A STUDY ON WATERBUS SERVICES USING PASSENGER PREFERENCES DATA AND THE WAY FORWARD

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ABSTRACT

The transportation system of Dhaka, a highly populated city in the center of Bangladesh, faces severe difficulties. But the most impressive feature of this city, Dhaka, is the waterway that encircles the whole city. On August 28, 2010, the Bangladesh Inland Water Transport Corporation (BIWTC) introduced the waterbus service, which has a 16-kilometer route. The waterbus service, within 18 months of its launch, which may have been useful for reducing the severe traffic congestion on roads, finally became a failure. In order to understand why the waterbus service failed in 2010, the Bangladesh Inland Water Transport Corporation (BIWTC) provided data on its reasons. In this study, using a questionnaire survey, user preferences for water transportation services were conducted and compared to the services of previous water buses. This study showed that concerns with low frequency and inconsistent operation, insufficient seat capacity, and poor vessel design were important contributors to the failure of the waterbus service. Inadequate awareness and weak marketing tactics also hampered the adoption and use of the service. Solutions to these issues included the introduction of hybrid electric water taxis, which would reduce fuel use; better time management, which would increase frequency and reliability; and enhanced passenger management, which would involve effective marketing campaigns and workable ticketing systems. Travelers and the transportation system are expected to gain from the implementation of these changes. In addition to promoting environmentally friendly transportation and offering a dependable and efficient mode of transportation, the waterbus service may reduce traffic congestion. The recommended changes might also aid in reducing pollution in the environment and encouraging urbanization. This study adds to our understanding of water transportation systems and highlights how important it is to improve service quality and cater to user preferences.

Keywords: *Circular waterways, traffic congestion, waterbus service, questionnaire survey*

1. INTRODUCTION

Dhaka lacks a complete public transit infrastructure to serve commuters and inhabitants, despite being mostly developed. A city's waterways may produce a scenic and aesthetically pleasing environment. When Buckland Bundh was built in Dhaka in the 19th century, the city's growth was mostly inward-looking, ignoring the waterways and preventing citizens from accessing the lovely and alluring locations along the rivers. These rivers were frequently thought of as being neglected or as the neglected sections of the city. Inland rivers provide significant possibilities for transportation, leisure activities, and recreation and have established themselves as important living infrastructure in many different countries across the world.

The most impressive feature of Dhaka City is the waterway that encircles the entire city. A continuous circle waterway has been constructed around the city by the Buriganga, the Turag, the Balu, the Shitalakkya, the Dhakeswary, and the Tongi Khal. In the past, the city had various canals and inland lakes as well. But many of these lakes and canals have been dammed or filled up.
On August 28, 2010, the Bangladesh Inland Water Transport Corporation (BIWTC) introduced the "Waterbus" service to transport people over a 16-kilometers route from Sadarghat to Gabtoli through Showarighat and Kholamura. At a cost of BDT 1.115 crore, two motorized vessels, MV Buriganga and MV Turag, were constructed to provide the service. When Waterbus first started operating, customers were quite excited about it, but the two very small-capacity vessels were unable to handle the huge demand from customers. Within 18 months of its launch, the waterbus service, which may have been a useful means of transportation for reducing the severe traffic congestion on roads, finally collapsed (Karim, 2013).

The 'Waterbus' proposal has emerged as a potential effort to capitalize on the advantages of the circular canal. It did not, however, completely match the demands and expectations of passengers during its initial implementation. But this project has the potential to make a big contribution to the city's transportation sector with careful and thorough planning.

The 'Waterbus' has the potential to act as a catalyst for intermodal travel, enabling the seamless fusion of many means of transportation. This integration is the key to lowering the heavy reliance on roads alone, which will result in a noticeable decrease in traffic congestion. The 'Waterbus' has the ability to boost overall mobility and contribute to a more effective transportation system inside Dhaka city by giving commuters a practical option and increasing connection.
The objectives of this study are:

a) Analyze the causes of the waterbus service's failure in 2010 using BIWTC data on waterbus.
b) Use a questionnaire survey to assess user preferences for water transportation services and contrast them with the waterbus service.
c) Based on user preferences and the gaps that have been found, provide suggestions, improvements, and changes to the waterbus service.
d) Evaluate how it would affect passengers and the transportation network.

2. LITERATURE REVIEW

3. History

Despite having rivers all around it, Dhaka's urban transportation system cannot benefit from these rivers because of their limited draft, lack of ghats on the eastern side, and improper connections to the road system. Through dredging and the construction of landing stations, BIWTA has finished the western side of the Circular Waterways System (from Sadarghat to Ashulia), however the eastern section of the CW System (from Ashulia to Demra) has not yet been finished.
The DMDP construction design also suggests creating a circular waterway around Dhaka using the existing rivers and natural waterways. The plan included for dredging the nearby rivers, canals, and channels as well as building landing ghats with access to important roads.

