

# Assessment of users and operators' challenges on inland water transport in Borgu local government area, Niger state

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## ABSTRACT

The inland water transport in Borgu local government area (BLG) plays a vital role in the movement of people and goods from one place to another. This paper, therefore, examines the users and operators challenges facing inland water transport in BLG. To do this, a questionnaire survey of inland water operators was carried out. A total of 395 questionnaires were administered in ten (10) riverine communities. The finding revealed that inland water transport is very common in BLGA. The operators of water transport are exclusively males' because 100% of the respondents were all males, similarly, the type of boat used is 100% wooden boats. It also discovered that the socio-cultural behaviour of the people negatively affects inland water transport in the selected communities as an aggregate of 66.7% of the respondents agree to that the users' challenges indicate that 54.6% of users' strongly agreed to the difficulty of boat access in the study area, 50.4% of respondents strongly agreed to poor maintenance culture. the operators identified challenges include the level of financial support which is very low, 55.0% of the operators' strongly agreed to low financial support, 50.0% of the operators strongly agreed to the high cost of maintaining boats and 50.0% of operators strongly agreed that seasonality of water level affects IWT operation in BLG area. And the implication is that it will affect the socio-economic activities of the people of Borgu local government area, and the government needs to play the stakeholder role by giving out loans to the boat operators, provision of standard boats for the easy conveyance of people and goods, regulations of the inland water transport activities and provision of safety equipment to save lives and properties of the users and operators. Doing this will enhance the socio-economic activities of the BLGA, and the government can generate more revenue from the operation.

**Keywords:** Assessment, Users, Operators, Challenges, Inland Water Transport (IWT).

## 1. INTRODUCTION

Transportation and distribution play a critical role in the successful planning and implementation of today's business and economic activities (Stephens & Idowu,

2020; Oladun & Ayantoyinbo, 2020). The effectiveness of transportation system planning and execution will not only enhance human resource productivity but will also increase the level of revenue of a nation with improved growth and development (Olisa et al., 2020). The transportation of people, goods, funds, and information act a vital function in any economy (Salvendy, 2001). This study attempts to examine challenges facing the users and operators of inland water transport in the BLG area in Niger State. Inland water transportation is one of the oldest economic and environmentally sustainable modes of transportation for passengers and cargoes. In some areas it is the only means of mobility and access to basic services, Ismaila (2008) and BLGA is one of them.

BLGA is one of twenty-five (25) LGA in Niger state, having its headquarters in New Bussa. BLGA also called Borgu Emirate and includes part of Borgu game reserve, a section of Kainji National Park and towns such as Babanna, Banisare, Malale, Lumma, Shagunu and New Bussa. The communities are of mixed or various ethnic populations such as Boko, Kambari, Busa, Hausa, Fulbe, Yoruba, Laru, Duka, Nupe, Lopa and others (Adelakun *et al.*, 2016). The community relies on natural resources and biodiversity for food, medicines, wild meat, livestock, fodder, income generation, socio-cultural values, soil and water management. To achieve easy distribution of foods and services in the community of BLGA of Niger State, Nigeria, the LGA adopts the use of inland water transport system, Adelakun (*et al.*, 2016) because of the presence of navigable Niger River which transverse the area. The inland water transportation in BLGA if adequately harnessed may contribute to the development of Nigeria transportation system.

It is noted that in recent years the IWT has been bedevilled with a mishap where record shows that mishap occurred on 28<sup>th</sup> September and 3<sup>rd</sup> October 2013 in Malale and Ulakami respectively, a total of 42 lives were lost (Niger State Emergency Management Agency, 2018). Studying the characteristics of IWT in the area will assist in proffering solutions to the cause of mishaps. Moreso, the non-consistency and lack of integration of inland water transport with different modes of transportation constitute a serious setback to the effectiveness and efficiency of the system. Thus, access to new boats and engines either fibreglass or wooden type for ease of replacement could also constitute a major challenge facing IWT in the BLG area. The present work is intended to add value to the previous work. Therefore, the need to understudy the users and operators' challenges becomes imperative.

