



Insights into Passenger Vessel Accidents and Casualties in Bangladesh: A Characteristics Analysis

Mir Tareque Ali¹, Md. Imran Uddin^{2,*}, Zobair Ibn Awal³

ARTICLE INFO

Article history:

Received 28 Apr 2025;
in revised from 01 Aug 2025;
accepted 05 Sep 2025.

Keywords:

Maritime safety, Passenger vessel,
Accidents, Bangladesh.

ABSTRACT

The maritime safety of Bangladesh is significantly deteriorating due to recurrent passenger vessel accidents. This study is aimed to perform a comprehensive characteristics analysis of passenger vessel accidents during 2008 to 2022. The accident data is collected from Department of Shipping and Bangladesh Inland Water Transport Authority. The analysis is performed by using Microsoft Excel and Geographical Information System (GIS) software, and the results are presented in graphical forms. The annual and month-wise distribution of accidents, accident types, involved vessel types, distribution of fatalities based on types of foundered vessels, location, and temporal distribution of accidents are analyzed in this study. The results indicate that accidents involving passenger vessels are responsible for 93.9% of overall fatalities due to maritime accidents in Bangladesh. Besides, during only four months i.e. February, March, May and December more than half of total fatalities involving passenger vessel accidents occur. Furthermore, collision is identified as the predominant cause of passenger vessel accidents and fatalities. Additionally, passenger launch is identified as the predominant type of passenger vessel responsible for significant proportion of accidents and fatalities. At the end of the study, several recommendations are proposed those are immensely imperative for mitigation of passenger vessel accidents in Bangladesh.

© SEECMAR | All rights reserved

1. Introduction.

Bangladesh is blessed with bountiful rivers and canals forming a marvelous inland water transport that allows contented and cheaper transportation of passengers and freights. Almost 12.3% area of this developing nation is comprised of water bodies (Central Intelligence Agency, 2025). More than 750 rivers have crisscrossed the entire country forming a marvelous inland water transport system (Bangladesh Water Development Board, 2023). Most of the people of this developing country have been using this cheaper mode of transportation for a

long time. Besides, this potential mode of transport considerably contributes to national GDP as well (Bangladesh Bureau of Statistics, 2023). Table 1 presents the classification of inland waterway routes of Bangladesh.

Table 1: Classification of inland waterway routes of Bangladesh.

Name of Route	Minimum Depth	Minimum Vertical Clearance	Minimum Horizontal Clearance	Length of Route (Percentage)
Class-I	3.66 m	18.30 m	76.22 m	683 km (11.39%)
Class-II	2.13 m	12.20 m	76.22 m	1027 km (17.13%)
Class-III	1.52 m	7.62 m	30.48 m	1885 km (31.44%)
Class-IV	Less than 1.52 m	5.00 m	20.00 m	2400 km (40.04%)
<i>Total</i>				<i>5995 km (100%)</i>

Source: Bangladesh Inland Water Transport Authority, 2024.

¹Department of Naval Architecture and Marine Engineering, Bangladesh University of Engineering and Technology (BUET).

²Accident Research Institute (ARI), Bangladesh University of Engineering and Technology (BUET).

³Department of Naval Architecture and Marine Engineering, Bangladesh University of Engineering and Technology (BUET).

*Corresponding author: Md. Imran Uddin. E-mail Address: mdimran.buet@gmail.com.

