

# **PROBLEMS OF RIVER TRANSPORTATION IN BANGLADESH**

Submitted by

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A Thesis Submitted to the Department of Civil Engineering, Daffodil International  
University in Partial Fulfillment of the Requirements for the Degree of  
**Bachelor of Science in Civil Engineering**



**Daffodil**  
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## DECLARATION

The thesis entitled “*Problems of River Transportation in Bangladesh*” has been performed under the supervision of **Mr. Saurav Barua**, (Assistant Professor) Department of Civil Engineering, Daffodil International University, Dhaka, Bangladesh, and got permission in partial completion of the requirement for the Bachelor of Science in Civil Engineering. This is hereby declared that this thesis or any part of it has not been submitted elsewhere and any degree.

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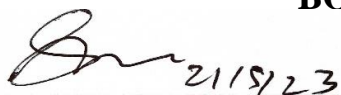
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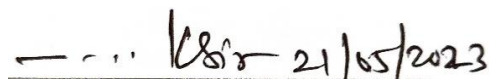
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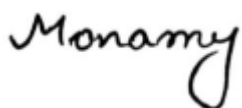
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## **ABSTRACT**

This paper presents a study on problems of river transportation in Bangladesh. We used eight criteria to design survey question. This study is motivated by problems on river networks. We establish the statistical properties of a flow along a directed branching network and suggest its compact parameterization. Those criteria are, as follows, slow speed of water vessels, too many circular, cyclone and storm related problems, discontinuous routes in winter, flood problem, navigability problem, insufficient number of ports, unfit and backdated vessels. Question surveys were conducted among the shippers, the receiver carriers and agents, the government and the consumers. Two locations are considered, Sadar-ghat port and BIWTA. 9% BIWTA members, 20% shippers, 15% receivers, 19% carriers and agents, and 37% of end users responded for the survey. Large portion of stakeholders believed that unfit and backdated vessels are the main reason of river transportation problem. More than half stakeholders responded slow speed of water vessels and discontinuous and too many circular routes are the problems of river transportation. Concern authority should take necessary steps to improve water transportation system as per the suggestion made by a large-scale of survey. Our study can be used as a guideline for such kind of budgetary survey which needs financial assistance, man power and sufficient time. In the end the paper highlights the issues regarding the problems of river transportation in Bangladesh and the solution of the problems.

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Thanks to almighty Allah for his graciousness, unlimited kindness and with the blessing of whom the good deeds are fulfilled. I would like to express my deepest sincere gratitude to my supervisor **Assistant Professor Saurav Barua** for giving me a unique opportunity to work on such an important topic. His continuous guidance, invaluable suggestion, affectionate encouragement, generous help and invaluable acumen are greatly acknowledged. His keen interest on the topic and enthusiastic support on my effort was a source of inspiration to carry out of study. I consider myself fortunate to work under his supervision. I take this opportunity to express my deep sense at gratitude to **Professor & Head Dr. Mohammed Hannan Mahmud Khan** for his valuable guidance laced with suggestion and help. Finally, I would like to express a very special indebtedness to my mother and father whose encouragement and support was a continuous source of inspiration for this work.

May 2023

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# CHAPTER 1

## INTRODUCTION

### 1.1 General

Since the advent of civilization, people have shown their peculiarity in waterways as it is the cheapest mood to transport. Travelling by water is a prime part for millions of urban and rural areas people. It can assist to transport bulky goods over a long distance at a bargain. Despite permitting us to transport goods at low cost, transportation by river can consume too much time especially when it comes for small business and it can be a reason of discomfort for passengers. Other than that during the monsoon, it's troublesome to point out our required place and reach there in desired time.

### 1.2 Back ground

Developing a country by using the method of river transportation is far-fetched as it is slow paced which leads to make us loss huge amount of time. Numerous natural disasters (storm, earthquake, Volcanic activity and so on), backdated, lower quality and unfit transport can be the consequence to lose our lives. Seasonal changes can also conduct accidents, which have a great impact on river transportation.

According to Awal, Z., Hossain, M. T., & Das, S. (2014), using faulty tool can cause accidents at the time of river transportation. In their paper, they have also discussed the unique safety of river transportation. A similar study by Haque M.E (1989) also stated that the accidents, damages and Cargo Losses in Inland Shipping.

We asked some questions about the problems of river transportation. From that, we were able to find people's thought and real situation regarding this issue. Those questions include Slow speed, Circuitous routes, Inclement weather, Seasonal characteristics, Interruption of service, Navigability, Insufficient port, Unfit vessels. The purpose of our research is to find out the problems of river transportation in Bangladesh and solution of the problems.

### 1.3 Work Plan

- i. Study on problems of the river transportation and develop questions for surveying and those have eight criteria.
- ii. Conduct those questions what we use for our surveying among the stakeholders and users of port (launch ghat), authority of BIWTA.
- iii. Data collection and convert the collected data into numerical scale.

- iv. Data analysis, determine the scores and identify problems of the different locations.
- v. List short term and long-term recommendations based on the identified problems of the river transportation.

#### **1.4 Objective**

The purpose of this study is to find out the problems of river transportation in Bangladesh & solution of the problems.

#### **1.5 Summary**

Living in a world which has developed to the point that we are not only associated with roads but also sky routes. In this progressive era, waterways are becoming unvalued and abandoned every single day. Major areas of Bangladesh have waterways. By solving the issues what we have got from our observation can be a helping hand to upgrade the lacking of waterways as we can make use of it to take our country development into a further level.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 General

The literature review is the beginning of a research work and it suggests that most research works are limited to the identification of major types of problems, accidents and causal factors. While doing the research we have considered some key components about this topic. The field survey gives a clear picture of the Problems of River Transportation in Bangladesh.