## 2. LITERATURE REVIEW

According to Ibama *et al.*, (2015) Nigeria has the second-longest length of water in Africa; it has around 8,600 kilometres of inland water a broad coastland of around 852 kilometres. Nigeria fixates on its longest waterways, Rivers Niger and Benue, which cuts the nation over into the cardinal east, west and north segments. The two waterways run into one another at Lokoja and stream into the Atlantic Ocean. The waterfront water stretches out from the Badagry area through Warri to Calabar. Even though water transport is slow and inadmissible for quicker traveller development, productive seaside and inland water advancement can limit the strain on a nation's rail and street transport foundation (Ndikom, 2008). Ibama et al., (2015) featured that the activity of inland water transportation is extremely valuable concerning expenses of moving weighty gear, and hardware particularly where instantaneousness isn't placed into thought

This study is based on the assessment of users and operators' challenges of IWT in Borgu and this leads to measuring of performance management of the operators. This will help in tracking IWT performance against the targeted objectives and identifying strengths and opportunities for improvement. The measurement will help in determining performance management in terms of productivity, job satisfaction, turnover and quality of the service of operators in the riverine communities under study.

## 3. RESEARCH METHODOLOGY

The study used a questionnaire as the primary instrument to collect data from the 395 respondents. The questionnaire is designed by the researcher using the Likert Scale that is Strongly Agreed (5 points), Agreed (4 points), Disagree (3 points), Strongly Disagree (2 points) and Undecided (1 point). The instrument is divided into sections. A section gives information on place of work, gender, year of experience and age of respondents while B section is designed to reflect the objectives and research questions.

### 3.1. Method of Data Analysis

The data was analysed using descriptive analysis. The use of Tables, graphs and charts are employed.

## 4. DATA ANALYSIS AND DISCUSSION OF RESULTS

### 4.1. Socio-Economic characteristics of the IWT Operators' & Users

Information on the socio-economic characteristics of the IWT users and operators) was collected, analysed and presented in Table 1.

Table 1 reveals that the majority 90.05% of the respondents/passengers are male while their female's counterparts constitute about 9.95% of the sample population. The table also reveals the age structure of the sample population indicates that 63.61% of the sample populations are between ages 19- 35 which are the majority, 9.95% (1-18), 22.51% (36-50), 2.88% (51-59) and 1.05% are between ages 60 and above years respectively. Out of the 382 respondents, 19.63% are single while the majority 80.15% are married adults. Those who are divorced, widows constitute 1.57%, and 1.83% of the respondents consecutively. Information on the educational status of the population was also gathered analysed and presented also in Table 1. The table reveals that about 83.77% of the study population has no formal education. About 10.99% of the population has primary education as their qualification while 4.71% have secondary school education (O-Level). Those with tertiary education are null of the users/operators' in the BLG area due to their zero record. This implies that the literacy rate is very low in the BLG area. Data on the occupation of the respondents in the BLG area was also collected, analysed and presented in table 1, the summary of the analysis shows that about 42.41% of the respondents are farmers, 29.32 % of the respondents/users are fishermen, artisan and civil servant constitute only 0.26% each, 5.24% are domestic workers, 0% constitute employee of private workers, while trading/ business account for 13.87% of the respondents. The income of respondent are express in table 1 showing that, #1-50,000 earner constitute 63.35% of the respondents, 32.72% earns #51,000-100,000 and #101,000-150,000 constitutes 3.93% of respondents earning. Majorly, the largest percentage of earning is #1-50,000 which shows that the level of income is low and portray the intensity of poverty level in the BLG area.

