Mainstreaming inland waterways into national logistics network: national experience of Bangladesh

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<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
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<tr>
<td>BIWTA</td>
<td>Bangladesh Inland Water Transport Authority</td>
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<tr>
<td>BIWTC</td>
<td>Bangladesh Inland Water Transport Corporation</td>
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<tr>
<td>BRTA</td>
<td>Bangladesh Road Transport Authority</td>
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<tr>
<td>BUET</td>
<td>Bangladesh University of Engineering</td>
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<tr>
<td>DoS</td>
<td>Department of Shipping</td>
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<tr>
<td>ESCAP</td>
<td>Economic and Social Commission for Asia and the Pacific</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GPS</td>
<td>Global Positioning System</td>
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<td>ICD</td>
<td>Inland Container Depot</td>
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<td>ICT</td>
<td>Inland Container Terminal</td>
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<tr>
<td>ILO</td>
<td>International Labour Organization</td>
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<td>IRI</td>
<td>International Roughness Index</td>
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<tr>
<td>IT</td>
<td>Information Technology</td>
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<tr>
<td>IWT</td>
<td>Inland Water Transport</td>
</tr>
<tr>
<td>JICA</td>
<td>Japan International Cooperation Agency</td>
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<tr>
<td>kilometer</td>
<td>km</td>
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<tr>
<td>LCS</td>
<td>Land Customs Stations</td>
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<tr>
<td>LGED</td>
<td>Local Government Engineering Department</td>
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<td>LGI</td>
<td>Local Government Institutions</td>
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<tr>
<td>NAME</td>
<td>Naval Architecture and Marine Engineering</td>
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<tr>
<td>NTP</td>
<td>National Transport Policy</td>
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<tr>
<td>PIWTT</td>
<td>Protocol on Inland Water Transit and Trade</td>
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<tr>
<td>PPP</td>
<td>Public-Private Partnership</td>
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<tr>
<td>RHD</td>
<td>Roads and Highways Department</td>
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<tr>
<td>SDG</td>
<td>Sustainable Development Goals</td>
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<tr>
<td>TEU</td>
<td>Twenty-foot Equivalent Unit</td>
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<td>UN</td>
<td>United Nations</td>
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<td>VAT</td>
<td>Value Added Tax</td>
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Introduction

Background

Bangladesh is a riverine country located in South Asia. It has a border with India on the western and northern sides and most of the eastern side, totaling more than four thousand kilometers (km) in length, making it the fifth-longest in the world (Alamgir, 2021). In addition, there is a short 270-km border with Myanmar on the southeastern side. Bangladesh is bounded by the Bay of Bengal on the south side, with the coastline extending more than 580 km (Islam, 2013). Two of the major rivers – Ganges and Brahmaputra – originated from the Himalayas and flow into the Bay of Bengal. Along with another non-Himalayan river, the Meghna, these two rivers formed one of the largest deltas in the world known as the Ganges-Brahmaputra Delta or the Bengal Delta.

Bangladesh has eight administrative divisions: Dhaka, Chittagong, Khulna, Rajshahi, Sylhet, Mymensingh, Barisal, and Rangpur. The centrally located city, Dhaka, is the capital of the country. With more than 166 million people, Bangladesh is ranked as the 8th populous country in the world (Worldometer, 2021). It covers a land area of 147,570 km², and its density of 1265 people per km² makes it one of the most densely populated countries in the world (World Population Review, 2020). As a war-affected country, Bangladesh struggled initially after gaining independence from Pakistan in 1971. However, it has made tremendous strides in recent times and has been one of the fastest-growing economies globally in the last decade, courtesy of readymade garments exports and well-sustained macroeconomic conditions (World Bank, 2021). The country managed to cut down the poverty level from 44% to 15% in 25 years from 1991. Its status was elevated to a middle-income country in 2015, and it is likely to move out of the cohort of the least developed countries in 2026. To achieve this, Bangladesh needs to sustain its growth rate and boost its exports, ably supported by an efficient and effective logistics and transportation network.

Sustainability has been at the forefront of any development activities worldwide since the beginning of the 21st century. The goal is to go for economic growth, ensuring social inclusiveness and environmental sustainability. In 2015, all the United Nations member states (UN) agreed to the 2030 agenda for sustainable development. The 17 Sustainable Development Goals (SDG) include targets to eradicate poverty and ensure economic growth, decent employment, gender equality, and sustainable cities (United Nations, 2015). Therefore, planning logistics and transportation in any country needs to consider the relevant goals.

This study covers Bangladesh’s logistics and transportation issues, mainly focusing on the Inland Water Transport (IWT) subsector. Bangladesh is renowned for its extensive river network and long coastline. There is a high potential for freight movement through IWT that has not been realized in the past. Given the constraints in road transport and railways, IWT can play a vital role in providing an efficient transportation system and also help achieve sustainable outcomes. The study attempts to cover relevant aspects of logistics, including all the modes involved in the sector, to identify the potentials and limitations of IWT mode compared to other modes and how it can complement them. Some policy recommendations
have been put forward in the end to realize the potentials of the IWT subsector and utilize it to promote economic growth and address equity and other sustainability issues.

**The historical context of the transportation system in Bangladesh**

A historical context is always helpful for understanding the issues faced at present times and taking lessons from the past. The first development in the transportation sector in Bangladesh can be traced back to the period 1540-1545 when a part of the 2,400 km long Grand Trunk Road was built through Bangladesh (Khan, 1982). It is one of the oldest roads in Asia, connecting the Indian sub-continent with central Asia. The construction of the road started during the period reigned by the Mughal emperor, Sher Shah Suri. The road underwent reconstruction and realignment many times between 1833 and 1860 when Bangladesh was ruled by the British. In the initial period, movement on this road was primarily done on foot, bullock carts, and horses. A limited number of private cars, owned mainly by the Nawab family, started to ply on the roads of Dhaka from the early twentieth century.

Almost the entire railway network of Bangladesh was built in the British period, starting with a 53-km long broad-gauge track between Darsana and Jagati, on the western part of the country, in 1862. Bangladesh inherited about 2858-km routes (Bangladesh Railway, 2020). However, the total route length reduced to 2,656 km in 2006. There were many limitations of the inherited network. Many projects have been undertaken since the 2010s, but most of them are yet to finish. At present, the route length of the railway stands at 2,885 kilometers.

At the time of independence in 1971, Bangladesh had one international airport in Dhaka and a few domestic airports in cities like Chattogram, Sylhet, Saidpur, and Jashore (CAAB, 2021). The Dhaka airport was later relocated to a new larger site in 1980, and the airports at Chittagong and Sylhet were upgraded to international status later. A few airports have also been added for domestic flight operations since then, and presently there are eight domestic airports in operation.

Bangladesh has about 24,000 km-long waterways, including rivers, streams, and canals. They cover around 7% of the land area of the country (Guda, 2018). However, a much smaller segment of the waterways is available for navigational purposes both in monsoon and dry seasons. Steam navigation in inland waterways started in the mid-nineteenth century with passenger services between Kolkata and erstwhile East Bengal (Bangladesh). Inland Water Transport (IWT) is one of three key modes for freight movement in Bangladesh. In four decades since the 70s, Bangladesh has given importance to the road sector by allocating more funds and institutional strengthening. As a result, the share of freight transportation for the roadways benefitted at the expense of railways and waterways.
Table 1.1: Share of fund allocations (in percentage) for transportation subsectors in two and five-year plans of Bangladesh, 1973-2025

<table>
<thead>
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<tbody>
<tr>
<td>Road</td>
<td>28.36</td>
<td>37.51</td>
<td>31.80</td>
<td>42.30</td>
<td>66.42</td>
<td>74.46</td>
<td>58.68</td>
<td>70.7</td>
<td>48.5</td>
</tr>
<tr>
<td>Rail</td>
<td>23.91</td>
<td>27.35</td>
<td>32.14</td>
<td>29.83</td>
<td>17.06</td>
<td>16.08</td>
<td>21.82</td>
<td>23.5</td>
<td>30.4</td>
</tr>
<tr>
<td>Water</td>
<td>35.30</td>
<td>24.41</td>
<td>24.63</td>
<td>20.38</td>
<td>13.07</td>
<td>5.32</td>
<td>12.53</td>
<td>4.2</td>
<td>17.4</td>
</tr>
<tr>
<td>Air</td>
<td>12.44</td>
<td>10.73</td>
<td>11.44</td>
<td>7.49</td>
<td>3.45</td>
<td>4.14</td>
<td>6.96</td>
<td>1.6</td>
<td>3.7</td>
</tr>
<tr>
<td>Total allocation for all modes (billion taka)</td>
<td>5.28</td>
<td>4.50</td>
<td>12.86</td>
<td>28.02</td>
<td>52.17</td>
<td>24.79</td>
<td>107.71</td>
<td>1658.7</td>
<td>3050.4</td>
</tr>
<tr>
<td>Sector allocation as % of total public sector outlay</td>
<td>11.65</td>
<td>13.79</td>
<td>11.59</td>
<td>12.01</td>
<td>16.50</td>
<td>18.81</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>


Table 1.1 shows the share of fund allocation for four transportation subsectors – road, rail, water and air in five and two-year periods from 1973 to 2025. It can be observed that the share of allocation for the road subsector increased from 28.36% to 58.68% between 1973-78 and 1997-2002, while it decreased from 35.30% to 12.53% for the water subsector in the same period. Under-investment in the IWT subsector in the past has led to its limited role at present. The modal share of IWT for both passenger and freight transportation decreased between 1975 and 2019 (Table 1.2). The reduction was more pronounced for freight transportation, as the modal share shrank to 6 percent in 2019 from 37 percent in 1975. The share of fund allocation for the IWT subsector has increased in the current five-year plan between 2020 and 2025, but it is still less than what it was in the pre-1990 period.