#### 2.2 Prior Studies

Studied references are mentioned in the following:

**Table 2.1: Prior Studies**

References	Study topic	Remarks
T. Hofer (2006)	Floods in Bangladesh: history, dynamics and re-thinking the role of the Himalayas.	The role of the Himalayas should be reduced in flooding in Bangladesh.
MJA Sarker (2019)	Analysis of port management in Bangladesh: challenges and potentials.	Bangladeshi ports could not ensure profitable progress at the asked position due to risks of poor structure and connectivity, inefficiency, lack of international cooperation, etc.
M.L Rahman(2014)	Circular Water Transport System of Dhaka City: Analysis of Existing Condition, Inherent Problems and Future Prospects.	To make effective transport system both for people and different goods it's necessary to change the circular water transport system of Dhaka city
Z.I Awal (2018)	Some Aspects of Water Transport Accident and Injury Problems in Bangladesh.	In order to prevent accidents and injuries cost-effectively authority needs to train the agents.

## 2.3 Score

**Table 2.2: Rating of Remarks**

<b>Rating</b>	<b>Remarks</b>
5	Strongly agree
4	Agree
3	Neutral
2	Disagree
1	Strongly disagree

## 2.4 Summary

In this chapter, we have discussed about the key features of problems of river transport in Bangladesh. Also on floods, some aspects of water transport accidents and also analysis of port management in Bangladesh. The next chapter deals with the methodology of our research.

# **CHAPTER 3**

## **METHODOLOGY**

### **3.1 General**

The methodology is the guideline of a researcher to conduct the research work. It is a process or strategy that explains the various steps or stages of data collection and defines analytical techniques. However, the proposed criteria in our study are universal and can be applied anywhere in the world.

### **3.2 Criteria**

Total 8 criteria were considered to design survey questions. Those are:

- i. Slow speed of water vessels;
- ii. Too many circular routes;
- iii. Cyclone and storm related problems;
- iv. Discontinuation routes in winter;
- v. Flood problem;
- vi. Navigability problem;
- vii. Insufficient number of ports;
- viii. Unfit vessels.

Each of the criteria was evaluated based on relevant questions.

The questions were close ended and multiple-choice type.

Each question categorized as following 5 level scale.

Excellent = 5, good = 4, average = 3, poor = 2 and very poor = 1.

**Table 3.1: Explanation of Criteria**

Criteria	Question	Explanation
Slow Speed	Slow speed of water vessels (C1)	Moving on water, ships have to face greater resistance. Speed is also decreased for hostile wind or tide of the river. If the drag force, which is the force acting opposite to the relative motion of any object moving with respect to a surrounding fluid, becomes less dominant to the resistance forces then the ship reaches its terminal velocity.
Circuitous Routes	Too many circular routes (C2)	They have to be careful about sand-bed, stones, hills, algae etc. for preventing accidents and as well as from wind flow.
Inclement Weather	Cyclone and storm related problems (C3)	Need to notify the people who will be in the vessels.
Seasonal Characteristics	Discontinuous routes in winter (C4)	Vessels should be moved in the middle of the river. Because the water level falls at the highest rate which causes the travel discontinuation.
Interruption of Service	Flood problem (C5)	Flood causes various damages and disasters and flooded areas have some obstacles too. The city, ports, villages etc. go underwater during the flood and fill up the riverbeds with silt. Moreover, water transport is risky and non-navigable in the flooded area.
Navigability	Navigability problem (C6)	Navigation is an important factor for any water-related transportation. If the river loses its navigability the port as well as the water transports lose their functions.
Insufficient Port	Insufficient number of ports (C7)	Ports are inadequate which is a significant problem. The total waterways can't be utilized properly for the insufficient ports. Transport loading and unloading time of ferry service.
Unfit Vessels	Unfit vessels (C8)	The overall inland water transport situation is worst. So, the vessels should be updated for safe water transport.

### 3.3 Summary

BITWA must identify the issues or factors that can differentiate between a good and poor river environment and also can reduce the sufferings of users.



## **CHAPTER 4**

### **DATA COLLECTION**

#### **4.1 General**

The most time-consuming part of any research project is undoubtedly gathering reliable data. Due to the paucity of authentic data, data collection and preparation are the most arduous stage of the research work. In this study, we have collected our data from different sorts of locations such as port (Shadarghat) and BIWTA.

#### **4.2 Field survey**

The survey locations of the study are :

- (1) Port (Sadar-ghat)
- (2) BIWTA

Total 54 stakeholders interview data were collected and photographs of ghat were captured during survey.