For a densely populated country like Bangladesh, water-

ways have the potential to significantly meet transportation demands. Unfortunately, this economical mode of transportation has long been neglected. In addition, recurrent accidents in the inland waterways are deteriorating the maritime safety situation of the country. These accidents have also led to substantial number of casualties sharing a greater proportion of fatalities. At times the death toll due to a single accident becomes so high that it grabs the attention of global community as well. A study by Rahman (2017) stated that major proportion of fatalities due to maritime accidents in Bangladesh is caused by the involvement of the passenger vessels. After every accident, the government forms a maritime accident investigation committee to identify the root causes and implement some measures to mitigate those accidents in future. However, the accidents in the inland waterways always remain as an unmitigable problem till now. It should be noted that the percentage of unregistered vessels among the overall vessels are 85% that has been creating crucial challenges and disorders in the inland waterways of Bangladesh (Hasan, 2023). According to Inland Shipping ordinance, 1976 of Bangladesh, it is permitted that mechanized vessels having a maximum engine power of 16 Horse Power do not need registration (Ministry of Laws, 2024). This is the main reason for movement of huge number of unregistered vessels in the inland waterways. It is worth mentioning that these unregistered vessels are not surveyed at all. Moreover, life-saving appliances are not present inside these vessels, and they are also operated by unqualified masters and crews. In many cases, it is seen that these vessels collide with the registered vessels leading to disastrous accidents. Table 2 presents the number of different types of registered inland vessels in Bangladesh.

Table 2: Number of different types of registered inland vessels in Bangladesh.

Type of inland vessel/boat	Number
Passenger launch	857
Passenger trawler/boat	549
Cargo ship	3,744
Oil Tanker	390
Sand carrier	6,379
Dredger	1,796
Cargo trawler/boat	1,212
Barge	544
Tug boat	179
Speed boat	1,003
Ferry	46
Work boat	137
Inspection boat	26
Tourist launch	10
Others	96
<i>Total</i>	<i>16,968</i>

Source: Department of Shipping, 2023.

It has often been observed that accidents involving a single passenger vessel can be so catastrophic that the death toll reaches several hundred. Apart from the types of passenger ves-

sels outlined in Table 2, it must be mentioned here that some passenger launches have very poor design features those are prone to significant damage leading to substantial casualties after an accident. These are known as ‘sunken deck’ type launch. These launches have no watertight integrity due to lack of watertight compartments. Unfortunately, these vessels are still being allowed to ply on the waterways despite the nation has experienced many disastrous accidents involving that type of vessel. Furthermore, the sand carrying trawlers, locally known as bulkhead’ in Bangladesh, have been posing serious threats to the passenger vessels. These vessels mostly ply in overloaded condition and do not have proper lighting systems.

This study is focused on performing a comprehensive characteristics analysis of passenger vessel accidents in the inland waterways of Bangladesh for the period of 2008 to 2022. During these 15 years, 174 accidents involving passenger vessels have occurred leading to 1957 casualties, specifically loss of 1319 lives, 361 injuries and 277 missing. It is also crucial to note that absence of standard and timely search and rescue operation after the accidents could be termed as a vital contributory factor behind such huge toll of casualties. The annual and month-wise distribution of accidents, accident types, involved vessel types, distribution of fatalities based on types of foundered vessels, location, and temporal distribution of accidents are analyzed in this study. This will lead to point out a number of key research findings which will help the stakeholders of maritime sector of the country to comprehend the pattern and trend of passenger vessel accidents. Besides, the pragmatic recommendations of the study will also assist them in undertaking effective steps or initiatives to mitigate the accidents involving passenger vessels, and thus improving the overall maritime safety scenario of this developing country.

2. Literature Review.

There have been a few studies addressing the maritime safety scenario of Bangladesh. Furthermore, the specific investigations devoted solely to the analysis of passenger vessel accidents and safety has been more limited as well. In a study by Khalil (1985) it is mentioned that many inland motor-propelled passenger launches of Bangladesh founder at the middle of the river mainly due to faulty construction. Islam (1997) stated that the passenger vessel accidents of Bangladesh cannot be exclusively attributed to the stability or design issue of the vessels, rather the problem is socio-economic in nature. A study by Huq and Dewan (2003) revealed that passenger launches carry commercial cargo and goods along with the passengers in the upper deck that makes the launch highly unstable. Besides, lack of safety awareness by the passengers, and improper monitoring by the enforcement authorities are essentially responsible for overloading issues. Iqbal et al. (2008a) investigated the adverse weather conditions and overloading related safety issues by analyzing the water transport accidents during the period of 1981 to 2005. In another study, Iqbal et al. (2008b) proposed the idea of addition of entirely enclosed inflatable lifting bags under the rigid fender of the passenger ship as a probable cost-effective design modification aimed at improvement of the de-