The capacity to navigate the surrounding waterways was anticipated to improve and facilitate the flow of people and products by water to various portions of the city (Karim, 2013). Circular Waterway around Dhaka at a glance in Figure 1:

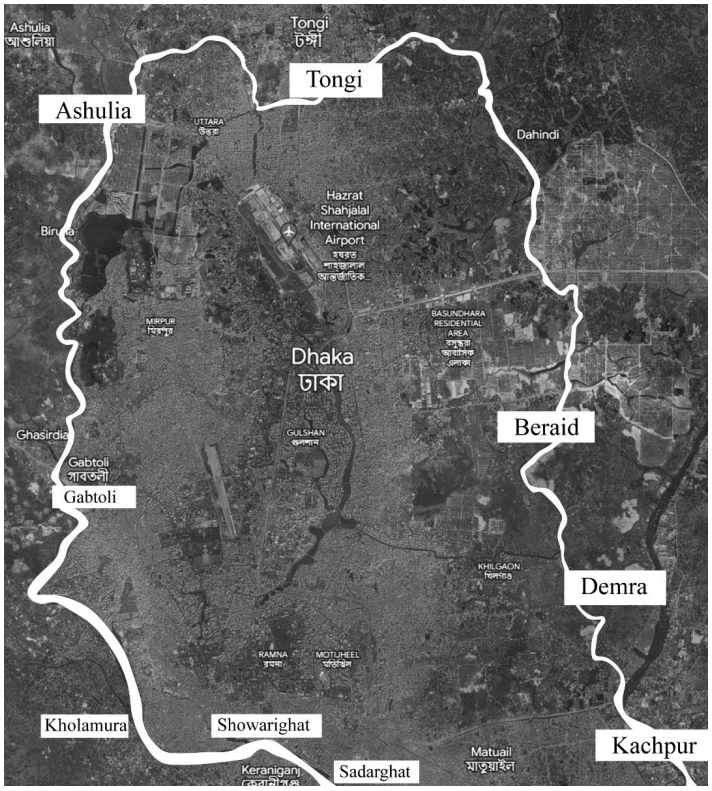

Figure 1: Circular Waterway around Dhaka

- The first phase covered a 30 km corridor from Sadarghat to Ashulia along the 110 km ring road that encircles Dhaka.
- The second phase is a 40 km waterway that runs through Ashulia and ends in Kanchpur via Shitalakhya and Balu rivers.
- The remaining 40 km of the route from Kanchpur to Sadarghat.

4. Inland Water Transport

In Bangladesh, inland water travel is governed by the Bangladesh Inland Water Travel Authority, or BIWTA. According to a prior study, inland waterways carry over 102 million passengers over 110 billion passenger kilometers and 30 million metric tons of freight over 18.6 billion tons kilometers. IWT plays a pivotal role in the government's effort towards the growth and reduction of poverty under the National Strategy for Accelerated Poverty Reduction (NSPAR).

Half of all rural homes (25.1%) have access to river transportation, which is the only reasonable route through which a sizeable fraction of the rural population (12.3%) can reach the transportation network. Furthermore, the National Waterway Transport Association (NWTA) proposes that there is significant potential to enhance the utilization and quality of current waterway routes, as well as to undertake new waterway projects (Rangaraj & Raghuram, 2007). The inland waterway transport (IWT) is described in Table 1.

Table 1: IWT Network Classification (Rangaraj & Raghuram, 2007)

Class	Indicated draft (meter)	Length (kilometer)	%	Classification Criteria
1	3.6	683	11	Major transport corridors where LAD of 3.6 m is required to be

				maintained round the year
2	2.1	1000	17	Seasonal routes where maintenance of LAD of 1.5 m or more in dry season is not feasible
3	1.5	1885	32	Being seasonal in nature, it is not feasible to maintain higher LAD throughout the year
4	<1.5	2400	40	Links major inland ports or places of economic importance to class I routes
Total		5968	100	

5. Water Transportation

In the city of Venice, Italy, water buses are the primary mode of transportation, given the ubiquitous presence of canals. Similarly, in Thailand, inland water transport (IWT) holds a significant share of the freight carried, with approximately 20 million tons transported via waterways, ranking second after road transport (Shajahan & Nilufar, 2013). While Bangkok has often been referred to as the "Venice of the East" due to its intricate river and canal network, the unfortunate truth is that it is rapidly transforming into the "Los Angeles of the East." This comparison alludes to the escalating traffic congestion and urban sprawl that mirror the challenges faced by Los Angeles, a city known for its extensive road networks and heavy traffic conditions (Hossain et al., 2013).

Bangladesh boasts a considerable river network with an estimated total length of approximately 24,000 kilometers. Among these rivers, around 6,000 kilometers are accessible for the movement of modern mechanized vessels during the monsoon season. Furthermore, approximately 3,800 kilometers of these waterways remain navigable throughout the year, providing continuous transportation opportunities (Ahmed & Alam, 2007).

Dhaka stands as the largest and most industrialized city in the country. Its prominence as the primary city of Bangladesh has led to the recognition of the need for effective transportation infrastructure (Shajahan & Nilufar, 2013). To address the pressure on the mainland, a portion of the total 1,327 kilometers of waterways surrounding and passing through the capital will be divided into three sections. This division aims to alleviate congestion and ensure smoother navigation within Dhaka's waterway system (Rangaraj & Raghuram, 2007). According to BWDB (Bangladesh Water Development Board) the general information about rivers encircling Dhaka is given in the Table 2.

Table 2: Rivers Encircling Dhaka

Name	Length (kilometer)	Width (meter)	Depth (meter)	Off take/ outfall
Tongi Khal	17	60	9.15	Turag river, Tongi, Balu River, Dhaka
Turag	71	218	13.5	Uthpathi Bangsi alaca, Calia/ Buriganga river, Dhaka
Buriganga	45	265	14	Turag river, Dhaka
Shitalakhya	73	277	14	Old Brahmaputra, Sibpur Dhaleshwari River
Balu	45	100	9.63	Tangi Khal, Tongi / Shitalakhya river, Demra

6. Impacts of Water Bus

7. Reduced Environment Pollution

Most of the roadway transport emits harmful substances into the environment. Railway and waterway transports are still considered relatively better for the environment than vehicles on roadways. As the waterbuses will use electric engines, the emission of harmful substances will be much less than in all other vehicles. Also, the noise pollution from the waterbus will be near zero as the electric engine has a quieter propulsion system. Moreover, the waterbus will be far from the dense population, so the disturbance will be very minimal.