**Figure 4.1: Port(Sadarghat)**



**Figure 4.2: Port(Sadarghat)**



**Figure 4.3: Port(Sadarghat)**



**Figure 4.4: Port(Sadarghat)**



**Figure 4.5: Port(Sadarghat)**

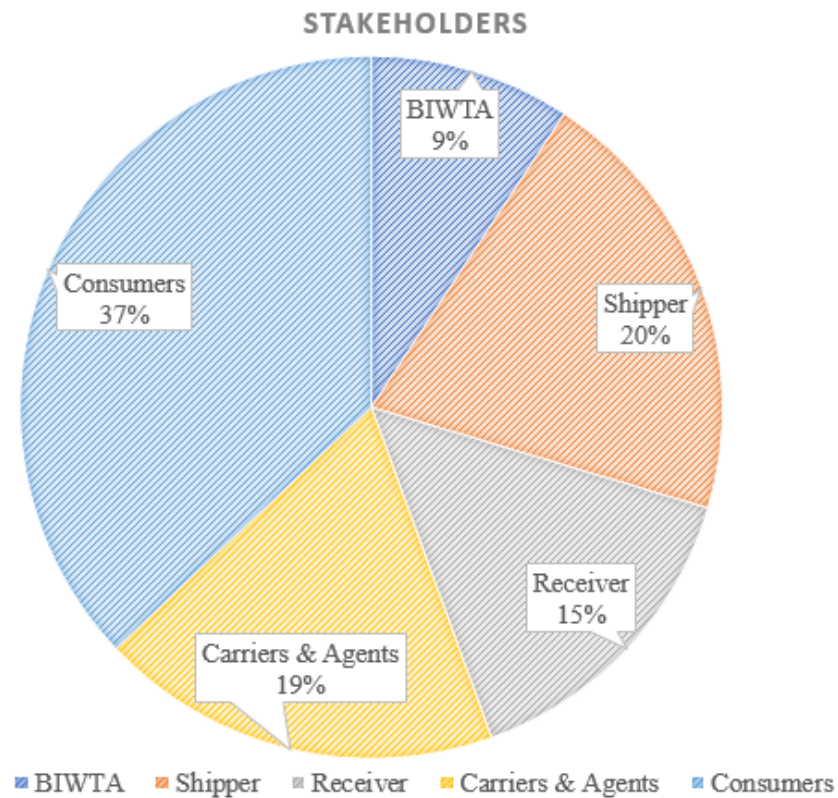


**Figure 4.6: Port(Sadarghat)**



**Figure 4.7: Port(Sadarghat)**

### 4.3 Data



**Figure 4.8: Pie chart of stakeholders**

Just 9% BIWTA members answered, compared to 20% shippers, 15% receivers, 19% carriers and agents, and 37% end users responded.

### 4.4 Summary

This part of the chapter deals with field data collection. In this chapter, we have discussed the responses of the various kind of stakeholders. The next chapter will discuss the data analysis section.

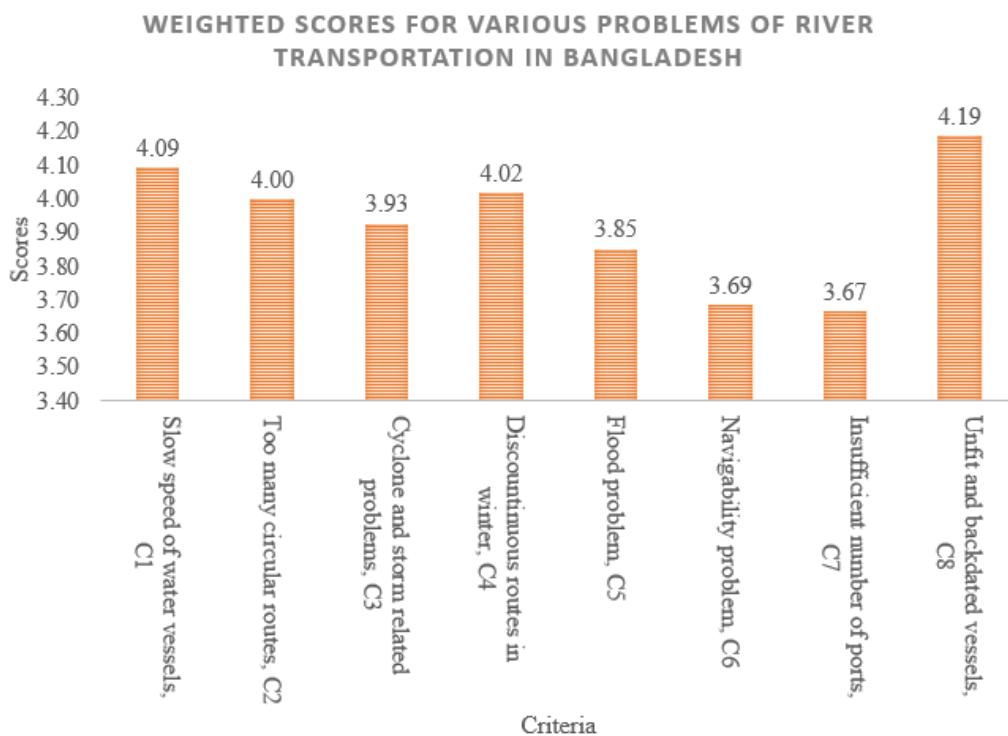
# CHAPTER 5

## DATA ANALYSIS

### 5.1 General

In this part, we are going to brief the proposed criteria which were considered to design the survey we did in port (Sadar-ghat) and BIWTA (Bangladesh Inland Water Transport Authority). It is necessary for BIWTA to identify the measures or criteria which can distinguish a good environment for river transport from a bad one.

### 5.2 Stacked plot

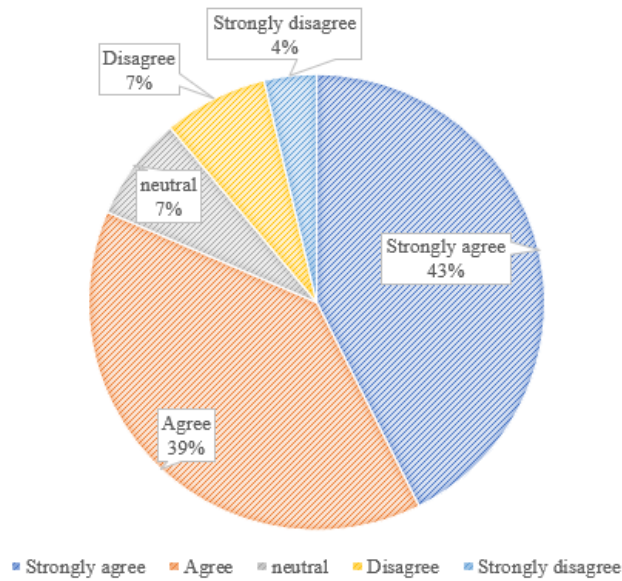


**Figure 5.1: Weighted scores for various problems**

From the survey, we found that the major problem of river transportation in Bangladesh is unfit and backdated vessels. The next problem is slow speed of water vessels. From the graph we can see that the minor problem of river transportation in Bangladesh is insufficient number of ports.

