Exploration of the Factors Militating Against the Massive Adoption of the Inland Water Transport Mode in Niger Delta, Nigeria.

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ABSTRACT

This study investigated the reason why road transport mode is preferred over the inland water mode in the Niger Delta region. The study was delimited to only few selected coastal capital cities in the Niger Delta. The research method adopted in the study was a survey. Simple severity index was also used to ascertain the safety level of both ferries and automobiles which could influence commuters' mode choice behaviours. The data required for this study were obtained from both primary (obtained through the administration of questionnaire to household heads) and secondary data extracted from FRSC, records. Four states in the Niger Delta (Akwa-Ibom, Bayelsa, Delta and Rivers) with very similar transportation system were selected for the survey. A total number of 5,000 pieces of questionnaire were distributed proportionately. Households were randomly selected from streets and offices in the urban centers and the jetties\ water fronts (Khaima, Odi, Nembe, Marine Base Abonima wharf) to capture ferry users. From the results, it was gathered that the accident level in both water and road are similar. The introduction of free bus system affects users' choice of transport mode, hence militating against the adoption of inland water transport mode in the region. The introduction of Rapid Mass Transit affects users' choice of transport mode, thereby militating against the adoption of inland water transport mode in the region. The introduction of Monorail System affects users' choice of transport mode, thus, negatively impacting the adoption of inland water transport mode in the Niger Delta region. To make the inland water borne transport mode attractive to the people of Niger Delta region, there should be a government intervention in the introduction Luxurious Water Taxi, which the study respondents agreed to that it will positively affects their choice of this transport mode.

Keywords: Inland water mode, Niger Delta, Transport mode choice.

INTRODUCTION

The externalities of transport are more severe if every individual prefers taking one mode of transport, because the cause of transportation problem will increase. The need to change individual choices from one mode to other types is urgently needed, particularly in Nigeria. One of the efforts to support the change is by improving the public transport quality, and to help improve this effort the factors affecting individual to choose mode of transport should be identified. Understanding mode choice is important since it affects how efficiently we can travel; how much urban space is devoted to transportation functions as well as the range of alternatives available to the traveler (de Dios Ortúzar & Willumsen, 2024). Furthermore, this factor is the basic knowledge which helps determine any effort to change travel behavior for people.

A critical look at the transport system of any nation reveals the level of development (industrialized, developed, or underdeveloped) of the nation. Hence, Oni and Okalawon (2006) concludes that transportation is the corner stone on which civilization is built. The choice of transport mode therefore implies that there are

alternatives to choose from (rail, road, air, inland water/sea) for passenger and freight transportation. In most states in Niger Delta road -bus and inland water- fairies\speed boats have the potentials to compete favourably, unfortunately the road transport mode is the most prominent been widely used for both passenger and freight carriage (Trivedi et al., 2021; Breuer et al., 2022). Vanderwaeden and Timmermans (2002) asserts that the need to compete for customers' loyalty and to create and manage customer relationship is core competence of any professional service company including transportation companies. One aspect of this task is to prevent passengers/customers from switching to another service provider or mode. To manage customer /passenger relation well, the reasons that lead to the failing of loyalty or even to switching behavior must be recognized (Harris et al., 2015; Fan et al., 2021).

O'Fallon, Sullivan & Harsher (2004) assert that there is an increasing interest in alleviating congestion on the road transport network to improve economic productivity, reduce pollution and to use transport network more efficiently. This could only be achieved in the Niger Delta area, if the inland water transport is encouraged and improved upon. The numerous advantages of the inland water transport should be exploited in the coastal parts of Nigeria. The inland water transport is ideal when it comes to the conveyance of large awkward abnormal or indivisible as well as dangerous cargo too large to be transport by rail or road transport modes or usually carried by special road vehicles (Xu et al., 2021).