Table 1.2: Modal share for passenger and freight transportation in Bangladesh in selected years between 1975 and 2019

<table>
<thead>
<tr>
<th>Year</th>
<th>Total passenger-km (billion)</th>
<th>Modal share (%)</th>
<th>Total ton-km (billion)</th>
<th>Modal share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger</td>
<td>Freight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total passenger-km</td>
<td>Road</td>
<td>Rail</td>
<td>IWT</td>
</tr>
<tr>
<td></td>
<td>(billion)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>17</td>
<td>54</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>1985</td>
<td>35</td>
<td>64</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>1989</td>
<td>57</td>
<td>68</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>1997</td>
<td>90</td>
<td>72</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>2005</td>
<td>112</td>
<td>88</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>2019</td>
<td>195</td>
<td>87</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: GED, 2020; World bank (2017); Bangladesh Planning commission, 1997.

Economy and Geography

Transportation development mainly aims to support economic growth and improve accessibility to all parts of a country. For almost two decades since 2000, Bangladesh’s
Bangladesh’s economy has been heavily reliant on the agriculture sector. However, in this period all the sectors grew except agriculture. Bangladesh especially made a mark in the global textile and readymade garments sector. Readymade garments contribute 84 percent to the total export earnings of Bangladesh and employ more than half of the workers engaged in manufacturing (Dappe et al., 2020). It will be challenging to sustain the role played by this sector by depending only on cheaper labor costs. Efficiency in the transportation and logistics system will be a crucial determinant of whether Bangladesh can hold on to its competitive advantage. The country also needs to broaden the range of export items to sustain economic growth. In addition, the agricultural sector needs to be revived to its former position to boost the rural economy and contribute to poverty reduction and equity.

People living in rural areas and women, in general, belong to the marginalized segment of the population in Bangladesh. The rise of the readymade garments industries driven by export demand has enormously impacted women’s social and economic life. In 2018, 60.5 percent of the workers employed in the readymade garments industry were women (ILO, 2019). This has made it possible for women to be self-dependent and raise their prestige and dignity at home and in society. While the readymade garments sector involves women in urban areas who have basically migrated from villages, the handicraft industry has created a number of women entrepreneurs and employment for the women in rural areas. The items under handicrafts produced by these women include goods mostly based on textile, leather, clay, metal, bamboo, cane, wood, stone, and glass and ceramic (Textile Today, 2021). They are produced in small manufacturing entities run only by the owners or through a workforce of 10 to 20 people. The industry employs about 3 million people, and 20 percent of the products are exported. While a countrywide efficient transport system can boost export, improved transport access, primarily through IWT, to rural areas can support the people engaged in the rural economic activities.

The economic activities are not distributed in a balanced way in Bangladesh. Dhaka and Chattogram are the major contributors to economic activities (Dappe et al., 2020). More than half of jobs in the manufacturing sector and less than one-fifth of the service sectors are located in Greater Dhaka and Chattogram metropolitan areas. Almost the entire garment export industries are based in these two areas. Poor transport connections contribute to other areas of Bangladesh lagging behind these two major regions. The economy of other regions is primarily dependent on agricultural production. Employment in the non-agricultural sectors includes limited jobs in the service sector. Goods transport and logistics are vital for Bangladesh’s economy as 96 percent of the commercial enterprises depend on this sector, and 90 percent of the employment is generated in the freight-dependent sectors. The heavy reliance on the transport and logistics sector implies that the performance of this sector directly affects the economy.

The Jamuna and Padma River bifurcated Bangladesh into Eastern and Western parts. Before the construction of the Bangabandhu bridge over Jamuna River in 1998, the only way vehicular traffic could move from the east to west and vice versa was through ferries across Jamuna and Padma (Dappe et al., 2020). However, the 4.8 km long bridge for the east-west crossing has been able to cater to only a part of the demand of the surface modes of transport. A dual-gauge single rail line was added to the bridge later. The movement of trains in both directions is not possible simultaneously, resulting in a bottleneck, and the railway extension has load and speed restrictions. To overcome these issues, the construction work of a separate railway bridge having a length of 4.8 km has started recently just 300 meters north of the Bangabandhu bridge.
(Railway Technology, 2020). It will have a dual-gauge double-track railway. The second major east-west crossing is presently being built across the Padma River. It is a 6.15 km long multipurpose bridge with two levels (BBA, 2018). The upper level will have a four-lane highway and the lower level a single-track rail line. Padma bridge will improve the connections from Dhaka and Chattogram to the southwest parts of Bangladesh, improving accessibility to 19 districts. The east-west connection and access to Bangladesh’s second major seaport, Mongla Port, will improve once the project is completed. While the major rivers hinder continuous mobility by surface modes across Bangladesh, they provide opportunities for IWT.
2.1 Domestic Freight Movement

As the economic activities of Bangladesh are heavily concentrated in two major cities, Dhaka and Chattogram, the rest of the cities and urban centers fail to attract workers and investments (Dappe et al., 2020). Greater Dhaka acts as the hub for freight movement. It is the origin and destination of a high proportion of cargo trips, and many long-distance cargo trips pass through Dhaka. The vastly used southeast corridor connects the major seaport with Dhaka. It is predominantly used for moving export and import items. Two other prominent corridors for domestic products link with Dhaka. The northwest corridor connects Dhaka with the major centers in the northwest region, like Faridpur and Rangpur (Figure 2.1). It is mainly used for carrying agricultural products. The corridor between Dhaka and Sylhet in the northeast primarily transport consumption products and construction material.

To plan for an effective transport and logistics system, it is required to know where freight is generated, where it is destined, and the type and volume of the freight. Around 470,000 tons of inter-district cargo are generated per day in Bangladesh, equivalent to 3.3 kilograms per person (Dappe et al., 2020). The manufacturing sector’s contribution is the highest with 53 percent, while agriculture, wholesale, and retail contributions are 25, 12, and 8 percent, respectively. Consistent with economic activities, freight generation is concentrated in a limited number of districts. The first 10 generate 42 percent of the total inter-district cargo. Dhaka and Chattogram are the top two ranked districts with contributions of 13 and 6 percent, respectively. The best ten districts are situated in the corridor running from the southwest to the northeast. Three northwest districts – Rangpur, Bogura, and Sirajganj – feature among the top three (Figure 2.1). Dhaka is the center of the country’s economic activities and the hub for freight movement. Greater Dhaka contributes to 20 percent of Bangladesh’s GDP and offers 50 percent of jobs in the formal sector (Bird et al., 2018). In general, the shorter the trip duration from Dhaka, the more inter-district freight a district produces.

Manufacturing is the dominant sector in Musniganj, Gazipur, and Narayanganj, generating over 75 percent of their inter-district cargo. For Dhaka, the figure is 54 percent. When manufacturing-generated inter-district freight is considered for the whole country, the share of Dhaka, Gazipur, and Narayanganj is 22 percent in total. Ten districts dominate the share (32%) of inter-district freight generated by the agricultural sector. Cumilla is the leading district in this regard, with a share of 4.8 percent. Five of the remaining nine districts fall on the west side of the country. Dhaka and Chattogram lead with shares of 37 and 5 percent in the productions of wholesale items that are transported to other districts. Dhaka also leads for retail products related to inter-district freight with a contribution of 14 percent, followed by Chattogram with
8 percent and Rangpur with 6 percent. The top ten districts contribute almost half of the retail-related inter-district freight, 6 of which are located on the east side of the country. Freight movement between different districts related to foodservice is mainly concentrated in Chattogram (32% share) and Dhaka (6% share), and seven of the top ten districts are located on the east. Considering all the sectors together, eight of the top ten districts associated with inter-district cargo movement by transport systems are situated on the west. Joypurhat leads with a share of 14 percent, followed by Rangpur with 8 and Gaibandha with 6 percent.

Bangladesh is greatly dependent on the road sector for freight transport. The roads have been under pressure from traffic for a long time (Dappe et al., 2020). In 2013, the annual average daily traffic exceeded 20,000 in some sections. Cargo movements’ contribution is around 18 percent for national traffic, 19 percent for inter-district traffic, and 16 percent for urban traffic. Traffic is much heavier in Dhaka and Chattogram, with the corridor connecting these two areas experiencing the heaviest movement. The other corridors connecting with the hub, Dhaka – Dhaka-northwest, Dhaka-northeast, and Dhaka-southwest – have to accommodate huge truck-based traffic. The top three destinations for domestic freight from Dhaka are Chattogram, Narayanganj, and Sirajganj districts. On the other hand, Dhaka receives most shipments from Chattogram, Narayanganj, and Mymensingh.

For goods movement, primarily three types of trucks are used in Bangladesh – small and utility trucks, medium trucks, and heavy trucks. Each of these serves different purposes based on cargo size and delivery distance. The small and utility trucks are used for local delivery, while the medium and heavy trucks are for long-distance trips. Medium trucks are involved in 52 percent of cargo delivery trips, utility trucks in 33 percent, and heavy ones in 3 percent. There is a scarcity of heavy trucks in Bangladesh. They are primarily engaged in the Dhaka-Chattogram and Dhaka-Sylhet corridors and visible in the Chattogram area.

### 2.2 Export and Import Freight Movement within the County

Freight movement from and to the seaports, airports, and land ports is categorized as export and import cargo. Chattogram is the major hub for international freight. Chattogram port negotiates 80 percent of export-import items by weight (Dappe et al., 2020). The movement of these items is heavily concentrated in the Chattogram-Greater Dhaka corridor linking Chattogram with Dhaka, Narayanganj, and Gazipur districts. The Dhaka-Chittagong corridor accommodates 90 percent of the freight handled at Chittagong Port.

