

**INTERMODAL TRANSPORTATION SYSTEM IN INDIA;
INTERGRATING INLAND WATERWAYS WITH OTHER
MODES**

PROJECT REPORT

In partial fulfilment of the requirement for the award of the degree of
MASTER OF BUSINESS ADMINISTRATION
(International Transportation and Logistics Management)

By

Dilsha Dileep

(Reg. No. 2105305014)

Under the guidance of

DR. JAYAN P.A

Assistant professor

Indian Maritime University, Kochi campus



INDIAN MARITIME UNIVERSITY

(A Central University under the Ministry of Shipping)

SCHOOL OF MARITIME MANAGEMENT,

KOCHI CAMPUS

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(A Central University under Ministry of Port, Shipping and Waterways)

SCHOOL OF MARITIME MANAGEMENT

Dr. JAYAN P A

Assistant Professor

School of Maritime Management

Indian Maritime University, Kochi Campus

CERTIFICATE

This is to certify that the Project titled “**Intermodal transportation system; integrating inland waterways with other modes**” submitted by DILSHA DILEEP register number 2105305014 student of MBA ITLM is a bonafide record of her internship report and submitted to the School of Maritime Management, Indian Maritime University, Kochi campus, under the supervision of Dr. JAYAN P A, Assistant Professor IMU, Kochi campus. It is also certifying that the above work has not previously formed or submitted for the award of any degree, diploma, associate ship, fellowship, or other similar titles, and it is an independent work done by the candidate.

Dr. JAYAN P.A

DECLARATION

I, **DILSHA DILEEP (2105305014)**, hereby declare that this project report on the study of “**Intermodal transportation system in India; integrating inland waterways with other modes**” is a Bonafede record of work done by me in partial fulfilment of the Master of Business Administration program (**International transportation and logistics management**), under the supervision and guidance of Dr. Jayan P.A, Assistant professor of Indian Maritime University, Kochi campus.

I also hereby declare that this project Report has not been submitted at any time at any other university or institute. I also declare that the data collected is from various secondary and primary sources and acknowledged by me. I have made my full efforts to complete and present the project report successfully.

Date:23/04/2023

Place: Kochi

DILSHA DILEEP

Supervised By: **Jayan P.A**

Designation: Assistant professor

School of maritime management

Indian maritime university, Kochi

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ABSTRACT

Title of Dissertation: Intermodal transportation system; integrating inland waterways with other modes

A wonderful kind of transportation is inland waterways transportation (WT), which involves travelling over rivers and canals. It doesn't need to lay tracks or roadways to move, uses the least amount of fuel per tonne of cargo, emits the least amount of carbon dioxide, doesn't need to use up valuable land parcels for traffic, has fewer accidents, and costs the least to carry. Despite having several benefits, IWT's contribution to total transportation in India is essentially nonexistent. As opposed to this, a number of other nations, like the USA, China, Germany, Netherlands, Belgium, Bangladesh, etc., have a sizable IWT population.

IWT is not an independent method, hence its underuse in India represents a missed chance to reduce the nation's freight costs.

Unless consignors and consignees are located on a river bank, first mile and last mile transit requires alternative modalities. Intermodal transportation refers to the movement of freight using at least two different modes of transportation in succession. The use of intermodal transportation enables shippers to take full use of each mode of transportation while combining them in a way that maximizes cost efficiency, planned departures, geographic reach, and environmental benefits. The unitization of the load and seamless transition from one mode to another are made possible by containerization, a fundamental enabler for intermodal transportation.

In order to develop an intermodal Transportation System in India, this study aims to understand how to combine the IWT mode with other modes.

IWT has not been widely used in India, hence little research has been done there. This demanded that this investigation take an inductive method. The research needed extensive, comprehensive discussions with subject-matter specialists to obtain significant amounts of rich material. Thus, it was determined that a qualitative approach would be most appropriate for this research. Grounded Theory was chosen as a research strategy because it enables very methodical and disciplined theory construction that is supported by facts. The foundation of good research is always theory. A theoretical framework offers a framework for observations and interpretations as well as the structure the researcher needs to connect to current knowledge.

General Systems Theory is the foundation of this study. The general systems theory is a theory of "wholeness" that enables one to see a phenomenon in terms of a system complete with its own internal dynamics as well as external interactions. Shippers, Carriers, Terminals, and the Government are its main constituents, and their interactions within and with the environment determine how well the intermodal transportation system functions.

The study used in-depth interviews with sixteen subject matter experts to get its data. An intermodal transportation system conceptual framework was developed using the data collected and coded for analysis.

The integration of WT with other modes in India was suggested in ten different ways. The main recommendation has been for India to pick one prominent canal and focus all of its efforts on making it successful. The goods routes in India that are most suited for the transportation of IWT were suggested. There have been suggestions on the ownership and management of terminals and barges, the role of the public and private sectors in the development of IWT in India, the significance of incentives to jumpstart the process, and the relevance of skill development to continue the process.

