

The Challenges and Prospects of Inland Waterway Transportation System of Bangladesh

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ABSTRACT

Bangladesh is crisscrossed by rivers and inland waterways have been playing a significant role to the transportation of goods. For nation's economic prospects it is very important to develop the inland waterways transportation systems in Bangladesh. But inland waterways in Bangladesh are facing challenges due to many problems in spite of having good prospects. Therefore, the objective of the study is to examine the present IWT systems, its challenges and how it can contribute more than others transportation systems to our national economy. This paper is mainly based on secondary data. The data is collected from journal papers, internet, newspaper, books, and articles. Data is also gathered from different maritime authority's website. The research findings indicate that the Bangladeshi inland waterways have huge prospects, but lack of knowledge gap of current condition of inland navigability, not conducting hydrographic survey after 1989, lack of poor management, inadequate inland port facilities, low quality vessel and poor inland connectivity are the reasons for all of this problem. Inland waterways transports are environmentally friendly than others transportation systems and many local business person, exporter, importer will be benefited by using IWT. But authority should have to utilize the inland water ways in a right manner. Adequate the depth and air draft should have to be maintained and the inland port facilities improvement and infrastructure development are necessary for IWT.

Keywords-- IWT, Inland Transport, Dredging Maintenance, Inland Port

I. INTRODUCTION

In Bangladesh, there are different transportation systems such as roads, railways, IWT and air. Among these transportation modes, inland water transport (IWT) is familiar due to low-cost and environmentally friendly way of transportation. Bangladesh is a riverine country located in the funnel shaped coast of the Bay of Bengal. Due to her geographical location, a significant number of rivers flow through the country going on the Bay of Bengal set up a strong river network and have been known from the ancient times. In the monsoon seasons most of the time rain fall around the whole country. As for that in many areas water transportation is being used as the number one transportation. Over a long period, time, many rivers of the country have been deteriorated

both for natural and morphological processes, anthropogenic reasons, and for extraction of water from the rivers beyond the border and within the country, thus decreasing the navigability during dry season. This was further aggravated by poor or no maintenance of navigability and comparatively low allocation of budgetary funds and under-investment. During last few decades, the country has not been able to reap the benefits that IWT can bring in terms of economic growth and poverty reduction in comparison to other modes of transport. Considering the significance, Bangladesh's three noteworthy ports are Chittagong, Mongla and the Dhaka-Narayanganj complex where Chittagong port handles around 76% of the nation's 10 million tons of yearly foreign trade. Mongla port is yet to satisfy its commitment because of issue of siltation at the ways to deal with the berths and hinterland. In spite of the fact that the port was intended for 7.5 meters profound approach channel, because of siltation the imperative draft isn't accessible aside from amid the high tide as it were. The Dhaka - Narayanganj port complex is dealing with an expanded volume of trade from 1.6 million tons in 1980 to around 8.00 million tons now of which around 45% are ocean borne. There are possibilities for development in container movement and conceivable foundation of a global port of call at Dhaka. A current UNCTAD contemplate demonstrates that the developing nations without their own shipper fleet for the most part pay 8-10% higher cargo rates than the nations with their own particular fleet. Shipping should be treated as an export-oriented industry and given all kinds of support for development. In Chittagong port Container traffic is growing at the rate of 34% per annum and it is expected that the port has to handle 5 million of TEUs by 2023. In port area, especially container terminal are always remains congestion because of deprived dispersal of traffic to Dhaka area, which accounts for 60% of the overall traffic. Contributory elements for the congestion are; lack of equipment maintenance at the multipurpose container terminal at Chittagong, deficiency of container wagons and trains to get container to Dhaka terminal and insufficient framework.

In Bangladesh, the inland waterways listed some 11 major and over 100 minor ports and about 750000 waterways vessels are in operation. In Bangladesh Maximum ports are getting closed due to insufficient facilities for mooring and unloading ships

and for stowage of goods as well as by siltation of approach channels. These issues are intensified by the changing morphology and flightiness of the waterways, which frequently change course, disintegrate dikes and by and large imperil settled riverfront foundation. Considerable increments in budgetary portions for dredging and in the efficiency of the dredging fleet are required the nation where rivers convey 2000-2500 million tons of sediment a year in that nation there has not been included even a solitary new dredger in most recent 24 years' time. There are overall 35 dredgers, of which 27 are under BWDB and the rest 8 are under BIWTA. Shockingly two dredgers were worked in 1950 and were utilized as a part of burrowing the Suez Canal. The aggregate amount of sediment dredged in 1995-96 by IWTA was 104.76 million cft, while BWDB dredged 65.20-million cft of residue amid a similar period. In 1996-97, IWTA dredged 126 million cft of residue and BWDB dredged 88.60 million cft of sediment.

With an inland waterway system of more than 5600 navigable rivers and 2000 inland ports, China has the most developed ICT subsector in the region. IWT development thrust is being concentrated on 5 specific areas (Yangtze River, Pearl River, Beijing-Hangzhou Grand Canal, Yangtze River Delta and the Pearl River Delta). A \$220 million project, with World Bank funding, aimed at bringing greater prosperity to a region where 6 million people live at subsistence level. The funds were directed at power generating dams, by-passing ship locking systems, and a deeper waterway throughout the system permitting large vessels to undertake trade. Other notable initiatives include the vast Three Gorges project, which will improve electric power and navigation safety and reduce transportation costs; and development along the Hang-Yong Canal, connecting a network of six rivers with the country's largest river. The emphasis in plans for the construction and development of the inland waterway network over the next decade is being placed on inland port development and the construction of 20 inland river channels in major north-south and east-west corridors and localize networks.