Mongla Port is the other major port of Bangladesh. International trade handled at the seaports is split between Chattogram Port and Mongla Port, with the former taking care of 90 percent of the cargo. In the case of containers, the distribution is even more biased towards Chattogram Port as it handles 98 percent of the containers. How the ports operate greatly affects the performance of the logistics system. Both the ports have many limitations preventing them from operating efficiently. With a draft of 9.1 meters, Chattogram is Bangladesh’s deepest port. However, this depth does not compare favorably with the ports in the South Asian region. Export freight has to be transported first to regional ports, such as Colombo and Singapore, in feeder ships, for onward transport to destinations in deep-sea ships. Chattogram port is beset with issues like lack of yard space and appropriate equipment and infrastructure (Figure 2.1). There is a shortage of cranes for handling containers and weighbridges as well. Capacity constraints at the ports result in ships waiting for ten days on average before they can berth. The dedicated berth for IWT vessels at Chattogram Port caters only to imported cargo.
Warehouses are unevenly distributed in Bangladesh. Seventy percent of warehouses are located in Dhaka and Chattogram. A cluster of warehouses outside Dhaka and Chattogram, such as Khulna, Sylhet, Barishal, Bogura, and Rangpur, act as regional hubs. The warehouses cater to three types of products – agricultural harvests, imported inputs for industrial production as well as outputs for export and retail commodities. Import-export warehouses primarily stock material carried in containers. The containers are unloaded and loaded at these locations to move within the country or to the seaports. Freight stations for containers are clustered around Chattogram Port.

There is a single Inland Container Depot (ICD) located at Kamalapur in Dhaka. It is connected to the Chattogram Port by railway. The ICD has parking scarcity and can be accessed by narrow streets, making it difficult for transloading from and to trucks (Gibson, 2015). Customs restrictions also do not facilitate the shipment of intact containers from the Chattogram Port. Only a few items can be processed outside the port, implying most commodities need to be removed from the containers for customs clearance and bulk shipped by covered vans (Hoque, 2016). It adds to space-constraint problems inside the port premises and defeats the reasons for importing by containers. There is a chance of pilferage of and damage to goods as well. Furthermore, the process leads to deploying a 1.25 covered van for transporting stuff in one TEU container. It affects the cost of transport and traffic. Sometimes, it is impossible to transport garment products in containers as the factories are located a bit far away from the arterial road and need to be accessed through narrow streets.

**2.3 Regional Freight Movement**

Bangladesh’s trading activities with neighboring countries mainly occur through road transport (Rahman et al., 2015). The country has 181 Land Customs Stations (LCS), with 33 of them
operational. Among the active stations, 16 serve road routes, nine serve water routes, and three are dedicated for rail routes. Five stations cater to mixed routes, including road-rail, road-water, and water-rail. Nine road routes, nine rail routes, and five waterways have been earmarked to facilitate trade with India, Nepal, and Bhutan. The five river routes, under a protocol between India and Bangladesh, are (BIWTA, 2020):

- Kolkata-Chandpur-Pandu-Silghat-Kolkata
- Kolkata-Chandpur-Karimganj-Kolkata
- Silghat-Pandu-Ashuganj-Karimganj-Pandu-Silghat
- Rajshahi-Dhulian-Rajshahi.
- Kolkata-Chandpur-Ashuganj (by waterways)-Akhaura-Agartala (by road)

which are under a protocol between India and Bangladesh. The first two are considered significant and cost-efficient corridors for trade between India and Bangladesh among the five waterways. However, these routes are underused owing to factors including insufficient river depth, absence of navigational aids, lack of enough port of call, and absence of long-term protocol. The protocol was first signed in 1972 and has been renewed many times since then. Bangladesh shares borders with India on three sides. The total trade value between these two countries makes India the most important country for regional freight movement. Among the countries Bangladesh imports commodities from, India is second based on trade value (Hasan et al., 2018). On the other hand, Bangladesh sits in the tenth position on the list of countries where India exports its products. The value of traded goods between India and Bangladesh stood at 6142.52 million USD in 2016, out of which 89 percent constituted export from India to Bangladesh. The figures indicate trade imbalance and that Bangladesh imports more from India than it exports to. The items imported from India are dominated by raw and intermediate materials for the readymade garments industry, such as cotton, yarn, and fabrics (38% of total imports). Food products come next (28%) and include edible oil. Contrarily, Bangladesh mainly exports jute products and woven and knit garments.

The freight movement between Bangladesh and India mainly occurs through land routes, owing to the long land border (Dappe et al., 2020). Bangladesh operates 13 land ports, primarily for trading with India. These ports function with inadequate supporting infrastructure, insufficient space, and adopt poor practices. In the absence of scanning devices, manual inspection of cargo at bonded warehouses prolongs the dwell time to up to ten days. Insufficient parking spaces force the trucks to queue up on the access roads, creating congestions in the neighboring areas. Railway plays a minimal role in bilateral trade with the help of vessel and truck transloading (Hasan et al., 2018). Goods carried by railway are transloaded to inland vessels at Noapara river port and trucks at Ullapur near Bogra.

In addition to surface freight movement, the coastal routes between the eastern ports of India and Chattogram port are used by ships (Dappe et al., 2020). Inland water transport is an option for trade, but it is restricted to one commodity that is about 2 million metric tons per year (Hasan et al., 2018). On a positive note, there has been some container movement from Kolkata to Pangaon Inland Container Terminal in recent times, albeit irregularly. There is a potential for IWT to play a more significant role in bilateral trade between the two neighboring countries. The majority of the imported goods from India originate from West Bengal (82%), Haryana (6%) and Andhra Pradesh (2%), and they are all in the vicinity of waterways. Bangladesh’s largest delta is formed by three major transboundary rivers, Ganges, Brahmaputra and Meghna, which enter into the country through India. Though freight movement through inland waterways is negligible in India with a modal share of 0.5% percent, it assumes a bigger
responsibility in Bangladesh by taking care of 16 percent of freight traffic. It seems Bangladesh needs to take the initiative to involve water transport more in bilateral trade. To Bangladesh’s advantage, a protocol already exists between the two countries to facilitate goods movement by waterways. However, Bangladesh needs to overcome many challenges to materialize the potentials of inter-country river transport. These include infrastructural deficiencies, inadequate investment, absence of awareness, insufficient service providers, navigational constraints (e.g., depth issues), institutional issues, lengthier trip time, and trade imbalance. A shipment from Kolkata to Dhaka usually takes 20 days to reach, but it is possible to reduce the period to half by addressing some of the challenges, making it comparable to road transport.

There is a couple of prominent corridors for carrying regional cargo through land ports. The corridor between Dhaka and Jashore is used to export and import cargo through the Benapole land port. The northwest corridor, which is prominent for domestic goods movement, is also used to transport freight between Bangladesh and Nepal, and Bangladesh and Bhutan through land ports at Bangladesh and Burimari. Bangladesh has road and rail connections with India. But a few differences between the two countries concerning transportation system and operation, such as standards and axle load limits, make it difficult for seamless truck and train movement between them. On many occasions, transloading has to be done that exacerbates the logistics costs.

Bangladesh has a scope to play a pivotal role in regional trade. However, it depends on appropriate trade policy as well as the removal of logistics limitations (Rahmatullah, 2010). Due to Bangladesh’s convenient location in the Bay of Bengal, it has the potential to serve two land-locked countries, Nepal and Bhutan. It can let these two countries use Chattogram and Mongla ports for importing and exporting goods. Nepal currently uses a capacity-constrained Kolkata port for international trade. Mongla port has spare capacity and is favorably located to serve Nepal if India allows transit through the chicken neck for traded goods between Nepal and another country besides Bangladesh. Bangladesh and Bhutan signed a memorandum of understanding (MoU) in 2017 regarding the use of inland waterways for trade between the two countries and also transit freight through coastal and Protocol on Inland Water Transit and Trade (PIWTT) routes between India and Bangladesh.

Bangladesh can assist the semi-landlocked North East India similarly by allowing the use of the ports and shortening the elongated freight movement routes across India by offering more direct transit routes through Bangladesh (Rahmatullah, 2009). For example, India exports tea from Assam to Europe through the Kolkata port. Tea is transported to the port using a 1,400 kilometer-long route through the chicken neck. Had Chattogram Port been used, it would have cut the distance by half. While railway is the preferred mode for transit traffic due to congested road networks, IWT can also play a role as it does for bilateral trade between India and Bangladesh. The regional transport connectivity measures could be beneficial for Nepal, Bhutan, India and Bangladesh. As a transit facilitator, Bangladesh can boost its economy through transit charges, transport payments, port tariffs, border crossing fees, and potential Indian outlay on logistics improvements (Rahman et al., 2015). Bangladesh could act as the transport hub for this region.

Compared to the surface modes, IWT has been playing a limited but steady role in regional goods transportation (Hoque, 2016). IWT transported more than 19.33 million tons of cargo between 2012-14, 98% of it by Bangladeshi vessels to inland India and the landlocked northeast states. The two prominent IWT routes have the potential to play a more significant role in cross-border transport both for bilateral trade and transit (Rahmatullah, 2009), provided navigability.
and other issues are addressed. Strategically located, Ashuganj can be made a transshipment port providing facilities to transfer containers or goods from vessels to trucks for forwarding to Akhaura port with India or vice versa. The multimodal route is likely to be feasible compared to road transport. India could also benefit from this initiative as the freight originating in Tripura State would need to travel 500 kilometers instead of 1,645 kilometers, a reduction of 70 percent.
Limitations and Opportunities of the Transport and Logistics System

3.1 Limitations of the Transport and Logistics System

Inept logistics and transportation system has put a cost burden on Bangladeshi producers (Farole & Cho, 2017). Because of poor transportation and logistics performance, it was placed at 99th position among 137 countries on the World Economic Forum’s Global Competitive Index in 2018. It is also behind Asian coastal countries based on World Bank’s Logistics Performance Index. Logistics cost takes up a significant portion of the product sales price in Bangladesh, with all the major logistics components contributing to it. This is true for all types of tradeable and nontradeable goods. The lowest share is 4.5 percent for leather footwear, and the highest is 47.9 percent for horticulture. High transport cost mainly lifts the logistics cost, but warehousing and associated costs are also significant.

