"A STUDY ON CONTAINER TRAFFIC AMONG MAJOR PORTS IN INDIA"

Submitted for partial fulfilment of the requirement for the degree of

MASTER OF BUSINESS ADMINISTRATION
(Port and Shipping Management)

By

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CERTIFICATE

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This is to certify that the project report entitled "**A STUDY ON CONTAINER TRAFFIC AMONG MAJOR PORTS IN INDIA**", submitted to the School of Maritime Management, Indian Maritime University, Chennai Campus., in partial fulfillment for the award of the degree of Master of Business Administration in Port & Shipping Management/ International Transportation and Logistics Management, is a record of work carried out entirely by**DEVANANTH.M**, Reg No: **2003304012.**

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DECLARATION

I, **DEVANANTH.M**, Registration No:2003304012, hereby declare that this project report titled **"A STUDY ON CONTAINER TRAFFIC AMONG MAJOR PORTS IN INDIA"** is a bonafide record of work carried out by me under the supervision of **Dr. M Sekar Assistant Professor** School of Maritime Management, Indian Maritime University, submitted in partial fulfillment of the requirements for the award of the degree of **MASTER OF BUSINESS ADMINISTRATION IN (Port and Shipping Management)**. The information submitted is true to the best of my knowledge.

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CHAPTER-1
INTRODUCTION

DEFINITIONS AND MEANING

The process of carrying freight in larger containers is known as containerization. Containerization is a popular shipping method that first appeared in the early twentieth century. Road-and-rail containers, sealed boxes of standard sizes, were used early in the century, but it wasn't until the 1960s that containerization became an important feature in ocean transportation, with access to contemporary ships built specifically for container transport.Container ships are large and fast, carrying containers both above and below deck, and their goods are readily loaded and unloaded, allowing for more frequent journeys and less time in port. Port facilities for rapid container handling are inherently complex and costly and are often justified only when there is significant cargo traffic running both ways.

Growth of Container Industry

After being utilized as a unit of transportation for the first time during WWII, the break-bulk cargo was handled slowly until the mid-1960s; ship loading and unloading were mostly manual. Because of benefits such as door-to-door delivery, quick intermodal transfers, cheap handling costs, reduced breakage and pilferage, lower insurance costs, and so on, the introduction of the container as a unit for transporting products revolutionized general cargo and allied shipping and port activities. It improved the efficiency of operations and increased trade volumes by speeding up the loading and unloading of ships. Cargoes that were previously shipped in bulk began to be containerized over time.

The development of containerization has given rise to the demand for adaptable organizations with worldwide logistics capability. On the transport side, one notices the evolution of mega transport operators. Acquisition of ships, owning and leasing of containers, having dedicated terminals, trucking, etc. are the various activities performed by these operators.

Container trade has outpaced marine trade in terms of growth.

While total maritime trade rose at an average pace of 3.3 percent per year between 1987 and 1999, the container trade surged at an annual rate of 8.3 percent. Between 1990 and 2003, the

container growth rate was still higher, at 10.05 percent. Maritime trade is predicted to rise between 3.5 percent and 4 percent per year over the next ten years, according to an ESCAP research; container trade, on the other hand, is expected to grow at a faster rate of 6 to 8 percent.

World Container Fleet

The number of fully cellular container ships in the globe is increasing, as is their container carrying capacity. There were 7335 ships with an aggregate carrying capacity of 8.47 million TEUs by the end of 2004. In 1990-91, 85.6 million TEUs were handled; in 2000-01, 231.7 million TEUs were handled, and in 2003-04, 297.2 million TEUs were handled. In the early 1990s, India joined the league of container ship owners when the Shipping Corporation of India purchased three cellular boats. India currently has ten cellular vessels with a tonnage of 1,79,613 DWT or 14,968 TEUs.

In 1957, Sealand was the first shipping line to use containers. It should be mentioned that until the mid-1980s, the capacity of container ships was limited by the Panama Canal's size. Container ships have changed dramatically in size, form, carrying capacity, and other aspects over time. These ships can be categorized into generations based on these parameters. In major container terminals, sixth-generation container ships with a capacity of 8000-9000 TEUs are now in use.