1 horsepower can propel 4 tones on water but only one tone on rail. Furthermore, inland water transport penetrates coastal countryside (such as are found in Niger Delta) to ease the evacuation of Agricultural goods, alternates the burden of other mode, and interfaces the sea navigation at harbor (Boulange et al., 2017). It is interesting to note that the use of inland water transportation is declining in most part of the world, for instance, Maitri and Sarka (2010) explained that inland water transport in India forms a very small part of the total transport network of the country despite been energy efficient, economic, and environmentally friendly. The primary reason for low share of inland water traffic is its spatial limitation, confined to a special region and is effective only when both origin and destinations of production and consumption centres are located at the water fronts. This expressly captures the situation in the coastal parts of Nigeria. The congestion experienced in the cities and suburbs can be eased through the diversion of some traffic to the inland water transport mode.

In Nigeria there exists numerous modes as, Road (bus, taxi, private cars motorcycle, bicycle, walking) rail, Air (various Airplanes) and Water- (ferries, speed boats, barges, and ships), but the road transport is the most predominant (popular) been used extensively. 22 out the 36 states in Nigeria make use of the water as a means of transport thereby positioning it as a potential alternative to road transport in all forms of travel.

The imbalance in the modal share in the Nigerian transport system has resulted in much externality such as road traffic congestions and increasing pollution level caused by increase in private\public vehicle ownership without corresponding increase in the road capacity and other relevant information. Irrespective of these problems associated with the road transport mode, it has continued to enjoy a very high level of patronage against the inland water transport, even when the later offers a faster, cheaper, and more efficient alternative. For instance, currently it costs N500 by boat to get to Buguma via Abonema wharf and takes about 50 minutes while it cost at least N700 by bus and takes about 1hour 20mins with 3 stops by bus yet commuters prefer the road mode. This could be because of safety issues, people's attitude, lack of modern vessels, inaccessibility/ poor conditions of jetties or the development of roads and bridges. These are the questions /problems that this research is undertaking to address. The choice of a transport mode is probably one of the most important classic models in transport planning. This is because of the key role played by public transport in policy making.

The Niger Delta region of Nigeria, endowed with a vast network of rivers, creeks, and estuaries, presents a significant yet underutilized opportunity for inland water transport (IWT). Despite the potential for reducing road congestion, lowering transportation costs, and fostering economic development, the adoption of IWT in the Niger Delta remains limited. The Niger Delta's extensive waterways span approximately 3,000 kilometers, providing a natural and cost-effective transportation network. Efficient utilization of these waterways could significantly enhance the movement of goods and people, particularly in a region where road infrastructure is

often inadequate. Inland water transport is recognized for its environmental advantages, including lower greenhouse gas emissions compared to road and air transport. Promoting IWT could contribute to Nigeria's environmental sustainability goals and reduce the negative impacts of road transport, such as pollution and road accidents. Despite the evident benefits, inland water transport accounts for only a small fraction of the transportation modal share in the Niger Delta. According to the Nigerian Maritime Administration and Safety Agency (NIMASA), IWT represents less than 2% of the total transport activities in the region. This low adoption rate is concerning given the strategic importance of the Niger Delta to Nigeria's economy, particularly in the oil and gas sector. Thus, this study aims to identify and analyze the specific factors hindering the widespread adoption of inland water transport in the Niger Delta. By understanding these barriers, policymakers, stakeholders, and investors can develop targeted strategies to enhance the efficiency and safety of IWT, thereby unlocking its full potential for regional development.

Thus, the specific objectives of this study include to determine the level of safety in both ferry and bus services and determine the effect of government policy intervention on passenger choice of transport mode. And the below null hypotheses were formulated to guide the study:

i. H_{01}: Bus system of transport is not safer than ferry system.
ii. H_{02}: Government policy on transportation has no significant effect son individual's choice of travel mode.

The study will contribute to the existing works on choice of transport mode. It will bring to the fore the unending advantage of the inland water transport particularly in the Niger Delta region and hence the need to improve the mode in coastal regions all over West Africa. This study will benefit the Federal Government in terms of resources allocation and to intervene in areas where there exists inefficiency/neglect, to adjust where possible.