Several development projects aimed at enhancement of inland water transport infrastructure and operations are under way not only in European and other Western countries but also in Asian countries such as China, Myanmar, and India. India has many large and small rivers providing facilities for water transport. In the midst of the British time allotment the Brahmaputra and Barak-Surma-Kushiyara-Meghna river systems were comprehensively used for transport and exchange between north east India and the port of Kolkata. The inland water transport departments of both the state and central governments have been trying to improve the water transport system in the region. The Brahmaputra now has several small river ports, for example Sadiya, Dibrugarh, Neamati, Tezpur, Guwahati, Jogighopa, and Dhubri. In addition, there are more than thirty pairs of ferry ghats (crossing points) on the Brahmaputra,

transporting both passengers and cargo. The Barak additionally has little ports at Karimganj, Badarpur, and Silchar and ship administrations at a few places crosswise over it. The major tributaries of the Brahmaputra (the Lohit, Dhansiri, and Subansiri), the rivers of Tripura (the Gumti and Haora), the Tizu River in Nagaland, and the Kolodnye River in Mizoram have immense navigation potential that can be developed for both cargo and passenger movements.

The government of Bangladesh has taken up a master plan to improve navigability of the waterways across the country as more than 2,000 kilometers of river routes have become inaccessible over the last decade due to loss of navigability. Under the master plan, extensive river dredging will be conducted considering the adverse impacts of poor navigability of rivers. Bangladesh Inland Water Transport Authority (BIWTA) said the master plan will be implemented during a period of 15 years or more at a cost of Tk 21 lakh crore (21 trillion). Poor navigability is causing a continued decline in irrigation and fish production as well as inundation during floods. A recent report of the World Bank (WB) mentioned that at least 12.3 percent of the country's people depend solely on water transport for moving to cities or elsewhere. The spread of the comparatively less-length 24,000 kilometers of waterways of the country is much more than 274,000-km road network.

The purpose of this dissertation is, therefore, to figure out the present condition, prospects and challenges of IWT sector in Bangladesh. How much it will be helpful for Bangladeshi economy, which is analyzed in this dissertation paper as IWT in Bangladesh has many prospects like increasing GDP, cost reduction as well as better transportation than road etc.

Inland waterways transportation systems could play a vital role in Bangladesh. But the transportation in Bangladesh mainly depends on the road transportation as IWT has the draft limitation, lack of good mechanized number of inland vessel and many more. This paper tried to measure the challenges and prospects of inland waterways transportation systems for Bangladesh.

II. LITERATURE REVIEW

In a report of World Bank (2007) named – “Revival of Inland Water Transport: Options and Strategies, Washington DC” defined that the Inland Water Transport (IWT) in Bangladesh has been dealt with in detailed manner. After analyzing the present and past IWT projects in Bangladesh, it goes into the economic analysis of the IWT sector. This also includes the transport demand analysis in Bangladesh. Further, it describes the institutional arrangements and sectoral finance and the issues like private sector participation. In the ninth chapter of the study, cross-border IWT between India and Bangladesh has been analyzed. According to this study, IWT can compete with the rail and road transport systems of this region if it can be utilized

properly. This is because of the fact that Road traffic is penalized by the regulatory framework, which requires that goods are transhipped between Bangladeshi and Indian vehicles since neither of the two countries allow foreign trucks to enter their national memory. Rail traffic was hampered by the difference in rail gauges between the West and East rail networks. The report finds that there is a strong agreement within the Government that IWT is a key contributor to poverty reduction in rural areas and to economic growth in the country and new business opportunities exist such as development of container transport between Dhaka and Chittagong or between India and Bangladesh, and further expansion of existing programs such as dredging, ferry services, port management and operations by the private sector.

Transportation in South Asia with Special Reference to India's North East and Bangladesh Adhikari, K. D. et al (2000), *Cooperation on Eastern Himalayan Rivers: Opportunities and Challenges*, New Delhi: Konark Publishers Pvt. Ltd. Ninth chapter of this book 'Development of Inland Water Transport in the GBM Region' is relevant for our study. Here GBM region means Gang Brahmaputra-Meghna basin. The author at first has analyzed the potential of inland waterways transport system in Bangladesh, Nepal and India. The hindrances to successful operationalization of the inland waterways have also been dealt with. In later part of the chapter, the author has discussed about regional cooperation in inland water transport system. It has also been suggested that the inland waterways transport sector in GBM region should be coordinated by a regional organization.

Mehrotra, P. N. (1999), "Transport Coordination", in Muchkund Dubey et. al (eds.) *South Asia Growth Quadrangle: Framework for Multifaceted Cooperation*, MacMillan: New Delhi, pp. 104-33. In this book two articles are important for our purpose. One is 'Trade and Transit' by Mustafizur Rahman and another 'Transport Coordination' by P. N. Mehrotra. In his article Mehrotra has analyzed in detail about the transport infrastructure of Bangladesh and North East India. Later he has described the present transport linkages in South Asia Growth Quadrangle region. Further he has suggested actions on a priority basis. In this he has also analyzed the prospect for inland waterways transport network for the economic integration of the region.

Sarma, Harekrishna Deva (1997), "Inland Water Transport in Assam" in Baishya, P. et al. (eds.) *Development Issues of North-East India*, Guwahati: Lawyer's Book Stall, pp.290-301. Sarma in his paper titled "Inland Water Transport in Assam" has given a detail account of the development of the inland water transport system in Assam. His paper is divided into three parts. The first part deals with history of water transport development till the British annexed the region. In this part he has described how the Koch and the Ahoms had developed this mode of transport for their economic activities. Boat building was then one of the most profit-making industry. This remained to be a big

industry till the David Scot of East India Company started operating steam boats in waters of Assam. The second part of the paper deals with the development during the British rule and the third part deals with the developments after the partition of the sub-continent. After this Sarma sees greater prospects for inland water transport if proper initiative is taken by the government.

