

Inland Waterways Transportation in India: Understanding and Meeting Shipper's Service Requirements

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Abstract

After Raw Materials, 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 final 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. This 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.

Key Words : Transportation, Shipper, Inland waterways Transportation, Service requirements.

1. INTRODUCTION

An efficient transportation network of Railways, Roads, Airways, Inland Waterways, Coastal shipping and Pipelines are essential for progress of any country. India is blessed with myriad rivers flowing across the length and breadth of the country. Of the total length of river and canals in the country, 14500 KM is declared as navigable and out of this

about more than 5000 KM is suitable for Inland Water Transportation.

IWT possess the following benefits over other competing modes:

(a) Fuel Efficient

One litre of fuel moves 105 T-KM of cargo over IWT, vis-à-vis 24 T-KM moved by Road and 85 T-KM moved over Rail (IWAI website www.iwai.nic.in).

(b) Environment friendly

The carbon emission by IWT is almost half of that of Road for the same distance travelled. With modal share of Road increasing in India, Road is significantly contributing to pollution and India's overall carbon footprint (IWAI website www.iwai.nic.in).

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(c) Least Cost of Development

IWT does not require costly highways to be built or trains tracks to be laid. The cost of developing IWT per KM is about 10 per cent of that of Road and Rail for the equivalent number of KM (IWAI website www.iwai.nic.in).

(d) Cost of Maintenance

The cost of maintaining the waterway channel is also a fraction of cost of maintaining a highway or railways tracks (IWAI website www.iwai.nic.in).

(e) No Land acquisition required

As IWT happens over rivers and canals; it does not require any acquisition of land. With raising population land is another resource which is under huge duress in the country (IWAI website www.iwai.nic.in).

(f) Safe mode

The number of accidents and fatalities on IWT is far less as compared to Road and Rail.

(g) External costs

The external costs of this mode in terms of pollution, congestion, mishaps and effect of community is far less.

(h) Transportation of Hazardous and ODC cargo

Due to its safe nature IWT is ideal for transportation for some specialized cargo like hazardous chemicals or over dimensional Capital equipment's.

Due to its inherent advantages, IWT is widely used in several countries. IWT account for almost 14 per cent of total cargo moved in China, about 8.3 per cent in USA, 24 per cent in Belgium, 38 per cent in Netherlands and 13 per cent in Germany (KPMG Report, 2014). In India, IWT remained an ignored sector. All focus of Indian Govt was towards Rail and Road development leading to its poor development and poor share in modal pie.

In India, Logistics account for about 14 per cent of the total GDP. This is far higher than that of other developed countries. Out of the total logistics costs in India, the largest contribution is that of transportation. With several initiatives like "Make in India" started by Government of India there is an urgent need to bring down overall costs and look for more efficient and cost effective transportation modes.

Figure 1 - All National Waterways on Indian Map (Source - IWAI website)



2. LITERATURE REVIEW

IWT progress in India can be tracked through website of Inland Waterways Authority of India (IWAI) the nodal agency for development of IWT in India (IWAI Website) The first five declared Waterways are presented in the table above. Praveen S and Jegan J (2015) explains the background of inland water transport sector in India along with the discussion of issues and challenges faced by the sector. Dr. S Sriraman (2010) in his study has highlighted the major reasons for sluggish growth of IWT in India. Qualitative and Quantitative comparison in terms of cost between IWT and other modes of transport such as Railways and Roadways have been presented by Amit Mishra, Alipt Saxena, V.B. Khanapuri. Nidhi Nagabhatla and Prakhar Jain (2013) present a comparison of river transportation system with surface road-rail network to explain prospective contribution of IWT for green economic growth. The authors explore transport and trade as two broad service sectors of inland water resources. KGS Sarma (2010) provides an overview of IWT sector in other countries like Europe, US and China.