**Table 1:** Socio-Economic characteristics of the users/operators' (respondents) in the study area

Variable	Number of Respondents	Percentage %
<b>Sex</b>		
Male	344	90.05
Female	38	9.95
<b>Age</b>		
1 -18	38	9.95
19-35	243	63.61
36-50	86	22.51
51-59	11	2.88
60 above	4	1.05
<b>Marital Status</b>		
Single	75	19.63
Married	306	80.15
Divorced	6	1.57
Widow/widower	7	1.83
<b>Qualification</b>		
No Formal Education	320	83.77
Primary	42	10.99
Secondary	18	4.71
Tertiary	2	0.52
<b>Occupation type</b>		
Student	9	2.36
Artisan	1	0.26
An employee of the private sector	0	0
Civil servant	1	0.26
Unemployed	24	6.28
Domestic workers	20	5.24
Traders	53	13.87
Farming	162	42.41
Fishing	112	29.32
<b>Income</b>		
1-50,000	242	63.35
51,000-100,000	125	32.72
101,000-150,000	15	3.93

Source: Field Survey, 2019

Table 2 shows cargo throughputs in the study area

Types of Goods/Cargoes	Weight (kg)/throughputs per day
Fish	450kg
Grains	750kg
Yam	350kg
Sugarcane	540kg
Firewoods	150kg
Animal	30kg
Manufactured goods	400kg

Source: Author survey 2019

Table 2 shows the cargo throughputs in the BLG area per day, 450kg of fish, 750kg of grains, 350kg of yam, 550kg of sugar cane, 150kg firewood, 30kg animals and 400kg of manufactured goods are transported daily through IWT in the area of study.

#### 4.2. Analysis of Types of watercraft and their traffic flow

The type of watercraft used for the movement of goods, people and services within Borgu local government is analysed and their traffic flow.

Table 3 show the types of watercraft in use

		Types of watercraft			
		Frequency	Per cent	Valid Percent	Cumulative Percent
<b>Valid</b>	wooden boat	120	100	100.0	100.0
	fibreglass	0	0		
<b>Total</b>		120	100.0		

Source: Author Survey 2019.

Table 3 shows the types of watercraft commonly in use in the BLG area, the information was extracted from the operational characteristics of 120 respondents in the BLG area. Table 3 shows that 100% of watercraft in use is the wooden boat and zero records for fibreglass as watercraft. The reasons for the common use of wooden boats are due to easy access to construction material and cheap cost of production and acquisition as compared to fibreglass. Also, the spare parts of the wooden boat are readily available, reliable, cheap to maintain and people are used to it.

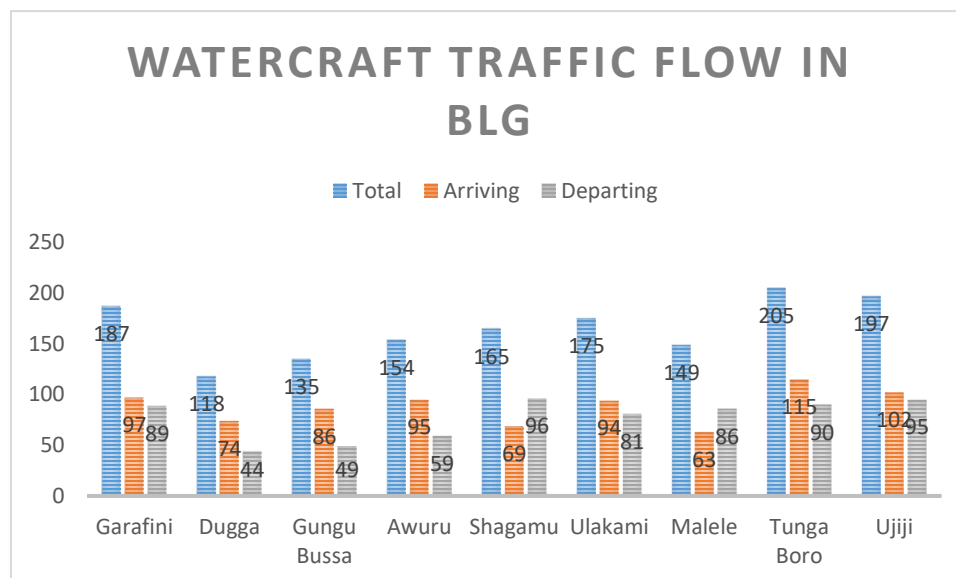
Table 4: the major route ply or waterways of operation of movement time and fare charges