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CHAPTER 1

INTRODUCTION

Suppose there were no transportation. Other cities and nations won't be real; they'll only exist in stories or in people's imaginations, with no chance of travel. We won't be able to interchange items between regions and will be restricted to specific geographic zones. We'll only consume food that we raise. We will never receive Himalayan apples or fish from the sea. Trade, sports, and the arts will all be confined to a certain region. All information will be localized to a specific area and not transferable. The entire civilization's advancement will halt.

The advancement of humanity has been significantly influenced by transportation. Since the beginning of time, transportation has made it possible to exchange goods across different towns and nations. The development of civilization has been heralded by transportation. Different modes of transportation may be used for the transportation. The three main modes of transportation are water, surface, and air. Water transportation can take place both inland and along the coast via rivers, creeks, and canals.

IWT, or inland water transport, is a fuel-efficient, environmentally beneficial, affordable, and economically viable means of transportation. This means of transportation comprises navigable rivers and man-made canals as well as natural waterways. Inland rivers are traditionally thought of as a crucial route for communication and transportation, particularly for the rural population. . The main benefit of this mode of transportation is that it provides less traction resistance at a comparable speed to other types of transit. Due to the existence of natural channels, the maintenance costs are quite minimal. Additionally, because of their versatility, these channels offer a less expensive option for transporting items from one location to another.

India has a long history of using rivers for transportation. At Lothal, Gujarat, India, archaeologists found a burnt brick basin that was possibly the first river dock ever built by humans. During the Indus Valley Civilization, around 2400 BC, this dock connected Harrapan settlements with the Arabian Sea through the network of the Sabarmati River. Throughout history, the Ganga and its tributaries have been important commercial routes. In his travelogues, Megatheres claims that interior transport began to prosper in the fourth century BC along the Ganges and its main tributaries.

were easily negotiated. Kautilya made extensive mention of a variety of navigational issues in his Arthashastra for the Mauryan Empire in the 4th century BC, including boat size, ferry regulating rules, port fees, labor tasks, and state taxation (Mishra et al., 2012). River-based trade and transportation were highly widespread even throughout the Mughal Empire, and Agra, Mirzapur, Varanasi, Munger, and Patna were important ports with connections all the way up to Bengal. The Barak-Surma and Brahmaputra canals were frequently used for trade and transit between upper east India and the port of Kolkata during British control (Mishra et al., 2012).

1.1 Background

Intermodal transportation is the movement of goods or persons utilizing at least two different modes of transportation, with the transition between the first mode and the second mode taking place at an intermodal terminal. (2005) Teodor Gabriel Cranic and colleagues. Intermodal transportation is defined as "movement of goods in one and the same loading unit or vehicle, which uses successive, various modes of transportation (road, rail, and water) without any handling of the goods themselves during transfers between modes" by the European Conference of Ministers of Transport

Intermodal transportation networks include a number of important participants. The need for the transfer of goods is first created by shippers, and then it is needed by carriers, who offer services for doing so.

At intermodal terminals, which may be an ocean port or a land terminal, airplane passengers can switch from one mode to the next. Rail yards, river ports, and terminals, etc. The fundamental idea behind intermodal transportation is to use road transportation for the first and final mile while taking advantage of low-cost modes of transportation like rail and water for the trunk route.

Intercontinental trades have benefited greatly from intermodal transportation. It enables trade between nations scattered across several continents. As the majority of the journey is completed using more fuel-efficient modes of transportation, intermodal transportation is also more environmentally friendly than unimodal transportation.

There are currently 14500 km of navigable inland waterways in India, including rivers, canals, backwaters, creeks, and tidal inlets that may accommodate mechanized boats. According to the Directorate General of Shipping (2009), India has roughly 5000 km of big rivers and 480 km of canals that are suitable for inland transportation. Control and management of India's inland waterway transportation is the responsibility of the Inland Waterways Authority of India (IWAI), a 1986 establishment. The Indian government has designated 111 waterways as national waterways. However, the top three were the first three declared rivers that were within the IWAI's jurisdiction. The Ganga-Bhagirathi-Hooghly River system from Kolkata/Haldia to Allahabad, the River Brahmaputra from Dhubri to Sadiya, and the West Coast Canal system in Kerala from Kotta Puram to Kollam along with Udyogmandal and Champa kara Canals are all examples of river systems. The first of these canals is known as National Waterway No. 1, the second as National Waterway No. 2, and the third as National Waterway No. 3.

1.2 Problem identification

Worldwide, inland waterways are different in their own way. The inland rivers' water physically separates the regions and links the cities. Inland rivers have served as the primary means of moving cargo over great distances on land for ages. For instance, the Hansa Network of Europe was a commercial confederation that was dominated by the 17th-century Baltic interstate trade carried out by ships. In the 19th and 20th centuries, interest in freight transportation via rail and road began to grow. Large volumes of bulk commodities are typically transported by inland waterways. IWT is the most dependable and secure means of transportation for bulk cargoes that need to be carried over great distances.

