

INNOVATIVE APPROACH IN TRANSPORTATION - AN INDUSTRIAL LIFE

SUB THEME: INTEGRATION OF INLAND WATERWAYS IN TRANSPORTATION

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Abstract---Transportation is the single largest component of cost for any company. Transportation is key to existence of any organisation as it delivers the product in the hands of customer. Supply Chain Managers have to do a fine balance between cost of transportation and service levels. One of the important decisions in transportation is selection of mode of transportation. Inland Waterways Transportation (IWT) is the mode of transportation within a country where cargo is moved over rivers and canals. As compared to road and rail, IWT is more fuel efficient, environment friendly, less capital intensive, safe and possess least external costs. In spite of carrying several advantages and being recurrently used in several countries, the spread of IWT in India is extremely poor. IWT does not contribute even 0.5 per cent of the total Indian freight transportation. The paper attempts to understand the Indian shipper's transportation service requirements and various factors which influence his choice of mode and how IWT in India can realign itself to meet these requirements. The paper provides some of the recommendations for IWT sector to evolve to meet the shipper's service requirements.

Keywords---*Comparison, technological and physical viability, transportation corridors, other nations IWT, way ahead, IWT units of Indian Army.*

I. Introduction

Water based transport is effective as operating costs of fuel are low and environmental pollution is lower than for corresponding volumes of movement by road, rail or air. A major advantage is that the main infrastructure i.e. the waterway is often naturally available, which then has to be "trained", maintained and upgraded. Transport over waterways is especially effective when the source and/or destination are waterfront locations. Intermodal transport may be interpreted as a chain of actors who supply a transport service. Inland navigation can play a crucial role in increasing supply chain service performance.

II. History

Northeast India has many large and small rivers providing facilities for water transport, especially in plains sections. In ancient period until roads were constructed, the Brahmaputra and Barak rivers were common and only means of transport. During the British rule the Brahmaputra and Barak-Surma rivers were used extensively for transport

and trade between northeast India and the port of Calcutta (now Kolkata). With the growth of the tea industry these rivers became important carriers of trade. The East India Company started the water route along the Brahmaputra from Kolkata to Dibrugarh in 1844 and steamships were introduced by the Joint Steamer Company in 1847. At the same time Silchar was linked with Kolkata along the Barak-Surma-Meghna navigation channel. However, with the partition of India in 1947, water transport received a serious blow as a foreign country was born between northeast India and the port of Kolkata. Dibrugarh was also considered to be a massive port in Asia in 1947.

III. Benefits

Inland water transport saves on fuel. It is a cost effective mode in case of hazardous goods and over sized cargos. It is environment friendly and saves on time. It is a safe mode of transportation as it reduces number on accidents as compared to road and rail. Moreover it is also free from congestion. It generates employment opportunities to the communities which are traditionally involved in shipping. It promotes cruise culture and tourism and is useful in domestic cargo transportation. In North East India, road and rail transport is blocked during monsoons and difficult terrain precludes building of extensive rail and road network in this area, while water transport is suitable in such regions. It creates less pollution as compared to existing transport system. The following pictures fig1, fig2& fig3 show the advantages and comparison of the inland waterways with the existing transport:-