Community	Routes		Time spent	Fare charges ₦
	From	To		
Malele	Malele	Garafini	30mins	500
		Shagunu	30mins above	600
		GungunBussa	30mins above	500
		T/Nailo	30mins	400
Ujiji	Ujiji	kokoli	40mins	200
		Yauri	7hrs	3000
		Shagugu	1hrs	1000

<b>Shagunu</b>	Shagunu	GungunBussa	30mins above	500 above
		Ulakami	30mins	600
<b>Dugga</b>	Dugga	Kokoli	1hr	500
<b>TungaBoro</b>	T/Boro	T/Alhasan	30mins	500
		FariDutsi	30mins above	500
		Gwajibo	30mins above	700
		T/Isah	40mins above	700
		Lolhoninoshi	21-30mins	400
		Wurma	30mins	400
		T/Audu	30min	300
		T/Nailo	45mins above	900
<b>GungunBussa</b>	GungunBussa	Tungasamiya	1hr	1000
		Yumu village	30mins above	800
		T/Hausa	20mins above	300
		Chapamini	30mins above	600
		T/babanloko	20mins above	500
		T/Giwa	30mins	600
		Unguwani	30mins	900
		Shagungun	30mins	500 above
		Malele	30mins above	600
		kokoli	40mins	300
<b>Ulakami</b>	Ulakami	okondo	30mins	300
		Papiri	1hr	500
		Yauri	7hrs	3,000
		Rofia	2hrs	600 above
		Gunfanti	40mins	500
		Musawa	30mins	500
		Tada	30mins	400
		Fakun	30mins	800
<b>Yuna</b>	Yuna	Musawa	30mins above	600
		Tungadanbaba	30mins	600
		FarinDutsi	30mins	300 above
		TungaBoro	30mins	400
<b>Awuru</b>	Awuru	Babudole	30mins above	500
		Malele	30mins	500
<b>Garafini</b>	Garafini			

Source: Author Survey 2019.

Table 4 above shows the routes ply in the operation of the water transport, the fare charges and time/duration on travel i.e travel time from their origin to the destination.



**Figure 1** shows the watercraft traffic flow in a respective community in Borgu local government.

Figure 1 above express the watercraft traffic flow in the BLG area, Garafini has a total of 187 volume of watercraft flow, Dugga has 118 watercraft traffic flow, Gungu Bussa has 135 watercraft volume, 154 is the watercraft flow in Awuru, 165 is the watercraft flow in Shagunu, Ulakami record 175 watercraft flow, Malele watercraft flow is 149, Tunga Boro recorded the highest volume of watercraft flow of 205 and Ujiji came second with 197 watercraft volume in the BLG area.

#### 4.3. User and Operators' challenges of inland water transportation in BLGA.

##### 4.3.1. Users challenges of inland water transportation in BLGA

Table 5 below presents the frequency of the difficulty to boat access in the BLG area, 54.6% of respondents strongly agreed, 27.5% agreed, 13.7% of respondents disagreed, 4.0% of respondents strongly disagreed. The study shows that there is difficulty in access to the boat in the BLG area. Passengers do cover several kilometers before access to the river bank. The larger percentage strongly agreed with the difficulty in accessing boats in the BLG area.

**Table 5** show the accessibility of boat in the BLG area

the boat is difficult to access			
		Frequency	Per cent
<b>Valid</b>	SA	143	54.6
	A	72	27.5
	DA	36	13.7
	SD	11	4.2
	Total	262	100.0

**Source:** Field survey 2019

**Table 6** shows the economic life span of the boats

the economic life span of the boat			
		Frequency	Per cent
<b>Valid</b>	SA	130	49.6
	A	91	34.7
	DA	31	11.8
	SD	8	3.1
	U	2	.8
	Total	262	100.0

**Source:** Field survey 2019

Table 6 presents the frequency of the economic life span of most boats in the BLG area, either old or outlive. 49.6% of respondents strongly agreed, 34.7% agreed that a larger number of the boats are old and have outlived their economic life span, 11.8% of respondents disagreed, 3.1% of respondents were strongly disagreed, and 0.8% of respondents remained undecided. The study revealed and agreed that the boats are old and have outlived their economic life span.