METHODOLOGY

The research method used in this study entailed a survey using questionnaire. Simple severity index was also used to ascertain the safety level of both ferries and automobiles which could influence commuters' mode choice behaviours. Four states in the Niger Delta (Akwa-Ibom, Bayelsa, Delta and Rivers) with very similar transportation system were selected for the survey. A total number of 5,000 copies of the questionnaire were distributed as shown in Table 1.

Table 1. Sampling scheme.

S/N	State	Population	No. of questionnaire Distributed
1	Akwa-Ibom	3,172,000	1,350
2	Bayelsa	1,900,000	800
3	Delta	3,594,000	1,500
4	Rivers	3,172,000	1,350
Total			5,000

Households were randomly selected from streets and offices in the urban centers and the jetties\ water fronts (Khaima, Odi, Nembe, Marine Base Abonima wharf) to capture ferry users. The questionnaire was structured in such a way that it consisted of the reaction of commuters to government policy intervention such as the introduction of Rapid bus transit monorail or subsidy. The data generated from the questionnaire were all represented in different kinds of charts, tables, represented in percentages and graphs using the statistical package for social science (SPSS) software.

The questionnaire required the respondents to select options as satisfied (S), very satisfied (VS) dissatisfied (DS) very dissatisfied (VDS), Agreed (A), strongly agreed (SA), disagree (D) strongly disagree (SD). In the ranking VS will be higher than S and DS more than VDS (Likert scale).

Table 2 Sample five point of Likert scale

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Code	SD	D	N	A	SA
Scale	1	2	3	4	5

Analysis of variance (ANOVA Test) was used to ascertain the effect of presumed government policy in the selection of mode of travel by respondents and test of the corresponding hypothesis.

RESULTS AND DISCUSSIONS

Age Bracket of Respondents

Table 3. Age of household Representative

Age Bracket	Frequency	Percentage
Below 21	30	0.6
21-30	2,100	42
31-40	2,075	41.5
41-50	560	11.2
51-60	120	2.4
Above 60	60	1.2
NR	55	1.1
Total	**5,000**	**100**

From Table 3 and Figure 1, over 80% of the household representatives fell between 21 and 40 years (working class) age bracket also known as productive age bracket.
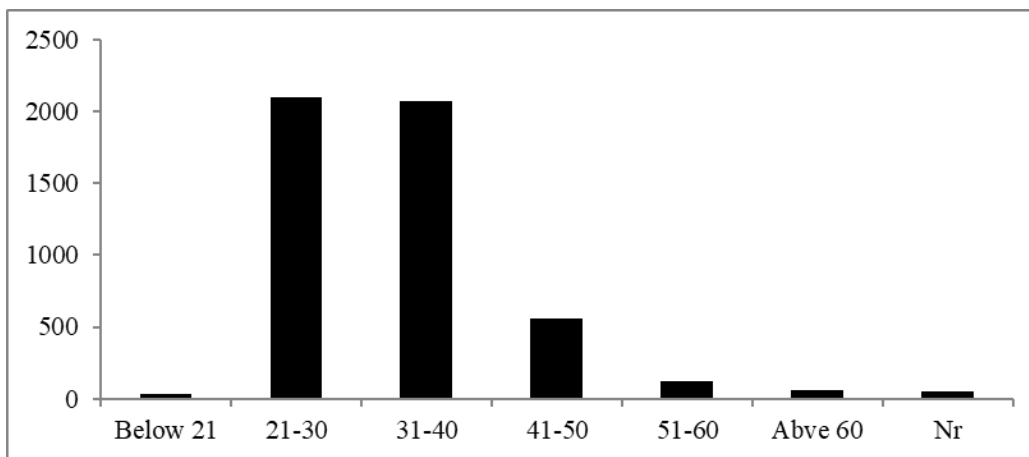

Figure 1. Graph of age Bracket of household representative.