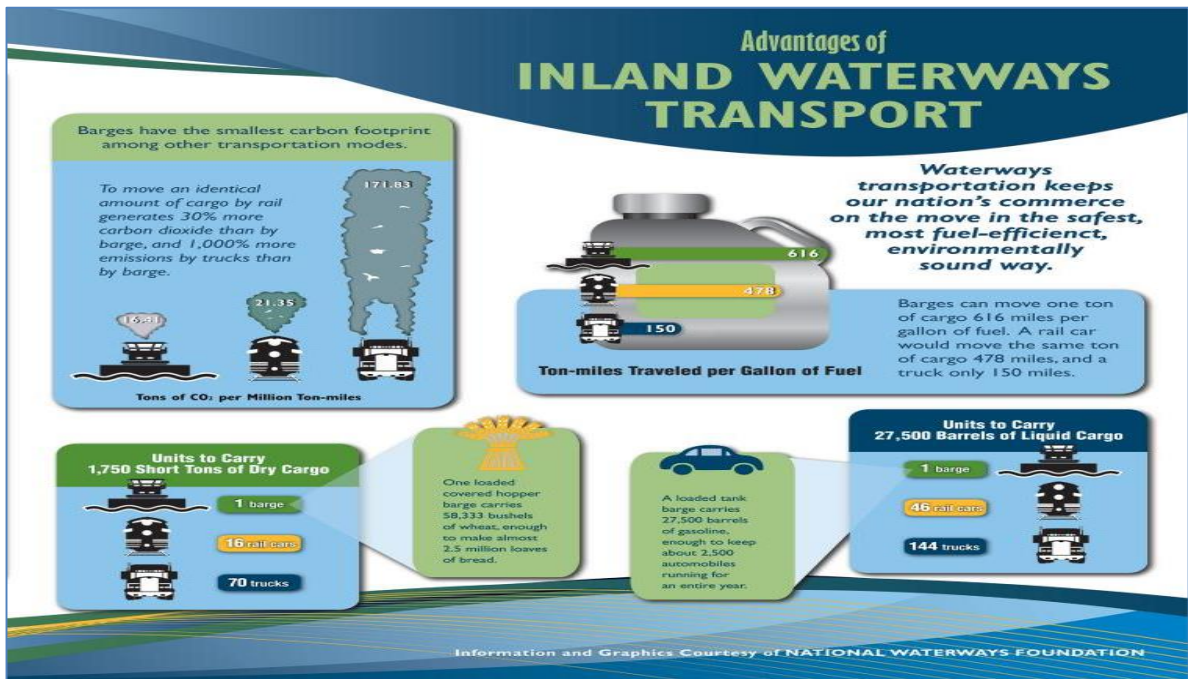


Fig 1: Advantages of IWT



Fig 2: Comparison with Other Modes of Transport

Comparison between IWT, Rail and Road

Parameters	IWT	Rail	Road
Energy efficiency: 1 horsepower (HP) can move what weight of cargo (kg)?	4,000	500	150
Fuel efficiency: 1 litre of fuel can move how much freight (ton-km)?	105	85	24
Inter Modal Comparative Operating costs (Rs./ton-km)*	1.06	1.41	2.58
Equivalent single unit carrying capacity	1 barge	15 rail wagons	60 trucks
Air pollution	Low	Medium	High
Land acquisition	Low	High	High
Capital required	Low	High	High

*Inclusive of taxes
 Note: the information is for indicative comparison only
 Source: IWAI, KPMG in India analysis

IWT is an energy and fuel efficient mode of transport with relatively low operating costs and less negative effects on the environment...

Fig 3: Comparison with Other Modes of Transport

Govt Initiative and Various Schemes

Inland Waterways Authority of India (IWAI)

(a) Inland Waterways Authority of India (IWAI) is the statutory authority in charge of the waterways in India. Its headquarters is located in Noida, UP. It does the function of building the necessary infrastructure in these waterways, surveying the economic feasibility of new projects and also administration.

(b) National Waterways come under purview of Central Government and Inland Waterways Authority of India (IWAI), whereas other waterways are under the control of the state government.

IV. National Waterways

There are 111 officially notified Inland National Waterways (NWs) in India identified for the purposes of inland water transport, as per The National Waterways Act, 2016. Out of the 111 NWs, 106 were created in 2016. The NW network covers around 20,275.5 km. NW-1, 2, & 3 are already operational. Cargo as well as passenger / cruise vessels are plying on these waterways. Detailed Project Report (DPR) for development of NW-4 & 5 was completed in 2010. The DPR of NW 5 was updated in 2014. For the newly declared 106 NWs, techno-economic feasibility studies have been initiated.