**Table 7** shows the waiting time of passengers for boats

<b>waiting time is too long</b>			
		Frequency	Per cent
<b>Valid</b>	SA	106	40.5
	A	100	38.2
	DA	45	17.2
	SD	9	3.4
	U	2	.8
	Total	262	100.0

**Source:** Field survey 2019

Table 7 above present the frequency of waiting time for boats in the BLG area, 40.5% of respondents strongly agreed, 38.2% agreed to too long waiting time, 17.2% of respondents disagreed, 3.4% of respondents strongly disagreed with too long waiting time, 0.8% of respondent remained undecided. This study revealed the waiting time for the boat is too long in the BLG area. The attributable reason is that the boats are limited and mostly operates on fixed-route therefore if a passenger's journey is not in the same direction as a departing boat then he will have to wait for the boat plying his route. Too long waiting time is a serious challenge and hindrance to the users or passengers of the boat in the BLG area, going by the saying time is money.

**Table 8** shows the maintenance level of boats

<b>Poor maintenance culture of the boats</b>			
		Frequency	Per cent
<b>Valid</b>	SA	132	50.4
	A	64	24.4
	DA	46	17.6
	SD	15	5.7
	U	5	1.9
	Total	262	100.0

**Source:** Field survey 2019

Table 8 presents the frequency on level of maintenance in the BLG area. 50.4% of respondents strongly agreed to poor maintenance culture, 24.4% agreed to poor maintenance culture of the boats, 17.6% of respondents disagreed, 5.7% of respondents strongly disagreed with poor maintenance culture of the boats, and 1.9% of respondents remained undecided. A larger percentage of respondents affirms that the boats are poorly maintained in the BLG area as revealed in the above table.

**Table 9** shows the safety level of boats

<b>the boat is not safe</b>			
		Frequency	Per cent
<b>Valid</b>	SA	117	44.7
	A	91	34.7
	DA	36	13.7
	SD	16	6.1
	U	2	.8
	Total	262	100.0

**Source:** Field survey 2019

Table 9 presents the frequency of respondents in percentage on the safety of the boat in the BLG area, 44.7% of the respondent was strongly agreed, 34.7% agreed, 13.7% disagreed, 6.1% strongly disagreed and 0.8% are undecided. The study concluded that the boats are not safe in the BLG area.

**Table 10** shows response (standby search and rescue operation) to boat mishap/accident

		accident/mishap rescue	
		Frequency	Per cent
<b>Valid</b>	SA	92	35.1
	A	79	30.2
	DA	61	23.3
	SD	27	10.3
	U	3	1.1
	Total	262	100.0

**Source:** Field survey 2019

The frequency table 10 present the respondents in percentage on the standby search and rescue operation in case of boat mishap/accident in BLG area, 35.1% of the respondent strongly agreed that there is a standby search and rescue team, 30.2% agreed, 23.3% disagreed, 10.3% strongly disagreed and 1.1% are undecided. The study discovered that the standby search and rescue activities are available but not organized because it is carried out by available volunteers.

**Table 11** shows the level of security in the BLG area

		Security for passenger	
		Frequency	Per cent
<b>Valid</b>	SA	129	49.2
	A	92	35.1
	DA	16	6.1
	SD	22	8.4
	U	3	1.1
	Total	262	100.0

**Source:** Field survey 2019

The frequency table 11 shows the level of security in the study area, 49.2% of respondents strongly agreed, 35.1% agreed to there is no security, 6.1% of respondents disagreed, 8.4% of respondents strongly disagreed with there is no security for passengers on board, and 1.1% of respondent remained undecided. The findings revealed that there is no security for passengers on board due to the percentage level of agreement.