sign by increasing the ship restoring moment at large heeling angles by providing an additional reserve of buoyancy above the waterline. A study by Azad (2009) mentioned that majority of passenger vessel accidents in Bangladesh are associated with the collision where unskilled vessel operators, adverse weather and machinery breakdown are responsible. Rahman and Rosli (2014) proposed the concept of the elevator operation as a design solution to mitigate the overloading problem of passenger vessels in Bangladesh. An investigation by Rahman (2017) revealed that almost 35% of accidents involving the passenger vessels occur during the months of March to May when the violent nor'wester lashes the country frequently. Rashid and Islam (2022) recommended two major aspects to improve the safety of passenger vessel operation in Bangladesh; one is the institutional reformation, and the other is the improvement of design and engineering features of the vessels. Recently, Uddin and Awal (2020), and Uddin (2019) applied Systems Theoretic Process Analysis (STPA) method to identify the Unsafe Control Actions (UCA) and causal factors those are responsible for passenger vessel accidents in Bangladesh.

From the above discussion, it can be said that very limited studies were carried out on analyzing passenger vessel accidents, and associated safety issues. However, no recent study is found on investigation of characteristics or pattern of accidents involving passenger vessels. In this regard, this study will perform a comprehensive characteristics analysis of passenger vessel accidents and casualties in the inland waterways of Bangladesh.

3. Data Collection and Methodology.

A significant part of this study has been to accumulate accident data of passenger vessel accidents in the inland waterways of Bangladesh. There are only two authentic sources of maritime accident data in Bangladesh; the Department of Shipping, and Bangladesh Inland Water Transport Authority (BIWTA). The accident data of this study has been collected from these two organizations. However, it has been observed that presently these two organizations do not maintain any standard database and as such it was very difficult to extract technical data from the information mentioned in the reports of the organizations. There is a prioritization of legal information than the technical information in those reports. As a result, a significant portion of time of this study has been devoted to sorting the technical information. The accident data of 2008 to 2022 has been accumulated for this study. 174 accidents involving passenger vessels are selected for analysis out of 379 overall inland water transport accidents. Then the characteristics analysis is carried out to identify different features of the passenger vessel accidents in the inland waterways of Bangladesh. The accident data is analyzed using the Microsoft Excel and GIS software, and the results are presented in graphical forms.

4. Analysis of Accidents.

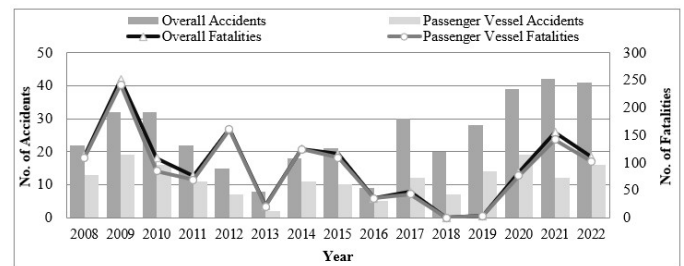
This section presents the characteristics analysis of the accidents involving the passenger vessels in the inland waterways

of Bangladesh. The annual and month-wise distribution of accidents, types of accidents, involvement of vessel types, distribution of fatalities based on types of foundered vessels, location and temporal distribution of accidents are analyzed to reveal the contemporary scenario of passenger vessel safety.