IWT development is aided by the globalization and standardization of containers. A number of nations have constructed special vessels for the transportation of containers. Interstate highways and bridges with the growth of several intermodal container ports, a new standard was adopted (Koning's, 2009).

Inland waterways integrated intermodal transport is more competitive and lucrative over long distances and for overcoming geographic challenges thanks to the usage of ISO containers at ports. Additionally, because WT is so cost-effective, it can significantly lower the logistics costs associated with shipping

goods. Total trade both domestically and internationally increases as a result of cost reduction and market benefits.

Additionally, it backs environmental preservation campaigns in the logistics industry. It is a green mode of transportation because it produces significantly less pollution. IWT use is more environmentally friendly than other forms of transportation. Policy officials in many nations have been promoting the use of IWT mode due to its advantages.

1.3 Research objective

The study is restricted to intermodal transportation based on inland waterways. Intermodal systems based on other modes will not be the subject of this research. The "what" and "how" parts of the intermodal system are addressed by the study. However, this research did not include any analysis of the recommendations' costs or technical viability. On the opinions of subject matter experts, this study was built. To develop a theory based on facts, the subject matter experts' interview was analyzed. There were few subject specialists in India because this specific method is not used there.

Bulk freight and containerized cargo are the two main categories of cargo that move on IWT mode. In the USA, wheat, coal, and petroleum products make up the majority of the bulk cargo that crosses the IWT. However, both bulk and container cargo flow through IWT in the cases of China and the EU. In the case of India, it has primarily been bulk cargo with a small amount of ODC cargo up till recently. Compared to IWT, containerized transportation has a nearly nonexistent proportion. The primary goal of this study is to advocate for containerized transportation in India rather than IWT.

1.4 Dissertation structure

- Title page
- Declaration
- Acknowledgement
- Abstract
- Table of contents
- The core chapters
 - Chapter 1 - Introduction
 - Chapter 2 – Review of literature

- Chapter 3 – Research methodology
- Chapter 4 – Concept Analysis and Discussion
- Chapter 5 – Recommendation and Conclusion
- Chapter 6 – Reference and Bibliography

CHAPTER 2

LITERATURE REVIEW

The primary goal of a literature review is to build on the theories of other researchers who have already examined the topic in order to avoid reinventing the wheel (Janowicz, 2005). The main goal of a literature review is to identify the major themes that will be studied, critically evaluate previous research and theories related to these themes, and draw similarities. The purpose of a literature review is to show that the researcher is capable of interpreting the facts and presenting them, rather than simply repeating the ideas of other experts. A literature review provides an overview of the researcher's field or selected topic, exhibits his breadth of expertise, and aids with or directs future research.

2.1 Literature search strategy

A literature review is a search engine that locates published articles and research papers on a subject. A systematic and organized method is required for the literature search because of its importance. A thorough literature search entails keeping track of all research and findings. Making a search strategy is necessary for this.

There are different types of literature reviews, each with their own methodology, analysis, and justification. These sorts are not reliably labelled, which further complicates matters. The inductive or deductive methodology that the researcher intends to utilize informs the literature review methodology (Johnson, 2010). When using deductive methodology, the purpose of the literature review is to thoroughly examine the body of existing information and identify various theories or concepts that may be of interest.

In this scenario, the main goal of the literature review is to find theories that can be utilized to find hypotheses that can then be tested through the gathering of pertinent data. With inductive research methodology, the goal of the literature review is entirely different. As the inductive approach focuses on creating a hypothesis from the real data, neither conceptual frameworks nor theories are present.

The traditional or narrative literature review method was used to analyse and synthesize a vast corpus of literature discussing the aforementioned points.

The thesis is crucial. Traditional or narrative literature reviews aid in:

- Makes inferences about the subject
- Points up gaps in or potential contradictions in the body of knowledge. A thorough literature search has the following benefits: It keeps the researcher from repeating previously published work. The researcher will be able to build a far more solid foundation for his own investigation by combining data from earlier studies.
- Relevant research might offer fruitful insights and know-how to improve one's own in-depth analysis of his, such as the best strategy or information-gathering techniques.

The researcher will be in a position to identify the flaws and holes in the existing research and develop pertinent and valuable research questions as a result.

Researcher is going to become acquainted with terminologies of the area of his by utilizing as well as finding ideal keywords.

This particular literature review attempts to create a rational flow to guide the reader from general comprehensive knowledge to research gaps and goal.

2.2 Inland water transportation in global content

Recent growth in inland canal transport is encouraged by the possibility of cost savings, dependability, and environmental friendliness. It might be the greatest.

a viable substitute for rail and roads throughout the majority of the world.