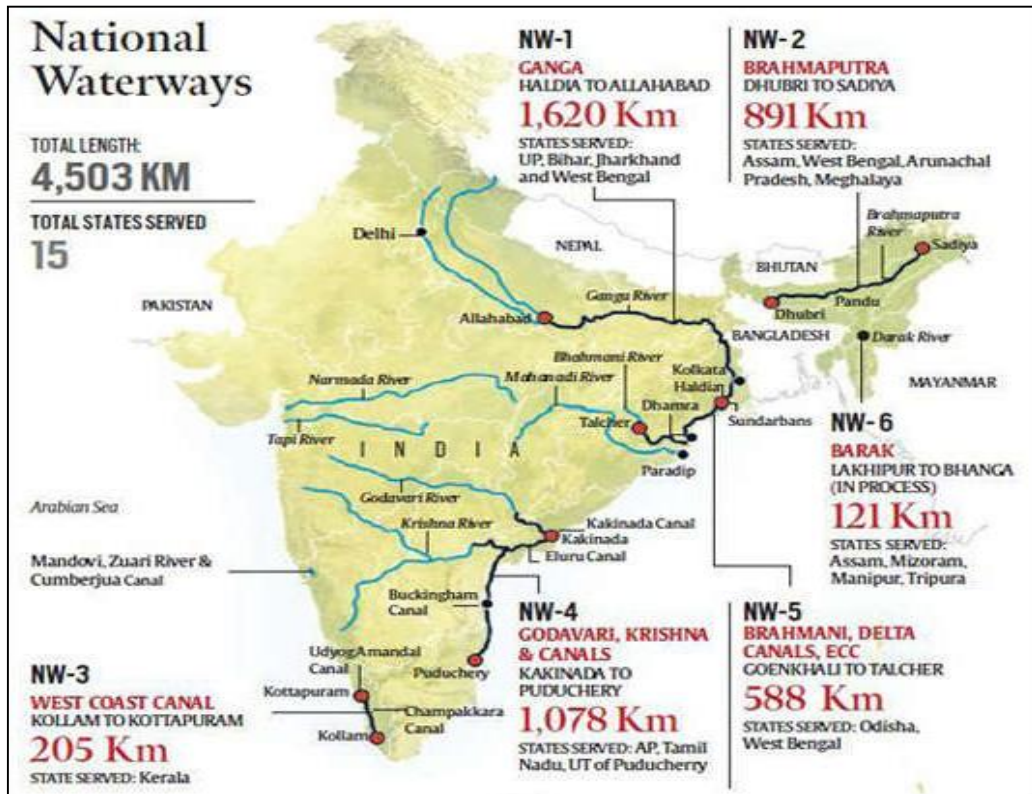


Fig 4: Waterways in India

V. Coastal Shipping.

- (a) Coastal shipping acts as an inter-modal transportation and plays an important role in integrated logistics chain in developed countries.
- (b) Coastal shipping, also known as Short Sea Shipping (SSS) accounts for 43% of cargo traffic in Europe.
- (c) Other economies such as US and China have adopted development and utilization plans for increased transportation through inland / coastal waterways.

VI. Cargo Movement by IWT in India .

Cargo movement by IWT increased from 32 million tons in 2003-04 to 69 million tons in 14-15. Most of the cargo movement by IWT takes place in Goa and Maharashtra, which account for around 90% share of cargo traffic on IWT.