The author highlights that though IWT is the cheapest mode of transportation it has a long distance to travel in India to truly realize its potential. Vijaya Singh (2010) studies the various modes of transport and highlight need for an integrated transport plan for all modes of transport. Study about nationalization of Inland Water Transportation sector ; the major policy issues which have hampered the involvement of the private investors to participate in this sector; solutions for triggering the private sector involvement in the Inland water Transport has been conducted by Juhi Mittal (2013). Sarkar, P. K., V. Maitri, K. Kalra, and V. Mathur (2007) reinforce the conclusion that the government of India should undertake rapid and massive efforts for national IWT development. A pilot study was conducted on two major national waterways, NW1 and NW2 to determine the viability of such investments, in terms of not only financial but also potential economic gains. Certain tangible gains were quantified along with intangible social and environmental benefits. Their studies found that such projects would meet World Bank EIRR norms. Rangaraj, N, and Raghuram, G (2007) study the IWT policy and try to answer questions like how much should Govt invest in this sector, role of various institutions, the policy instruments which are available and what are the major stakeholders in this sector.

Modal Choice has solicited fair amount of interest from the research community. One of the earliest studies on this subject was done by W. J. Baumol and H. D. Vinod (1970). They argued that the optimal choice of mode involves a trade-off among freight rates, speed, dependability (Variance in speed) and en-route losses. Michael A. McGinnis (1979) identify variables affecting the shippers' transportation choice process. Neuschel (1987) argued that the economics of transportation requires balance between customer considerations like manufacturing, warehousing, and customer service with company policies. Ortuzar and Willumsen (1995) summarizes six factors that would

be expected to influence freight movement as Locational factors, Physical factors, Operational factors, Geographical factors, Pricing factors and Dynamic Factors. Meixell, Mary J and Norbis, Mario (2008) attempt to categorize transportation choice research (mode choice and carrier selection) leading to insight on themes in the literature and directions for future research. Their study reveals that several important themes are under represented in the transportation choice literature: environmental and energy use concerns; security in the supply chain; supply chain integration; international growth; and the role of the internet and emerging information technologies. Mustafa Gursoy (2010) studied the problem of choosing the best possible shipping alternative among a set of transportation modes with four considered decision criteria. Roberts Keith (2012) has highlighted what factors play the largest role in a company's decision of how to deliver its products, focusing specifically on the modal and carrier choice decision process. Market trends such as shrinking capacity, tightening cost structures, and the growing importance of environmental friendliness all will be shown to play a significant role in this decision-making process. Using case studies and a survey, Martin Heljedal (2013) identify four factors, viz costs, environmental impact, attitudes and risks, and their impact on the choice of mode of transportation for companies located in the vicinity of a rail terminal. Hyun Chan Kim in his doctoral thesis (2014) has shown the operational and logistical influences that affect mode choice vary with the shipper and the industry. Shipper's freight modal choice depends on freight demand and infrastructure as well as the quality of service characteristics of alternative modes, such as transport cost, delivery time, reliability, damage and loss and frequency of service. Christofidis Georgios(2015) identified that four models for the evaluation of transportation choice were reported in the literature - The classical economic model , The Inventory-theoretic model, The trade-off model and Constrained optimization model.

3. RESEARCH METHODOLOGY

A detailed review of published literature was made of track IWT progress in India. The review helped to identify the key challenges faced by this sector and reasons for its low visibility and awareness among shippers. A detailed review was also made of the various factors which shippers consider in making the choice of mode. The background knowledge about IWT and shipper mode choice criteria acted as foundation for conducting interview process.

Sampling technique used in this research was purposeful sampling. Purposeful sampling allows the researcher to select participants based on the given reason rather than randomly (Tashakkori, 2003). Rather than gaining standard information from statistically significant sample, this technique allows the researcher to carefully select the participants and collect detailed information through probing and semi structured interviews. The participants used in this research were senior supply chain managers working with various organisations in Delhi NCR region. Semi structured interviews were conducted mostly in the participants office to create a relaxed environment for free exchange of views. The interview mainly focused on three areas. The participant's criteria for choosing a mode for transportation, their level of awareness about IWT in India and their recommendations to promote IWT mode in transportation in India. A sample interview questionnaire is enclosed as Annexure 1. Interviews were audio recorded with the permission of the participants so that researcher can focus on the matter being discussed and not get distracted in taking notes. The audio tapes were then transcribed to create interview scripts. The interviewed scripts were then analysed using qualitative techniques of coding. The names of the participants were kept confidential.