8. Promoted Urbanization and Recreation

There are many divisions by water bodies, such as rivers, canals, lakes, etc. Waterbuses can help with easy access to those areas. So, the process of urbanization will be developed. Also, with the waterbuses, many tourists will be attracted to visit the city. Only 9% of the overall respondents' thought that the river just happened to be there and played no part in their recreation, whereas 65% thought the river is "very important" and 26% thought it was "somewhat important" (Nahar Sultana & Hafiz, 2013).

9. Reduced Traffic Accidents and Congestion

The most powerful effect of water buses is to reduce congestion on roadways. Waterbuses provide alternate modes of transportation to people so that they can avoid cars or vehicles, which can cause severe traffic congestion on the roadway. As more people use the waterbus, fewer vehicles will be on the roadway, so the traffic flow will be smoother and the travel time will be reduced (Mahmud et al., 2012).

The safety of waterbuses is way better than that of vehicles on the roadway. As the speed of waterbuses is less than that of roadway vehicles, navigation is easier than that of cars or buses. Also, by hiring more expert captains of the waterbuses, the safety measures will increase more than roadway vehicles (Hossain & Awal, 2014).

10.METHODOLOGY

11. Types and Source of Data Collection

Bangladesh Inland Water Transport Authority (BIWTA) is responsible for the maintenance of the waterway itself, and Bangladesh Inland Water Transport Corporation (BIWTC) is responsible for the operation of inland water vessels in these waterways.

At first, for the investigation of the Waterbus project, necessary data regarding the Circular Waterway itself was collected from BIWTA. Necessary information regarding Waterbus operation, such as fare, schedule, operating cost, income, benefit, loss, number of daily passengers served, amount of fuel consumed, etc., throughout the seventeen months of its service, was collected from BIWTC.

Previously, waterbuses were operated in the western part of the circular waterway only; the eastern part was not evaluated. In the present situation, waterbuses will cover the route in a circular way. That's why a questionnaire was conducted in specific areas along the circular route to know their socio-economic conditions, travel behavior, and mode choice data. Special questions were set to know their comments about different features of the Waterbus operation and the reason why they showed reluctance in using Waterbus. During the field visit, landing stations were visited, and GPS readings of these landing stations were noted.

Primary Data: Questionnaire, Field Survey, Overall Observation, Survey at Different Levels and Sectors, and Capturing Photographs

Secondary Data: BIWTC and BIWTA

12. Data Collection Period

The primary data collection questionnaire was conducted at landing stations and in specific areas, both offline and online. An offline questionnaire in Sadarghat and Showarighat was conducted on February 21, 2023, from 3 p.m. to 5:30 p.m. It was a weekday (Tuesday). The day was sunny, so a number of respondents were found.

Later, on May 3, 2023 (Sunday), another questionnaire was conducted in Narayanganj. A total of 72 respondents' comments regarding Waterbus were collected at each of these two stations. Again, this questionnaire was conducted from 8 a.m. to 10 a.m.

Questionnaires in Gabtoli and Uttara were conducted on May 12, 2023 (Friday) and May 13, 2023 (Saturday), respectively. A total of 65 respondents were interviewed in these areas. Moreover, there were 173 respondents to the online survey with the same questions.
People staying along the circular route have been tried to reach by an online survey. So, in total, 310 respondents were interviewed for the questionnaire. After the debacle of the Waterbus project, Gabtoli landing station was completely closed. So, a questionnaire was conducted near the bus terminal for Gabtoli. But in all other stations, some kind of water transport is in operation. A questionnaire was conducted at the landing stations for Sadarghat, Showarighat, and Kholamura. As stated, another source of primary data was a survey.

13.RESULTS & ANALYSIS

The Table 3 provides a description of several canal segments along with the kilometers that correlate to each section's length.

Table 3: Waterways Distance Descriptions (BIWTA Hydrology Department)

Description	Length (kilometer)
Demra to Tongi Bridge	30
Tongi to Ashulia	7.5
Ashulia to Mirpur Bridge	12.5
Mirpur Bridge to Kholamura	10
Kholamura to Sadarghat	6
Sadarghat to BG Mouth	12.5
BG Mouth to Gop Ghar	12
Gop Ghar to Naranganj	6.5
Naranganj to Demra	13.5
Demra-Tongi-Sadarghat-Demra	110.5

14. Impact of Socio-economic Characteristics Based on a Questionnaire Survey (Figure 2 and 3)

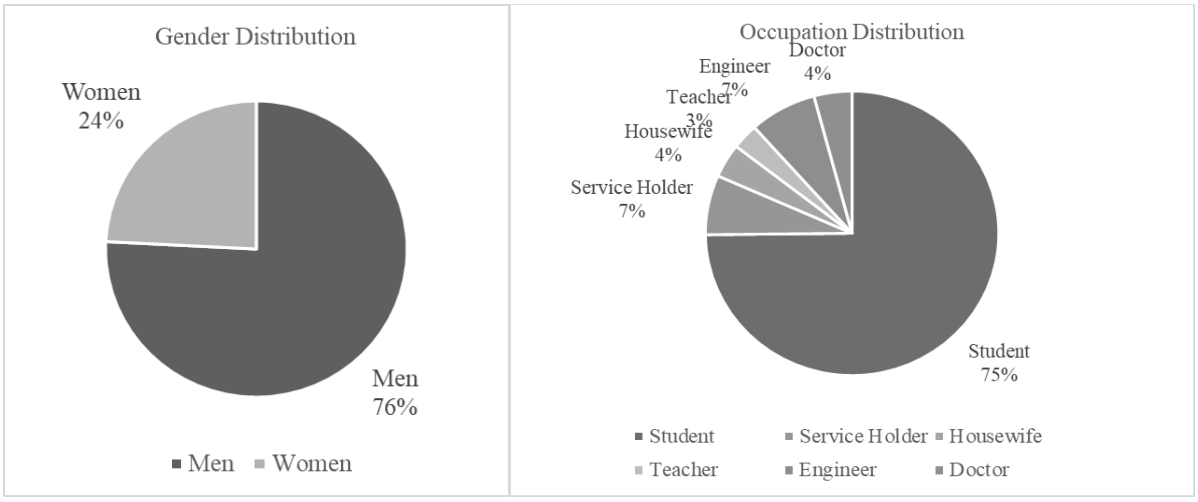

Figure 2: Gender and Occupation Distribution (Survey, 2023)

