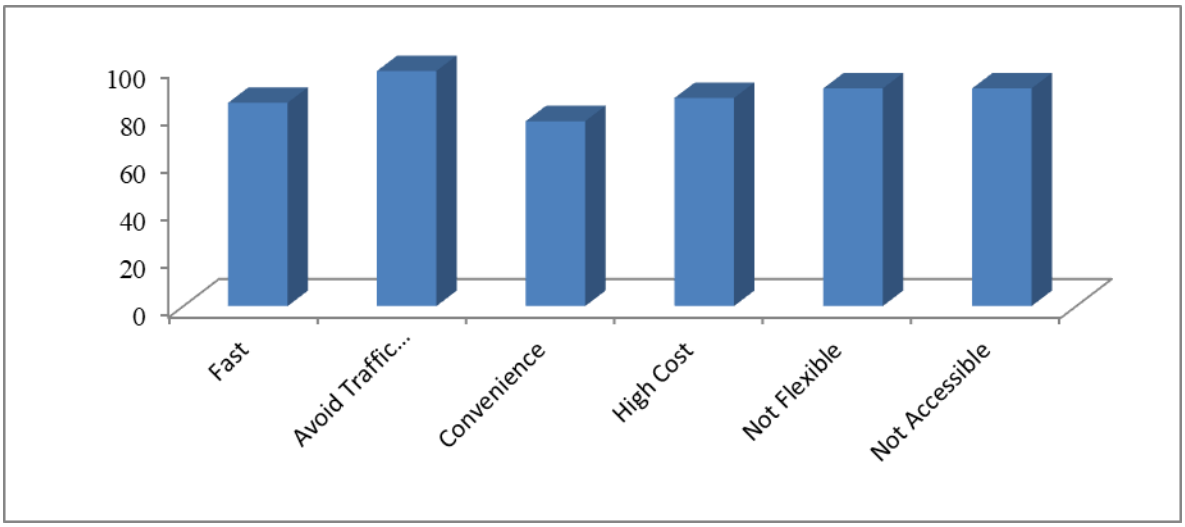

Fig. 3: Choice of water transportation

Source: Author's Analysis, 2021

3.4 Passenger safety and use of water transport in Lagos metropolis

The test results from a step-wise multiple regression (see Table 2) indicated that safety of passengers and cost predicted the low level of interest shown to water transportation in Lagos metropolis. The results revealed that safety was identified as the principal predictor variable that best explained the passenger's reluctance to use water transport indicated in Table 3. Thus, safety was responsible for 78.1% of reluctance to travel by water within Lagos metropolis. The result further revealed that cost of water transport within Lagos also have significant influence on passenger's reluctance ($F = 27990.685$, $p<0.05$). The signs of the regression coefficients indicated that safety and cost of water transport positively explain the passenger's reluctance to the use of water transport service by Lagos residents. There was however no significant difference among respondents in how traffic congestion, time, distance and accessibility predicted water transport usage.

However, considering the standardized regression coefficients of the predictors, safety received the strongest weight in the model followed by cost. The t-value results indicated that among the

six set of predictor variables, safety of water transport exerted significant effect on the reluctance in the use of water transport. From the analysis, it could be adjudged that safety is the foremost considered factor that discourages the residents from using water transport mode for intra-city travels. This is apparent as this factor has strong weights in the model because safety is very important to most commuters. This is because commuters who patronize water transport still doubt the effectiveness of the safety measures put in place (Bayode and Ipingbemi, 2016). The equation for estimating perception of water transportation safety is of the form:

$$Y = 0.019 + 0.983SWT + 0.089CWT \ldots\ldots (2)$$

Where:

Y = the level of water transport patronage,

SWT = Safety of Water Transport

CWT = Cost of Water Transport

Table 2: Stepwise multiple regression results of passenger safety and use of water transport

Predictor variables	b coef.	Std. Error of b	Multiple R	Level of explanation	level of explanation	t-value for variables
Safety of Water Transport	0.983	0.017	0.881	78.1	78.1	45.954*
Cost of Water Transport	0.089	0.023	0.128	2.4	74.6	3.634*
Intercept: 0.019; F = 27990.685*						

Source: Author's Analysis, 2021

Moreover, this study hypothesized that passengers' perception of safety significantly predicted the low patronage of water transport in Lagos waterways. By this, the study sought to answer a main research question of how commuters' perception/observation/experience predicted the use of water transport. Specifically, the study sought to answer questions on water travel characteristics of Lagos residents and their perception of water transport. Most importantly, the study sought explanation on water transport patronage in order to make recommendations for service improvement in water transportation in Lagos and Nigeria in general.

Results of this study revealed that safety in water transportation had the highest influence on the use of water transportation (78.1%). This is despite other advantages such as short travel time of the mode because of traffic congestion, which is very critical giving the Lagos mobility challenges. These findings agreed with (Bayode and Ipingbemi, 2016) that safety is a key quality attribute of any transportation mode. Furthermore, it also confirms that lack of safety of a mode of transport will make people shift to other modes.

Conclusion

Despite the important advantages of water transportation, its choice as a mode of commuting within the metropolis has not been well appreciated. This was significantly linked to the poor perception of safety by the passengers. It is therefore necessary now, more than ever, for the government and water transport operators to improve on its services, particularly in the area of safety, by making sure that proper safety measures are adequately adhered to. Part of these measures may include one, not allowing boats to exceed its carrying capacity, constant maintenance and servicing of boats. Subsequently, quality of service should be improved to make the water transportation more attractive to commuters. Furthermore, water transport operators must make their services safer by providing adequate and efficient safety measures in their various boats/ferries and jetties. This study suggests that the Lagos State government should make efforts to put in place adequate and efficient safety measures and other necessary actions to revive the water transportation in Lagos in order to reduce pressure on road transport and help to reduce the incessant traffic congestion on Lagos roads.

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Declaration of interest

The author declared that there is no conflict of interest and the manuscript has not been simultaneously submitted elsewhere for publication.

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