Sex of respondents (Gender)

Table 4. Gender of Respondents

Gender	Frequency	Percentage	Degree
Male	3,975	79.5	286.2
Female	1,025	20.5	73.8
Total	5,000	100.0	360.0

Table 4 and Figure 2 reveals that 79% of respondents were male while only less than 21% were females.
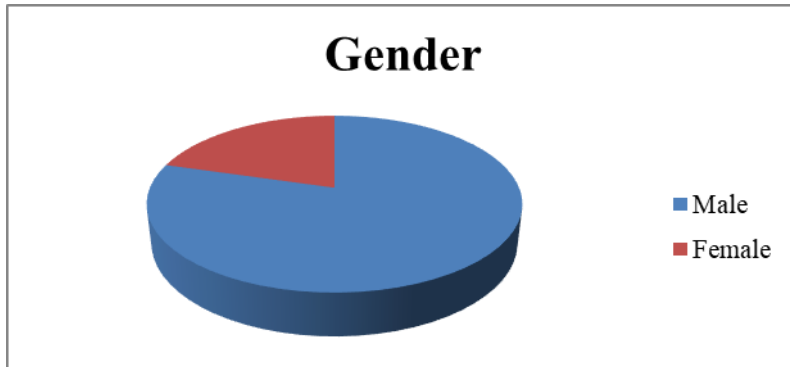

Figure 2 Gender of Respondents.

Marital status

Table 5. Marital Status of the Respondents

M.Status	Frequency	Percentage	Degree
Single	2,130	42.6	153.4
Married	2,850	57.0	205.2
Nr	20	0.4	1.4
Total	**5,000**	**100.0**	**360.0**

From Table 5 and Figure 3, 57% of the respondents were married 42.6% are single while o.4% were indifferent to the question for personal reasons.
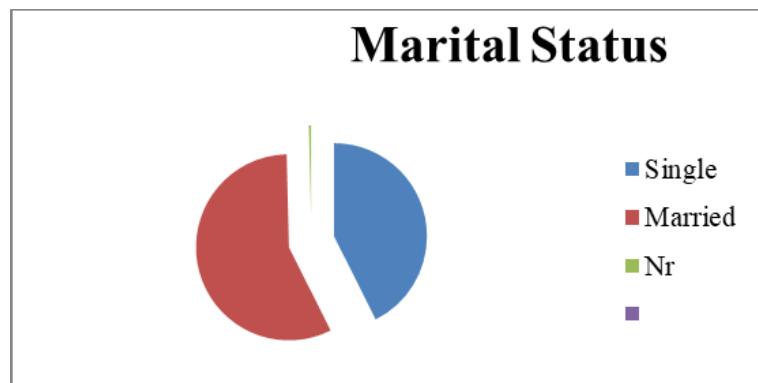

Figure 3. Marital status of Respondents

Employment Status

Table 6. Employment Status of Respondents

Status	Frequency	Percentage
Public servants	1,625	32.5
Civil Servants	1,950	38.8
Self-Employed	1,055	21.1
Unemployed	180	3.6
Retired	200	4
Total	**5,000**	**100**