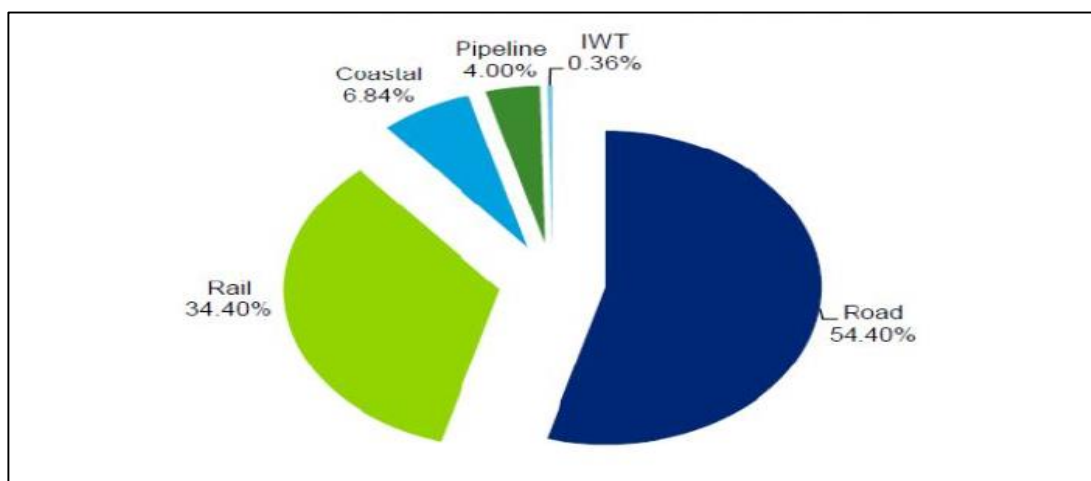


Fig11: Modal Share for Inland Cargo Movement

VII. Possibility of Integration of IWT with Coastal Shipping.

The integration of inland waterways with coastal shipping depends upon:-

- (a) Infrastructural linkages. Connectivity of seaports with inland waterways in the State.
- (b) Operational Aspects. Design of inland vessels being able to move / berth at the sea-ports and coastal vessels moving / berthing on inland waterways .
- (c) Regulatory Framework. Allowing the inter-modal flow of the vessels.

VIII. Integrating with Other Plans And Programs

The Central Government has several different programs dealing with rivers. Water being a state subject, state governments also have many plans for rivers in their respective states. It is important that these programs and waterways integrate properly with each other. If this does not happen, there could be conflicts between various programs of the central government and also centre-state conflicts.

- (a) *ILR Program*

One such program is the Inter Linking of Rivers. It's a moot question how interlinking of rivers would fit with the waterways project. The former wants to divert water from "surplus" rivers, while the latter needs substantial water to continue to flow in the rivers. We have not seen either the waterway reports or their interlinking reports address this issue.

- (b) *Ganga River Basin Management Plan*

Ecological restoration of National River Ganga is urgently needed since river biodiversity is being rapidly lost. The main factors affecting the river habitat identified for causing this loss habitat disturbances are plying of noisy vessels, dredging etc. Hence, the measures recommended are restrictions on river bed farming, gravel and sand mining, plying of vessels, dredging, and bed and bank modifications.

- (c) An IIT Consortium report emphasized that there should be restriction on environmentally harmful activities in the national River Ganga basin, including allowance, prohibition or regulation of sand mining, dredging, stone crushing, sediment removal and mining of other materials from river beds. Plying of noisy vessels, dredging, and river bed and bank modifications by taking into consideration the actual environmental impacts assessed in specific situations as also their social and economic implications.

IX. **Technological and Physical Viability**

(a) Water Flow

For smooth functioning of inland waterways water depth must be maintained throughout the channel. The basic prerequisite for waterways transport is the availability of water flow in the main waterways. This may have decreased over years because of increased usage arising from habitation, industrial and agricultural needs. The extent of regular flow may also have decreased because of impact of dams and river on river streams.

(b) River Training Dredging and Navigation.

The next requirement is that the river is drained and consistently provides a sufficient depth vis-a-vis the draft of vessels that are expected to play on it. This is possible for some type of river beds and may require maintenance of banks and dredging of river bed periodically.

(c) Industrial And Agricultural Needs. The requirements for navigation channel markings night navigational aids including the possible development of GPS and river maps and charts for navigation exists. The National Inland Navigation Institute in Patna has been set up to oversee this development by the use of appropriate technology.