4. SHIPPER TRANSPORTATION SERVICE REQUIREMENTS

The following section indicates the key service

requirements of shippers as found from the research conducted. This section will also discuss some of the recommendations to improve IWT in India to meet the shipper's service requirements.

(a) Cost of Service

The final intent of any business is to make money. Any business decision has to make economic sense. The cost of transportation is an important element in the total cost and can have large implication on the total cost of the product, particularly for low valued products. Cost of service was one of the most significant factor highlighted by most the participants. Keeping Supply Chain costs down is an universal target which almost every Supply Chain manager carries in his KRA list. Among the Supply Chain costs heads, the single largest component is of transportation cost. Any saving here can directly hit the bottom line. During current financial times when the market has been slower and it is not easy to push revenue numbers up, it is even more important to keep the cost numbers under control was indicated by most of the managers. The shipper highlighted that the cost of service is just not cost of moving the goods on the transport. The cost has to be looked in their entirety. There are cost associated with cost of using the services, cost of damages, cost of transit time, cost of inventory in transit, cost and managing and others. For dependent modes like Rail and Road, the cost of first and last mile is also a very important cost component.

IWT is the most economical mode as compared to Rail and Road. However at the same time IWT is not an independent mode but needs road for first mille and last mile connectivity. For IWT solution to be cost effective following aspects needs to be addressed:

- (i) **Largest Part of the journey through IWT:** A general rule of thumb being followed is that for IWT to be effective the first and last mile distance should not exceed 20 per cent of the total distance. Being a dependent mode there is a large cost of transfer from IWT to other mode and vice versa. The cost of

exchange can only be compensated if the bulk of the total journey happens on IWT.

(ii) Connectivity with Other modes:

Connectivity with other modes of Road and Rail is critical for IWT success. The IWT terminals should be as close to National and State Highways as possible with good roads laid out from terminal till the highway. Similarly for Rail connectivity the terminal should be at river bank only to avoid duplicate movement from Rail to IWT.

(iii) Industry to be based closer to IWT routes:

Some of the other countries like China, Bangladesh and other Asian countries have consciously tried to locate industries close to IWT to reap the benefits of it. In India no such planning was made. However it makes a lot of economic sense to locate newer plants close to IWT mode. Several industries like Power, Steel, Grains, and Cement require large movement of material by bulk. In all such scenarios a close proximity of the plant to an IWT location and terminal will be of great assistance.

(iv) Incentives: In EU, the Union ran a program called Marco Polo. This program offered incentives for modal shift. If the cargo is moved from environment unfriendly mode like Road to Rail or IWT, an incentive was offered. A similar kind of scheme was also launched by Kerala Government offering incentive for cargo moving on IWT. Such incentives lower the cost of the moving goods on IWT and help addressing the issues of first and last mile connectivity.

(v) Insurance Costs: Though not a very large cost, the insurance costs on IWT mode are much lesser as compared to Road due to its safer nature of transit.

(b) Nature of the Product

The physical characteristic of the product is an important determinant is deciding the mode of

transport. Bulk cargo like Ores, Coal, Fly Ash, Steel, Cement, Grains, Soda Ash, Plastic Granules and Liquid Bulk like Crude Oil, Petroleum Products and Bulk Chemicals tend to move through modes like Rail, Coastal Shipping and IWT. The packaged and manufactured cargo tends to move predominantly through Road unless carried in Container. If the product carries special traits like being temperature controlled, being hazardous or needing special equipment's to load or unload; the mode of cargo is decided accordingly. Cargo with special requirements tends to move more through Road.

IWT worldwide has been extensively used for movement of certain types of cargo. In India we can focus on movement of following cargo through IWT mode:

(i) Bulk Commodities: Bulk commodities like Coal, Iron Ore, Fly Ash etc are ideal to move through IWT mode. They are low on value and the freight advantage from IWT mode could be substantial here.

(ii) Hazardous Goods: In countries like China, IWT mode is used to carry hazardous goods. It is far more safe to carry these goods through IWT mode as compared to Road or Rail as the damage to lives in case of any accident would be far less and

(iii) Over dimensional Cargo(ODC): IWT has been used in the past in India to carry ODC cargo. Carrying ODC cargo in India is an arduous task with several Road and rail bridges need supporting the movement of ODC cargo. An ODC cargo can flawlessly move through rivers and canals.