According to Sjogren and Woxenius (1994), water covers one-third of the world. thus, inland. The future of global trade may be significantly influenced by waterways. Even though it has recently attracted the attention of policy makers at the national and international level of the logistics world due to its

potential to bring about sustainable solutions in the transportation world, it is still an area that is little explored by practitioners and researchers (Ranga raj and Raghuram, 2007).

IWT is a less expensive and greener form of transportation for both people and products, but it is not used to its full potential in many nations throughout the world. Although many nations in the Asian and Pacific region have excellent networks of rivers and canals to support IWT, the percentage of IWT is still low in some of these countries due to a delay in enacting development-related rules and regulations.

The list of nations and the length of their combined waterways may be found below.

A literature review enables researchers to study any research topic critically and unearth previously undiscovered aspects. The strategy and organizational framework for the researcher's literature review were described in this chapter. In order to assess the major topic's core topics, the researcher have to evaluate the previous publications.

In important nations with a higher share of IWT, the structures and policies were investigated. The IWT's advancement in India was evaluated. The topic of intermodal transportation was investigated, and different aspects like its benefits, elements, mechanics, evolution, players, and cost were discussed. We assessed the crucial variables that allow IWT to be combined with other modes to form an intermodal transportation system. A shipper's mode choice is a crucial decision, and several factors that influence this choice were covered. Based on the literature analysis, a conceptual lens for an IWT-based intermodal transportation system was created.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction and bibliographic scoping

The process of accurately determining, comprehending, or revising facts, events, concepts, and behaviors is known as research. Additionally, research is global. Morey and Redman's exploratory investigation is a "systematized attempt to get novel information," according to two scientists.

The research design is a methodical and well-organized way to solve an issue. Thinking of the procedure that will be used to carry out the research is a scientific endeavor. Research methodology refers to the techniques used by researchers to describe and foretell the solutions to a given problem. Similar interpretations include the examination of knowledge-acquisition strategies.

The main goal of research methodology is to develop the study's operational plan. Finding a method for the chosen problem is essential and necessary for any researcher.

The process of sorting the data required to answer the study query and figuring out how information might be gathered when a subject has been selected and the study query has been fine-tuned. Choosing the best strategy requires a clear understanding of what each method offers, what it is capable of, and most importantly, what kind of research discoveries will soon be presented. Research methodology includes the process of locating solutions to the questions raised by our investigation.

It is necessary to choose from a variety of methods, processes, and versions at each operational stage of the research process in order to effectively accomplish our objectives. The theme of the study, fundamental logical slants on how philosophy should be developed, criteria that must be met, and resources that are available must all be included in the study procedures. Saunders asserted in 2009 that the investigative approach should include critical assumptions about the author's ontological and epistemological views of the world.

The dissertation's research methodology is contained in this section. The study methodology, study design, information collection methods, sample size and study technique, study design framework, information analysis type, ethical considerations for the study, and study constraints are all described in this part.

To outline and defend the contemplative and intellectual process involved in arriving at the chosen methodology. The research onion's layers are gradually peeled back, with an examination of each one of them offered to explain the thinking behind the technique that was chosen.

3.2 Research design

This research has used only secondary data that has been collected from various articles, journals, books, websites etc. It has been used to study the Intermodal Transportation system in India by integrating inland waterways with other modes of transportation. Subjective methodology is used to gather the systematic information or data. All the data included is the secondary based and have given proper references wherever necessary.

3.3 Research problem statement

Researchers analyses, create, and distinguish a study dilemma to provide an overview of their research. Identification of research concerns motivates people to concentrate and focus on the research process in order to address the issue in the most impactful manner. Selecting and formally defining the study issue is the main step in the research process. It is said that an exam problem is one that requires a specialist to locate the question's best possible solution. The expert must choose the best course of action so that the mining rationale can be effective in a certain situation.

The difficulty of the challenge might be attributed to a variety of variables. A problem statement is an explanation of a current issue that needs to be resolved. It establishes the context for the investigation and the questions that the study advises being answered. The most significant and valuable step in the entire research process is the work of creating or identifying a research problem. To distinguish between important information and irrelevant information, the problem statement must be precise. Establishing the objectivity and effectiveness of all the facts related to the study subject is also vital.

3.4 Research objective of the study

In any research, objectives are the goals that are set to be accomplished. They inform the reader of the goals the researcher has for the study. Any hypothesis' goal can be expressed in a problem statement, but the objectives provide a clear

and comprehensive description of the specific steps that must be taken to achieve that goal. The objectives must be stated explicitly and in clear terms. There should only be one investigation-related attribute included in each aim. The objective of the analysis is one of the essential elements for examining any theory because it helps to shape the likelihood of doing the investigation.

The main objective of all researchers is to confirm the veracity of current knowledge and to identify the differences between existing information, or to add new knowledge new perspectives on what is already known. It is essential to before the research begins.

Decide what your goals are so that you don't waste time or effort later on. Qualitative and quantitative research aims can both be classed.