(d) Locks.

The physical drop of river channels cannot be too much or else locks have to be provided to manage the height differential.

(e) Availability of Vessels and Associated Infrastructure.

India has a long history of river based water transport. Among operators, the government owned CIWTC(Central Inland Water Transport Corporation) is the largest owner of vessels and barges. Private operators have a substantial fleet, but have not been investing in new vessels in the last decade. In fact, it has been scrapping vessels of late and all operators may require some help in reviving them and investing in new vessels.

X. **Infrastructure**

Apart from the waterways or the channels themselves, these national waterways will also need and hence involve the construction of other related infrastructure facilities like riverside jetties and ports, navigational aids and control points, material handling sites, storage godowns, barge maintenance and repairing centers, refueling points, associated dredging equipment, parking areas for vessels and so on. Some of the port/terminals are planned as multimodal hubs which will connect rail, road and waterways, for e.g. the multi-modal hub at Varanasi. Moreover, there is a plan to link many of the national waterways to each other, to roads and railways and to major ports. This scheme is being called the **Integrated National Waterways Transportation Grid**. According to the National Waterway Transportation Grid Study by Inland Waterway Authority of India: "Integrated National Waterways Transportation Grid study is undertaken with an aim to link all National Waterways to National/ State Highways, Railways and Sea Ports so that all these waterways become an integral part of the total transportation grid." Another aim is to also connect the waterways to the different economic corridors being planned like Eastern Freight Corridor, Western Freight Corridor well projects like **Sagarmala Project**, which aims to promote port-led direct and indirect development. According to the Vision for Coastal Shipping Tourism and Regional Development of the Shipping Ministry, "The Sagarmala project at hand envisages seamless connectivity of sea-borne cargo with inland waterways for hinterland movement." The Inland Waterway Authority of India has signed a MoU with the Dedicated Freight Corridor Corporation of India Ltd to develop a multimodal hub at Ramnagar near Varanasi in Uttar Pradesh. This multimodal hub will connect the National Waterway 1 to the Eastern Freight Corridor as well as the highway. The rail line of the eastern Corridor runs parallel to National Waterway 1 between Allahabad and Varanasi. Through this linkage, commodities and cargo can be swapped/shifted from and to the National Waterway 1, the Eastern Freight Corridor and road transport.

XI. **Other Nations Experience**

(a) Surveys have been done in past reports of other countries where inland waterways have been successfully used and continue to be used. In the region, United Nations Economic and Social Commission for Asia and Pacific publications on IWT give brief comparative pictures of India, Bangladesh, China, Indonesia and Thailand. It also discusses measures such as standardization of navigation rules and modernization strategies through this forum. An initiative taken by Japan attempts to consolidate the

knowledge base and facilitate exchanges of good practices on IWT. IWT experience across world is varied and offers interesting comparison.

- (b) Bangladesh. A significant fraction about 35% of the freight movement in the country is by it because of the Geography of the region. Riverine ports are quite well developed and competing modes (rail and Road) are not as developed in comparative terms.
- (c) Thailand. IWT is next to road in share of freight carriage (about 20 million tons). Passenger movement in and around Bangkok is significant, with different types of services, including Express services.
- (d) North America. Freight movement on the Great Lakes and the Mississippi continue to be the important modes. Leisure activities based on water movement are quite common.
- (e) Europe. It is estimated to carry about 7% (and growing) of freight traffic in those EU States. In the EU States with waterways, this proportion is 12% overall and it account for more than 40% of ton-kilometre in some regions.
- (f) China. The navigable inland waterways in China total more than 100000 kilometre and there are a large number of Inland port facilities with work of large vessels. IWT accounts for almost 10% of the total freight tonnage carried in the country.