**Table 12** shows the level of infrastructure development in the BLG area

		Inadequate infrastructure development	
		Frequency	Per cent
<b>Valid</b>	SA	78	65.0
	A	26	21.7
	DA	5	4.2
	SD	11	9.2
	Total	120	100.0

**Source:** Field survey 2019



Table 12 presents the frequency of respondents in percentage on inadequate infrastructure development in the Borgu. 65.0% of the respondent strongly agreed, 21.7% agreed, 4.2% disagreed, 9.2% strongly disagreed. The study depicted that the inadequacy of infrastructure development in the study area is overwhelming.

**Table 13** shows a level of financial aid for the operators

No access to finance			
		Frequency	Per cent
<b>Valid</b>	SA	66	55.0
	A	31	25.8
	DA	11	9.2
	SD	11	9.2
	U	1	.8
	Total	120	100.0

**Source:** Field survey 2019

Table 13 above presents the frequency of respondents in percentage on the level of financial assistance for boat operators in the study area. 55.0% of the respondent strongly agreed, 25.8% agreed, 9.2% disagreed, 9.2% strongly disagreed and 0.8% are undecided. The study uncovered that there is no financial assistance for the boat operators in the study area.

**Table 14** shows the cost of maintaining boats in the Borgu area

High cost of Maintaining a boat			
		Frequency	Per cent
<b>Valid</b>	SA	60	50.0
	A	33	27.5
	DA	18	15.0
	SD	9	7.5
	Total	120	100.0

**Source:** Field survey 2019

Table 14 presents the frequency of respondents in percentage on the cost of maintaining a boat is very high in the study area, 50.0% of the respondent strongly agreed, 27.5% agreed, 15.0% disagreed, 7.5% strongly disagreed. The study found that the cost of vessels maintenance in the BLG area is very high.

**Table 15** shows the negative effect of socio-cultural behaviour on IWT in the study area.

Socio-Cultural behaviour affecting IWT development			
		Frequency	Per cent
<b>Valid</b>	SA	51	42.5
	A	29	24.2
	DA	26	21.7
	SD	14	11.7
	Total	120	100.0

**Source:** Field survey 2019

Table 15 presents the frequency of respondents in percentage on the negative effect of socio-cultural behaviour on IWT in the BLG area, 42.5% of the respondent strongly agreed, 24.2% agreed to the socio-cultural harms IWT, 21.7% disagreed, 11.7% strongly disagreed. From the analyses, it is obvious that to a large extent socio-cultural behaviour of the people in the BLG area harms IWT.

#### 4.3.2. The Operators' challenges in the study area.

Table 16 shows the level of operational control and regulation

Lack of Operational Control and Regulation			
		Frequency	Per cent
<b>Valid</b>	SA	55	45.8
	A	40	33.3
	DA	15	12.5
	SD	9	7.5
	U	1	.8
	Total	120	100.0

Source: Field survey 2019

Table 16 presents the frequency of respondents in percentage on whether there is a lack of operational control and regulation of operation in the BLG area. 45.8% of the respondent strongly agreed, 33.3% agreed to lack of operational control and regulation of the operation, 21.7% disagreed, 11.7% strongly disagreed with lack of operational control and regulation of operation. The study shows that there is a lack of operational control and regulation of operations in the Borgu area.

Table 17 shows the nature of jetties

Jetties are not well constructed			
		Frequency	Per cent
<b>Valid</b>	SA	59	49.2
	A	36	30.0
	DA	13	10.8
	SD	6	5.0
	U	6	5.0
	Total	120	100.0

Source: Field survey 2019

Table 17 above presents the frequency on the present condition of jetties in the Borgu LGA. It shows that 49.2% of respondents strongly agreed, 30.0% agreed that the jetties are not well constructed, 10.8% of respondents disagreed, 5.0% of respondents strongly disagreed that jetties are not well constructed, 5.0% of respondents remained undecided. Careful observation from the foregoing indicates that the jetties are not constructed and secured in the BLG area.