Bangladesh is mainly dependent on road transport for its supply chain, and the cost ranges from $0.06 to $0.12 for a 16-ton truck and a trailer, respectively (Dappe et al., 2020). Some industries spend a lot on storing raw inputs and finished products. Inventory carrying costs can be 17 to 56 percent of logistics costs, exceeding 30 percent for maximum industries. The delays on the network due to traffic jams escalate the carriage cost by trucks up to 200 percent. A study using GPS technology found that the average speed of trucks was 19 kilometers per hour when ideally, it could have been more than double if they operated in an uncongested condition, driving the logistics costs down by 7 to 35 percent. Delays are also experienced at the ports, which affect the logistics costs for export and import items. Export containers spend four days and import containers 11 days at Chattogram Port on average (HPC et al., 2015). Delays in the transportation network and at ports can increase the inventory holding costs by 53 to 75 percent based on the type of the sector. For example, industries relying on export, such as readymade garments, and import, such as pharmaceuticals, might be compelled to hold six months’ equivalent inventories to account for the unreliability in the logistics system.

Countries deficient in infrastructure provisions need to make more capital investment to cover the shortfall. They spend comparatively less on infrastructure maintenance as the policy focuses on decreasing the deficit between demand and supply. Once the countries become sufficient in infrastructure provision, they tend to allocate a higher proportion of funds for maintenance work. For example, when the U.S.A decided to construct an extensive freeway network to facilitate freight movement across its 52 states in the early 1960s, it spent more than three percent of GDP on infrastructure, with the split between capitals works and maintenance three-fifth and two-fifth, respectively (Goodman & Hastak, 2006). As the freeway network expansion work was coming to completion by 1990, the total amount spent on infrastructure reduced to less than 2.7 percent of GDP, and the share of maintenance work increased to more than 55 percent. Developing countries usually need to spend 2-8 percent of GDP on infrastructure purposes. For Bangladesh, it has been estimated that 10 percent of GDP needs to
be spent on infrastructure, with transportation requiring half of it. Unfortunately, the country has the capability to spend two percent, which implies that a lot of high-priority development work might not get funding. Compared to other developed countries, Bangladesh experiences a high cost of infrastructure construction. The reasons include the high cost of inputs. It makes the provision of infrastructure more challenging.

Countries like Bangladesh need to prioritize how the limited fund for infrastructure is spent and ensure a balanced allocation among competing subsectors. For more than four decades since Bangladesh’s independence in 1971, investment in transport infrastructure has been biased towards the road sector, giving less importance to the IWT and railway sectors. The unbalanced funding affected the modal share for both passenger and freight transportation. In 1975, the modal share for freight transportation was almost evenly split among road, rail, and IWT modes (Table 1.2). Unfortunately, with the most investment made for the road sector, its reflection was observed in the modal share of IWT and railway.

The use of multimodal transportation can lead to positive logistics outcomes. A combination of different modes can be used to transport cargo from origin to destination, maximizing the advantages of each mode for the section they are employed. However, utilization of multimodal transportation warrants effective integration. Facilities and infrastructure are required for shifting the goods from one mode to the other. Unfortunately, there are only a few instances of modal integration in Bangladesh. The country’s transport infrastructure has been developed by considering each of the modes separately. It has resulted in poor integration among modes. River ports are not effectively linked to the road network or economic hubs (Dappe et al., 2020). For example, trucks have to drive through narrow and congested access roads to reach river ports in Dhaka. It lengthens the journey time and increases the trucking costs. In addition, there are security and theft-related issues for nighttime trips.

For a plan to be effective, it needs to be based on reliable data. For effective transport infrastructure planning, it is necessary to know the demand, especially the origins and destinations of different types of goods and how they are moved from the starting to the endpoint. Bangladesh has a limitation as it does not collect data on transport and logistics in an organized manner (ADB, 2012; G. M. K. Alam, 2015). A commodity flow survey could have helped develop an origin-destination matrix for freight in Bangladesh.

The logistics system of Bangladesh can be termed primitive. While countries with advanced logistics systems use various combinations of modes under multimodal environments for efficient transportation of goods, Bangladesh hardly integrates modes to minimize transportation costs. It lacks appropriate infrastructure that could facilitate the integration and operation of multimodal transport services. Availability of information technology (IT) is not taken advantage of. As a result, most of the shippers do not have any mechanism to track their shipments. Tracking and tracing shipments would have aided in avoiding delays and loss of goods. The service delivery in the logistics sector is fragmented as the key elements – freight forwarding, customs clearance, and warehousing – are often done separately. Integrating all the components into seamless service is the key to efficient services.

3.2 Opportunities of the transport and Logistics System

Advancement in the transport sector can better connect Bangladesh with the rest of the world. The relationship between logistics costs and trade is quite straightforward. Improved logistics
performance leads to trade expansion, export broadening, more foreign direct investment, and ultimately economic prosperity (Arvis et al., 2012). A 0.1 percent decrease in transportation costs could drive the demand for readymade garments and textiles by 7.4 percent.

If the amount of time spent by the export and import items at the port can be shortened, it will decrease the logistics cost considerably. Models were used in a study to investigate the impacts of different contributing factors on logistics costs. It was found that if dwell time at Chattogram could be reduced by a single day, the average speed of truck movement on highways can be increased to 40 kilometers per hour, and appropriate policies could be adopted to remove the inefficiency in the logistics system, the logistics costs for tradeable goods could be cut down by 26 percent, leading to 19 percent increase in export earnings (Dappe et al., 2020).

Considering the global supply-demand situation in the readymade garments sector, Bangladesh still has scope to expand its production and export volume. The rise of wages in China opens up an opportunity for Bangladesh to offer products at a competitive price. Moreover, though the share of readymade garments and textile items is 84 percent of export, other items such as jute products, shoes, seafood, leather items, and medicines have good potentials to drive export growth (Kathuria & Malouche, 2016). However, this greatly depends on the performance of the logistics system. A well-functioning logistic system eliminates delays in transporting, handling, and administrative processing export items, thereby reducing the costs. In the same way, it expedites the movement of imported products and raw materials used to produce goods. Agriculture will keep on playing a dominant role in Bangladesh’s economy. Development of the agricultural sector can be facilitated by a proficient logistics system, especially in the move to high-value agriculture covering horticulture, livestock, and fisheries products. Bangladesh’s geography aids it in using a multimodal transport system. A combination of road, rail, and water modes can be used to transport goods that enable ease in movement and optimize logistics costs.
Freight Transportation by Surface Modes And Air

4.1 Freight transportation by road

Bangladesh possesses a road network that is classified in a hierarchy of categories based on their importance and administrative criteria. The categories of roads, their characteristics, organizations responsible for their provision and maintenance, and their total lengths are presented in Table 4.1.

Table 4.1: Road classifications of Bangladesh

<table>
<thead>
<tr>
<th>Road Class</th>
<th>Characteristics</th>
<th>Length (km)</th>
<th>Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Highway (NH)</td>
<td>Highways connecting national capital with divisional headquarters or seaports or land ports or Asian Highway</td>
<td>3,570</td>
<td>RHD</td>
</tr>
<tr>
<td>Regional Highway (RH)</td>
<td>Highways connecting district headquarters or main river or land ports or with each other not connected by national highways</td>
<td>4,323</td>
<td>RHD</td>
</tr>
<tr>
<td>Zila Roads (ZR)</td>
<td>Roads connecting district headquarters with upazilla headquarters or connecting one upazilla headquarters to another upazilla headquarters by a single main connection with national/regional highway, through shortest possible distance/route.</td>
<td>13,678</td>
<td>RHD</td>
</tr>
<tr>
<td>Upazilla Road (UR)</td>
<td>Roads connecting upazilla headquarters with growth centers or connecting one growth center with another growth center, by a single main connection, or connecting growth centers with the higher road system, through shortest distance/route.</td>
<td>36,876</td>
<td>LGED</td>
</tr>
<tr>
<td>Union Road (UR)</td>
<td>Roads connecting union headquarters with upazilla headquarters, growth centers, local markets, or with one another.</td>
<td>41,781</td>
<td>LGED/LGI</td>
</tr>
<tr>
<td>Village Road Type A</td>
<td>Road connecting villages with union headquarters, local markets, farms, and ghats, or with one another.</td>
<td>1,28,540</td>
<td>LGED/LGI</td>
</tr>
<tr>
<td>Village Road Type B</td>
<td>Roads within a village.</td>
<td>1,46,155</td>
<td>LGED/LGI</td>
</tr>
</tbody>
</table>

The top three types of roads are of the highest importance to the nations, and their responsibilities have been vested in the Roads and Highways Department (RHD). The following four categories of roads are taken care of mainly by the Local Government Engineering Department (LGED), while the rest of the lower category roads by some Local Government Institutions (LGI). From the classification system (Table 4.1), it can be observed that the main criterion for assigning importance is freight movement. The roads network is arranged in such a way that, ideally, products can move from villages to the capital following the hierarchy. Even from the characteristics of Village Road Type A, there is an indication that multimodal transport option was considered as roads connecting to river ghat were included under this category.

The road network is considered complex and beset with many issues, including inadequacy, quality, sustainability, and coverage. Road density in Bangladesh is relatively low as there is only 0.19 km of roads for 1,000 people considering the top three categories. The figure rises to 1.9 km when the rural roads are considered in the density. However, some of the rural roads, such as Rural Road Type B, which has the most extended total length, would not be considered roads in most parts of the world (World Bank, 1996). In terms of road density, Bangladesh is lagging behind even the South Asian neighbors. For example, Pakistan has a road density of 1.5 km per 1,000 population, while the same figure for India, Sri Lanka, and Bhutan are 3.5, 5.5, and 9.7, respectively (Andrés et al., 2013). Only one-fourth of the roads in Bangladesh are paved, the lowest proportion for the region (Hoque, 2016).

Apart from the limited road network, the quality of the roads adds to the transportation-related shortcomings for freight movement. According to a survey conducted in 2017, more than one-fourth of the higher-order roads in Bangladesh are in poor, bad, or very bad condition (RHD, 2018). Though the surface condition is reasonable, the lack of sustained maintenance has resulted in the deterioration of the underlying strength of national highways. For regional highways, both surface and underlying conditions are not up to the mark. In the future, most of these roads would require costly rehabilitation to make them function efficiently. The status of Zila roads is even worse as more than 25 percent of roads under this category are in poor condition. They have an International Roughness Index value (IRI) in excess of 8. Substandard road conditions contribute to vehicle breakdowns, accidents, and traffic jams, subsequently adding costs. In addition, more than a quarter of the Zila Roads is unpaved. As of 2009, 16 Upazilla headquarters were not connected to the district headquarters by Zila roads (RHD, 2009).