4.1. Annual Distribution of Accidents and Fatalities.

The annual distributions of overall accidents and passenger vessel accidents during 2008 to 2022 are illustrated in Figure 1. The number of accidents, and fatalities are plotted on the primary vertical axis, and secondary vertical axis respectively. It is seen that the number of annual overall accidents is higher during recent years i.e. during 2020 to 2022, which is a matter of great concern. The number of passenger vessel accidents was considerable during 2008 to 2010, although, the numbers were comparatively lower during the period of 2011 to 2018. However, in recent years i.e. during the 2019 to 2022, the number of passenger vessel accidents has shown a rising trend.

Figure 1: Annual distribution of number of accidents and fatalities due to overall accidents and passenger vessel accidents.



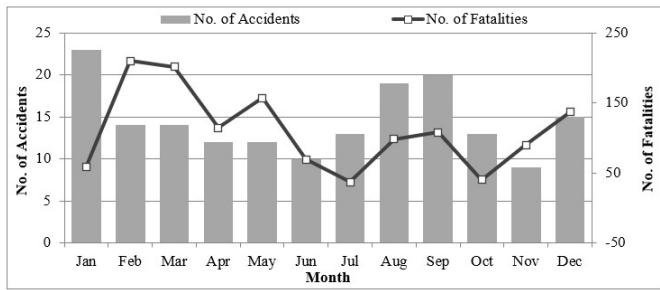
Source: Authors.

It is also evident that the trend of fatalities involving overall accidents and passenger vessel accidents almost coincides with each other. Considering the overall death toll during these 15 years period, it is found that almost 93.9% of overall fatalities is shared by the fatalities due to passenger vessel accidents. It indicates the devastating consequence of passenger vessel accidents in Bangladesh. Therefore, immediate steps should be taken to stop this huge death toll by mitigating passenger vessel accidents that will ultimately improve the overall maritime safety scenario of this developing nation.

4.2. Month-wise Distribution of Accidents and Fatalities.

Figure 2 illustrates the month-wise distribution of number of accidents and fatalities involving the passenger vessels during 2008 to 2022. It is obvious that the number of passenger vessel accidents remain higher during January, August and September. However, the number of fatalities is significantly higher during February, March, May and December. The analysis revealed that more than 53.4% fatalities caused by the passenger vessel accidents have occurred during these four months which is a vital issue. It indicates that during the rest eight months of the year only 46.6% of fatalities take place.

Figure 2: Month-wise distribution of number of passenger vessel accidents and fatalities.

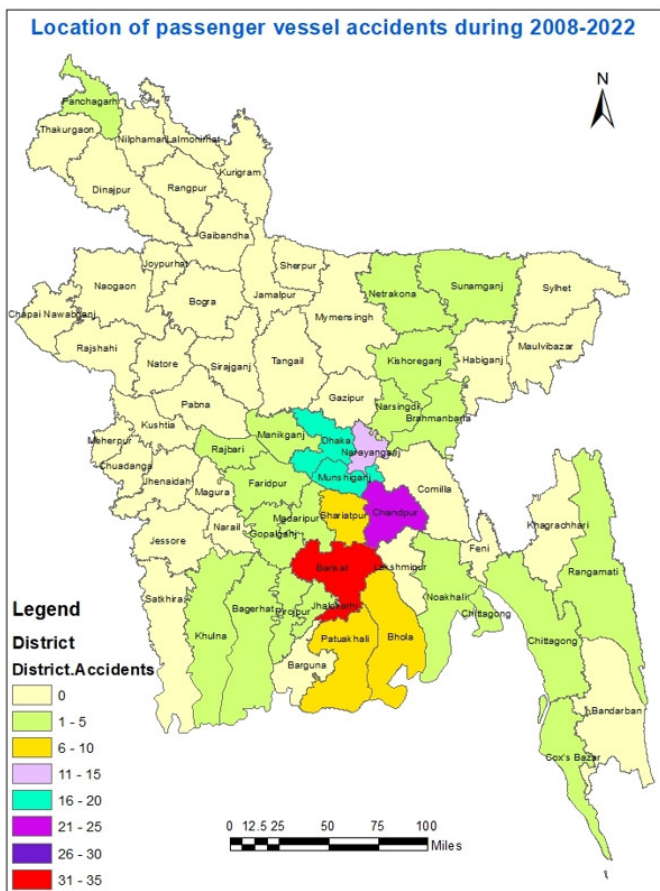


Source: Authors.