From Table 6 and Figure 4, over 70% of the Respondents were employed either by the public sector (38.8%) or the private sector (32.5%), 7.6 were either retired or unemployed while 21% were self-employed.
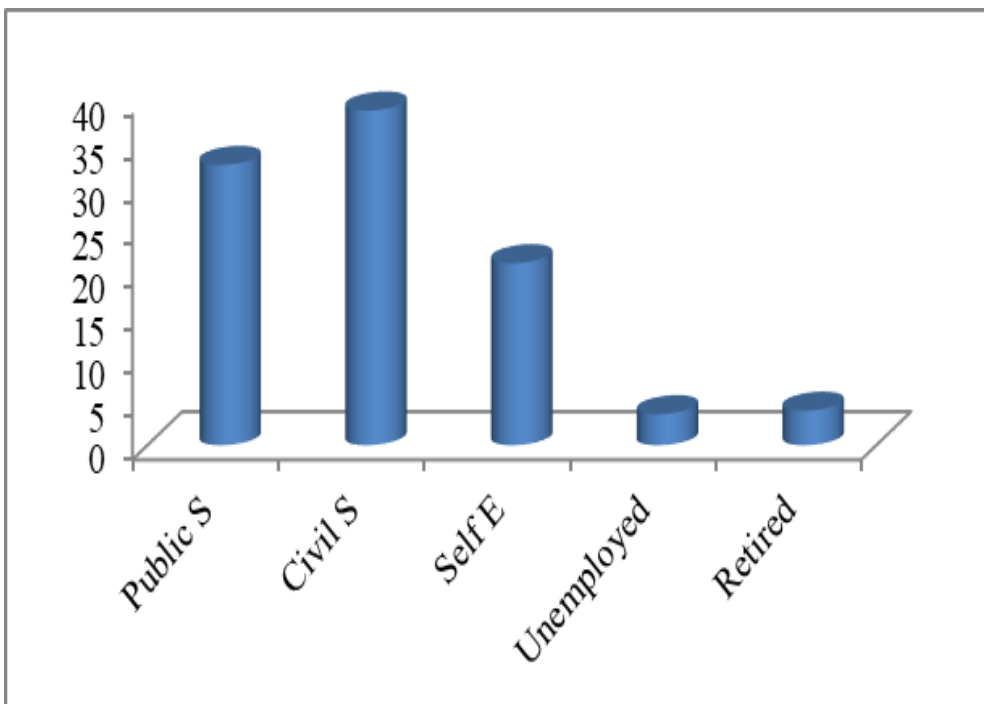

Figure 4. Employment Status of Respondents.

Number of household members

Table 7. Number of household members (family size)

Number of Persons	Frequency	Percentage
1	385	7.7
2	515	10.3
3	1,085	21.7
4	970	19.4
5	980	19.6
6	590	11.8
7	255	5.1

8	105	2.1
9	10	0.2
10 & above	25	0.5
Nr	80	1.6
Total	**5,000**	**100.0**

From Table 7 and Figure 5, over 21% of the households had 3 members and over 19% had 4 and 5 members respectively while only 7% had just one member and 0.7 had at least 9 members in their household.
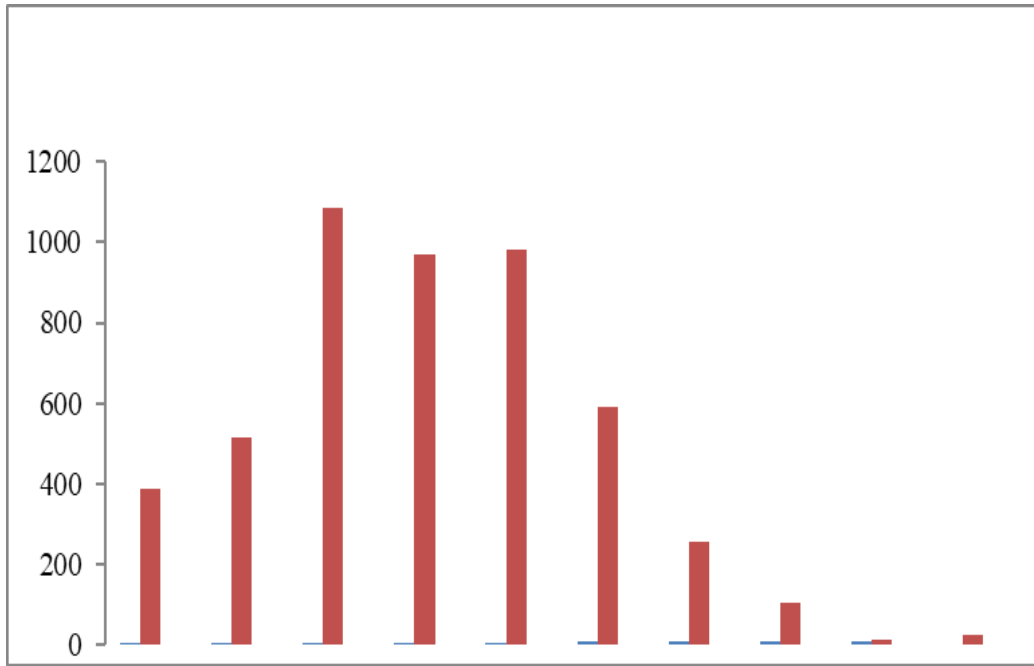

Figure 5 Family size (number of household members).