### 5.3 Analysis

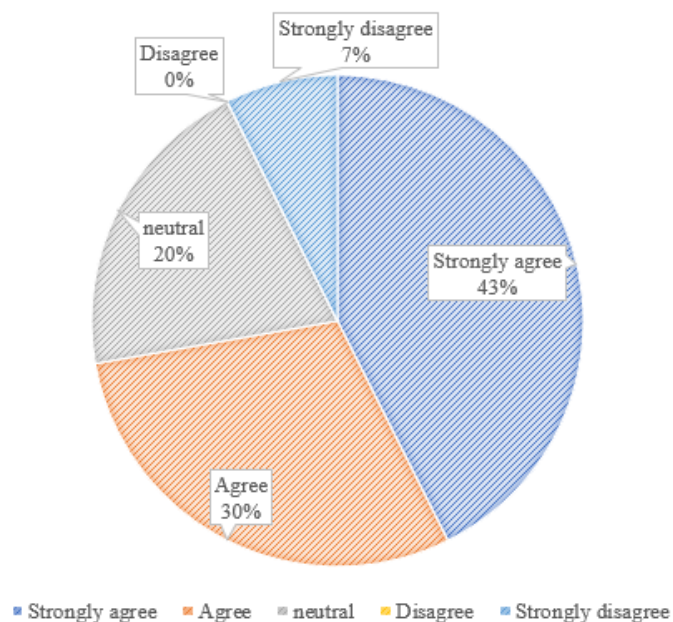
**SLOW SPEED OF WATER VESSELS, C1**



**Figure 5.2: Survey result on slow speed of water vessels**

In slow speed of water vessels (C1), 43% of people have agreed strongly, 39% of people are agree, 7% of neutral, 7% of people are disagree and 4% of people are strongly disagree respectively.

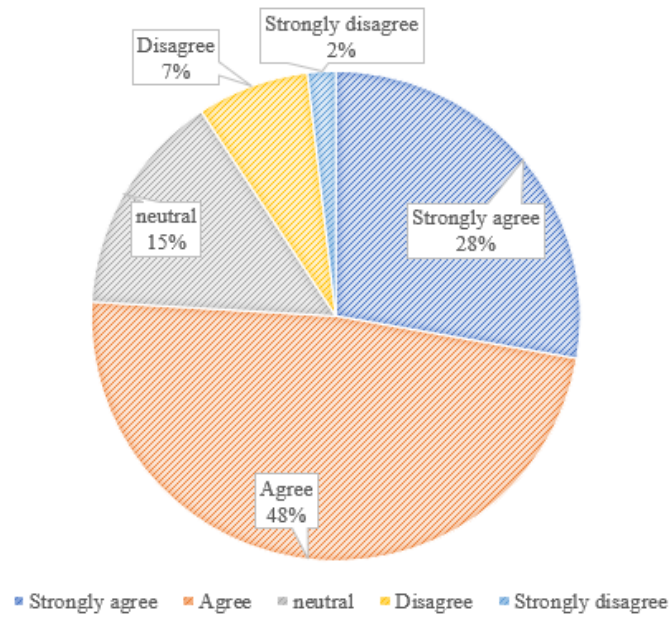
**TOO MANY CIRCULAR ROUTES, C2**



**Figure 5.3: Survey result on too many circular routes**

In slow speed of water vessels (C2), 43% of people are strongly agree, 30% of people are agree, 20% of neutral, 0% of people are disagree and 7% of people are strongly disagree respectively.

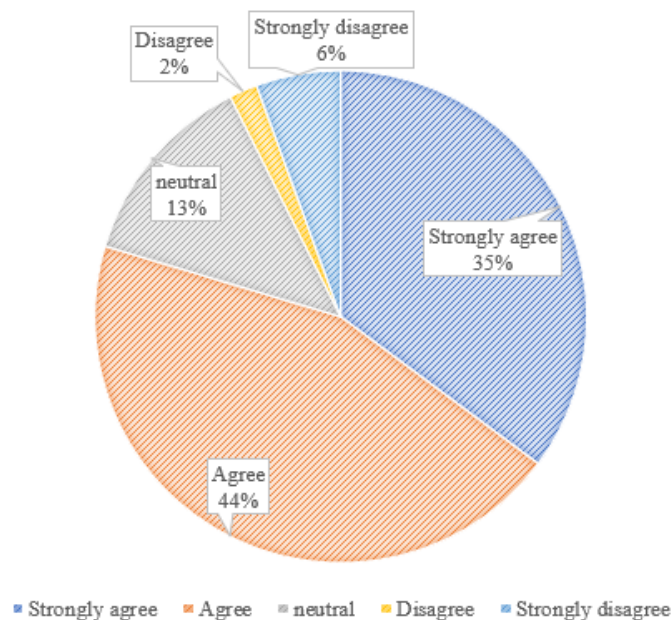
### CYCLONE AND STORM RELATED PROBLEMS, C3



**Figure 5.4: Cyclone and storm related problems**

In Cyclone and storm related problems (C3), 28% of people are strongly agree, 48% of people are agree, 15% of neutral, 7% of people are disagree and 2% of people are strongly disagree respectively.