XII. Problems Envisaged

- (a) National Waterways Act, 2016 aims to give inland waterways the place it deserves as a means of transportation. It seeks to declare certain inland waterways as national inland waterways and work for its integrated development. But government is likely to face the undermentioned challenges in achieving the desired objective.
- (b) Operational.
 - (i) Seasonal variations in river water levels and dependency on monsoonal rain. Drying up of rivers will require maintaining water artificially- building of barrages.
 - (ii) Interlinking of Rivers. Ministry of Water resources have concerns of waterways impact on interlinking. Flood/pollution in one waterway or the interlinked river can adversely affect the other.
 - (iii) Heavy sedimentation and curveous path of rivers make it difficult to sail. Inland sailing skills haven't developed either due to lack of demand.
 - (iv) Inland waterways can compete with land and railways only if hinterland connectivity is provided for. This limits the scope of waterways which are heavily dependent on last mile connectivity of road and railways.
 - (v) Depth. The availability of depth on inland waterways may not be amenable for construction of an optimum designed vessel suited for both. Therefore, the depth on waterways needs to be further increased to at least 3.5 meters.
- (c) Infrastructural.
 - (i) Indigenous shipping industry hasn't developed so much to provide for surge in requirement of inland transportation ferries and vehicles.
 - (ii) Creation of port terminals.
 - (iii) Infrastructure at ports and waterways where goods exchange is to be done are less equipped to handle cargo.
- (d) Financial.
 - (i) Paucity of finances and unwillingness of the private sector vis-a-vis investments.

- (ii) Insufficient budgetary allocations.
- (e) Institutional.
 - (i) Absence of robust institutional capacity in implementation. Eg: Inland Waterways Authority of India (IWAI) lacking autonomy.
 - (ii) Difficulty in getting land acquisition and coordination of state governments, as water and land are state subject.
 - (iii) Overlapping of authorities. Eg: Ministry of Transport, Water Resource Ministry and Ministry of Environment.
- (f) Social.
 - (i) Competing demands on the stressed water levels, particularly for agricultural and household needs.
 - (ii) Threat to Aquatic Wildlife. Environment clearances can be granted only once the detailed plans of projects are made. This may delay project implementation and also can undermine the efforts of project planning if clearance is not granted. Also clearance may be stretch wise.

XIII. Way Ahead

- (a) The government has decided to take up 30 of these waterways for development in the next three years. In fact, because these waterways could also find linkages with the ports of India, the shipping ministry hopes to connect the hinterland using these waterways as well, in addition to the roads and rail that most people are familiar with.
- (b) To encourage the modal shift from road and rail, the State government may provide incentives to the shippers for moving the cargo by IWT. The operators may leverage the incentives and attract cargo shippers to IWT with cost-economical offers.
- (c) Experimenting with innovations that would allow barges to be powered with LNG (liquefied natural gas, from which a leaner fuel CNG is derived). These barges will be designed in such a manner as to operate in waters that have a depth of not more than 2.5 metres
- (d) The new vessels capable of carrying 2,500 tonnes and navigating in shallow waters are being designed in India.
- (e) National Waterways Act is a step in right direction and needs to be complemented with adequate policy and financial support. It can boost India's economy and promote green development due to its eco-friendly nature. The new road of India's development is waterway.

IWT Units of Indian Army

15. Indian Army has deployed IWT units at various locations to provide crossings across major rivers. The units are responsible to ferry troops as well as provide logistic support. Their inventory consists of various types of boats and equipment. These specialized units are trained and equipped for improvement works on banks, speed loading, ferrying and unloading of a large quantum of troops and material at short notice in both peace and war situation.

Conclusion

16. IWT and coastal shipping are complementary in nature to each other for providing hinterland-port-port connectivity. The operational and regulatory paths are already paved for integrating IWT with coastal shipping. However, infrastructural aspects need further attention. In addition, the viability of using the inland waters for movement of cargo toward the nearest port also has to be considered.

Note. Case study of IWT will be discussed during the paper presentation.

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