4.3. Location of Accidents.

The district-wise distribution of the number of passenger vessel accidents is illustrated in Figure 3.

Figure 3: District-wise distribution of number of passenger vessel accidents.



Source: Authors.

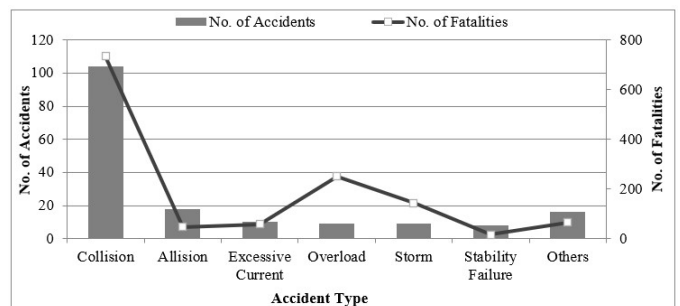
The image is generated by using the Geographic Information System (GIS) software. The data shows that among 64 districts of Bangladesh, passenger vessel accidents occur within waterway areas of 27 districts. It is found that most of the accidents occur in the waterway zones of the districts of Dhaka,

Narayanganj, Munshiganj, Chandpur, Shariatpur and Barisal. Almost 63.2% accidents by the passenger vessels occur within the waterway zones of these six districts. It is worth mentioning that these districts are located in the renowned and busiest waterway route of the country named Dhaka to Barisal that connects the Capital city Dhaka with the southern part of the country. Therefore, it is evident that most of the passenger vessel accidents occur within the waterway zone of the districts located in the southern zone of the country. However, in the northern part of the country, the waterway is not so popular due to lack of sufficient navigability of the waterways all over the year, and having better road and railway network.

4.4. Accident Types.

The distributions of number of accidents and fatalities based on the types of the passenger vessel accidents are presented in Figure 4. It is evident that 104 accidents out of 174 accidents, and 735 fatalities out of 1319 fatalities involving passenger vessels occurred due to collision. Obviously, this leading category of accident is responsible for 59.8% accidents and 55.7% fatalities. If types of vessels involving collision are considered, then it is found that 53.8% of collision takes place between passenger vessels and cargo vessels. Besides, collision between two passenger vessels occurs in 43.3% cases. Furthermore, collision between passenger vessels and fishing vessels occurs in 2.9% cases.

Figure 4: Distribution of passenger vessel accidents and fatalities based on accident types.



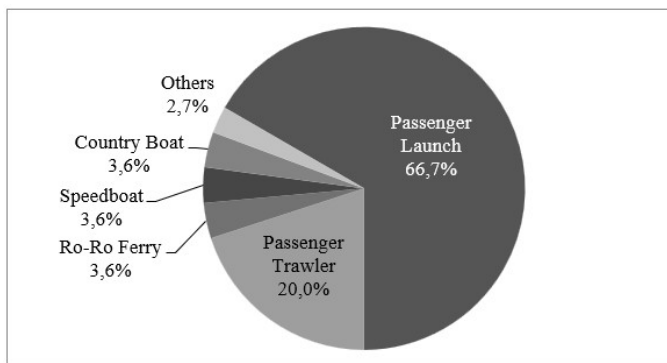
Source: Authors.

Apart from collision of passenger vessels, allision and excessive current are responsible for 18 (10.3%) and 10 (5.7%) accidents respectively. However, these types of accidents share a minor proportion of fatalities. Although, overload and storm have lower proportion of accidents, however, these types of accidents are responsible for 251 (19.0%) and 144 (10.9%) fatalities respectively. Now, if the average fatality per accident ratio is considered for all accident types, then it is observed that these ratios are considerably higher for the accidents due to overload and storm, which stands for 27.9 and 16.0 respectively. The main reason behind such high ratio is that the vessels are foundered after these types of accidents. In addition to that, the search and rescue operation conducted after an inland water transport accident is very poor.