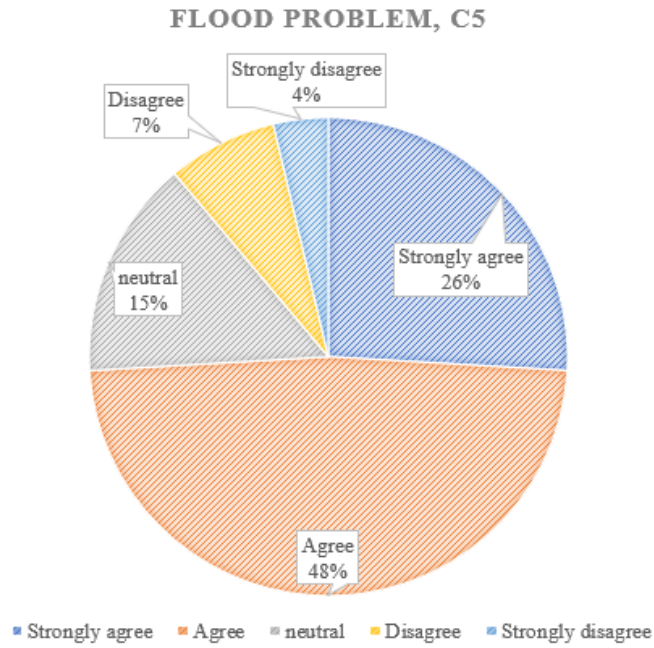
### DISCONTINUOUS ROUTES IN WINTER, C4



**Figure 5.5: Discontinuous routes in winter**

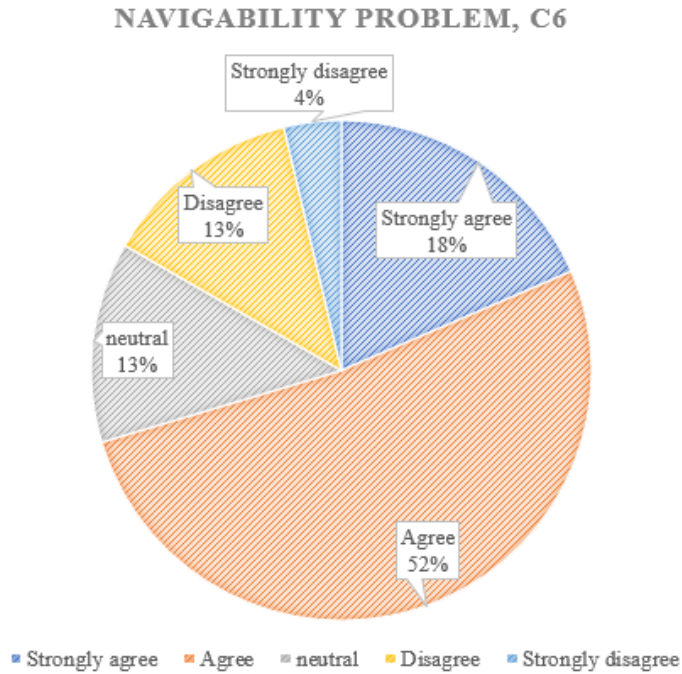
In Discontinuous routes in winter (C4), 35% of people are strongly agree, 44% of people are agree, 13% of neutral, 2% of people are disagree and 6% of people are strongly disagree respectively.





**Figure 5.6: Flood problem**

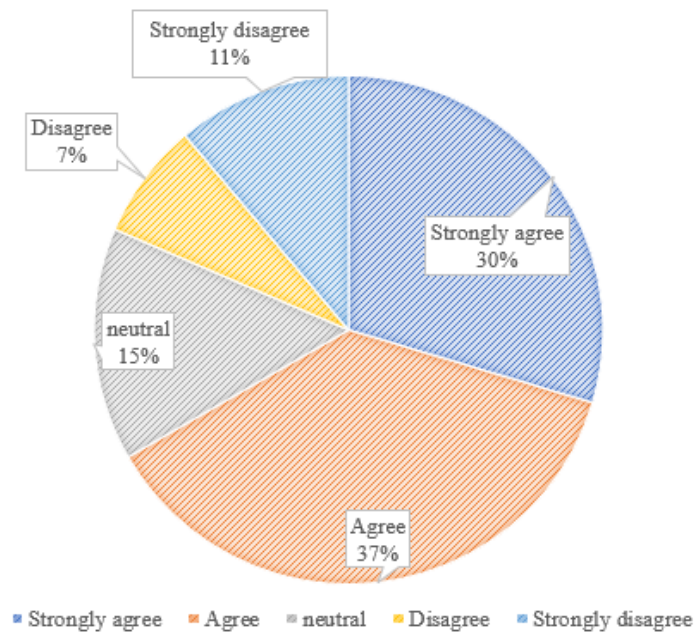
In Flood problem (C5), 26% of people are strongly agree, 48% of people are agree, 15% of neutral, 7% of people are disagree and 4% of people are strongly disagree respectively.



**Figure 5.7: Navigability problem**

In Navigability problem (C6), 18% of people are strongly agree, 52% of people are agree, 13% of neutral, 13% of people are disagree and 4% of people are strongly disagree respectively.

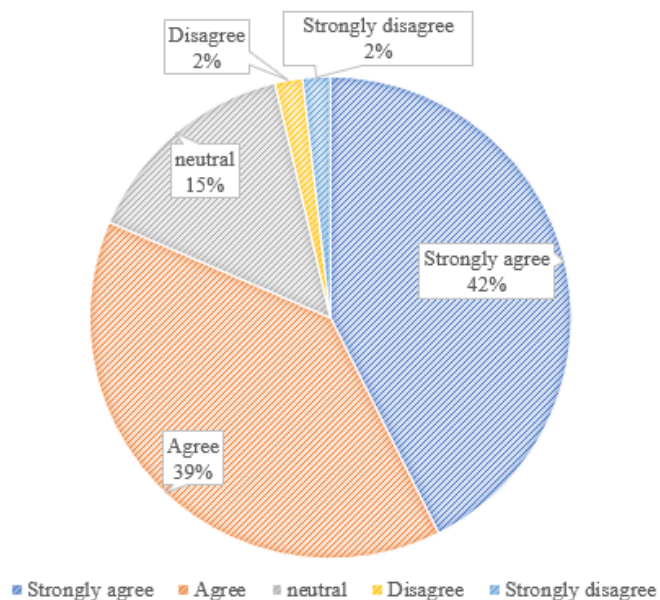
### INSUFFICIENT NUMBER OF PORTS, C7



**Figure 5.8: Insufficient number of ports**

In Insufficient number of ports (C7), 30% of people are strongly agree, 37% of people are agree, 15% of people are neutral, 7% of people are disagree and 11% of people are strongly disagree respectively.