Number of children below 18 years

Table 8. Number of children below the age of 18 in households

Children	**Frequency**	**Percentage**
1	588	11.8
2	1,010	20.2
3	2,005	40
4	1,030	20.6
5	358	7.2
Nr	12	0.2
Total	**5000**	**100.0**

Table 8 and Figure 6 indicate that 40% of the sampled households had 3 children below the age of 18, over 20% had 2 and 4 children respectively, over 11% had one child while only 7.2% had 5 children less than 18 years.
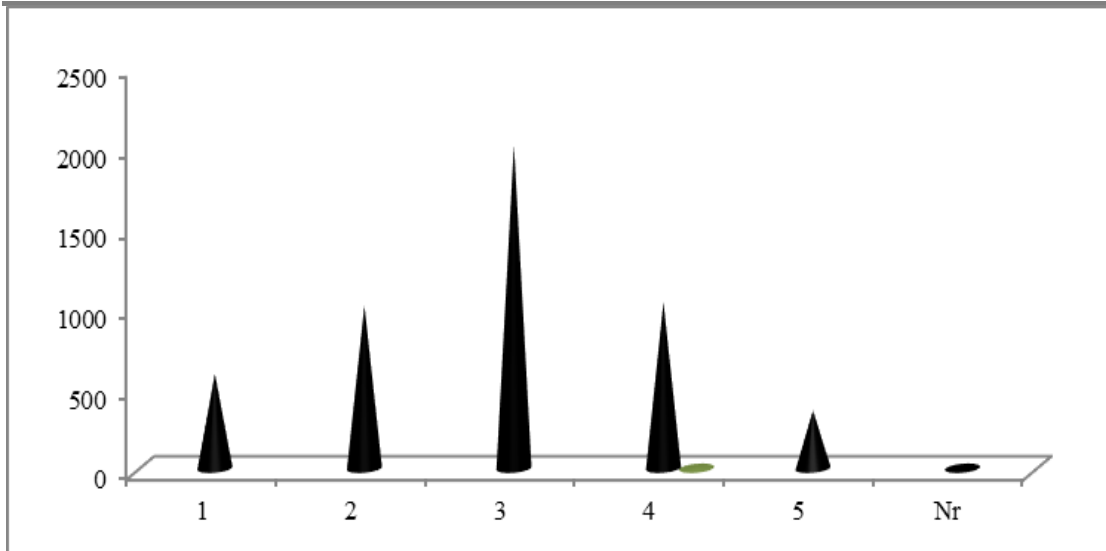
Figure 6. Number of children below the age of 18 in households

Test of Hypotheses

Examining the level of safety in Ferry and Bus services

Accident Severity Index (ASI)

The Accident Severity Index measure the seriousness of an accident. It is defined as the number of person death per 100 accidents. The table below presents Accident Severity Index for the Niger delta region from 2005-2016.

Table 9. Accident severity index ASI

Year	Number of persons death	Total number of accidents	ASI (%)
2005	4519	9062	49.87
2006	4944	9114	54.25
2007	4673	8477	55.13
2008	6661	11341	58.73
2009	5693	10854	52.45
2010	6052	11385	53.16
2011	6054	13196	45.88
2012	6092	13262	45.94
2013	6544	13583	48.18
2014	5996	10380	57.76
2015	5440	9734	55.89
2016	5053	9694	52.13

Source; Federal Road Safety Corpse Annual Reports 2012-17.

Compared to road accidents, there seems to be equivalent number of accidents for both ferry and bus. This could be militating the adoption of water borne transport in the Niger Delta region.