The qualitative objective strives to evaluate the theories and applicability of the research, whereas the quantitative objective looks to maximise a certain performance. Indicators for the research system. Choosing the best approach is crucial for researchers.

CHAPTER 4

CONCEPT ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

By combining the raw data, drawing correlations, developing classes, participating in hypothetical inspections, and finally consolidating all of the research into one proven theory, theories that are based on data emerge (Charmaz, 2005). This particular chapter follows chapter four by providing a thorough explanation of the strategy used for data collecting and analysis for the study. This specific chapter offers a thorough information gathering method and an analysis "for developing a conceptual framework for integrating inland waterways with various other modes to produce an intermodal transportation system." Since this study used an inductive grounded theory methodology, interviews with renowned experts in the subject were the primary method of gathering data.

. After going through the coding exercises, the rich data that had been collected was finally used to create a conceptual framework for intermodal transportation. System

Following is a list of practitioners and researchers' definitions of intermodal transportation. Intermodal transportation was defined by as a service that has a variety of characteristics as well as business, operational, and managerial perspectives for moving objects from one location to another using more than one mode of transportation. It was described as a process by (Daley and Murphy, 1998) as opposed to a framework or notion. The European Conference of Ministers of Transport (ECMT) offers arguably the most understandable description of intermodal transport. Intermodal transportation is described by ECMT in (2001) as "the movement of commodities in one and the same

Or a vehicle that switches between different modes of transportation without handling the contents themselves.

IMT can be thought of as the movement of goods through the sea, land, and rail in exchangeable bodies and particularly built containers. ECMT/CEN defines multimodal transport as "the movement of goods wherein at least two different modes are used in a door-to-door transport chain"; the EC definition extends

beyond this definition and is equivalent. Intermodal transport is now defined by the United Nations as "a system of transport whereby two or more modes of transport are used to transport the same loading unit or truck in an integrated manner, without loading or unloading, in a door-to-door transport chain," which is a modification of the ECMT and CEN definitions.

According to Lowe (2006), it is "the utilisation of two or more 'suitable' modes in the formation of an integrated transport chain, which is intended to achieve operational efficiency and cost-effectiveness in the delivery of goods in an environmentally responsible manner from their point of origin to their final destination."

4.2 THE EVOLUTION OF INTERMODAL TRANSPORTATION

Containerization is essentially the main force behind intermodalism because intermodal transportation involves moving cargo in an intermodal container using many modes of transportation (Woxenius, 1992). When coal was actually being conveyed in a container on the Canal of England in the 18th century, containerization was at its infancy. In 1830, Manchester and Liverpool railroads started utilising specially made wooden containers for the same purpose, and between Swansea and Neath Docks, iron containers were being utilised in 1841. After then, covered containers were used to transport goods between train and road during the beginning of the 19th century.

The United Kingdom's Railways standardised curved roof containers for use on conventional container flats in the 1920s, and by 1928, they were providing door-to-door intermodal road train service with these containers. Truck trailers were first used by Chicago Great Western Railways in 1936; they were later produced in North America in 1952. In the same way, United Kingdom railways offered a craned service to load and unload containers from the back of trucks. From the 1830s through the 1940s, actual wood luggage crates were also transported across America on railway flatcars.

4.3 Importance of Containerization in Intermodal transportation

The introduction of containers can be credited to Mr. McLean. He was employed for a trucking business that had acquired a shipping business. Using

the same container sizes as in rail-to-land transit, he extended the idea to sea-to-land transportation, enabling smooth movement between the two. He made the decision that additional equipment should be added to containers to make switching between modes easier. Additionally, he suggested equipping ships with unique cell guides or rail systems that would permit vertical stacking of containers on top of one another.

Containerization and the growth of intermodal transportation nearly occurred together. Due to the various sizes and dimensions of the containers, there was a lot of uncertainty at the shipping line. Transporters of containers interact various volumes and boxes of various sizes. Consequently, Richard F. Gibney was the first to use the term "standard TEU" (20-foot Equivalent Unit) in 1969.

Containerization helps the intermodal transportation system become more widely used. As a result, containers are important because of intermodalism, not because they are just plain boxes.

The development of intermodal transport was impacted by a variety of causes, some of which slowed it down and others of which accelerated it.

(1970–1990) Adoption Stage. Building of intermodal facilities and recognition of containers as a transportation product spread around the world. At this era, container-only ships were also introduced, and ports were transformed into facilities exclusively for handling containers. Investments in containerization and intermodal transportation increased as the risk decreased and the industry became more stable.

Increase (1990–2008) Stage. The containerization process began in earnest, having a significant impact on production tactics and international commerce patterns. Chains became a significant centre for manufacturing and facilitated lengthy trans-Atlantic and trans-pacific container pendulum voyages. The shipbuilding industry also developed big post-Panamax boats with large capacities during this time. With the transportation of containers through rail and barges from ports to inland areas, containerization on the land side began relocating more hinterland.