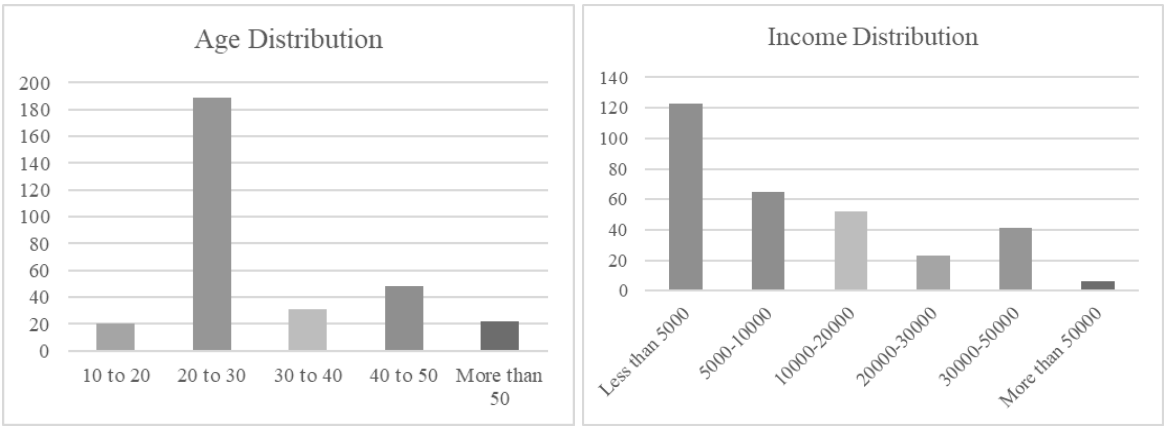

Figure 3: Age and Income Distribution (Survey, 2023)

15. Impact of Travel Behaviour Based on a Questionnaire Survey (Figure 4 and 5)

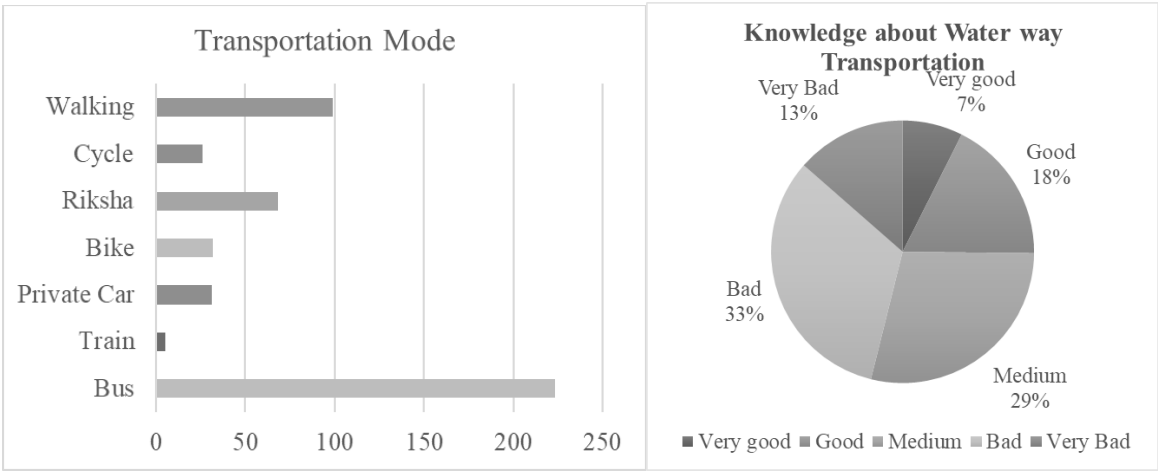

Figure 4: Transportation Mode and Knowledge Percentage about Waterways (Survey, 2023)

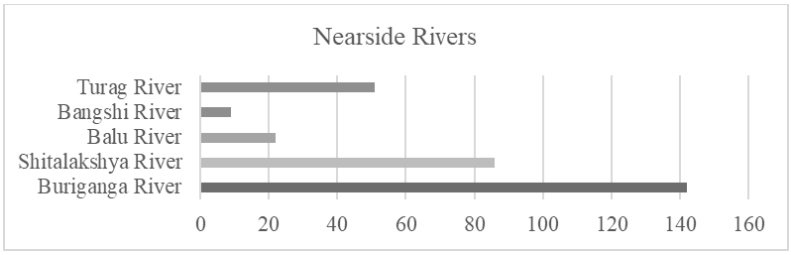

Figure 5: Nearby Rivers (Survey, 2023)