As many rivers and tributaries crisscross Bangladesh, the road network requires bridges and culverts at frequent intervals to ensure connectivity and avert flooding. About 15,000 of these types of structures serve the RHD network. A significant portion of the structures are damaged and require heavy repair or replacement. The condition of the lower order roads, managed by LEGD and LGIs, is inferior to those under the RHD network. These roads do not even have adequate bridges and culverts. For example, there is one gap in every two kilometers of rural roads (World Bank, 1996). A substantial share of the lower order roads is not all-weather roads. There are implications of these issues for the transportation of rural products. The efficient motorized modes cannot be used, and vehicles have to be changed due to the lack of continuity of the network. The non-motorized vehicles become difficult to ply in rainy seasons. For example, the rickshaw van pullers have to put on extra effort to move their vehicles. All these delay the transportation process and add to the costs, affecting the rural people and their economy.
Efficient transportation of goods on trucks has not been possible in Bangladesh for multiple reasons. One of the primary ones is the road infrastructure. For tradeable goods, trucks have to move through the highways and local road networks. The highways have capacity constraints, and they cannot cope with increased traffic owing to economic growth (Dappe et al., 2020). Fund constraints and delays in upgradation work affect the capacity improvement projects. For example, converting the 192-kilometer section of the Dhaka-Chattogram highway from two-lane to four-lane began in early 2006 and took more than ten years. There are highway segments in Bangladesh that present bottleneck conditions for the vehicles, especially on some bridges which are narrower than the connecting roads. Congestions on inter-district roads can reduce the average speed of freight traffic to less than 19 kilometers per hour from 40. It can more than double the typical trucking costs along the Chattogram-Dhaka corridor. The absence of bridges implies the vehicles have to depend on ferry services. It increases the delivery time and makes the process unreliable.

In some cases, the vehicles try to avoid the ferry services and eliminate the waiting time. For example, due to the lack of east-west crossing over the Padma river, cargo trucks moving between the southeast and southwest part of the country sometimes follow an elongated route to use Bangabandhu Bridge instead of ferries. Another vital element of the inefficient truck operation is the movement of empty trucks. More than one-third of all inter-district truck trips run empty. Due to congestions and other reasons, increased travel time has direct and indirect effects on logistics costs. The additional logistics costs occur due to extra fuel consumption, greater fleet size, increased labor expenses, and higher inventory holding costs due to the unreliable transportation system.

Owing to lack of maintenance, the condition of the roads is in dilapidated condition in many sections, preventing the smooth flow of vehicles. Inadequate maintenance, due to fund constraints and management limitations, leads some roads to reach beyond repair conditions. They need to be rehabilitated and renewed to bring them back to serviceable states. The rehabilitation work usually costs the country at least thrice the money it would have cost had the roads been maintained at the right time (World Bank, 2005). Often the high fund required for this level of work is not available soon enough. As a result, the trucks are compelled to move through these highways, leading to slow speed and poor reliability. In the first place, the roads often fall into disrepair quickly, primarily due to the movement of trucks heavier than allowed and poor quality of construction and maintenance work. It is not uncommon for truck operators to carry loads 50 percent more than the truck’s capacity. It has not been possible to curb the overloading problems through strict monitoring and imposing fines, as weighbridges are installed mainly before bridges. But, the overloaded trucks manage to bypass them, paying facilitation costs. It is estimated that the damage caused by overloaded trucks is four times the damage caused by usually loaded ones. The road network is also vulnerable to natural calamities (Quium & Hoque, 2002). Over 50 percent of the network can be inundated by floodwater.

Other issues of freight transport by road are related to service and operation. In many cases, truck drivers do not have the necessary training and skills (Dappe et al., 2020). They obtain their license from BRTA through unfair means. The problem is exacerbated due to the operation of unfit trucks. Most of the trucks have been illegally modified to increase their load-carrying capacity. The owners of the trucks manage to get fitness certificates from BRTA by paying extra money unofficially. A combination of these factors leads to accidents on roads, increasing truck operation costs by up to 11 percent.
The operation of trucks is associated with externalities as well. According to an estimate, emission of Carbon Dioxide (CO₂) due to the movement of freight trucks on the highways of Bangladesh results in social costs amounting to 1.2 percent of GDP. Traffic jam is responsible for about 60 percent discharge of CO₂. Other pollutants are also emitted, including carbon monoxide (CO), nitrogen oxides, and particulate matter (PM₁₀ and PM₂.₅). This type of externalities should be considered in the analysis, and their costs to society should be determined. Externalities also include crashes caused by goods trucks, damage of roads by overweight trucks, and contribution to congestion. Other road users and people living in the vicinity of the corridors are affected by the externalities.

4.2 Freight transportation by railway¹

A single government organization, Bangladesh Railway, is involved in the operation of passenger and freight rail services. Railway only transports bulk materials across Bangladesh and operates container service from Chattogram Port to Inland Container Depot (ICD) at Kamalapur, Dhaka (Dappe et al., 2020). It is the preferred mode for container transport. The corridor alone deals with more than one-third of freight moved by railway. However, for many reasons, including a low average travel speed of 15-50 kilometers per hour, a container takes around 18 days to reach Dhaka from Chattogram Port (Hoque, 2016).

Bangladesh Railway cannot play a significant role in freight transportation due to many factors despite huge potentials. At present, it has a route length of 2,877 kilometers (Bangladesh Railway, 2020). The railway network is shown in Figure 4.1. Most of the existing railway infrastructure was inherited from the British. They are old and have many limitations. The route was oriented mainly to serve Kolkata, a city of West Bengal in India. Therefore, it does cater to the needs of independent Bangladesh. For example, the main transport corridor between Dhaka and Chittagong is served by an elongated route, which could have been 100 kilometers shorter if the network was oriented towards Dhaka.

The network is divided into east and west zones due to the Jamuna and Padma rivers. Despite the construction of the Bangabandhu bridge over Jamuna around 25 years ago, the goods trains have to go through a transshipment process to move cargo from the east to west and vice versa. There is a lack of uniformity in gauges across the rail network. The west zone has predominantly broad gauge tracks. In contrast, the east zone had only meter gauge tracks until recently, implying a seamless movement of trains across zones was not possible even if bridges connected them.

Another major issue of the inherited rail network is that the route segments consist of a single line. As a result, they create bottlenecks for the movement of trains. Passenger services usually get priority over goods trains, and freight movement is continuously delayed. Moreover, there are speed restrictions in many network sections due to aging infrastructure, especially on the bridges. Bangladesh Railway is heavily dependent on diesel-electric locomotives, many of which are past their lifespan. Other types of rolling stock, including goods wagons, require replacement as well. Bangladesh Railway, a government agency, solely operates rail services and manages the rolling stock and rail infrastructure in Bangladesh. The services suffer from a monopolistic environment. The shortage of skilled workforce since the golden-handshake scheme was adopted in the early 1990s also adds to the challenges in offering efficient services.

¹ This sub-section has mostly been written based on author’s experience of working with Bangladesh Railway and information collected from the transport agency.
Railway operation did not get much attention until 2010, after which few infrastructure development projects and rolling stock replacement programs have been undertaken. Under infrastructure projects, portions of railway tracks in the east zone have been converted to mixed gauge so that both meter and broad gauges trains can operate in the east zone. Some of the bottleneck issues have been addressed by making a few sections double-lined. The railway network covers 44 of the 64 districts of the country. Some of the districts in the southwest, such as Barisal and Patuakhali, are not served by the railway and have to depend on the other two modes. Under the current projects, the network is being extended as well. However, the progress of the projects has been slow so far. The COVID-19 pandemic has also made it difficult. The interplay of so many factors does not allow the railway to serve the country to its potential. It, therefore, plays a limited role in freight transportation. Bangladesh Railway has 450 operational railway stations (Dappe et al., 2020). Among them, 55 are involved in freight transportation. In a year between 2016 and 2017, these stations handled around 100,000 goods trains. The goods handled at the major stations amounted to 3.1 million tons in this period. In addition, Bangladesh Railway transported 72,000 20-feet equivalent unit (TEU) containers. Most freight traffic was observed between Dhaka and Chattogram, and the container movement, with both directions loaded, is confined to this corridor. The second prominent section was between Rohanpur station in the Nawabganj district and the Sirajganj station in the Sirajganj district, followed by Darshana station in the Chuadanga district. The Rohanpur and Darshana stations are in the vicinity of the Border with India. The freight handled at these two stations mostly comes from India. They are transported to Sirajganj and Faridpur, on the west bank of Jamuna and Padma river, from where they are transshipped by trucks to the east side. Usually, commodities are not transported from the east to the west, or vice versa, by train due to load restrictions on the Bangabandhu Bridge. Overall, the bulk materials transported by railway include stones, petroleum products, dry oil cake, fly ash, fertilizer, and wheat.

4.3 Freight transportation by Air

Air transportation of freight is indispensable for situations like time constraints and delivery of specific types of goods. In the context of the logistics system in Bangladesh, air transport plays a minimal but essential role. Data from 2015 informs that Bangladesh handled 0.26 million tons of domestic and international cargo by air transport (JICA, 2017). The range of products carried on outgoing and incoming flights includes readymade garments, machinery, electronics, frozen food, and medicines. Out of the three international airports in Dhaka, Chattogram, and Sylhet, 90 percent of the cargo was processed through Dhaka’s Hazrat Shahjalal International Airport. However, it has space limitations and lacks a skilled workforce and cargo handling and scanning equipment. Especially, the warehouses at the airport are inadequate for handling the cargo volume and sensitive types of cargo. Imported goods are often left outside, making them vulnerable to damage and theft. The absence of state-of-the-art scanning equipment means the process cannot be completed in Dhaka, and goods need to be transported to hubs for scanning before delivering to their destinations. The extra steps add to the costs and act as a disincentive for the air freight operators.
5.1 Advantages of IWT

IWT has some inherent advantages over other modes, making it a sustainable transport option for moving freight. In general, it consumes less energy, creates less noise, and emits less gas compared to the surface modes (Sarker et al., 2014). The IWT mode consumes energy slightly less than one-fifth of road mode and half of the railway mode for transporting one ton of goods for one kilometer. In addition, IWT helps to lower the congestion levels of busy freight road corridors. Recent studies point that overall external costs of IWT, covering accidents, congestion, noise effect, air pollution, and other environmental impacts, are one-eighth of road transport. Arguably, it is also a safer mode. Other attributes of water transport might be country-specific.