Stage of Maturity (2008-). The development of the world economy will set the stage for the maturation of container traffic. A number of things influence world trade. Global trade will be impacted in the future days by manufacturing advantages with various nations, rising energy costs, and trade imbalances. As containerization progresses, electronics will become more prevalent in shipping containers.

4.4 Decisive multimodal transportation characteristics include:

The type and volume of the conveyed goods. Such conveyance is appropriate for goods that weighs less than 25 tonnes per load unit. The farther apart the origin and destination, the more likely it is that an transportation that is multimodal. Generally speaking, a distance more than 500 kilometres is Preferably, coverage will be provided through multimodal transportation.

- A Due to their reach and efficiency, truck, rail, and sea are the dominant modes of intermodal transportation in terms of time and cost. Costly and difficult to transfer load units to other modes, air travel is expensive.
- Value of shipment - A direct benefit of using air cargo for high-value shipments is options for low-value shipments using rail and vehicles The maritime has a small radius. Consequently, multimodal transportation offers an Option for intermediate cargo value.
- Frequency is necessary for freight flow to be efficient and cost-effective continuous and unwavering in both weight and volume.

4.5 Advantages of intermodal transportation system

Historically, the operation costs, vehicle maintenance costs, and journey time had been used to evaluate transportation systems. However, because it provides a variety of services to numerous users, a transport system does have an impact on the creation, consumption, enjoyment, and transmission of knowledge. Thus, it is crucial to gauge how a transport system is affecting the entire network.

Since it makes use of the relative advantages of many modes of transportation, intermodal transportation, as it has been defined, goes beyond simple improvements in the transportation infrastructure (Churchman, 1979).

Economic, environmental, and operational benefits can all be attributed to the use of intermodal transportation:

economic benefits

(Yuri Yevdokimov, 2000) proposed that multimodal transportation had financial benefits. According to him, the effects of multimodal transportation can be split into four categories:

Increasing the amount of intermodal transportation results in an increase in the amount of cargo being transported. This Volume growth does not necessitate proportionately greater labour.

The mechanism therefore produces "economies of density". Containerization of goods and

Vehicles are used more frequently in intermodal transportation due to cargo consolidation.

Thus, load factor improves density economics.

Cost savings in logistics: This allows shippers to benefit from lower freight rates, more consistent pricing, more frequent services, and flexible loading and unloading services.

This results in just-in-time delivery and a decrease in inventory holding costs, which make up a sizable portion of logistics costs. Reduction

The increase in productivity is accompanied by an increase in inventory holding costs. O Transportation network expansion: Economy of size (the transportation equivalent of economies of scale) is characterised by intermodal transportation, which increases the overall distance travelled between all service points in the network. The economics of size increase proportionally as the number of service locations increases. Intermodal transport has a large initial network.

of service stations that are connected at the terminals. Intermodal transportation therefore increases total mileage and the transportation network. By decreasing the rate at which transportation costs are rising per tonne of freight, and by improving economies of scale, overall distance increases.

Enhanced market access for input and output: increased transportation

Network makes it easier for the network to acquire skilled labour and superior input materials. Additionally, it improves the networks' ability to efficiently service a larger market.

4.6 Disadvantages of intermodal transportation system

Intermodal transportation, which combines numerous modes of transportation, including trains, trucks, and ships, has a number of benefits, including lower costs, shorter travel times, and increased dependability. However, there are certain drawbacks to multimodal transportation as well, such as:

Coordinating several modes of transportation can be challenging and requires careful preparation to guarantee that items reach at their destination on time. Intermodal transportation entails this coordination. The entire supply chain may be impacted by any delays or disruptions in one form of transportation.

Infrastructure restrictions: Intermodal transportation depends on the presence of suitable infrastructure, such as ports and rail lines, which can be scarce in some places. As a result, the transportation system's flexibility may be limited, and transit times and prices may increase.

Increased handling: Using numerous transportation methods frequently requires multiple handling locations, which raises the possibility of items being damaged or lost. For shippers, this may mean higher costs and delays.

Intermodal transportation is susceptible to security issues like theft, tampering, and terrorism. This can lead to higher insurance rates and more costs for security precautions.

Intermodal transportation can be more effective than utilising only one mode of transportation, yet it still has an influence on the environment. The usage of diesel-powered vehicles such as trucks and locomotives can worsen air pollution, and building and maintaining infrastructure can have an adverse effect on ecosystems and natural habitats.

4.7 Intermodal transportation system in India

Any nation's economic development depends heavily on transportation. A huge and geographically diverse state like India offers a fantastic chance to put the concept of intermodal transportation into practise. According to Vivek Kelle (2013), India has a coast line that is approximately 7,517 kilometres long and is home to 187 transitional and minor ports in addition to thirteen large ports (twelve government and one private). The Indian logistics sector is anticipated to generate revenues of USD 200 billion by the year 2020. The GDP spent by the Indian logistics industry on different costs associated with logistics operations amounts to about 14%. Companies frequently outsource the function of logistics.