16. Impact of Peoples' Choice in Mode Based on a Questionnaire Survey (Figure 6 to 8)

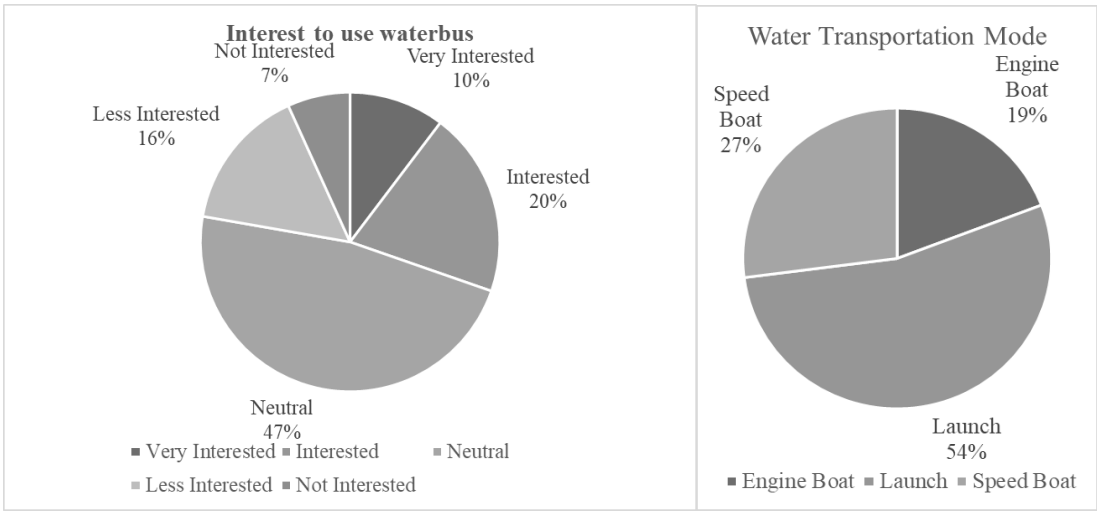

Figure 6: Percentage of Interest in Using Waterbus and Transportation Modes (Survey, 2023)

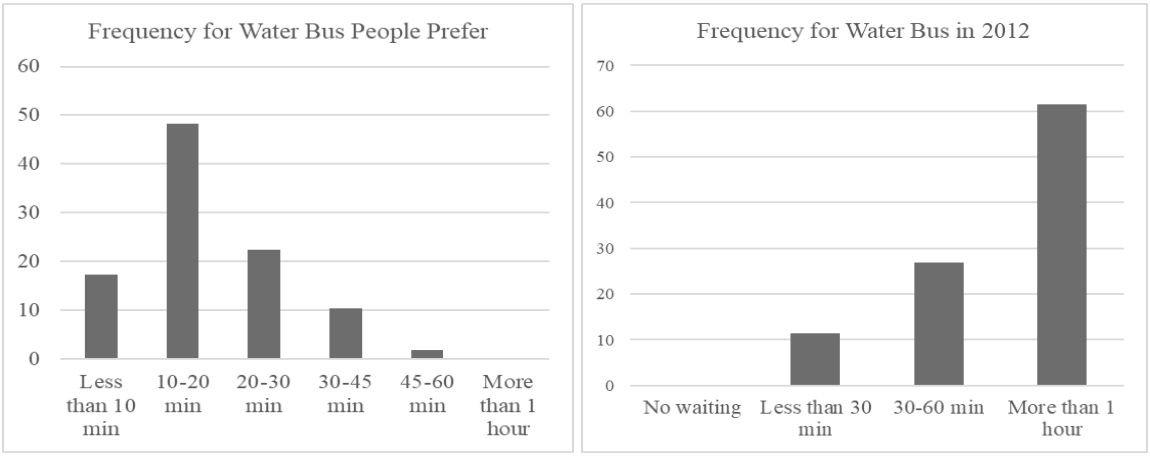

Figure 7: Frequency for Waterbus People Preferred in 2023 and 2012 (Survey, 2023)

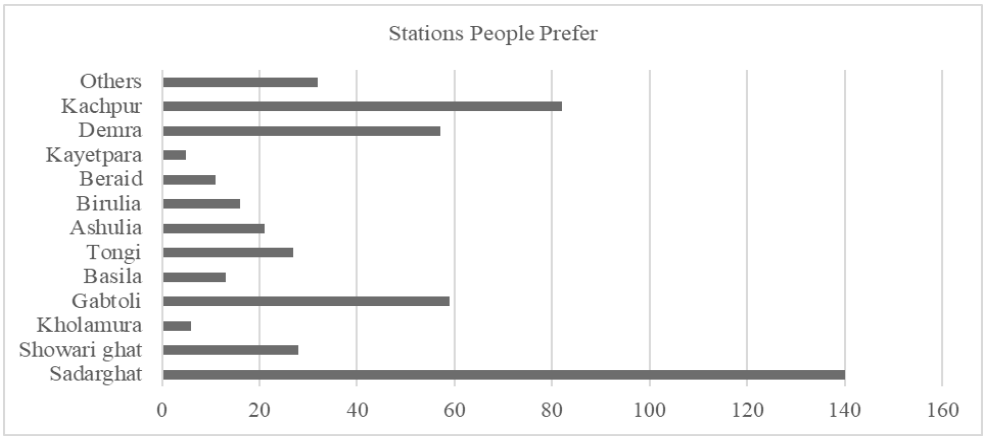

Figure 8: Stations People Prefer (Survey, 2023)

17. Analysis Based on BIWTC Data

Table 4 shows that the quantity of journeys significantly affects both the number of passengers and the degree of satisfaction with the canal transport service.