India Development and Growth in Northeast India: The Natural Resources, Water, and Environment Nexus, Washington DC: World Bank (2007). Although this report does not deal exclusively in IWT sector, it identifies the rationale and the potential for the up gradation of the existing routes and development of new routes. It identifies 399 kms of inland water transport route which are not part of the National Waterways 2 of India but have high potentials for the traffic. The report also finds out some of the major issues for the development of IWT in India's North East including technical and institutional. As the government of India has renewed its interest to develop the IWT route in the region, it is expected that NW-2 can develop into a well-functioning waterway with adequate infrastructure in a time frame of 8 to 10 years. The development of NW-2 and of waterways in the tributary rivers would enhance the opportunities for economic growth and employment and would accelerate the development of the hinterland.

Thapilyal, Sangeeta (1999), "India-Bangladesh Transport Links: A Move for Closer Cooperation, Strategic Analysis, 22(12): 1921-31. In this article the author has pointed out some of the political factors which hindered close cooperation between the two countries in transport sector. The 1965 crisis caused discontinuation of rail links, which were not addressed till date even after the creation of Bangladesh in 1971. She has also pointed out the Protocol on Inland Water Transit and Trade of 1972 were not implemented. After establishment of a sustainable transportation links, this can be extended to other countries in the region especially Nepal and Bhutan.

Md. Imran Uddin, M. Rafiqul Islam, Zobair Ibn Awal, Kazi Md.Shifun Newaz, "An Analysis of Accidents in the Inland Waterways of Bangladesh: Lessons from a Decade (2005-2015)", 10th International Conference on Marine Technology, MARTEC 2016, are explained their article that the accident have been broke down as per diverse factors, for example, vessel composes, area of mishaps, time dispersion of accident, last state of vessels after the event of accidents and others. The analysis uncovered that the real reasons for conduit accidents are impact, nor 'wester or tempest, over-burdening, dependability disappointment, unnecessary present, base harm. The analysis demonstrates that cargo vessels and passenger's vessels are confronting more mischances contrasted with different sorts of vessels. About half (45%) of all the vessels are sunk after the occurrence of accident. This may be due to the poor design and structural strength of the vessels. Collision is the leading cause of waterways accidents in Bangladesh. Nearly two-third of all

waterway accidents occurs due to collision. It has been observed that during winter season (January and February in particular) a significant number of collisions took place. During this period the day light is limited and often the weather is foggy. Perhaps these are the contributing factors behind this type of accident. In this article they didn't shown the safety passage navigation system in Bangladesh and how to reduce the accident to using the proper routes. They only analyze the reason of accidents in iwt.

A Study on the Accidents of Inland Water Transport in Bangladesh: The Transportation System and Contact Type Accidents, Mohammad Tanvir Hossain, Zobair Ibn Awal, Subir Das shown here on contact type accidents of water transport in Bangladesh. They also said unique characteristics of the IWT in Bangladesh. A fault tree is developed to represent the chain of events resulting in collision and grounding. This paper centers on creating fault tree for crash and establishing sort of accidents as an appropriate instrument for the accumulation and examination of accidents information to distinguish unsafe chain of occasions. The point is to distinguish blunders and risks which are identified with the mishap procedure, both expressly and verifiably. Such blame tree can be utilized as an establishment for broad hazard examination. In addition, this paper talks about the novel highlights of IWT framework in Bangladesh.

Riverine passenger vessel disaster in Bangladesh: options for mitigation and safety, Abul kalam azad, This study is an attempt to identify different factors that causing passenger vessel fatalities and thereby addressing viable options for Bangladesh. in this paper he tried to show the present scenario of IWT condition in Bangladesh. he also gave the opinion that The government's weakness in enforcing laws, mismanagement, negligence and irresponsibility of concern authorities, profit centred attitude of vessel owners, corruption and insufficient budget are the underlying causes of these tragic disasters. But in this paper, he did not say anything about the future challenges and how to solve those challenges and develop the iwt. The author just provided some recommendations but not gave the solution to about the vessel disaster.

Sustainable Transportation & Infrastructure, Volume 3 Inland Waterways & Ports (2015), Ban Du DeltAS, explained in this dissertation paper about the iwt and port in Bangladesh. the author tried focused all the things such as financing, port facilities, navigability, role of BIWTA, the author explained the necessity of dredging, financing of iwt and Bangladeshi maritime ports. in this paper tried to cover 2009 to 2014 in iwt and maritime ports in Bangladesh. One of the main factors for revival of IWT would be container traffic in inland waterways. To meet the growing demand of transporting containers between Dhaka and maritime ports, utilization of inland waterways has become inevitable. Railway suffers from capacity constraint and the road does not

have bearing capacity to accommodate trailers, so all the studies conducted recently recommended for inland waterways and also described the necessity of transit between India Bangladesh. The author shows only few challenges in iwt system in Bangladesh. it just said the condition of iwt system and inland port. but didn't say how to increase the cargo. A good number of vessels are very important to increase the pace of IWT. But in this paper author didn't described about the ship.

"Climate changes and inland navigation of Bangladesh", ministry of environment and forest explained how to climate changes in bd for iwt activities. IWT is environmentally friendly and consumptions of fuel is four to eight times lower than that of roads. CO2 emission by engine of inland ship is also lower making a positive impact upon the environment. But inland navigation is becoming hazardous and waterways shrinking rapidly. The change in waterways is very much evident and visible. This report shows the how-to climate change by inland ships and others reasons. it also explained some challenges and recommendations. In this report, the author didn't show about the benefit of iwt system. in bd the climates changing so many reasons but it was not showed in this report. Iwt can reduce the cost, road traffic and it can be increase the GDP in bd.