The manufacturing centres in India are positioned apart from the main cities in the hinterlands.

Punjab, Haryana, Delhi NCR, and other states like MP are North Indian states that serve as a gateway. Away from ports are major manufacturing centres located (Badvar Dnyandev Vishvas, 2015). In this vein, multimodal transportation may be an option (counting long). Also, short distances) is excellent. India's exports and imports to foreign markets

The total value of imports is expanding quickly, at a rate of roughly 8–10% each year Annum.

4.8 Evolution of Intermodal Transportation in India.

Indian Railways' Container Corporation of India, also known as CONCOR, is a division of the company. According to Vivek Kelle (2013), CONCOR has been instrumental in advancing multimodal transport in India. The campaign of Indian Railway to position India as a containerized shipping hub began in 1966. In light of India's vast size—more than 3,000 miles from North to South and from West to East—rail

Transporting heavy loads via transportation is undoubtedly more cost-effective than a great distance. In 1966, Indian Railways entered the door-to-door intermodal transportation sector.

Do not overfill DSO containers. Despite the fact that 150 of the first containers to arrive in India were. Although it was handled in Kochi in 1973, the primary 150 container wasn't placed there until 1981.

Inland by Indian Railways to Bangalore, home to the country's first ICD (Vivek Kelle, 2013). An organisation was required to deal with and progress with the improvement of containerization in India as a result of the network's expansion to 7 ICDS by 1988. As a result, CONCOR was incorporated in March 1988 and started working in November 1989 after taking over management of Indian Railways' current network of 7 inland holder terminals (CDs) (Vivek Kele, 2013). Currently, it runs 61 ICDS/CFSS (Container Freight Stations) in India. Nearly 300 privates, open CFSS, and ICDs are currently available in India, giving

Intermodal Transportation in India Faces Challenges The global standards of the Indian logistics industry are still behind Performance, This is demonstrated by the fact that, according to the World Bank International Logistics Performance Index, India came in at number 46 out of 155 countries. Multimodal transportation is marketed as an effective shipping method and has been proven to reduce transportation costs everywhere in the world: transporting goods over greater distances To expand the availability of multimodal transportation options in the nation, adequate road and rail infrastructure is required. The main challenges in developing a strong intermodal transportation system were identified by Badvar Dnyandev Vishvas in 2015 India:

- Road Transport

National Highways and roads are of poor-quality poor use of the automobiles.

About a third of all automobiles in India are commercial developed nations

Interstate checkpoints and unexpected sales tax inspections have an additional negative impact the use of automobiles.

Trucks are thought to lose roughly 40% of their Due to these pauses, their driving times. Entry fees for goods or services into cities like Octroi also cause procedural bottlenecks.

Despite making up only 2% of the entire Indian Road network, national highways carry nearly 40% of the country's traffic. There are no specific guidelines in place for founding a trucking company. Everyone can

Enter this field of endeavour.

large number of small, unorganised participants who are all savagely competing with one another

Other,

Rail Transport

- The cross-subsidization of passenger freights has resulted in higher freight rail fares in India.
- The highest in the entire world.
- Lack of dependability and real-time tracking in rail freight
- Large billable minimum distance.
- difficult refund and documentation processes,
- Limited capacity for manufacturing waggons and racks.
- The public-private partnership is hampered by the tariff structure and revenue sharing.
- Partnership in the construction of rail infrastructure.

Indian Railways' monopolistic behaviour in a variety of business areas. Indian Railways is deficient in operational excellence, customer focus, and velocity.

- Harbour Freight

Increased turnaround times for vessels as a result of inefficient berthing and delays during loading and unloading Coordination between Port Authorities and Customs is delayed.

Some of the ports in India have very poor hinterland connectivity as well as bad Port and landside infrastructure with outdated equipment's.

Ports with insufficient berths prevent large vessels from berthing. Larger vessels cannot berth due to navigation channel restrictions. In addition to the aforementioned adjustments, limitations brought on by a lack of synchronisation In India, there are many ministries for roads in addition to various modalities and organisations. There is no single ministry for transport like China's that can look after rail and shipping after well-coordinated development.

1993's Multimodal Transportation of Goods Act

According to India's MMT Goods Act of 1993, "the MMT of items, from within India to outside India, in view of a MMT contract and for issues related thereto or incidental thereto" is required. The implementation of this Act began on February 2, 1993.

According to the Act, "multimodal transportation" refers to the movement of goods using more than one mode of transportation from their point of origin in India to their destination outside of the country. This Act outlines the procedures for enrolling a company as an MTO, and an enrolled MTO may conduct MMT.

The Director General of Shipping is qualified to act on behalf of the MMT Act, including MTO registration. Immediately following the duration of

One year, and it must be renewed annually.