Table 4: Water Bus in 2010 (BIWTC)

Waterbus		**MV Buriganga**			**MV Turag**	
Month	In service	Number of trips	passengers served	In service	Number of trips	passengers served
Aug-10	3	24	489	3	22	358
Sep-10	29	186	3164	30	212	4872
Oct-10	7	44	674	31	180	2652
Nov-10	0	0	0	30	148	1534
Dec-10	28	102	732	5	16	97
Jan-11	31	124	594	0	0	0
Feb-11	24	76	434	13	32	304
Mar-11	31	62	377	31	62	452
Apr-11	30	60	452	30	60	516
May-11	30	60	452	31	62	377
Jun-11	29	58	446	29	58	413
Jul-11	30	64	494	29	60	439
Aug-11	30	60	585	30	62	595
Sep-11	30	60	536	30	60	605
Oct-11	31	62	524	31	62	590
Nov-11	28	56	505	30	62	562
Dec-11	31	62	518	31	62	543
Jan-12	31	64	547	30	60	548
Feb-12	13	26	200	13	26	215
Total	**466**	**1250**	**11723**	**457**	**1306**	**15672**

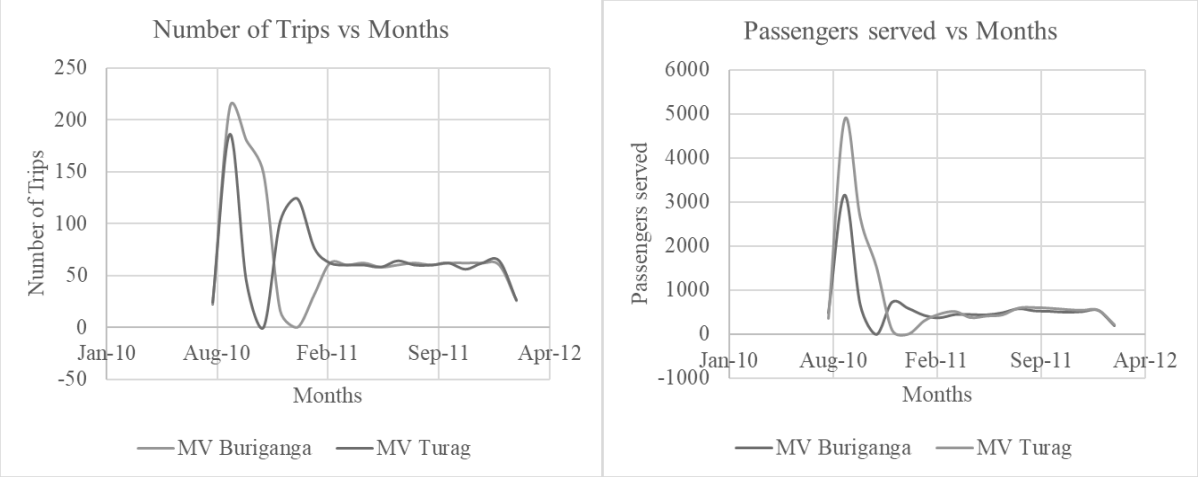

Figure 9: Number of Trips and Passenger served vs. Months (BIWTC)

Moreover, Figure 9 shows both vessels' unsatisfactory service led to passengers' unhappiness. The waterbuses suffered technical difficulties and needed repairs, which resulted in operational interruptions. For instance, MV Buriganga and MV Turag made no trip in either November 2010 or January 2011 since they were transported to the dockyard for repairs. Additionally, both waterbuses regularly experienced technological problems that disrupted operations and made them unpredictable for users.

The relationship between the number of passengers and the corresponding number of trips:

$$Trips = 2 + 2 \times [(passenger - 1) \div 35] \quad (1)$$

The relationship between the number of passengers and the corresponding revenue (Figure 10):

$$Revenue=(19.5218205553213\times Passenger)-140.445648958669 \quad (2)$$

The relationship between the operating cost and the number of trips (Figure 10):

$$Operating\ Cost=(Trip\times 1181.69054679327)+535.270717483184 \quad (3)$$

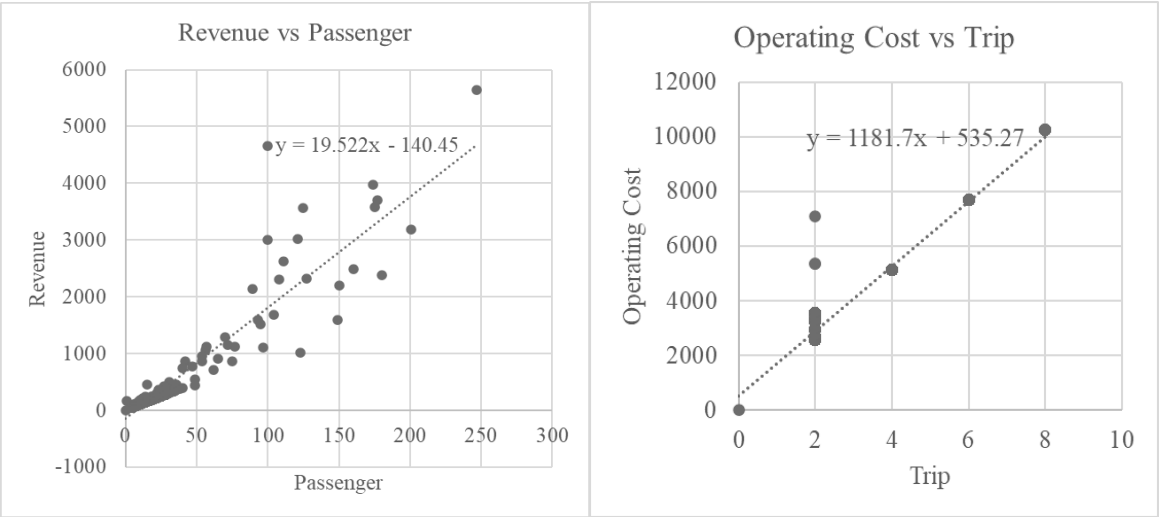

Figure 10: Revenue vs. Passenger and Operating Cost vs. Trip Graph (BIWTC)

For maximum benefits (Uyanık & Güler, 2013):

$$Benefits=Revenue-Operating\ Cost \quad (4)$$

The maximum benefit of -658.1467279420638 is achieved at 0.9 passengers.