### UNFIT VESSELS, C8



**Figure 5.9: Unfit vessels**

In Unfit vessels (C8), 42% of people are strongly agree, 39% of people are agree, 15% of neutral, 2% of people are disagree and 2% of people are strongly disagree respectively.

**Table 5.1: Score against criteria**

Criteria	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total Score
Slow speed of water vessels, C1	23	21	4	4	2	54
Too many circular routes, C2	23	16	11	0	4	54
Cyclone and storm related problems, C3	15	26	8	4	1	54
Discontinuous routes in winter, C4	19	24	7	1	3	54
Flood problem, C5	14	26	8	4	2	54
Navigability problem, C6	10	28	7	7	2	54
Insufficient number of ports, C7	16	20	8	4	6	54
Unfit vessels, C8	23	21	8	1	1	54

**Table 5.2: Score and Plan**

Criteria	Weighted Score	Rank	Action Plan
Slow speed of water vessels, C1	4.09	2	Immediate action is needed
Too many circular routes, C2	4.00	4	Plan within short term
Cyclone and storm related problems, C3	3.93	5	Plan within short term
Discontinuous routes in winter, C4	4.02	3	Immediate action is needed
Flood problem, C5	3.85	6	Plan within short term
Navigability problem, C6	3.69	7	Plan within short term
Insufficient number of ports, C7	3.67	8	Plan within short term
Unfit vessels, C8	4.19	1	Immediate action is needed

## 5.4 Recommendations

**Table 5.3: Problems and solutions**

Criteria	Specific Problems	Short Term Solution	Long Term Solution
Slow speed of water vessels (C1)	Slow in pace and taking a long time. Unreliable and potentially harmful modes of transportation. However, its infrastructure is woefully inadequate.	Maintaining a regular inspection schedule for boats, fixing any broken ones, and updating their equipment and engines to improve their speed.	Get the latest and greatest ships, and have BIWTA (Bangladesh Inland Water Transport Authority) lay out the rules for operating them).
Too many circular routs (C2)	Challenges with passenger trip distribution, station infrastructure, and limited station access. Inadequate vessel quality and the absence of a well-defined route system.	Provide a ferry service that connects the region to the routes and works to improve the water transportation options in the area.	Help passengers get where they need to go faster by giving them the option of taking a straight path rather than a circuitous one.
Cyclone and storm related problems (C3)	We must immediately halt all water transportation.	In the event of a hurricane or storm, it is imperative that all maritime services be promptly suspended. To add insult to injury, we need to repair or replace our infrastructure.	All water transportation infrastructures must be repaired in accordance with BIWTA (Bangladesh Inland Water Transport Authority) standards before a catastrophe of this sort may occur.

<b>Criteria</b>	<b>Specific Problems</b>	<b>Short Term Solution</b>	<b>Long Term Solution</b>
Discontinuous Routes in winter (C4)	Haze prevents ships from navigating the river's center.	There should be some movement of ships in the center of the river. As the water level drops, transportation stops.	Maintaining continuous navigation in fog is essential. In addition, the ships must be free to maneuver around the river's center.
Flood problem (C5)	A flood may cause a wide range of problems for the transportation industry along the river. As a result, ships can't move freely across the water.	Enhance shipping hubs such as harbors and river ports.	Reviving historic waterways and reestablishing wetland regions, as well as eliminating obstructions.
Navigability problem(C6)	In addition to reducing river flow, diverting water for agriculture may cause siltation, which can make rivers almost impossible to navigate.	The port and river transit will cease to operate if the river is not kept navigable.	"River Information Services," or "RIS" for short, is a crucial piece of technology. It's feasible to improve navigational security and efficacy using this. Every port and water transportation services must be equipped with this technology.

Criteria	Specific Problems	Short Term Solution	Long Term Solution
Insufficient number of ports (C7)	There are not enough machines to handle the cargo, not enough people to run the port, too much red tape, too many unofficial ways of doing things that have been institutionalized, not enough computers, not enough data analytics, etc.	In order to ensure the continued success of Bangladesh's port system, it is crucial that the necessary infrastructure be built and maintained.	A functional port cannot operate without the proper infrastructure being in place. The government of Bangladesh has to invest in modern infrastructure so that the ports can continue operating normally. The primary premise of port administration should be efficiency. For the sake of efficiency at the ports, it is essential to continue with IT deployment, service automation, performance monitoring, etc.
Unfit vessels (C8)	Problems include overcrowding, defective ships, hazardous competition, poor leadership, and inexperienced workers.	There has to be a halt to both overcrowding and the use of inexperienced crew members operating ships.	To prevent any untoward occurrence during the frenzied rush of passengers at launch ports, the government must take stringent steps to control the operation of unsuitable and defective boats, overloading, and provide enough fire safety and lifesaving equipment in each vessel, as per the guidelines of BIWTA (Bangladesh Inland Water Transport Authority).

## 5.5 Summary

This chapter describes the data analysis part of the study. Our study's recommendations and final thoughts are the subject of the following chapter. The next chapter discusses on recommendation and conclusion section of our research.