The exporter can now participate in global trade with a safe door-to-door shipping thanks to this act. The use of many modes of transportation lowers the cost of logistics, which lowers the product's overall cost and increases its ability to compete on the global market. The MMT Act of 1993 was put into effect in the aforementioned setting to accommodate global trade, and it was largely based on ICC/UNCTAD regulations. Additionally, the MMT Act ensures that only businesses with adequate infrastructures and financial resources were registered to carry multimodal transport in order to protect the interests of the

shippers. Having any shipping or goods forwarding business. The last three years' turnover of Rs. 50 lakhs or more is eligible for the registration as MTO.

The MMT Act complies with the rules for issuing Multimodal Transport Documents. One transport document covers the documentation for all types of transportation from the exporter to the consignee. Multimodal Transport Documents outline the obligations and liabilities of the MTO and eliminate any non-uniformity and ambiguity in the shipment of cargo. The multimodal transport document, which is a negotiable document by default and a document of title on the basis of which its holder can take delivery, would be an agreement for the transfer of cargo from the shippers to the consignee through multimodal transport.

The MTO/ITO responsible for carrying out the multimodal transport contract, the consignor who places the goods with MTO/ITO, the consignee who is to accept delivery, the banker who provides the documentary credit, and the insurers who insure the goods against loss and damage are the next parties listed as having the right to be held accountable.

CHAPTER 5

RECOMMENDATION AND CONCLUSION

5.1 INTRODUCTION

This analysis offers a solid framework for creating an IWT-based multimodal transportation system and, in doing so, sheds light on how the IWT mode may be incorporated with other modes of transportation. This final chapter focuses on the study's major findings and how they relate to the primary objective of the investigation.

This final chapter's goal is to wrap up the analysis and highlight the research's findings in relation to the study's main goal.

The study's results are summarised in this chapter. This study aimed to address the twin goals of

- a) To pinpoint several elements that will support an Inland Waterways-based
- b) To create a conceptual framework for an intermodal system based on inland waterways system of intermodal transportation India's transport system.

5.2 STUDY LIMITATIONS

The study also made an effort to remedy the issue that the research's underlying premise had created. In addition to outlining a conceptual framework for an IWT-based intermodal transportation system, the study analyses the critical variables. Even though it was created with the Indian context in mind, the framework can be used for any IWT-based Intermodal Transportation System.

This particular analysis has a number of limitations, as is the case with every analysis but perhaps even more so in the early stages of academic development and industry. Although these restrictions do not diminish the importance of the findings, it would be unfair to not include them at some point in this dissertation. It would be incorrect to reject some of the limitations identified during the analytical process because the study journey wasn't without its difficulties. The value of the study is increased by acknowledging the limitations of this particular approach rather than being diminished.

5.3 FINDINGS AND RECOMMENDATIONS

Making the fundamental presumptions and assumptions visible and available to criticism.

Possibilities for Additional Research IWT hasn't drawn a lot of research in India. There aren't many papers on this particular topic in India, according to a literature review. The results of this study open up a wide range of possibilities for more in-depth investigation and initiatives to make greater contributions to the field of IWT and intermodal transportation. Although there are essentially no restrictions on what can be researched in any discipline, the discussion in this section will be limited to topics that are closely related to the most recent results, contributions, and limits in the earlier section.

The researcher suggests the following areas for future research: A framework for multimodal transportation is created by this research. It may be possible to do additional study to contrast the IWT-based intermodal system with unimodal and alternative intermodal solutions in terms of prices, transit times, and simplicity of operation. They might make light of the suggested structure. Considering the competitiveness of the

The framework created and the ideas presented have a stronger Indian perspective. It may be possible to conduct additional study to create a global model that would apply to all nations.

- A few nations, such as the EU and China, have implemented IWT-based Intermodal Transportation Systems with far greater success. A more thorough study may be conducted to comprehend the policies and programmes adopted by these countries and their application in India, even if this research attempts to adopt some of the best practises from these nations.

- No particular cargo or product was taken into account in this study. Intermodal For solutions, unique commodities with high movement can be looked for.

Along the paths where India's rivers flow.

The domestic trade was the primary focus of this study. On how IWT might be used to promote international logistics with neighbouring nations and other South Asian nations, research may be done. This can increase IWT volume flow.

- (WT hasn't been a particularly effective mode of travel in India thus far. Additional analysis is required to get more empirical data on the issues involving the lower proportion of IWT in India because there is currently no significant research in the field.
- The creation of a showcase waterway in India has been suggested by a number of research participants, and NW1 has also been suggested as a prospective showcase waterway. The development of a thorough road map to transform NW1 into a showcase canal may be the subject of future research. This should provide proposals for anything from terminal operations to navigational infrastructure.
- The core of any transportation strategy is the shipper. Future studies could be conducted to learn more about the expectations that consignors and consignees have today and in the future and how IWT can be designed to meet them.

CHAPTER 6

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6.1 REFERNCE AND BIBILOGRAPHY

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