Based on the output, the maximum benefit achieved is -658.1467279420638, and it occurs at 0.9 passengers. Since the maximum benefit is still negative, it shows that the configuration for the 2010 water bus of the factors (such as fare, operating cost, and passenger count) is not optimized for benefits (Figure 11).

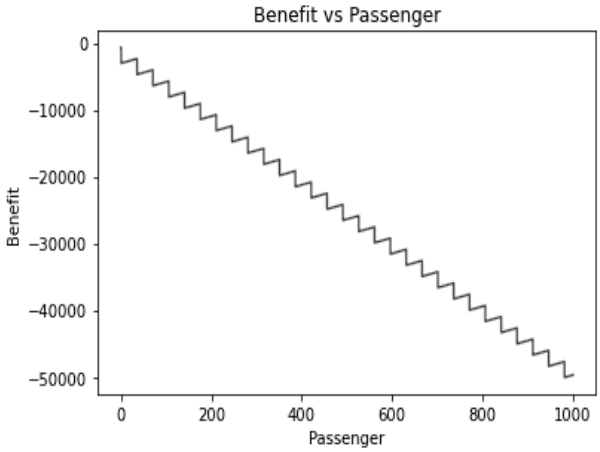

Figure 11: Benefit vs. Passenger

18. Reasons Behind this Failure

- Low Seat Capacity and Faulty Designed Vessel
- Low Frequency and Unreliable Service
- High Fuel Consumptive Engine and Contradictory Fare Rate
- Totally unaware of the Waterbus service and Unreliable service

19. Implement Solutions

20. Time Management

Previously, there was no time management for the waterbus service. As a result, the waterbuses had a minimum time gap of 1 hour between their departing times. The proposed time schedule will be more helpful for people and will increase the efficiency of the service.
Peak hours: (7:50 to 10:30) and (15:30 to 17:50); frequency in departing times: 20 minutes
Off peak hours: (any time except peak hours); frequency in departing times: 40 minutes

21. Passenger Management

Most of the people who live beside the rivers are low-income people. As they live beside the rivers, they have a greater chance to use the waterbus service. So, the management of these passengers should be done with the utmost care. At first, they need to be aware of the circular waterway. Because previously, it was seen that 14% of the people were totally unaware of the waterbus service (Karim, 2013). So, this time the advertisement should be enough so that all the people know about the waterbus service. The vehicles need to have sufficient standing and sitting arrangements. Otherwise, the vehicles may not meet the demand during peak hours. However, the number of standing passengers should also be limited and should be valid only during peak hours.
One of the main purposes of the waterbus will be the transportation of passengers for commuting. It will be very helpful in reducing traffic congestion in Dhaka city. So, it must be ensured that enough people ride the waterbus for commuting. That's why the vehicle should be convenient enough.

22. Vehicle Management

Salient features of the previous vessels:
Engine: two engines were used with 75 HP; length: 38.38 feet; width: 11.48 feet; speed: 22.8 kilometers per hour; and capacity: 35 seats.
Now, these two vessels couldn't meet the demand. The vessels had low capacity and low speed. Although BIWTC claims the vessels could generate a speed of 22.8 kilometers per hour, the actual travel time from Sadarghat to Gabtoli in a 16-kilometer waterway was almost 90 minutes. All these features made the service unreliable for the passengers and created a low frequency of vessel movement. Again, the vessels used to consume 30 liters of diesel for one trip, which was a huge financial loss.
To solve all these problems, a hybrid electric water taxi can be introduced.
Engine: hybrid model (electric-diesel); speed: 47.5 kilometers per hour; and capacity: 50 seats.
The engine consumes 30 liters of fuel per hour. If we consider the previous situation of travel time from Sadarghat to Gabtoli in a 16-kilometer waterway, then the travel time will theoretically be 21 minutes. Including other travel inconveniences, the travel time could be the highest at 35 minutes. So, the frequency of the vessels can be maintained properly.

23. Fuel and Fare Management

Previously, when MV-Buriganga and MV-Turag were in operation, it required 30 liters of diesel for a one-way trip from Sadarghat to Gabtoli or Gabtoli to Sadarghat. The unit price of each litter diesel during operation was BDT 44.62 (July 2011).
Operating Cost: Unit Price of Diesel (July 2011) = BDT 44.62
Fuel per one-way trip = 30 liters
Fuel Cost per One-Way Trip = 44.62*30 = BDT 1338.6
Income through Passenger Fare: One-Way Fare Rate from Gabtoli to Sadarghat = BDT 30
Full capacity = 35 passengers
Total Income through Fare = 30*35 = BDT 1050
Total Loss per Trip: Loss = BDT (1338.6-1050) = BDT 288.6
So, a hybrid-model electric water taxi has been selected. Though at present the route has been converted to a circular route of 110 kilometers, for evaluating the new engine, it needs to be operated under the same circumstances as before. However, in reality, all the passengers will not always travel from Gabtoli to Sadarghat. There are other maintenance and repair costs. So, the profit will be less than calculated. Depending on the present condition, the current price of diesel is BDT 109 per litter. So, the estimated fare for the hybrid model water taxi is shown below:

From Gabtoli to Sadarghat, length = 16 kilometers and speed = 37–46 kilometers per hour. It can be assumed that the speed is 40 kilometers per hour.
For 16 kilometers, travel time = (16/40) *60 min = 24 min.
The fuel consumption of the hybrid model water taxi engine is 30 liters per hour. So, in 24 minutes,
The fuel consumption will be (24/60) *30 liters = 12 liters.
Price of diesel = BDT 109*12 = BDT 1308
Vessel capacity: 50 passengers
Considering all passengers travel from Gabtoli to Sadarghat,
The fare should be BDT 1308/50 = BDT 26.16, and this fare is even lower than the roadway which is shown in Table 5.