4.5. Types of Passenger Vessels Involved in Accidents.

Figure 5 illustrates the distribution of types of involved passenger vessels in the accidents. It is observed that passenger launches are responsible for 66.7% accidents which is a matter of great concern. It is worth mentioning that majority of the passengers travelling through inland waterways of the country prefers passenger launches which are mostly used for the transportation along the long routes. The passenger carrying capacity of these launches is comparatively higher than the other types of passenger vessels. Therefore, a particular accident involving a passenger launch can be very disastrous which has been experienced in the last few decades. Besides, passenger trawlers are responsible for 20.0% accidents. This type of passenger carrying watercraft is generally designed for traveling shorter distance. Almost every trawler is mechanized, although it does not have proper navigational equipment, and the operators are not well trained as well. Moreover, speedboats, country boats and other types of passenger vessels are responsible for 3.6%, 3.6% and 2.7% accidents respectively.

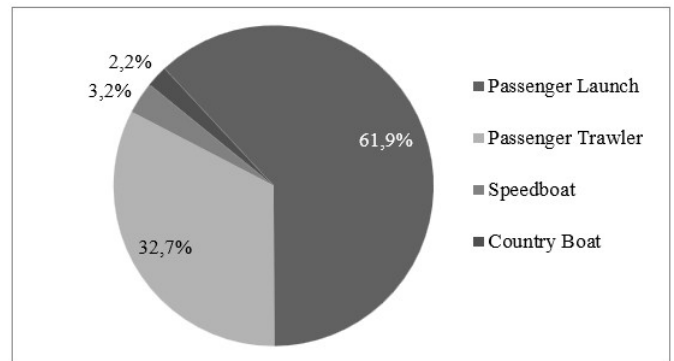
Figure 5: Percentage of types of passenger vessels involved in accidents.



Source: Authors.

During the analysis it is found that the foundering of passenger vessels is responsible for 93.5% fatalities caused by the overall passenger vessel accidents. Therefore, it is very essential to analyze the fatality distribution based on the types of passenger vessels that are foundered. This distribution is illustrated in Figure 6. It is found that the foundering of the passenger launches cause 61.9% of fatalities due to foundering of all passenger vessels. In many times it has been observed that, the accident of a single passenger launch caused the loss of several hundreds of human lives that grabbed the attention of the global community. In addition, the passenger trawler, when foundered, causes the fatalities of 32.7% of fatalities caused by foundering of passenger vessel accidents. Furthermore, the foundering of speedboat and country boats contributes for only 3.2% and 2.2% of fatalities due to foundering of passenger vessel accidents respectively. However, there were no fatalities due to foundering of Ro-Ro ferries and other types of passenger vessels.

Figure 6: Distribution of fatalities based on types of foundered passenger vessels.

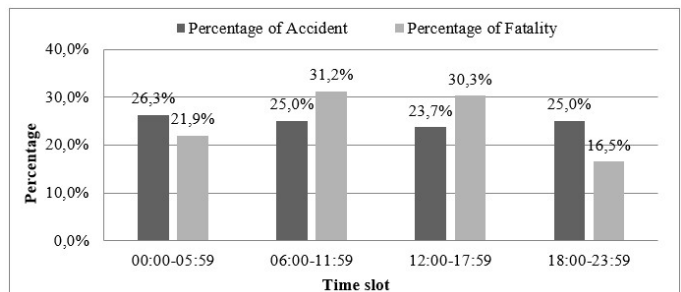


Source: Authors.