(c) Transit Time (Speed of Transport)

Another important aspect of service requirement is the transit times of the given mode. The transit time requirement can vary from Industry to Industry. The transit time requirements are critical for fast moving high value goods. As one of the shippers from Electronics Industry said that they have high value goods and work almost on a JIT kind of mode. Carrying

large inventories is a sin in their business. They would like to keep the cash to cash cycle as small as possible. They would like to keep the supply chain times and transit times to be as low as possible. If the transit times are longer was 4-5 days it offsets an advantage on the cheaper mode of transportation. The additional transit times increase the cost of our inventory in transit. In contrast the Logistics Manager from a cement company pointed out that they are not too concerned about transit time. They were in continuous process of manufacturing. The cost of transportation is paramount for them. Similar thoughts were echoed by companies handling other bulk commodities. The criticality of transit time is the function of the industry.

By its very nature the transportation on IWT is slower as compared to Road and Rail. However the issue of longer transit times can be addressed in following manner:

- (i) **Targeting right set of commodity:** There are certain goods which are commodities and have a lower value per Kg. Due to their lower value the cost of transportation form a substantial part of their overall cost. For such commodities the transit times may not be as critical as cost of transportation. IWT should target such commodities and try offer solutions for them. In US one the largest commodity which moves on IWT is Grains. Similarly in China Ores, Steel, Coal and building material form bulk of their cargo on IWT. India should focus on commodities like Fly ash, Cement, Iron Ore, Coal and other bulk commodities to negate effect of longer transit times.
- (ii) **Identify convenient routes for IWT:** IWT is a locational mode and available only in certain geographies in the country. However, in the geographies they are available they can be very effective. A movement in and out of North East is always difficult due to the chicken neck challenge. However cargo can easily move between North East and Kolkata

or even Southern India through IWT using Indo Bangladesh Protocol and with a costal connectivity. This route would have a lesser transit time as compared to Road or Rail. Similarly if there are imports from South Asian countries like Thailand or Malaysia to North part of India, they would far faster by importing through Kolkata and using NW1 to bring to upper North as compared to importing at Mumbai or Kandla and moving up North.

- (iii) **RO-RO Vessels:** There are certain rivers where numbers of bridges are less like Brahmaputra. For these set of rivers RO-RO vessels can be deployed to connect the two banks of the river. The trucks can move from one end to other end where the distances to nearest bridge are very long. This can substantially lower the transit times for trucks through use of IWT.

5. SAFETY OF THE CARGO IN TRANSIT

One of the shippers who was from the IT hardware sector highlighted the damage to the cargo due to road mode both at the time of imports and during transit in India. For imports they prefer to move by Rail from port to hinterland due to bumps on the road. However as far as domestic movements are concerned they have no other options but to use Road due to limitation of options available. They are left with no other option but to increase the level of packaging. Another challenge highlighted by a shipper with Road mode was in transit pilferages. Indian roads are unsafe and extremely susceptible to in transit thefts for high valued and easily sellable goods. Road mode can cause lot of damage to the cargo. The damage can be in the form of accidents or due to breakages due to road journey bumps and jerks. Commercial transportation on Road has also been a large contributor to accidents and fatalities on Road. The following table indicates the number of accidents and deaths on Indian Road in year 2015. The table

indicated almost fifty thousand lives lost due to Road accidents caused by commercial vehicles.

Table 1
Total number of accidents, persons killed and injured based on the involvement by vehicle type during 2015

Particulars	Number of Road Accidents		Number of Persons	
	Fatal	Total	Killed	Injured
Two-Wheelers	34,057	1,44,391	36,803	1,35,343
Auto-Rickshaws	5,430	30,340	6,155	38,820
Cars, Jeeps, Taxis	25,308	1,18,438	28,610	1,19,037
Buses	10,450	41,832	12,133	55,083
Trucks, Tempos, Tractors and other Articulated vehicles	33,710	98,897	37,458	92,174
Other Motor Vehicles	14,930	44,786	16,167	40,202
Other Vehicles/ Objects (including non-motorized vehicles)*	7,841	22,739	8,807	19,620

Source : Road Accidents in India -2015. Published by Transport Research Wing, Ministry of Road Transport and Highways.