Table 18 shows the level of obstructions in the waterways

Waterway full of obstruction			
		Frequency	Per cent
<b>Valid</b>	SA	52	43.3
	A	44	36.7
	DA	13	10.8
	SD	9	7.5
	U	2	1.7
	Total	120	100.0

Source: Field survey 2019

The table 18 shows the level of obstruction in the waterways of the BLGA which reveals that 43.3% of respondents strongly agreed, 36.7% agreed that the waterways are full of obstructions, 10.8% disagreed, and 7.5% strongly disagreed while 1.7% remain undecided. The larger percentage reveals that the waterways are full of obstruction in Borgu LGA.

**Table 19** shows the activities of marine police and other law enforcement agents

Law enforcement extorting money			
		Frequency	Per cent
<b>Valid</b>	SA	56	46.7
	A	40	33.3
	DA	16	13.3
	SD	7	5.8
	U	1	.8
	Total	120	100.0

**Source:** Field survey 2019

Table 19 presents the frequency of the relationship between marine police, other law enforcement agencies and the operators in the study area. 46.7% of respondents strongly agreed, 33.3% agreed that the marine police and other law enforcement agents are extorting money from operators, 13.3% of respondents disagreed, 5.8% of respondents strongly disagreed that the marine police and other law enforcement agents are extorting money from operators, 0.8% of respondent remained undecided.

**Table 20** shows the effect of water level/volume on IWT operation

Seasonality of water affects IWT operation			
		Frequency	Per cent
<b>Valid</b>	SA	60	50.0
	A	31	25.8
	DA	14	11.7
	SD	9	7.5
	U	6	5.0
	Total	120	100.0

**Source:** Field survey 2019

Table 20 present the frequency of the effect of water level/volume on IWT operation in the BLGA, 50.0% of respondent strongly agreed that seasonality of water level affects IWT operation, 25.8% agreed that water level/volume affect IWT operation, while 11.7% of respondent disagreed, 7.5% of respondent strongly disagreed that seasonality of water level/volume affects IWT operation, 5.0% of respondent remained undecided. The study revealed and agreed that the seasonality of water level/volume affects IWT operation in Borgu LGA.

## 5. CONCLUSION

The study concluded that there is a need to enhance Inland water transportation in Borgu LGA. The Users and Operators' challenges associated with inland water transport in Borgu Local Government Area of Niger State is a factor that needs urgent attention due to its impact on the lives of Borgu LGA for their mobility of goods, passengers and means of livelihood (occupation to operators). No doubt, the role of Inland water transport in Borgu LGA cannot be overemphasized as it has both direct and indirect effects on the economy of their community.

### Recommendations

Based on the summary of findings and conclusion of this study, the following were made to enhance Inland water transport in Borgu LGA.

1. There should be the provision of a life jacket and other safety equipment for users and operators to enhance safe delivery in the course of conveyance.
2. There should be financial assistance for the operation of inland water transport in the Borgu LGA. The government should intervene by the provision of funds to the boat's operator.
3. Adequate maintenance of boats should be encouraged, through the enlightenment of operators and location of a workshop near the water shore for easy accessibility.

4. The boat should be easily accessible by users to ease their day to day activities, through the construction of motorable roads and regular maintenance for sustainability.
5. There should be active and effective regulatory law and agency on the ground, to supervise the compliance of boat operators in the Borgu LGA. From fare regulatory, safety compliance, and the number of passengers to be carried.
6. Search and rescue team is highly needed to be at standby to rescue people in case of boat mishaps/ accidents during transportation. The government can provide fly boats and the operators too and liaise to put them in place to rescue mishaps.

### Funding

This study has not received any external funding.

### Conflicts of interests

The authors declare that there are no conflicts of interests.

### Data and materials availability

All data associated with this study are present in the paper.

## REFERENCES AND NOTES

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