4.6. Temporal Distribution of Accidents.

During the analysis it has been found that in almost 10.3% cases, the time of the accident has not been documented in the accident reports by the relevant government authorities. It indicates that the accident reporting or documentation system is poor in Bangladesh. Nevertheless, Figure 7 depicts the temporal distribution of passenger vessel accidents, excluding the unidentified cases. It is observed accidents involving passenger vessels have occurred all round the clock, having nearly one-fourth accidents occur during each of the four time slots. However, the percentage of fatality is higher during the time range of 06:00-11:59 hrs and 12:00-05:59 hrs. To be precise, almost 61.5% fatalities involving passenger vessels occurred during daytime, and the rest 39.5% fatalities occurred during the nighttime.

Figure 7: Temporal distribution of passenger vessel accidents and associated fatalities.



Source: Authors.

5. Concluding Remarks.

This section focuses two aspects: the research findings of the analysis and a number of recommendations that could be helpful to mitigate accidents involving the inland passenger vessels in Bangladesh.

5.1. Research Findings.

The research findings of this study can be summarized as follows:

- Almost 93.9% of overall fatalities are caused by the accidents involving the inland passenger vessels in Bangladesh.
- During the months of February, March, May and December 53.4% fatalities involving passenger vessel accidents occur.
- Collision is the major accident type contributing to almost 59.8% of overall passenger vessel accidents in Bangladesh. Notably, 53.8% of collision takes place between passenger vessels and cargo vessels.
- The fatality per accident ratio is higher for accidents due to overload and storm.
- Passenger launches are solely responsible for 66.7% of the overall accidents caused by the passenger vessels.
- Foundering of passenger vessels after accidents are responsible for 93.5% fatalities caused by the overall passenger vessel accidents. Besides, foundering of the passenger launches cause 61.9% of all fatalities due to foundering of all passenger vessels.
- Almost 63.2% accidents by the passenger vessels occur within the waterway zones of only six districts i.e. Dhaka, Narayanganj, Munshiganj, Chandpur, Shariatpur and Barisal which are within the country's most popular and busiest waterway route called Dhaka to Barisal.
- 61.5% fatalities involving passenger vessels occurred during daytime.
- To mitigate the accidents involving passenger launches and subsequent casualties, the regulatory bodies should ensure that passenger launches are equipped with adequate number of life-saving appliances.
- The current survey system of vessels should be modernized and upgraded to ensure proper fitness of vessels. Furthermore, the unfit passenger vessels must not be allowed to ply on waterway.
- Waterway safety audit should be conducted on the Dhaka to Barisal route to identify potential hazards and safety deficiencies, and relevant safety measures should be taken to mitigate accidents.
- Currently, there is no rule for enforcing the installation of navigational equipment and communication system like GPS, Radar, echo sounder etc. in the wheelhouse of the small-sized vessels. New rules should, therefore, be made to install these vital equipment as mandatory.
- The sand-carrying trawlers are not allowed to operate at night in the inland waterways of Bangladesh. However, it has been observed that these vessels operate all round the clock in overloaded and almost fully submerged condition which poses a high risk of collision with other vessels. Hence, the existing rules should be properly implemented to stop the movement of these vessels at night and to check the loading condition properly.
- The maritime accident data documentation system of this low-income country is very poor due to the absence of any standard database. The relevant government authorities should, therefore, take strong steps to develop a standard maritime accident database that will assist in performing a comprehensive statistical analysis of maritime accidents in Bangladesh.

5.2. Recommendations.

In consideration of the above facts, it is highly indispensable to take immediate measures for mitigating passenger vessel accidents in this developing country. Some pragmatic recommendations to mitigate passenger vessel accidents and, thereby, improve the safety of transportation of inland passenger vessels can be outlined as follows:

- The government of Bangladesh must take initiatives to begin the process of registration of the unregistered vessels.
- The regulatory bodies related to inland water transportation sector of Bangladesh should emphasize on ensuring safety of all passenger vessels. In this regard, proper monitoring and supervisory roles should be performed properly.
- To prevent accidents due to collision, all crews of the vessels i.e. the masters, helmsmen, inland marine engineers, greasers and others should be trained up with proper training programs regularly. Besides, adequate number of navigational aids should be installed on the waterway routes.