IWT by its very nature is a very safe mode. The barges effortlessly flow of the river causing least in-transit damage to the cargo. Further the accidents on IWT mode are minimal. If the cargo in IWT mode is well covered, even the weather conditions do not affect the movement. We can further push these benefits of IWT mode through:

- (i) **Creating awareness among Shippers:** Bringing awareness to shippers about availability of this mode and the benefits of this mode can bring
- (ii) **Containerisation of the cargo:** There is no better solution to managing the in transit damages than containerising any high value or damage prone cargo and stowing and lashing them well inside the containers and moving them through IWT mode.

6. RELIABILITY OF THE MODE (QUALITY OF MODE)

Another key consideration highlighted by the

shippers is the reliability of the mode or transit time variability. With the companies moving more and more towards JIT and Lean Inventory Management, the reliability of the mode is critical. A shipper from North India who was importing large number of containers to NCR region pointed out that during season time like summer holidays and Diwali, India Railways tend to divert locomotives to Passenger traffic leading to dearth of engines and thus delay in movement of containers from ports to hinterland. A shipper, who has used IWT in the past, pointed out that river like Ganga is alluvial in nature due to which the contours of the river are changing every 15 days. There is vast difference in the depth. The committed depth is not constant at 2.5m and varying from 2.2m to 3m during a period. The rivers are not well equipped with navigational aids. The Indo Bangladesh Water sharing treaty is also forcing India to release large quantity of water to Bangladesh every 15 days leading to less water being available to Indian side. The river banks are not paved. There is enormous erosion of river banks. These are some of the challenges they face while using IWT in India.

A consistency of transit times is paramount for all Supply Chain managers. Variability in transit times can affect their service levels to the final customers on the outbound side and can affect their production schedules on the inbound side.

India is still grappling with inconsistent LAD (Least Available Depth) on both Ganga and Brahmaputra due to alluvial nature of the rivers. Unless a consistent depth is not available throughout the years, shippers will never build confidence on this mode. India should like cue from Europe and US where rivers are trained by various means and provide consistent depth round the year.

7. CAPACITY OF THE MODE

The capacity of the mode is another important parameter highlighted by the shippers. Experts say that there is a 2x relationships between the GDP growth rate and Logistics Growth rate. The Logistics need to grow as double the GDP growth

rate. The GDP has been growing between 5 to 7 per cent for last six to seven years. The following table indicates the growth of Commercial vehicle industry in the country for last 5 years:

Table 2
Growth of Commercial Vehicle Industry

Year	Domestic Commercial Vehicles sales in Nos	YOY Growth in per cent
2010-11	6,84,905	—
2011-12	8,09,499	18.19
2012-13	7,93,211	-2.01
2013-14	6,32,851	-20.22
2014-15	6,14,948	-2.83
2015-16	6,85,704	11.51

Source : Society of Indian Automobile Manufacturers (SIAM).

The above table indicates that the commercial vehicle industry growth is not keeping pace with the overall growth of the industry. This is leading to dearth of vehicle availability as pointed out by many shippers. There are always pair of source and destinations which will have year round challenge in vehicle availability. Season times or month ends will also constraint the vehicle availability in the market. Further Government regulations like phasing out of older commercial vehicles, Emission norms and imposition of Green tax can affect the capacity in the market. Another factor which has huge effect on Commercial vehicle Industry is availability of drivers. Almost every transportation company is struggling with idle assets due to non-availability of trained drivers. Poor salaries, high risk to life, long working hours and poor working conditions are all leading to scarcity of drivers in the market.

There is an urgent need to augment the capacity of IWT mode for it to be an effective mode for shippers in India. The capacity augmentation has to be happening both at Terminals and Barge Operations.

(a) Terminal Operations

Terminals are critical in the IWT mode. The location of the terminal should be strategic and as close to industry cluster as possible. The terminals should be well connected with nearest Highways. Wherever possible the terminals should be Trimodal with Rail connectivity added to it. The terminals should have equipment's for loading and unloading of the cargo, should ideally have warehouses to store the material, empty containers in case of containerised cargo and Customs availability whenever required. The terminals should have scalability and should be built with possibility of future expansions.