From the review of literature, we find that a number of studies have been undertaken by various scholars, inter-governmental organizations and research institutes in related area and the literatures reviewed so far, have no doubt made significant contributions to the field of study. However, specific studies on prospects and challenges of inland waterway transportation systems for Bangladesh are rare. The current study attempts to explore this issue. In this paper the author tries to show how to develop IWT improving the present condition, challenges and prospects as well.

III. RESEARCH METHODOLOGY

The study adopted applied research employing empirical approach to enable it established new factual information. The nature of data collected for this study was an integration of qualitative and quantitative data for an informed analysis. Survey and qualitative research design were used for the study to enable researcher obtain data from the field and existing literatures on the subject for an informed analysis.

The study obtained data mainly from secondary sources and in some cases primary data has also been used. The primary and secondary sources of data are discussed in the subsequent paragraphs. Sources of primary data were the personnel directly related with maritime and IW. Secondary data were obtained from books, journals, Internet, newspapers, magazines and other relevant published and unpublished materials. In addition, official documents and publications were obtained from different Authority. Analyzed data were presented in a descriptive analytical form. In some cases,

the collected data has been converted into tables for clarity.

IV. DISCUSSIONS

4.1 History of IWT in Bangladesh

The history of transportation system in Bengal starts with water transport since the land is basically riverine and in the absence of a road system, waterways were preferred for movement and carrying goods from one place to another. People from all over the country came here with the help of water transportation, especially people from Asia, Arab countries, Turkey, Portugal, France and England, they all came for trading business by using the sea routes.

The vehicle area of Bangladesh experienced gigantic advancement with the assistance of benefactor subsidizing and specialized help from abroad amid the three decades after freedom. The quantity of dispatches and steamers enlisted with the Inland Water Transport Expert (IWTA) in 1970 was 2,712. Somewhere in the range of 18.9 million tons of load were moved by water transportation in 1986. Starting at mid-1988, the nation had 8,430 kilometers of safe conduits, of which up to 3,058 were primary freight courses.

Starting at 1987, the Bangladesh Inland Water Transport Corporation worked a fleet of in excess of 480 vessels; about half were inland and waterway freight ships, and the rest were utilized for coastal trade. The size of the corporation's fleet had been steadily declining over the years, but they still represented a substantial portion of the registered watercraft the aggregate number of traveler and cargo conveying nation water crafts utilizing the huge stream framework was about 300,000 and was expanding in the mid-1980s. Some of the larger boats use a single sail to supplement manpower. The larger boats carry loads up to thirty-five tons and operate with crews of three or more.

In 1986 Bangladesh Shipping Corporation has been owned 21 oceangoing ships in its inventory, and the vessels of many other countries called at the major ports. Chittagong, the principal port, starting at 1987, the Bangladesh Inland Water Transport Corporation worked a fleet of in excess of 480 vessels; about half were inland and waterway freight ships, and the rest were utilized for waterfront exchange has an excellent natural harbor and anchorage on the Karnaphuli River, about five kilometers from the Bay of Bengal. The port facilities were developed after 1947, and by 1970 Chittagong could berth 20 ships at a time and handle 4 million tons of cargo annually. In 1985, the port at Chittagong handled some 1,086 vessels and 6.2 million tons of cargo. Chalna is on the Pusur River around 64 kilometers south of the stream port city of Khulna. Chalna was all the while being produced in the late 1980s, yet it was quickly picking up on Chittagong in limit and in rush hour gridlock, especially as land and inland conduit associations additionally were being

enhanced to reorient the dissemination arrangement of the west and Northwest Territories of the nation to newer port. The port at Chalna handled 545 vessels and 2.3 million tons of cargo in 1985.

The advancement of inland ports, terminal offices and ancillary services for a smooth and safe route were aides to the business necessities of the individual administrators. There was no provision for governmental control and maintenance of waterways. The river conservancy work was carried out at the district level by the companies. Each district was headed by a Pilot Superintendent comprising a large establishment of pilots and surveyors grouped together and placed along the navigational routes. Each gathering used to Bay a predefined length of the waterways. They used to investigate the channels frequently utilizing nation water boats and estimated profundity with bamboos and different materials. Accordingly, dredging was presented in the waterway conservancy work. Yet at the same time numerous issues were unattended which incorporate advancement of inland ports and navigational aids. Amid British period the Gabkhan Khal a current tight brook between the relentless tidal waterways was exhumed and modestly extended. The Bengal Legislature passed the Inland Waterways Bill in 1934. This would have set up a Waterways Board. Sadly, the demonstration was never put into activity. Cargoes of raw jute or logs from the mangrove forest of the Sundarbans may fill all the interior space and project beyond the gunwales of the boat itself. Other cargoes may be bagged or Bayred with cloth or bamboo meshwork. Country boats are estimated to move more than 17 million tons of cargo yearly, on a system of at least 1,400 launch landings and the major river ports of Dhaka, Narayanganj, Chandpur, Barisal, and Khulna. inland waterway traffic of bulk agricultural goods is much larger than coastal traffic. Standard and energy techniques for water transportation meet at the seaports of Chittagong and Chalna, where a tremendous piece of Bangladesh's imports and passages are exchanged between out and out various sorts of vessels.

4.2 Importance of IWT

There are four vital transportation in Bangladesh such as Air, Road, Rail and Water transportation. water transportation is the most proficient, slightest costly and earth safe.

30% of general cargo transport yield and 20% of traveler travel are contributes by IWT in Bangladesh (Banglapedia, 2004). Besides, inland water transport is very important because of the following reasons:

1. It ensures access to the remote areas where development of other modes is not feasible.
2. It attracts new industries to the remote zones.
3. It helps expanding markets for a regional resources and products.
4. It generates water related recreation and tourism activities.
5. It creates related small business opportunities.
6. The maintenance cost of waterways is much less than other modes of transportation.