Bangladesh is in an advantageous position in this regard compared to many countries. The country is blessed with an extensive river network, facilitating water-borne transportation and offering distinct benefits over other modes. IWT is the only option for transportation for a considerable proportion of the rural population (World Bank, 2007). It is the primary transportation mode for people living in southern coastal areas of the country where the road network is limited. IWT is a cheaper mode for moving passengers and freight. The freight transportation costs are Taka 1, Taka 2, and Taka 4.5 per kilogram-kilometer for IWT, rail, and road modes, respectively (Hasan et al., 2018). Even after considering the handling charge at the port and transportation costs from the origin to the port and from the port to the destination of goods, IWT remains the cheapest mode (World Bank, 2007). For example, transporting one TEU container between Dhaka and Chattogram costs around Taka 600 per ton by IWT, whereas it is Taka 1,200 by railway and Taka 6,000 by road.

Consistent with the experience of other countries, IWT is a sustainable mode in Bangladesh as well. The sector uses less energy, putting less burden on the country’s foreign exchange reserve for importing fossil fuel. The environmental impacts of IWT are also less. Due to the use of IWT for passenger and goods movement instead of the road, 58.5 million liters of diesel are saved, and 155,000 tons of less carbon dioxide (CO₂) are produced in a year (Hasan et al., 2018; World Bank, 2007). There is room for improvement on this front by installing gear-box in country boats. This measure would save a further 100 million liters of diesel and emit 105,000 tons less CO₂.

Accident records indicate that IWT is a safer mode than the road in Bangladesh. The records for a period of 15 years reveal that casualty on IWT averaged 148 per year compared to 2,400 for roads (World Bank, 2007). When the figures are converted to the same unit, fatalities per
billion passenger-kilometer, deaths are 41 for IWT and 158 for roads. The IWT subsector creates employment for many people, especially the rural people. The extensive use of traditional country boats makes it easier for low-income and low-skilled people to own and operate them. A number of people are also engaged in building these boats. The country boat subsector employs around 3.8 million village-based workers. This contributes to addressing equity issues across Bangladesh. The country is prone to natural disasters. When the surface modes get disrupted due to natural calamities like floods, IWT is often the only option for mobility. Optimal use of water transport would protect Bangladesh’s precious agricultural land being taken up for new surface mode development projects.

Inland water transport (IWT) offers a ray of hope in the backdrop of the limitations of land transport. It is Bangladesh’s second most commonly used mode of transport. The country is blessed to have about a 24,000 km long river network. Unlike the surface modes, IWT can take advantage of the natural carriageway. The operation of vessels is less associated with environmental pollution. Boats might be used for recreation and sports in developed countries, but they are engaged in transporting passengers and goods in Bangladesh. Non-motorized boats, locally known as country boats, still occupy a significant proportion of the river vessel fleet. They are driven by sails or the boatman with the help of oars or by a combination of both (A. K. M. N. Alam, 2021). They emit zero pollution to the atmosphere. Bangladesh is prone to natural calamities. Surface transport is vulnerable to floods, which is a regular phenomenon in Bangladesh. When the surface transport network ceases to offer service, water transport is the only option for people and goods, especially in rural areas (World Bank, 2007).

5.2 IWT system in Bangladesh

There are 30 inland river ports in Bangladesh, out of which 12 are used for cargo services (Dappe et al., 2020). The waterway network through which the cargo vessels move is classified into four categories, based on the depth of rivers. The depths of the Class I-IV categories of rivers are provided in Table 5.1. The network is also serviced by about 800 landing stations and connects Chattogram and Mongla ports. Bangladesh Inland Water Transport Authority (BIWTA) is responsible for managing and maintaining these infrastructures. In a few instances, the organization has passed on the responsibilities to the private sector. The private sector has developed some facilities alone or partnered with BIWTA.

<table>
<thead>
<tr>
<th>Class</th>
<th>Depth (m)</th>
<th>Length (km)</th>
<th>%</th>
<th>Classification criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>3.5-4.0</td>
<td>683</td>
<td>11</td>
<td>Major transport corridors where LAD of 3.6m is required to be maintained throughout the year</td>
</tr>
<tr>
<td>II</td>
<td>2.1-3.5</td>
<td>1,000</td>
<td>17</td>
<td>Links major inland ports of places of economic importance to class I route</td>
</tr>
<tr>
<td>II</td>
<td>1.5-2.0</td>
<td>1,885</td>
<td>32</td>
<td>Being seasonal in nature, it is not feasible to maintain higher LAD throughout the years.</td>
</tr>
<tr>
<td>IV</td>
<td>Less than 1.5</td>
<td>2,400</td>
<td>40</td>
<td>Season routes where maintenance of LAD of 1.5m or more in dry season is not feasible.</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>5,968</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
From the perspective of freight transportation by IWT and considering the position of the major river ports, Bangladesh can be divided into five regions. The locations of the ports are shown in Figure 5.1.

Figure 5.1: Location of major river ports
Source: Dappe et al., 2020.

The regions and the areas they are serving are as follows:

- **Dhaka region**: It includes Dhaka, Narayanganj, Musnshiganj, Narshingdi, and Gazipur districts. The premier ports of this region include Dhaka and Narayanganj. Besides, there are handling facilities at Gabtoli, Aliganj, Pagla, Fatullah, and Kanchpur. In addition, Pangaon container terminal caters to container freight.
- **Northwest region**: The premier port of this region are Bagharbari and Nagarbari, the latter being the northmost port servicing the region along Jamuna. Shallow draft north of the port does not allow heavy cargo vessel movement.
- **Southwest region**: The premier ports of this region are situated in Faridpur and Noapara. In addition, private jetties in Khulna service this region.
- **Southeast region**: There are ports at Barishal and Daudkandi, and private jetties in Chattagram handle IWT cargo in this region.
- **Northeast region**: The Ashuganj-Bhairab and Chattak ports cater to the freight demand in this region.
5.3 Ranges of vessels, goods, and river routes

Freight movement through the inland water network occurs through different types of vessels. Each type is suitable for carrying different categories of products. They include oil tankers, dumb barges, and sand carriers (Dappe et al., 2020). Over 11,000 vessels operate on the network, and about two-thirds of them are freighters. Having an idea about the types of vessels and material they carry is not adequate for planning purposes. Freight transport planning for the inland water sector requires detailed data on the directions of movement from the origin to destination with the vessel type and cargo category, and load. Unfortunately, freight flow analysis is yet to be done in Bangladesh.

Despite the absence of detailed data, some freight-related information is available, which helps to develop an overall picture of the role of IWT. Around 76 million tons of goods are moved by water transport in Bangladesh in a year. The share of imported items is 61 percent. Three items, clinker, fertilizer, and wheat, make up two-thirds of the imported items. The rest include fly ash, sugar, edible oil, and bulk items such as salt, steel scrap, ceramic sand, gypsum, and stones. Therefore, the merchandise moved through the IWT system is mostly food items and raw materials for the construction industry. Some industries, such as cement, edible oil and sugar, are located adjacent to the river, and they manage their own jetties for receiving raw material and transporting finished products. The IWT sector’s involvement in the transportation of containers is minimal. It was 140,000 tons in 2017. Apart from imported merchandise, a small volume of domestic commodities is also moved by vessels. The items are similar to the imported ones and include construction inputs, petroleum products, and fertilizer.

The imported freight transported by waterways originates from Chattogram Port (79%), Mongla Port (15%), and Kolkata in India (6%). In 2017, Chattogram Port received 73 million tons of materials; 36 million tons were moved inland by vessels. The destinations of these waterway-transported products were the Dhaka region’s ports (27 million tons), private jetties in Chattogram areas (7 million tons), and Nagarbari port in the northwest region (1.5 million tons). The northeast and southwest zones received only 2 million tons in total. However, the southwest zone was catered to by the Mongla Port, which received 7.2 million tons of cargo in 2017. Ninety-six percent of these products were transported to the southwest and southeast regions. The destinations include private jetties in Khulna (3.7 million tons), Noapara Port (2.9 million tons), and Basirishal port (0.2 million tons). The goods brought directly from Kolkata through waterways amounted to 2.6 tons in 2017, and 96 percent of the commodities were despatched to the Dhaka region and the rest to Mongla Port.
All five regions experience domestic freight movement through IWT (Figure 5.2). Some of the water-based cargo is generated from large producers of specialized products, like Karnaphuli fertilizer factory and oil companies in Chattagram. Cement factories in Mongla generate cement cargo in the southeast region. Cement and fertilizer factories are also located in other areas as well. These factories import clinker and fly ash and produce cement and are mostly located along the bank of rivers to take advantage of water communication. Wheat flour mills are clustered in Narayanganj, which receive imported wheat and ship flour for domestic consumption. Dhaka region is the principal consumer of petroleum products. They are transported to other regions as well. The petroleum cargo is delivered to transitional warehouses near Daulatpur and Baghabari ports. They are then carried to other parts of the northwest region by railway. This is a rare instance of utilizing multimodal transportation. Sylhet is the major producer of construction materials, such as sand and stones, in the northeast region. They are transported via inland waterways to the places of demand, including mega-infrastructure construction sites like the Padma bridge.