References.

- Azad, A. K. (2009) *Riverine Passenger Vessel Disaster in Bangladesh: Options for Mitigation and Safety*. Thesis (Masters), BRAC University, Bangladesh.
- Bangladesh Bureau of Statistics, Gross Domestic Product (GDP) (2023). Available at: https://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/057b0f3b_a9e8_4fde_b3a6_6daec3853586/GDP_2022-23_Final.pdf [Accessed: 1 February 2025].
- Bangladesh Inland Water Transport Authority, About Us (2024). available at: <https://biwta.gov.bd/site/page/aea3e3d9-0e99-4bcd-9330-a0a9961c793c/aboutus>.
- Bangladesh Water Development Board, Rivers of Bangladesh Survey (2023). available at: <https://pani.bwdb.gov.bd/en/page/361> [Accessed: 1 February 2025].
- Central Intelligence Agency, The World Factbook-Bangladesh (2025). Available at: <https://www.cia.gov/the-world-factbook/countries/bangladesh> [Accessed: 1 February 2025].

Department of Shipping, Number of inland ships (2023) Available at: <https://dos.gov.bd/site/page/b21776b6-64b1-4ff4-86bf-92f0eec77e28/-> [Accessed: 1 February 2025].

Hasan, R. (2023). 85pc inland vessels running without licence, *The Daily Star*, 12 April 2023, Available at: <https://www.thedailystar.net/news/bangladesh/news/85pc-inland-vessels-running-without-licence-3294931> [Accessed: 1 February 2025].

Huq, N. A. and Dewan, A. M. (2003) Launch Disaster in Bangladesh: A Geographical Study, *Geografia*, 1 (2), 14-25.

Iqbal, K. S., Bulian, G., Hasegawa, K., Karim, M. M., Awal, Z. I. (2008a) A rational analysis of intact stability hazards involving small inland passenger ferries in Bangladesh, *Journal of Marine Science and Technology*, 13 (3), 270-281.

Iqbal, K. S., Bulian, G., Hasegawa, K., Karim, M. M., and Awal, Z. I. (2008b) Possible remedies for intact stability hazards involving contemporary small inland passenger ferries in Bangladesh, *Journal of Marine Science and Technology*, 13 (3), 282-290.

Islam, M. R. (1997) *Techno-economic Analysis Applied to Safety of Inland Passenger Vessels*, Thesis (MSc Engineering), Bangladesh University of Engineering and Technology, Bangladesh.

Khalil, G. M. (1985) A Study of Passenger Vessel Launch Disasters in Bangladesh. *The Journal of NOAMI*, 2 (2), 1-14.

Ministry of laws, Laws of Bangladesh - The Inland Shipping Ordinance-1976 (2024). Available at: <http://bdlaws.min-law.gov.bd/act-531.html> [Accessed: 1 February 2025].

Rahman, N. A. and Rosli, H. Z. (2014) An innovation approach for improving passenger vessels safety level: Overload problem, *International Journal of Business Tourism and Applied Sciences*, 2 (2), 1-14.

Rahman, S. (2017) An analysis of passenger vessel accidents in Bangladesh, *Procedia Engineering*, 194, 284-290.

Rashid, K. and Islam, M. R. (2022) Reasons and remedies of inland passenger vessels accidents in Bangladesh, *American Institute of Physics Conference Proceedings*, AIP Publishing, 1919 (1), p. 020036.

Uddin, M. I. (2019) *Hazard analysis of inland passenger vessel operation in Bangladesh using systems theoretic approach*. Thesis (MSc Engineering), Bangladesh University of Engineering and Technology, Bangladesh.

Uddin, M. I. and Awal, Z. I. (2020) Systems-theoretic approach to safety of inland passenger ship operation in Bangladesh, *Safety Science*, 126, 104629.