Bangladesh, a flat alluvial delta, is a land of three mighty rivers, Padma, Meghna and Jamuna. A dense network of water bodies covers the major parts of the country and provide a relatively cost-effective means of transport, particularly for the coastal settlements in the southern districts.

V. SWOT ANALYSIS OF IWT IN BANGLADESH

5.1 Strengths

1. IWT network providing access of high degree of saturation to 25 percent of the rural families.
2. A Government which appears to have taken the significance of IWT on a fundamental level and has begun to recognize this significance in different late archives
3. High competitiveness of IWT for bulk and container transport compared to road and rail.
4. Natural advantage of reaching remote parts of the country
5. Natural linkage of waterways with India.
6. Geo-vital favorable position of sending out transport administrations for transmitting
7. Products amongst terrain and landlocked north-east India through conduits of Bangladesh.
8. Leading private sector participation in all types of investment and operations.
9. Choice of poor people in respect of cost.
10. Comparatively attractive in bulk and container transport.

5.2 Weaknesses

1. Never ending dredging requirements and unstable rivers.
2. A position in the transport market which has eroded during the past ten years.
3. A weak position in the competition with road and rail for allocation of Government resources.
4. Fragmented responsibilities and lack of intermodal coordination.
5. Regulated passenger tariffs that erode profitability and encourage overloading.
6. Low skilled and educated workforce with little interest beyond daily earnings.
7. Lack of knowledge of the actual situation of the IWT network and potential for huge maintenance backlog.
8. Weak environment for public-private partnership (procurement, contractual arrangements, political interference, limited competition).
9. Lack of Master Plan, including dredging strategy, as a basis for the mid-term sector development.
10. Lack of adequate financial management and information system in BIWTA resulting in poor control of revenues and expenditures.
11. Perception of IWT as unsafe.

12. Few donors interested in the sector.
13. Deteriorating conditions of rivers and natural morphological processes.
14. Inefficiency and corruption due to absence of effective governance mechanism.
15. Low productivity due to manual labor-based operations.
16. Lack of confidence of market force.
17. Poor management capacity.
18. Lack of intermodal connectivity and coordination.
19. Overloading due to unhealthy competition and regulated pricing policy.
20. Knowledge gaps.
21. Absence of mutual trust and respect for public-private partnership.
22. Lack of recognition to importance of country boats.
23. Less participation of development partners.

5.3 Opportunities

1. Existing dredging surplus capacity in the private sector.
2. Development of intra-regional traffic and India-to-India traffic through Bangladesh.
3. Private projects interested in using IWT for bulk cargo in large quantities.
4. Private sector interested in piloting mechanized cargo handling and longer-term.
5. Lease or contractual agreements for port management and cargo handling.
6. Development and management of rural IWT infrastructure by Local Government.
7. Institutions having demonstrated this capacity with rural roads and markets.
8. New financing sources for the sector (from ferry revenues, from user charges, from petroleum products) benefiting from on-going discussions on developing similar sources for road maintenance.
9. Positive environmental impact of IWT compared to other transport modes.
10. Development of synergies between water management and IWT.
11. Current Government policies and strategies.
12. Commitment of Government to combat deteriorating conditions of rivers.
13. Environmental advantage in respect of carbon emission.
14. Private sector participation in dredging.
15. Increased transportation of bilateral traffic and transit traffic.
16. Increased bilateral cooperation in respect of inland navigation.
17. Development of container traffic between maritime ports and Dhaka-Narayanganj area by rivers.
18. Increased private sector investment.

5.4 Threats

1. Expansion and improvement of street arrange in rivalry with and contrary to the IWT organize.
2. Internal and external opposition to reforms from those who benefit unduly from the present situation or from those who would lose their jobs/positions.
3. Increased corruption may result from enhanced private participation. Corruption is a serious risk related to an increased role of the private sector in provision of dredging services. While private dredging companies are supposed to be contracted by BIWTA based on competition, there is an unusual practice of awarding contracts to dredger operator/company who do not have dredging equipment and lease equipment from other operators. This practice is contrary to good governance and basic principles of selection of contractors.
4. Similarly control of dredging operations is prone to corruption as there is no trace of the quantities dredged after they have been disposed. The use of performance-based contracts would limit human involvement in the control as performance would be measured using electronic equipment and with a lower frequency than when quantities are measured.
5. Negative environmental impact of dredging and IWT.
6. Poor water management at national and regional levels.
7. Construction of bridges and culverts with no compliance.
8. Construction of the Padma Bridge.
9. Replacement of riverside consolidation centers of cargo by Growth Center Markets (GCM) developed by LGED.
10. Increasing marine accidents.

VI. CHALLENGES AGAINST IWT

6.1 Inadequate Depth and Air Draft

Large parts of Bangladeshi waterways have inadequate depth for commercial movement of cargo. Moreover, Bangladeshi rivers (especially in the northern plains) face severe problems of siltation round the year. The river bed rises, impeding movement of cargo during non-monsoon months.

Multiple bridges with low vertical clearance obstruct the passage of bigger inland water transport vessels on waterways. There several navigable canals in Bangladeshi waterways but these cannot be utilized for cargo movement due to air draft restriction.