Evaluation of the effect of government policy intervention on transport user's choice of transport mode

The government policies included:

    i.   Introduction of Free Bus System.
    ii.   Introduction of Rapid Mass Transit.
    iii.   Introduction of Monorail system.
    iv.   Introduction of Luxurious Water Taxi.

Introduction of Free Bus System.

Table 10: ANOVA test result for introduction of free bus

FREE_BUS					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	418000.000	4	104500.000	3.335	.030
Within Groups	626694.000	20	31334.700		
Total	1044694.000	24			

Table 10 shows the ANOVA test of the hypothesis that the introduction of free bus system affects users' choice of transport mode. Since the probability value $0.03 < 0.05$(level of significance), we reject the null hypothesis that the introduction of free bus system does not affect users' choice of transport mode.

Introduction of Rapid Mass Transit.

Table 11. ANOVA test result for the introduction of monorail					
RAPID MASS TRANSIT					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	418000.000	4	104500.000	3.715	.020
Within Groups	562606.000	20	28130.300		
Total	980606.000	24			

Table 11 shows the ANOVA test of the hypothesis that the Introduction of Rapid Mass Transit effects users' choice of transport mode. Since the probability value $0.02 < 0.05$ (level of significance), we reject the null hypothesis that the introduction of Rapid Mass Transit does not affect users' choice of transport mode.

Introduction of Monorail system.

Table 12 ANOVA test Result for introduction of Monorail					
MONORIAL					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	418000.000	4	104500.000	9.809	.000

Within Groups	213060.000	20	10653.000		
Total	631060.000	24			

Table 12 shows the ANOVA test of the hypothesis that the Introduction of Monorail System effects users' choice of transport mode. Since the probability value 0.00 < 0.05(level of significance), we reject the null hypothesis that the introduction of Monorail System does not affect users' choice of transport mode.

Introduction of Luxurious Water Taxi.

Table 13. ANOVA test result for introduction of water taxi.					
Between Groups					
	Sum of Squares	Df	Mean Square	F	Sig.
	421600.000	4	105400.000	4.504	.009
Within Groups	468020.000	20	23401.000		
Total	889620.000	24			

Table 13 shows the ANOVA test of the hypothesis that the Introduction of Luxurious Water Taxi effects users' choice of transport mode. Since the probability value 0.00 < 0.05(level of significance), we reject the null hypothesis that the introduction Luxurious Water Taxi does not affect users' choice of transport mode.

CONCLUSION

Given the pressing need to diversify transportation modes and promote sustainable development in the Niger Delta, investigating the impediments to IWT adoption is both timely and crucial. This study will provide valuable insights into the challenges faced and offer actionable recommendations to foster a more robust and reliable inland water transport system in the region. The exploration of factors militating against the massive adoption of inland water transport (IWT) in the Niger Delta, Nigeria, has revealed a complex interplay of infrastructural, safety, regulatory, and socioeconomic challenges. Despite the region's extensive network of navigable waterways and the potential benefits of IWT, its adoption remains critically low.

Based on the findings, it was gathered that:

A larger proportion of the respondents disagreed that the introduction of world class monorail could induce a change in transport mode from ferry to Monorail, this largely because they have no alternatives to the ferries as a means of transport to the islands.

The introduction of free bus system affects users' choice of transport mode, hence militating against the adoption of inland water transport mode in the region.

The introduction of Rapid Mass Transit affects users' choice of transport mode, thereby militating against the adoption of inland water transport mode in the region.

The introduction of Monorail System affects users' choice of transport mode, thus, negatively impacting the adoption of inland water transport mode in the Niger Delta region.

To make the inland water borne transport mode attractive to the people of Niger Delta region, there should be a government intervention in the introduction Luxurious Water Taxi, which the study respondents agreed to that it will positively affects their choice of this transport mode. Addressing these issues requires a multifaceted approach. Investment in infrastructure is paramount to improve the navigability and safety of waterways.

Enhancing security measures and enforcing strict regulatory standards can mitigate safety concerns and build public trust.

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