Table 5: Fare Distribution

Origin-destination	Length (kilometer)	Time (min) (theoretical)	Actual time (min)	Fare (theoretical)	Actual fare
Sadarghat - Gabtoli	16	24	35	Tk. 26.16	Tk. 45
Gabtoli - Tongi	19	28.5	40	Tk. 31	Tk. 50
Tongi - Talna	15	22.5	35	Tk. 24.5	Tk. 40
Talna - Kachpur	18	27	40	Tk. 29.43	Tk. 45
Kachpur - Narayanganj	12	18	30	Tk. 19.62	Tk. 30
Narayanganj - Fatullah	23	34.5	45	Tk. 37.6	Tk. 50
Fatullah - Sadarghat	10	15	20	Tk. 16.35	Tk. 25

24. Determination of the Number of Vessels

The service will be open from 7:50 a.m. to 7:10 p.m. When the vessel is running in one circle, it will take (35+40+35+40+30+45+20) minutes, or 245 minutes, or 4 hours, 5 minutes.
During the peak hour (7:50 a.m. to 10:30 a.m.), there will be a frequency of 20 minutes, and during the off-peak hour, the frequency will be 40 minutes. So, in the first 3 hours (7:50 a.m. to 10:30 a.m.), the number of vessels is (160/20) +1 = 9.
In total, 10 vehicles will be needed, moving in one direction only. As the route will be two-directional, another 10 vehicles will be needed in the opposite direction.
So, the total number of vessels is (10+10) = 20. It is not possible to keep all twenty vehicles in the same terminal. So, the 10 vessels will be used for clockwise movement and will stay and start or end their journey from Sadarghat Terminal. The other 10 vessels will be used for counter-clockwise movement and will stay and start or end their journey from Fatullah terminal.

25. Estimation of trips and passengers in one day

In total, there will be 26 trips in one direction. In both directions, there will be (26*2) or 52 trips. If all trips are considered to have full capacity during operation,
then the total number of passengers will be 52 * 50 = 2600 people.
Now, the vessels will not always be at full capacity. Again, during peak hour, it may have to make standing arrangements for the passengers. Overall, we can estimate that 2500 people will be served by the water vessels.

$$Trips = 1 + \lfloor (passenger - 1) \div 50 \rfloor \quad (5)$$

$$Revenue = (40 \times Passenger) \quad (6)$$

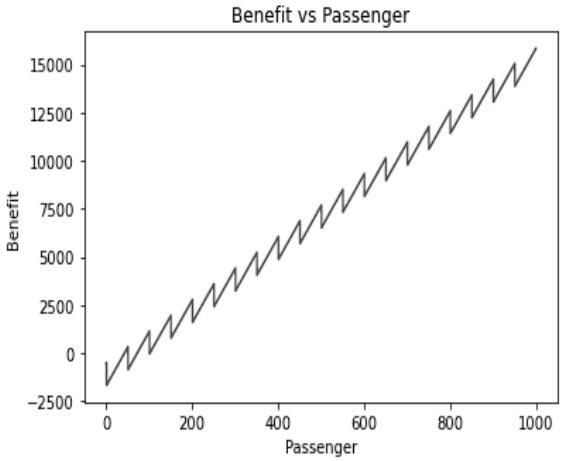

Figure 12: Benefit vs. Passenger

The positive gradient from Figure 12 suggests that the revenue generated exceeds the operating costs associated with the transportation service. Therefore, the equation for operating costs and trips that ensures a positive benefit is: $Operating\ Cost < passenger \times 40$ (7)

Therefore, the maximum operating cost will be less than 2000.

26.CONCLUSIONS

There were several factors behind the failure of the waterbus service, including insufficient seating capacity, design flaws, infrequent service, unreliability, excessive fuel consumption, uneven fee rates, a lack of public awareness, and low frequency. The suggested solutions include buying boats with more features and space, planning ahead, introducing hybrid electric water taxis, enhancing passenger management, and maximizing fuel and fee management.

The MV Buriganga and MV Turag waterbus boats' inadequate seating and poor design had caused serious problems for the transportation operation in 2010. Due to the limited capacity, passengers frequently had to wait a long time to find a seat. The lack of necessary facilities further reduced the appeal of the service and hampered customer comfort and safety. It is necessary to make investments in vessels with greater seating capacities and give the integration of essential safety measures first priority in order to improve the service.

Low frequency and disrupted scheduling are serious difficulties for the water transport service. Due to the few departures and scattered departures and arrival schedules, passengers had greater wait periods and delays in their travel arrangements. Passengers were forced to pick alternate modes of transportation as a result of the service's lack of dependability, which compromised its accessibility and convenience. As a result, there could be less demand for the use of the waterway transportation system.

Two major obstacles confront waterway transportation: high motor fuel consumption and inconsistent fee prices. Contradictory fare rates cause confusion and displeasure among users, while high fuel consumption raises operating expenses and has a negative impact on the environment. These difficulties have an effect on the waterway transportation system's economics, sustainability, and operational effectiveness. Lack of information and the unpredictable Waterbus service are two major obstacles facing waterway transportation. Limited advertising and information sharing reduce awareness, while erratic scheduling and delays reduce passenger confidence. These difficulties prevent potential passengers from using and embracing river transportation.

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