6.2 Lack of Navigability

Navigability of rivers in Bangladesh has been deteriorating over a long period. Both characteristic and morphological procedures and the extraction of water from the waterway past the border and inside

Bangladesh for water system and different purposes have brought about a diminished dry season navigability of the streams, channel depths turned out to steadily decay. The DHV Consultants evaluated the demands for advancement and maintenance dredging ranging from 2.25 to 7 million cubic meters every year between 1988-2005. While in 2009 the Inland Transport Master Plan contemplate by the Transport Sector Coordination Wing of the Planning Commission assessed an aggregate volume of dredging necessities up to 18 million cubic meters every year. As per reports accumulated from BIWTA it was uncovered that as a rule manageable safety couldn't be accomplished by dredging. Testimony of residues prevented the safety in certain stretches instantly after the dredging. All things considered BIWTA needs to battle for keeping up the safety. The IWT passage between Dhaka-Narayanganj and Chittagong oceanic port is of prime national significance as class-1 with an ensured LAD of 3.6 m. The conduits have satisfactory navigational draft for the vast majority of its length amid low water period with the exception of spots where affidavits of residues happen. One of such enduring issue spots lies close Hizla in the lower Meghna river. The vessels paying between Dhaka-Narayanganj and Chittagong need to sit tight for the high tide.

6.3 Shifting of Channels

In spite of BIWTA's guide to route strengthen along the channel, change of stream course has turned out to be relatively unusual. Therefore, vessels are grounded regularly cause enormous financial misfortune for the vessels operators. Currently, BIWTA performs Hydrographic Surveys just in the courses and regions which require need consideration. Hydrographic survey or other related investigations as such have not been carried out over a vast portion of the IWT network in recent years. However, officials and IWT operators opine that navigation during high water periods does not usually face any problem. In the low water season, although there exist long stretches of waterways in the sufficient depths, sedimentation and shoals appear in many places that restrict movement of the vessels.

6.4 Damage to Infrastructures

Impact of climate change is very much evident in case of 24 terminals developed by BIWTA in the early 1970s which were also used as cyclone shelters. Not a single terminal is now in use as the rivers lost navigability or change their courses far away from terminals. The equipment's (e.g., aid to navigation) are vulnerable to flood, storm surge and cyclone. Aid to navigation equipment's is being washed away regularly by onrush of flood water. SIDR in 2007 destroyed, damaged or washed away about 80% of the navigational aid equipment's installed in the waterways in Barisal and Khulna divisions. So far BIWTA developed 22 inland ports and 380 landing stations. Barisal Division developed around 43% landing stations in rural area. Around 35 landing stations are situated in the provincial zones of the regions of Khulna, Bagerhat and Satkhira.

Around 30% of these arrival stations were dented; pontoons were uprooted, harmed or upset amid SIDR also. Landing stations situated in the coastal zone presented to saline interruption floating boats, wharfs or shore connection can't keep going long because of saltiness of the water.

6.5 *Obsolete Inland Port and landing Stations*

The river ports and landing stations developed at the banks of the rivers need to be developed considering impacts of climate change. The design of these installations is dictated by the difference in water level between dry season and the wet season, which varies locally and may be in the magnitude of 6 meters. In coastal area the difference in water level is further amplified by tidal action. The banks of the river slope gently towards the Centre line of the river, necessitating long jetties to serve river craft in water with sufficient depth. A further significant factor in shaping the structure of the jetty is the method of cargo handling which is done almost exclusively by head-load. Following the benchmark of Public Works Department (PWD) BIWTA created ports and landing stations offices figuring the high water and low water variety. As environmental change factors were not considered, as of now in a few spots, it can be seen that the facilities which were produced in the past are currently on the shore very far from the waterway or in the mid-stream of the waterway with no shore connection. Floating barges are frequently moved to somewhere else because of progress obviously of stream or because of disintegration abandoning the piles or spuds.

VII. PROSPECTS OF IWT IN BANGLADESH

7.1 *Container Transportation*

Another business opportunity rises with a strong enthusiasm for trade of holder among Dhaka and the seaports of Chittagong and Mongla. With the strong improvement of container traffic at the port of Chittagong, the port's throughput will soon accomplish the cutoff of one million TEUs consistently. Railroads are congested and the street does not have the bearing ability to convey container trailers. Currently, 90 percent of the container are stripped/stuffed in the ports of Chittagong and Mongla and transported as regular general cargo. Only 10 percent of the containers are loaded on the rail and transferred to the Inland Container Depot located southeast of Dhaka City. While road capacity is expected to increase and improvement of railway services is envisaged with support from the donor community through a program of policy and institutional reforms and investments in the track and in a new inland container depot, IWT will remain competitive due to its lower costs and the limited need for investment.

BIWTC envisages the acquisition of two 100 TEUs container feeder vessels to operate between

Chittagong and Dhaka. The feasibility report prepared by BIWTC produces a low 8.1 % EIRR. The study is based on 12 hours of navigation, one day for loading and one day for unloading. Apparently, the operating productivity could be increased, loading and unloading times appearing to be quite high. Such committed tasks utilizing devoted terminal facilities at the two closures should finish a round trip in under three days making utilization of day and night route i.e., ten round-trips every month. However, the undertaking needs significantly facilitate top to bottom examination before its monetary and budgetary possibility can be firmly settled.

Provided that its feasibility is confirmed, the BIWTC project can be considered as a pilot operation to test and promote container transport using IWT. Assuming a three-day round-trip during 330 days, the two vessels to be acquired by BIWTC would be able to transport 44,000 TEUs per year to and from Chittagong and Dhaka. This represents 4.4 percent of the container traffic in the port of Chittagong, which leaves many opportunities to private operators to develop this market once it has been tested successfully with the operation of the two BIWTC vessels and the land infrastructure becomes available.