# CHAPTER 6

## CONCLUSIONS

### 6.1 General

One of the major dilemmas is slow-speed water vessels. Commuting by water vessels is very time-consuming. By improving hull design, increasing engine capability and fuel efficiency, and reducing weight we can improve the performance of the water vessels a lot. We are talking about the largest river port so the pedestrian trip quality criteria vary with geographic locations, demographics trends, funds, people's requirements, and choices that always can't meet the expectation, however, the proposed criteria in our study are universal and can be applied anywhere in the world. Natural disasters can happen at any time in the water path for this we can do something like monitor weather forecasts, secure the vessel, seek shelter or evacuation, and prepare emergency plans and equipment in place.

### 3.2 Findings

Findings of the study is given in the following section:

- i. Slow speed water vessels face the problem of decreased efficiency and increase travel time.
- ii. Traveling in unfit and backdated water vessels can pose safety risks, increase the likelihood of breakdowns and mechanical failures, and lead to a lower-quality travel experience.
- iii. Too many circular routes in water paths can cause delays, increased fuel consumption, and decreased efficiency for water vessels.
- iv. Floods can cause water transport to be temporarily suspended, damage infrastructure and vessels, and pose safety risks to passengers and crew.
- v. Cyclones and storm-related disasters when traveling by water vessels can cause damage to the vessel, pose safety risks to passengers and crew, and disrupt travel schedules.

### 6.3 Limitation

Limitation of this study are:

- BIWTA (Bangladesh Inland Water Transport Authority) didn't like to share their analysis outcome with us student.
- Agent or port representative shared some weightless data that didn't assist with our research.

- As for the owner of the dock of stakeholders standing on top in this field, it's quite difficult to get a chance to talk to them and if we get the opportunity, it's still hard to get any knowledge out of them. Because they are busy and don't think highly of us.
- Navigations turn tough for the duration of the monsoons. The worry of ships sinking is usually a concern. It is a gradual method of transport.

## **6.4 Summary**

It's necessary for civic itineraries and masterminds to identify the conservation cost in rail and road transport is relatively high but conservation cost of water transport is relatively lower. Heavy and big goods can be transported fluently at little cost through water transport. Eventually that's during natural disasters like flood tide and rains, when rail and road transport is disintegrated, relief operations can be operated through water transport.



## REFERENCES

- Awal, Z.I. (2007). A Study on Inland Water Transport Accidents in Bangladesh: Experience of a Decade (1995-2005). *International Journal for Small Craft Technology (IJSCT)*, 149, 35-42.
- Awal, Z.I. and Hoque, M.M. (2008). Some Aspects of Water Transport Accident and Injury Problems in Bangladesh. *Proceedings of the 10th Pacific Regional Science Conference Organisation (PRSCO) Summer Institute (pp. 15-17)*, Dhaka, Bangladesh.
- Hossain, S. (2015). Causes of Sedimentation Problem in Bakkhali River Estuary, Cox's Bazar, Bangladesh. *Asian Journal of Water, Environment and Pollution*, 12(3), 65-69.
- Islam, R., & Rashid, C. K. E. (2015). A brief interpretation of accidents in Bangladesh inland river routes:(An approach from practical point of view).
- Uddin, M.J., & Jeong, Y.K. (2021). Urban river pollution in Bangladesh during last 40 years: potential public health and ecological risk, present policy, and future prospects toward smart water management. *Heliyon*, 7(2), e06107.
- Akter, R., Alam, M.T., & Tasnim, S. Problems and Prospects of Mongla Seaport in Bangladesh.
- Hossain, S. (2015). Causes of Sedimentation Problem in Bakkhali River Estuary, Cox's Bazar, Bangladesh. *Asian Journal of Water, Environment and Pollution*, 12(3), 65-69.
- Chowdhury, A.S. (2005). *Waterway Accident Characteristics Assessment and Information System Development (M. Engg. Thesis)*, Department of Civil Engineering, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh.
- Hossain, M.T., Awal, Z.I., & Das, S. (2014). A Study on the Accidents of Inland Water Transport in Bangladesh: The Transportation System and Contact Type Accidents. *Journal of Transport System Engineering*, 1(1), 23-32.

# SURVEY FORM

I. Speed of water transport is slow.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

II. The river transports have to travel a lot of circular routes.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

III. Natural calamities such as storm, cyclone, hurricane, frost etc creates a great impact on water transportation.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

IV. The character of water transport is changed in different season. In the rainy season the transportation flow is smooth and minimizes the distance of destination. But in winter season the water level falls at a highest rate which causes the travel discontinued.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

V. Flood causes various damages and disasters and flooded area have some obstacles.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

VI. River loss its navigability the port as well as the water transports loss its functions.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

VII. The total waterway can't be utilized properly for insufficient and inadequate number of ports.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

VIII. Most of the transports are backdated, lower quality and unfit to use.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

## APPENDIX

Raw data

<b>Slow speed of water vessels, C1</b>	<b>Too many circular routes, C2</b>	<b>Cyclone and storm related problem, C3</b>	<b>Dis-continuous routes in winter, C4</b>	<b>Flood problem, C5</b>	<b>Navigability problem, C6</b>	<b>In-sufficient number of ports, C7</b>	<b>Unfit and backdated vessels, C8</b>
Agree	Strongly agree	Strongly agree	Agree	Agree	Agree	Strongly agree	Strongly agree
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Agree	neutral
Strongly agree	Strongly agree	Agree	Strongly agree	Agree	Agree	Strongly agree	neutral
Strongly agree	Strongly agree	Strongly agree	Agree	Agree	Agree	neutral	Agree
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Agree	neutral	neutral	Strongly agree
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Agree	Strongly agree	Strongly agree	Agree
Strongly agree	Strongly agree	Strongly agree	Agree	neutral	Agree	Strongly agree	neutral
Strongly agree	neutral	Agree	neutral	Agree	Disagree	neutral	Agree
Strongly agree	Strongly agree	Strongly agree	Strongly agree	Agree	Agree	neutral	Agree
Disagree	neutral	Agree	Strongly agree	neutral	neutral	Agree	neutral
Strongly agree	Strongly agree	Agree	Strongly agree	Agree	Agree	Strongly agree	Agree
Agree	neutral	Agree	Agree	neutral	Disagree	Disagree	Agree
Agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree	Strongly agree