There are about 14,000 cargo vessels in Bangladesh. The fleet includes dry cargo vessels, barges, tankers, and double-bottom vessels that transport petroleum products, as well as sand carriers (World Bank, 2007). In addition, the logistics sector is serviced by the informal operation of cargo country boats numbering around 261,000. A few decades ago, the country boats were wind and human-powered, but most have been modified by installing irrigation pump engines (Hoque, 2016; World Bank, 1996). These boats and unregistered barges carry construction materials, vegetables, raw jute, logs, and inputs for industries in the vicinity of river terminals. Some bulk imported materials are transported by vessels to inland ports from the Chattogram Port.
5.4 Challenges faced by the IWT subsector

Like the other two modes, IWT is faced with many shortcomings that do not allow it to provide service at its full potential. There is a considerable variation in the volume of water flowing downstream of the rivers in different seasons. For example, the volume of water flowing through the Ganges in dry seasons is about one-fourth of the volume in monsoon seasons (Light Castle Partner, 2018). For navigational purposes, only one-fourth (6,000 km) of the extended river network is available during monsoon and less than one-sixth (3,800 km) during the dry season. Every year, the river network experiences about 1.2 billion tons of sedimentation, with the Ganges River accounting for 729 megatons, the second-highest siltation rate in the world. The country’s geographical position is partially responsible for this, along with deforestation and indiscriminate construction of dikes and embankments (Hossain et al., 2014). Bangladesh is situated in the vicinity of the bottom of the Himalayas, which is at risk of soil loss and, therefore, it initiates sediment transport through the rivers. Bangladesh’s rivers have a gentle inclination, which means that much of that sediment load cannot be transported to the Bay of Bengal and ends up on the river bed.

Alluvial deposition reduces the navigability of the rivers. Large vessels cannot operate in 40 percent of the network due to inadequate depth, especially in the country’s northern part. Large rivers have up to 50 meters in depth. However, the downstream depth of the Meghna River, which runs through the vital Chattogram-Dhaka corridor, ranges from 10 to 25 meters. Depth becomes shallow at curved river sections, elevated sediments (bar) regions, and at the junctions of two rivers. Therefore, they hinder navigation for all types of vessels. The deposited silt limits boat maneuverability as well as the amount of cargo they can carry.

The navigability issues are prominent in other potential freight routes. For example, rivers in the Rajshahi and Rangpur regions have inadequate depths for vessel movement. As a result, the farmers cannot transport rice through the rivers. The nearest inland water terminals at Baghabari and Nagarbari are up to 200 kilometers away from their crop production areas. To realize the potential of the IWT sector and sustain its use throughout the year, capital and maintenance dredging are required perpetually (Light Castle Partner, 2018). Resorting to dredging is a feasible initiative as well. In a hypothetical situation, when all the goods moved by IWT are shifted to the road, it would cost the economy an extra Taka 2.1 to 3.1 billion, without considering the additional road maintenance cost and accidents due to the increased goods traffic (World Bank, 2007). On the other hand, the cost of dredging to facilitate the continuation of freight movement by waterways is estimated to be Taka 0.6 million.

There is a target to dredge 300 primary rivers having a total length of about 2,400 kilometers in the next 12 years. Fifty-three of the primary rivers have been earmarked for capital dredging. However, maintenance dredging is essential for ensuring continuous navigability. There is a mismatch between the amount of dredging required and the capacity of dredging. Eighteen million cubic meters of dredging is estimated to be necessary for the major river routes per year, but dredgers currently being used can handle 6.36 million cubic meters (Hossain et al., 2014). Not only do the dredging activities need to be boosted by an efficient system, but it is also required to know the current status of the rivers to fix their priority according to dredging needs. Due to fund constraints, hydrographic surveys are carried out irregularly and on a limited scale. For example, only 965 kilometers of river, making up 16 percent of the navigational routes, underwent hydrographic surveys in 2006-07.
For waterways falling under the regional routes, the neighboring countries are financially contributing in a few cases. For example, India is financing 80 percent of 470-kilometers dredging work in two routes – Ashuganj to Zakiganj, and Sirajganj to Doikhawa (located in Assam, India). The project will facilitate trade between India and Bangladesh and freight transit between Kolkata and the land-locked northwestern states of India (Dappe et al., 2020). Prior to the development of the road and rail networks, the Ashuganj-Karimganj river route was comprehensively used for freight and passenger transportation between Assam and Kolkata, especially in the British period (Sarker et al., 2014). The cargo transit in this route was stopped in 1965. Though it was revived after Bangladesh’s independence in 1971, it was not used like before due to increased reliance on the road and railway subsectors. The navigability of the downstream started to reduce from 1990, and cargo transport totally stopped in 2010.

The IWT subsector experiences fewer accidents than the surface modes and results in lower fatalities as well. Table 5.2 presents the accident record for IWT mode from 2005 to 2017. In total, 264 accidents happened in 13 years, resulting in 1,430 fatalities and 265 people missing. The number of accidents and fatalities each year is relatively stable. However, the accidents on the waterway receive broader media coverage and cause dramatic effects on the people. To lift the confidence of the people in water transport, the number of accidents needs to be reduced by making the mode safer. The navigation aids used in the river network are inadequate, especially the aids necessary for nighttime trips. For example, channels need to be marked with lighted buoys for navigation in the dark. Other aids such as unlighted buoys, beacons, iron and bamboo marks for marking shoals, channel bends, and shallow patches are also required (Hossain et al., 2014). Only 1,561 kilometers, or 26 percent of the total, of waterways, are equipped with night navigational aids, while only 3,256 kilometers, or 55 percent of the total, are equipped with day navigational aids. There are many other issues behind IWT accidents, including unskilled crews, human error, poor navigability of waterways, unfit vessels, inclement weather, and overloading of both passenger and cargo vessels (Rashid & Islam, 2017).

Table 5.2: Accidents in IWT subsector between 2005-2017

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Accidents</th>
<th>Fatality</th>
<th>Injury</th>
<th>Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>29</td>
<td>316</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>2006</td>
<td>21</td>
<td>50</td>
<td>54</td>
<td>10</td>
</tr>
<tr>
<td>2007</td>
<td>12</td>
<td>9</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>2008</td>
<td>21</td>
<td>113</td>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td>2009</td>
<td>31</td>
<td>251</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td>2010</td>
<td>31</td>
<td>108</td>
<td>22</td>
<td>86</td>
</tr>
<tr>
<td>2011</td>
<td>22</td>
<td>76</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>2012</td>
<td>15</td>
<td>161</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>2013</td>
<td>8</td>
<td>22</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2014</td>
<td>17</td>
<td>124</td>
<td>1</td>
<td>67</td>
</tr>
<tr>
<td>2015</td>
<td>22</td>
<td>120</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2016</td>
<td>9</td>
<td>35</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>2017</td>
<td>26</td>
<td>45</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>264</strong></td>
<td><strong>1430</strong></td>
<td><strong>135</strong></td>
<td><strong>265</strong></td>
</tr>
</tbody>
</table>

Source: Personal communication with Accident Research Institute, BUET.
Many of the bridges constructed to facilitate continuous mobility by road have given little regard to water transport. They have not left enough headroom for vessels to pass underneath (Figure 5.3). The problem is prominent in monsoon seasons when the water level is high. Considering the seriousness of the problem, 805 bridges have been identified for demolition and reconstruction (Ray, 2021).

The river ports are the nodes of the water transportation system. They need to function efficiently for the seamless movement of goods, especially for multimodal transport services. The ports are engulfed with different issues, making them unable to play their roles properly. The goods handling facilities are outdated and fewer than the demand. Goods have to be handled manually, thereby increasing the cargo loading and unloading time. It leads to poor utilization of barges and jetties and escalated operating costs. Most of the ports are devoid of adequate berthing facilities. The goods handling process has to depend on provisional jetties. Like the land ports, the river ports are also short of storage facilities, and similarly, cargo kept in the open spaces is vulnerable to damage and theft. IWT subsector can play a more significant role if it can be involved in container movement. For this purpose, inland container terminals (ICTs) need to be built at key locations keeping multimodal transportation objectives in mind (Hoque, 2016).

In addition to inherent issues of IWT, which do not allow it to function to its full potential, the sector has been receiving discriminatory treatment from policymakers. Preference given to the road sector in Bangladesh has affected the other two transport sectors, with IWT suffering the most. In Bangladesh, freight transport service is subject to value-added tax (VAT), and the amount differs according to the goods moved and the mode used. Fruit and vegetable are spared from VAT. For petroleum products, 4.5 percent and other goods, 10 percent VAT is imposed while transported by road. The amount becomes 15 percent when transported by waterways. Therefore, the taxation process disfavors the IWT sector.

Within the IWT subsector, the role of the informal segment is often overlooked in the planning process. Country boats operate in the informal segment of the subsector and transport 80 percent of freight (World Bank, 1996). They engage 58 percent of the people involved in the transport sector. Country boats compete well with trucks regarding freight rates for medium hauls as far as 120 kilometers and can offer lower rates than other traditional surface modes for trip distances 15 kilometers or less. They mainly ply rural waterways. No agency is entrusted with the responsibility of maintaining minor waterways in rural areas.

5.5 Governance issues

The government’s main role is to provide a conducive environment where the logistics sector can smoothly operate (Dappe et al., 2020). The role can hardly be effectively played in Bangladesh as different aspects of logistics – formulating policies, planning, managing infrastructure, and operating services – are overseen by nine ministries and twenty-plus government departments. This arrangement suffers from a lack of coordination among these agencies, and the whole system is seen in a fragmented way instead of as a whole. Especially, effective coordination is vital for the operation of multimodal transportation services. Moreover, the dedicated agencies face limitations and different issues while carrying out their responsibilities.