(b) Barge Operations

India as a country has been struggling with Barge availability for IWT mode. Due to lower volumes of cargo the barge operations are not becoming profitable hence lack of deployment and interest. The state Barge agency called CIWTC was also closed in 2016 after incurring continuous losses. There are several measures to be done to create barge capacities in India. Some of them could be:

- (i) **Least Available Depth:** The availability of draft or LAD is critical for Barge operations. Availability of draft in excess of 2.5m for distances for at least 500 KM round the year would give confidence to Barge operators.
- (ii) **Fiscal Incentives:** The fiscal incentives in terms of zero import duties on barges and its spares should be extended to this industry. Capital Subsidies for purchase of barge which were discontinued in 2006 have been reinstated in 2017.

8. ENVIRONMENT FRIENDLINESS

Environment concerns are increasing becoming important for organisations. Shipper realise that transportation is perhaps the largest or second largest contributor to the carbon footprint of any organisation. Some of the organisations have been started triple bottom line reporting with carbon footprint an important part of reporting yearly results. Though other parameters like cost of

service and quality of service are highlighted as more important criteria for selection of mode, many supply chain managers highlighted environment considerations being taken into account. Shippers highlighted how they have tried to move greener fuels like CNG wherever possible. Using higher capacity vehicle makes both commercial and green sense. Checking pollution certificates, fitness certificates and age of the vehicles being deployed are some of the other initiatives taken by many shippers.

IWT is far more environment friendly as compared to Rail and Road. Change into environment friendly transportation mode can substantially bring down the total carbon footprint. Government can formally encourage this for IWT mode by issuing the instruments similar to Renewable Energy Certificates (REC) which can help to monetize the green advantages of this mode. The advertising of IWT mode has to be done and awareness needs to be created for its fuel efficiency and environment friendliness.

9. EASE OF USING THE SERVICE

Another key consideration is ease of using the mode from indent till freight settlement. Road as a mode is extremely user friendly. The vehicle can be indented just over a phone call; the vehicle can be loaded at any location and Road mode provides door to door service. Shippers highlighted the difficulties in using Rail and Coastal shipping. Rail wagons are not easy to procure. Dealing with rail officials who are not customer friendly. Advance settlement of freight. Limited time slot available to load and unload Rail rakes. Lack of ownership by Railways for loss and damage to cargo during transit were some of the concerns highlighted. Shippers highlighted the large amount of documentation requirement for executing Coastal shipping contracts.

IWT is a dependent mode. The first mile and last mile still has to happen through Road. There is change of modes happening at terminals. The

documentation requirements for IWT mode will always be difficult as compared to Road. However, IWT can improve its customer service by providing visibility of the cargo through online tracking and continuous feedback.

10. AVAILABILITY OF SERVICE PROVIDERS

Availability and quality of carriers or service providers (SP) is another important criterion for choosing the mode. If the Shippers enjoy a good relationship and confidence with a carrier he tends to use its services more. Good financial standing of the SP, reputation, its years in business, capacity, national v/s regional presence and other criteria is taken into account in selecting them. Most of the Supply Chain managers indicated that tend to make multiple SP and tend not to put all eggs in one basket.

Government can improve the usage of IWT by attracting more and more MTO and Barge operators in this sector. This can happen only through private participation and good commercial viability for the private sector players.

11. CONCLUSION

Choice of mode of transportation is a significant decision for any organisation. It affects the customer experience of the company and influences their bottom-line too. Companies take lot of factors into consideration in opting for a mode. These factors include cost of service, the nature of the product, the speed of transport, safety of the cargo in transit, the capacity of the mode, the reliability of the mode, the environment friendliness of the mode, the ease of using the mode and availability of service providers for the mode. IWT is still a very insignificant mode on the map of India's Logistics services. There are numerous steps which need to be taken by the Government and country as a whole to make it a viable option for shippers. It starts by creating awareness about this products and highlighting the benefits of this mode. Offering an efficient operational navigational infrastructure laced with network of terminals and barge

operations; being utilised by MTO operators to meet the transportation needs of the shippers in the need of the hour. "The most advanced nations are also

those who navigate the most" (Emerson). Time for India to navigate through its Rivers.

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