Container traffic to and from Bangladesh is growing very fast, @12 percent per annum. In 2012-2013 total containers handled at maritime ports of Chittagong and Mongla were 1,512,586 with 97 percent share of the Chittagong Port. 70 percent of containers handled at maritime ports are destined for or originating from Dhaka/Narayanganj area being the main consumption and distribution Centre. Due to lack of appropriate intermodal distribution system of containers, further traffic growth is restricted. In absence of a dedicated railway line for freight and container movement between Dhaka and Chittagong, container movement by rail is to share with preferential passenger movement. The existing road does not have the bearing capacity to carry containers; presently 90 percent of the containers are stripped/ stuffed in the ports of Chittagong and Mongla and transported as conventional general cargo. Only 10 percent of containers are loaded on rail and transferred to Kamapur Inland Container Depot in Dhaka, managed and operated by Chittagong Port Authority. In view of the above a couple of studies recommended to utilize inland waterways for container traffic. In 1991 a JICA Study recommended the site of Pangaon, Dhaka on the bank of the Buriganga River to develop an Inland container terminal. The navigation channel is straight at this point with a width of 250m and provides a Class-I waterway that ensures LAD of 3.6 m perennially. Accordingly, an Inland container terminal had already been developed at that site and began experimental operation in 2013 with the following facilities:

- i) RCC jetty (upstream): 1,411 m²
- ii) RCC jetty (downstream): 1,411 m²
- iii) CFS: 280 m²

- iv) Paved area (marshalling yard): 60,000 m²
- v) Bank protection work: 60,250
- vi) Administration Office Building: 1 no
- vii) Workshop: 1 no

This ICT has the handling capacity of 116,000 TEUs with further scope of handling 160,000 TEUs per year. For introducing container service between Chittagong and Pangaon, Chittagong Port Authority hurriedly procured three reconditioned inland container vessels and put them into operation. But such experimental effort of the public port authority could not be successful, as such infrastructure developed at Pangaon are still unutilized. Officials of CPA, BIWTA and market forces considered the following main causes of the failure of Pangaon:

1. Insufficient vessels to ensure regular container service. Three ships procured by CPA are not operational any longer.
2. Long waiting time between sailings.
3. High waiting time of trans-shipment/transfer of containers from feeder vessel to inland vessel.
4. Only one handling crane available at Pangaon; procurement of an additional container is underway which will take 18 months.

5. Tariffs are high as against the present structure of costs of transporting cargo between Dhaka and Chittagong.

6. Shipping companies are still following a 'wait and see' policy.

7. No port promotion strategy on the part of public port authority. Report of the World Bank on "Revival of Inland Water Transport: Options and Strategies" published in 2007 identified container traffic and container handling trade as one of the attractive areas of private sector participation. The Report indicated that the tariff to transport a 20-foot container between Dhaka and Chittagong is around Tk. 600 per ton by IWT, compared to Tk. 1200 for rail and Tk. 6000 for road. The private sector has come forward in a big way to invest in container movement by waterways. GoB has formulated one procedure for according approvals for construction of riverside container terminals. In the meantime, five companies were allowed to construct such inland container terminals near Dhaka-Narayanganj region. Status of construction of such ICTs may be seen in Table 1.

Table 1: Status of construction of private sector ICTs(as of January 2015)

Sl	Company	location	Planned capacity(TEU)	Land area (acre)	Physical progress	Expected time of operation
1	SAPL	Mirkadim, Munshiganj	Phase 1:60,000 Phase 2:60,000	Phase 1:15.15 Finally:20	75%	2015
2	Rupayan group	Bandar, N'ganj	375,000	30	40%	2016
3	Ananda group	Sonargaon, N'ganj	-	-	-	-
4	A.K.Khan group	Palash, Narsingdi	Phase 1:140,000 Phase 2:70,000 Finally:330,000	Phase 1:30 Finally:50	35%	2016
5	Kumudini trust	Khanpur, N'ganj	-	-	-	-

Source: planning dept. BIWTA

The Ananda Group has obtained approval from the Government but the company is yet to finalize its project. While the Kumudini Trust is very much keen to engage the CONCOR, A Govt. of India enterprise of container company as the terminal operator. To this end, a feasibility study had already been completed and decision of the Govt. of India is in the offing. The Kumudini Trust will act as the landlord while CONCOR will be responsible for the operations of terminal. In addition to the above private sector initiatives, the Governments of Bangladesh and India have mutually agreed to develop a multipurpose port at Ashuganj, Brahmanbaria for handling of containers and break-bulk cargo. The port will mainly handle container and cargo transported between Kolkata and Agartala in India through the territory of Bangladesh. Development of this

port will be financed by Indian credit line as agreed by both Governments. A feasibility study to this end has been completed in 2014 and both Governments are now considering the investment project. According to the study, development of this port will involve a total amount of BDT 4.41 billion BDT (land cost BDT 2.00 billion to be borne by Bangladesh and BDT 2.41 billion construction cost by India). Besides, the GoB has decided to develop an inland container terminal at Khanpur, Narayanganj on a Build-Operate-Transfer (BOT) basis. Feasibility Study for this PPP project is currently underway.

7.2 Inland Container Facility

In perspective of the earnestness to set up sufficient container facilities with satisfactory waterfront in the Dhaka territory, the Government consider the

venture of changing over the current regular cargo port of Kanpur in Narayananj into a brief container terminal. This would require exorbitant fortification of the existing framework that is insufficient for holder taking care of. The private operator is much for this improvement and would be prepared to work freight ships from Chittagong and in addition from Kolkata (India) for the vehicle of container utilizing this facility.

In any case, earlier offering that was endeavored to draw in the venture through public private association, neglected to pull in qualified bidders. The reason is that the states of qualification incorporated a necessity for longstanding knowledge in development and task of compartment terminals, which none of national administrators has. Moreover, intrigued national firms neglected to look for joint wander with qualified outside firms.

The Chittagong Port Authority (CPA) and BIWTA are mutually advancing the task of building up another inland container facility close Dhaka.