<b>Slow speed of water vessels, C1</b>	<b>Too many circular routes, C2</b>	<b>Cyclone and storm related problem, C3</b>	<b>Dis-continuous routes in winter, C4</b>	<b>Flood problem, C5</b>	<b>Navigability problem, C6</b>	<b>In-sufficient number of ports, C7</b>	<b>Unfit and backdated vessels, C8</b>
Strongly disagree	neutral	Strongly agree	Strongly agree	Agree	Disagree	Agree	Agree
Strongly agree	Strongly agree	Agree	Strongly agree	Agree	Strongly agree	Agree	Agree
Agree	neutral	neutral	Strongly agree	neutral	neutral	Strongly agree	Strongly agree
Strongly agree	Strongly agree	Agree	Strongly agree	Agree	Agree	Strongly agree	Agree
neutral	Strongly agree	Agree	Strongly agree	Agree	Agree	neutral	Agree
Strongly agree	Strongly agree	Strongly agree	Agree	Agree	Strongly agree	Strongly agree	Strongly agree
Disagree	neutral	Agree	Strongly agree	neutral	neutral	Agree	neutral
Agree	Agree	Strongly agree	neutral	neutral	Agree	Agree	Agree
Strongly agree	Strongly agree	Agree	Strongly agree	Agree	Agree	Disagree	Agree
Agree	neutral	Agree	Agree	Disagree	neutral	Agree	Agree
Agree	neutral	neutral	neutral	Agree	Agree	neutral	Agree
Strongly agree	Agree	neutral	neutral	Agree	Agree	neutral	neutral
Agree	Strongly agree	Agree	Agree	neutral	Agree	Agree	Agree
Disagree	Strongly agree	neutral	Agree	Agree	Agree	Agree	Strongly agree
Agree	Agree	Agree	Agree	Strongly agree	Agree	Agree	Strongly agree

<b>Slow speed of water vessels, C1</b>	<b>Too many circular routes, C2</b>	<b>Cyclone and storm related problem, C3</b>	<b>Dis-continuous routes in winter, C4</b>	<b>Flood problem, C5</b>	<b>Navigability problem, C6</b>	<b>In-sufficient number of ports, C7</b>	<b>Unfit and backdated vessels, C8</b>
Agree	Agree	Agree	Agree	Strongly agree	Strongly agree	Agree	Strongly agree
Agree	Strongly agree	Agree	Agree	Agree	Strongly agree	Agree	Strongly agree
Agree	Agree	Agree	Agree	Strongly agree	Agree	Agree	Strongly agree
Strongly agree	Agree	Strongly agree	Agree	Agree	Strongly agree	Agree	Strongly agree
Strongly agree	Agree	Agree	Agree	Agree	Agree	Strongly agree	Strongly agree
Agree	Agree	Agree	Strongly agree	Strongly agree	Agree	Strongly agree	Strongly agree
Agree	Agree	Agree	Agree	Strongly agree	Agree	Strongly agree	Strongly agree
Strongly agree	Agree	Agree	Agree	Agree	Agree	Agree	Strongly agree
Agree	Agree	Agree	Agree	Agree	Agree	Strongly agree	Strongly agree
Agree	Agree	Agree	Agree	Agree	Agree	Agree	Strongly agree
Agree	Agree	Strongly agree	Agree	Strongly agree	Agree	Agree	Strongly agree
Agree	Agree	Agree	Agree	Strongly agree	Agree	Agree	Strongly agree
Agree	Agree	Agree	Agree	Strongly agree	Agree	Agree	Strongly agree
Agree	neutral	neutral	Strongly disagree	Strongly agree	Strongly agree	Agree	Disagree
Strongly	Strongly	Strongly	Strongly	Strongly	neutral	Strongly	Agree

agree	disagree	disagree	disagree	agree		disagree	
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<b>Slow speed of water vessels, C1</b>	<b>Too many circular routes, C2</b>	<b>Cyclone and storm related problem, C3</b>	<b>Dis-continuous routes in winter, C4</b>	<b>Flood problem, C5</b>	<b>Navigability problem, C6</b>	<b>In-sufficient number of ports, C7</b>	<b>Unfit and backdated vessels, C8</b>
Agree	Strongly agree	Strongly agree	neutral	Strongly disagree	Disagree	Strongly disagree	neutral
Disagree	Strongly disagree	Disagree	Strongly disagree	Agree	Disagree	neutral	Strongly agree
Disagree	Strongly disagree	Strongly agree	Strongly agree	Disagree	Agree	Strongly agree	Strongly agree
Strongly disagree	Strongly agree	Agree	Strongly agree	neutral	neutral	Strongly disagree	neutral
Strongly agree	Strongly agree	neutral	neutral	Agree	Agree	Disagree	Agree
neutral	neutral	Disagree	Disagree	neutral	Strongly disagree	Strongly disagree	Agree
Strongly agree	Strongly agree	neutral	Strongly agree	Agree	Disagree	Strongly agree	neutral
Strongly agree	neutral	Disagree	Agree	Strongly agree	neutral	Strongly disagree	Strongly disagree
Strongly agree	Agree	neutral	neutral	Disagree	Strongly disagree	Disagree	Agree
Strongly agree	Strongly disagree	Agree	Agree	Strongly agree	Disagree	Strongly disagree	Agree
neutral	neutral	Disagree	Strongly agree	Strongly disagree	Strongly agree	Strongly agree	Strongly agree