In the IWT sector, the main government agencies involved are the Department of Shipping (DoS), Bangladesh Inland Water Transport Authority (BIWTA), and Bangladesh Inland Water
Transport Service (BIWTC). They are all under the Ministry of Shipping of Bangladesh. The third organization mainly acts as a passenger service provider, including running ferries at the unbridged sections of roadways. The first two organizations have some overlapping responsibilities. DoS formulates rules, enforces maritime regulations, and ensures inland navigation safety (DoS, 2019). It is responsible for the registration of new vessels and issuing them fitness certificates yearly. BIWTA controls IWT and is accountable for developing and maintaining navigational waterways (BIWTA, 2017). These two agencies also suffer from some common issues, such as limited organizational capacity. DoS started operating in 1976 with 45 staff and one inspection boat (Hossain et al., 2014). There is a lack of staff for crucial activities and no inspection boat at present, though the vessel number has been increasing. Only four surveyors of DoS have to carry out inspections of over 10,000 vessels and issue fitness certificates. The safety of vessels is impaired as a result.

The prime IWT organizations are not only understaffed, but they also lack a skilled workforce (Azad, 2009). They suffer from fund constraints, and the problem is exacerbated due to the use of the available fund inefficiently and getting the priority wrong. For example, the development of primary routes used by large mechanized vessels is given importance, while the secondary routes, mainly in rural areas, where traditional vessels operate, are given less priority (World Bank, 2007). In addition, there are allegations of misuse of funds for major activities such as dredging.

Though there are regulations for different aspects of the transportation sector, they are weakly imposed. Therefore, they do not serve the purposes for which they were formulated. Drivers can get away with overloaded trucks due to poor monitoring. Owners can get fitness certificates for their illegally modified trucks by making facilitation payments. Making the laws harder and enforcing them strictly are often not possible due to protests from the truck owners association and drivers’ unions. The experiences of the IWT subsector are similar in this regard.

Though there is a vast number of logistics service providers in Bangladesh, the market lacks competition. The providers operate with a small fleet of trucks or vessels. They are not assisted by the financial institutions, which do not consider this sector robust enough to merit loans. They are especially biased against the water transport service providers. The barge owners are unlikely to get approval for loans unless they have a fleet of few vessels, can provide high-valued collateral, and have a record of being reliable borrowers. The policies that govern the logistics sector are mostly outdated and do not address the issues in the post-agriculture economic era. They do not offer incentives for foreign firms to get involved in this service.
Key Conclusions and Policy Recommendations

6.1 Key conclusions

The logistics sector incorporating the transportation system is a key contributory factor for the economic status of any country. Logistics performance assumes an even more significant role for economies reliant on the manufacturing and agricultural sector. Measures need to be taken to ensure inputs reach the producers in time and products are delivered to the consumers timely, in intact condition, and cost-effective way. All the elements in the supply chain line, including transportation service and infrastructure, ports, warehouses, and IT systems, have to function efficiently to achieve these outcomes. Sustainability issues also need to be incorporated in the process giving high importance. To achieve Sustainable Development Goals, not only is it required to use greener transportation, but poverty reduction and equity issues concerning women and marginalized segments of the community need to be aimed at in logistics planning. A well-functioning logistics system will lower transportation charges, decrease lead time and inventory costs, reduce product costs, and positively contribute to being competitive in trading.

Bangladesh is a developing country in South Asia. It has been making good progress on the economic front in recent years. The economy of the country is dependent on readymade garments export and agricultural production. Bangladesh’s continued success in economic growth depends on the performance of the logistics sector. Moreover, to engage everyone, including the women, in the economic endeavor and to ensure economic outcomes are distributed in a balanced way, it needs to provide transport accessibility to all, especially focusing on the marginalized groups. Since independence, Bangladesh has been investing more in the roads subsector, thereby not assisting the other two subsectors, railway and waterway, grow at the same pace. While the railway has started to receive more funds for development projects since 2009, water transport has continually been ignored.

Inland Water Transport is acknowledged as a greener mode worldwide. It is a cheaper mode for freight transportation. It consumes less energy and hence generates less environmental pollution. It is considered safer than other modes. From a sustainable perspective, it should be promoted in countries where available. There are other advantages of IWT, which are country-specific. Bangladesh is blessed to have an extensive river network. It is a densely populated country where surface mode development is difficult and encroaches the precious agricultural land. On the other hand, IWT offers a natural carriageway. It penetrates into areas where roads and railways are still not readily accessible. The subsector creates massive employment, especially in rural areas, more than any other mode. As a natural-calamity-prone country, some areas of Bangladesh are affected by floods when IWT offers the only transport option.

IWT has inherent disadvantages as well. For example, it cannot offer door-to-door service like the road mode. Like the railway, it is based chiefly on scheduled service. Therefore, it is inflexible in some regards compared to road transport. There are also country-specific disadvantages. Due to geographical issues, the rivers in Bangladesh are susceptible to heavy siltation affecting navigability. In addition, there are limitations from governance and management aspects, which do not allow the subsector to play its expected role. Though the
mode experiences fewer accidents than surface modes, the dramatic nature of the accidents creates a negative impression on the users.

6.2 Policy recommendations

The surface modes in Bangladesh have capacity constraints along important freight corridors and are beset with many problems. Despite the limitations, Bangladesh should maximize the use of IWT, considering its multi-faceted advantages. Measures should be taken to address the constraints to help the mode realize its potentials and achieve sustainable outcomes for the country covering economic, environmental, and social aspects. Recommended policy measures are as follows.

- **Funding**
  - IWT subsector needs more funding for its expanded role. There could be a limitation on the total fund available for the transportation sector. Investment in this sector should be encouraged through Public-Private Partnership (PPP) initiatives. The legal and institutional arrangements need to be strengthened to ensure the success of PPP projects. The relative funding among the different subsectors, including IWT, needs to be scrutinized.
  - The fund allocated for the IWT subsector needs to be distributed among the different activities based on needs and priority assessment.

- **Dredging**
  - Literature suggests that the priority considerations for the smooth and efficient functioning of IWT mode should be to increase and sustain the navigability of waterways. Some of the lost navigability can be regained by capital dredging. Sustainable navigability can only be ensured through maintenance dredging.
  - Before chalking out dredging programs, it is essential to know the current status of the river. Therefore, hydrographic surveys should be undertaken regularly for this purpose.
  - There are concerns regarding the capacity of BIWTA in undertaking dredging works and achieving efficient outcomes. The private sector can be involved in the process. Experienced foreign companies are likely to be interested in this work. However, the government and BIWTA need to take flexible approaches to involve these companies.

- **Safety improvement**
  - Accidents hamper the confidence of the users in IWT. Enough navigational safety aids should be provided. Vessels should be given registration only when they conform to the approved design. They should be carefully inspected during yearly fitness checks to assess their waterway worthiness and if their design has been modified. Inspection boats should be acquired to increase vigilance on waterway traffic.

- **Organizational reform**
  - It seems that the IWT subsector could perform better through some organizational reforms. There are chances for confusion regarding the responsibilities of BIWTA and DoS due to their overlapping nature. Some of the responsibilities might need to be redistributed to avoid this. It will improve the transparency of the system and the accountability of the organizations.
• Governance issues
  o Both BIWTA and DoS are understaffed, missing personnel in key positions. These positions need to be filled up as soon as possible after they become vacant. In addition, the recruitment process should be made simpler.
  o From the literature, it seems the workforce lack skills to carry out their responsibilities. Emphasis should be given to regular training programs for different categories of staff, including the vessel crews.
  o Apart from dredging activities, private sectors should be involved in the management of different categories of ports. At present, some river ports are leased out to the private sector for management. But, the leasing period is so short (usually one year) that the lessees do not feel motivated to invest in port infrastructure, including good handling equipment. The lease periods should be made longer.
  o There are allegations of dishonest practices in activities like dredging. More involvement of the private sectors in the profitable activities would address this issue and ensure a better return from any investment. Government organizations can oversee the activities of the private sector to monitor if they conform to the contracts.
  o At present, no organization is entrusted with the responsibility to look after the minor waterways. Local bodies, like the Union Parishad, can be given the responsibilities. Engaging the local people is likely to lead to sustainable outcomes.

• Coordination among different departments
  o Better coordination is required not only among the agencies related to IWT but other transportation agencies as well. For example, the Roads and Highway Department (RHD) and Local Government Engineering Department (LGED) should consult BIWTA when they plan to construct a new bridge. It will ensure that headroom problems for vessels will not occur in the future.

• Operational efficiency
  o Bangladesh is still operating the IWT activities in a primitive way. However, the logistic system has made tremendous strides worldwide in the last few decades. Therefore, Bangladesh needs to modernize the process by procuring and using state-of-the-art equipment and incorporating Information Technology (IT) in the supply chain system.

• Gender inclusiveness
  o The transportation system can play a role in removing disparity among people in different regions of a country. Since IWT has a good penetration in rural areas of Bangladesh, it could be used to improve the accessibility of marginalized people, especially women, who could benefit socially and economically from this.
• Logistics strategy
  o A complete logistics strategy should be developed that considers all the system elements and aims to integrate them for delivering the best possible outcomes. The strategy should be based on up-to-date data.
  o A detailed database is required to gather information on the origin and destination of freight movement and other details like type of goods, its volume, mode used, and truck or vessel type. A freight flow analysis could be useful. It will give a comprehensive idea about freight dynamics and aid the planning process.

• Regional freight movement
  o Bangladesh’s strategic location in South Asia should be taken advantage of so that it can act as the logistic hub for the region.
  o Important transit corridors should be identified through research and improved. In addition, the research will be able to determine if IWT could play a broader role.

• Multimodal transport
  o Transport connectivity should be improved to take advantage of the strength of each mode. Waterways could grow in importance and contribute to effective transport if they were well connected to railway and road systems. A thoroughly connected and balanced transport system could lead to sustainable development in Bangladesh.
  o River ports should be placed at strategic locations to facilitate multimodal transport involving road and waterways. These ports should be provided with modern equipment for transloading. In addition, trucks should be able to access these ports easily.
  o The formulation of a comprehensive National Transport Policy (NTP) and multi-modal transportation policy is essential to integrate different modes of transportation.

• Freight transportation
  o Container freight movement should be given priority irrespective of modes.
  o Bangladesh has a long coastal line, but it is underutilized for freight movement. Coastal shipping might be possible from Mongla Port to a river port and vice versa. It will help to use the spare capacity of the seaport.
References