7.3 Private Participation

7.3.1 Port Management

The present activity plans where BIWTA lease out port zones for a brief timeframe don't give the motivation to the port director to build up the port territory. Ports are one of the instruments accessible for the monetary advancement of locales. This instrument has not been utilized up to this point, with ports more considered as an open foundation instead of an instrument of monetary development. A few alternatives exist to overhaul the status of inland ports and their management:

a. Management by Public Society Organization

While ports are by and by rented out to private managers, port administration can be considered as open. The port renting contracts are basically a course of action to encourage the gathering of incomes. In this way, the arrival to coordinate administration by the organization can't be relied upon to enhance the current circumstance yet rather crumble it by making gathering of incomes more troublesome. Continuation of the current courses of action ought to be analyzed with the likelihood of exchanging a few obligations of BIWTA to the private supervisors. This would require an adjustment in the monetary conditions and the length of the rent

b. Formation of Self-sufficient Port Specialists

The port experts would have a landowner status focusing on accumulation of port incomes and renting out of port administrations to private operators. Port specialists would be in charge of maintenance of port territory and for port advancement. While port specialists would have an open status, this course of action would open to the way to additional association of port clients, neighborhood financial administrators and nearby government foundations in the basic leadership process with respect to port administration and advancement.

c. Concession of Port Administration to Private Operators

While this course of action would be fitting for overseeing port resources, particular modalities would require to be characterized for port improvement when the venture keeps going more than the concession contracts. The choice on the more proper plans ought to be founded on the qualities of the port.

7.4 Coastal Services

Presentation of the private segment in the arrangement of passenger ship and coastal front services was prescribed in the 1997 Inland Water Transport Sector Policy and Strategy Study without being sought after. Two modalities were proposed:

a. Rivalry for the market

The aggregate duty regarding the arrangement of a specific service on a specific route would be contracted to a private part service. Tariff would be controlled as per the agreement. Resources could be leased by BIWTC or possessed by the private service, as characterized in the offering archives.

b. Rivalry in the Market

Private area service would be presented in coordinate rivalry among themselves or/and with BIWTC. This methodology would have the preferred standpoint that the private segment would give effectiveness and in addition a security benchmark for people in public sector and the other way around.

The 1997 suggestion stays legitimate be that as it may, to be connected to existing services, would require a full rebuilding of the present operational states of these services. Specifically, this would require an investigation of BIWTC costs for working ship and waterfront services and a redefinition of the Public Service Obligation between the Government and BIWTC for working seaside benefits and in addition of the related endowment. While this rebuilding is probably not going to occur for the time being, new ship or beach front services to be created later on would be a chance to test the arrangement of these services by the private sector.

7.5 Bangladesh-India Trade

It is identified that the trade pattern is the key prospect for the IWT system. Most of the areas from where the cargo is originated and destined have connectivity with IWT. The cargo composition is also suitable for using IWT along with the greater connectivity. The inherited benefit of larger connectivity to the main hinterland with class I depth, cheap, safe and environment friendly, less maintenance cost, and the good experience of using IWT as a means of transportation (Hasan & Khondoker, 2016) could create additional benefit here. There is already a protocol to use the waterways of both countries. The development of Inland container handling facilities through IWT near Dhaka and introduction of liner services between Pangaon and Kolkata, even though are irregular in nature but still an opportunity for small traders. The slow steaming nature of IWT could be considerable if the total

time is compared between the road and IWT trade in parallel to the cost as well. It is found that a shipment through IWT from Kolkata to Dhaka area takes almost 20 days through IWT, which could be reduced to half by introducing efficiency at different levels of operation and development of infrastructure. On the other hand, in case of road haulage it also takes almost ten days because of high waiting time at the border for customs and other procedures (AITD). The WB (2007) identified that to transport 1 ton of cargo for 1 km it costs near Tk.1 for IWT, Tk.2.5 for rail and Tk. 4.5 for road in case of Bangladesh and the use of IWT rather road is reducing the emission of around 155,000 tons of carbon. Moreover, number of development projects initiated in both the countries for the development of IWT system would create ample opportunities for IWT trade. The Indian initiation to develop NW 1 and 2 as well as the Bangladesh initiation of developing the inland waterways under protocol would facilitate better connectivity between these two countries. The following table sums-up the prospects of IWT in India-Bangladesh Trade.

VIII. CONCLUSION AND RECOMMENDATION

Inland water transport provides transportation access to about 25% of rural households in Bangladesh. Considering the economic viability, inland navigation facility is comparatively cheaper than the other available transport system. The cost is low and IWT is environmental friendly, requires minimum maintenance and is a safe transport option. Considering the developmental issues, inland navigation transport facility has been under developed due to the overwhelming development of the road transportation system. Road network is responsible for deteriorating of many previous navigable routes due to the blockage of water transport.

Though we have natural rivers, our rivers draft is so less. Navigability is the main fact for IWT in Bangladesh. BIWTA should have to be hydrography survey to get updated knowledge about inland rivers in Bangladesh. Air draft, infrastructure damaged, lack of river port facilities are the main challenges. Upgrading terminals, establishing intermodal linkages, and training of personnel can lead to greater efficiency. A number of other indirect and intangible benefits may also flow from the increase in economic activity, including development of tourism circuits and water sports, conservation of biodiversity, and sectorial development, perhaps even the development of flourishing eco-towns with a growth in related service.

1. Adequate depth and air draft should be maintained in inland waterways by the BIWTA.
2. Navigability along the inland channel has to be confirmed by the help ministry of shipping.
3. Infrastructure development is needed to

4. Port and Landing facility should be ensured for the transports moving through inland waterways by the Government.
5. Shifting of channel has to be controlled taking effective measures by BWDB. Government should take initiatives to develop the infrastructure of inland waterways.

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