The emergence of huge ships has two important consequences: it defines the shipping industry's competitive power and becomes a primary factorindeciding the size of a port. Previously, it was thought that if container ship sizes reached 10,000 TEUs, diseconomies of scale would kick in because such a large ship would require two engines to power. Single-engine boats of 10,000 TEUs and more can currently be produced thanks to technological breakthroughs in engine design. A concept design for ships up to 18000 TEUs already exists.

Containerization has changed the world's port infrastructure. Port facilities are in more demand, both in terms of capacity and performance. With the rise in vessel size, more channel depth is required.

Evolution of Containerization in India

India is a relative newcomer to the container shipping industry. In 1973, American President Lines sent 400 containers to India, which marked the beginning of containerization in India. Since then, container traffic has been continuously increasing.

The volume of traffic has increased rapidly from 400 boxes in 1973 to 0.68 million TEUs in 1991, 3.98 million TEUs in 2003-04, and 4.52 million TEUs in 2004-05.Between 1990-91

and 2004-05, container traffic in TEUs grew at a pace of roughly 14.6per cent per year. In volumetric terms, container traffic grew at a slightly faster rate of 15.76 percent during the same time period.

Indian container transportation has a tiny but growing share of global container traffic. Due to infrastructure restrictions and their distance from international shipping routes, Indian gateway ports do not currently attract a sufficient number of mainline vessels. Currently, 51 percent of Indian export/import containers are delivered directly to JN Port and Chennai Port in India. The remaining 49% of containers are transhipped through adjacent international ports like as Colombo, Singapore, and Dubai.

Share of Container Traffic

From 5.26 per cent in 1990-91 to 14.27 per cent in 2004-05, the percentage of containerized freight handled at major ports increased steadily. The difference in the proportion of imports and exports in terms of tonnage was small; the difference in the proportion of imports and exports in terms of TEUs was marginal.

Northern and western India contributes over 69 percent of total container traffic, with the south accounting for per content and the east for only 5%. Around 18% of empty containers are handled at major ports. Air transport is used for some import-export container cargo. Over time, the volume of this traffic has increased. Since 2001-02, there has been an increase in both international and domestic traffic.

In the years 2004-05, total aviation cargo amounted to 1.28 million tons. The percentage of international traffic was 65 percent, while the percentage of local traffic was 32 percent.While air cargo accounts for only a small percentage of international freight traffic (less than 1%), it is significant in terms of value; it accounts for roughly 30% of worldwide trade. With the expansion of international trade, air freight's share of total cargo volume and value will grow in the comingyears.

1.2 OBJECTIVES OF THE STUDY

a) To study container traffic among Major Ports.

b) To study the Import of 20’ft and 40’ft containers in Major Ports.

c) To study the export of 20’ft and 40’ft containers in Major Ports.

d) To suggest findings from the above study.

1.3 SCOPE AND RATIONALE FOR THE STUDY

Container traffic in India has grown at a CAGR of 7% during the last ten years, with an annual average growth rate of 6.9% over the last five years. JNPT, Paradip, Vizag, Mumbai, and Kandla, India's top three container ports, manage nearly 53% of the country's total container traffic.

Historically, India's major ports have handled all containerized cargo, including exports and imports. However, things have altered in the last ten years. Container traffic has increased in tandem with India's expanding economic strength, and new and efficient private ports have sprung up in recent years to help fuel this expansion. When comparing the number of containers handled at Major and Non-Major Ports, it is clear that container handling at Non-Major Ports has outperformed development at the country's Major Ports. The expansion recorded by Mundra and Pipavav on India's western coast is principally responsible for the increase in Non-Major Port’s share.

With a 41 percent share of India's container throughput, the Jawaharlal Nehru Port (JNPT) in western India handled the most container traffic among the country's main ports in the fiscal year 2020. The Chennai Port came in second, with an 18% share of container handling.

Current containerization penetration in India

A considerable portion of break-bulk cargo that was formerly handled as non-containerized cargo is now shipped in containers. Granite exports from Andhra Pradesh, for example, were traditionally handled as break-bulk cargo, but due to a surge in the number of tiny shipments to various consignees around the world, containerization of this commodity has exploded. Scrap, for example, is still imported as break-bulk cargo by India, but a considerable portion of it is also shipped as a containerized commodity. Some non-traditional cargo, such as bananas, has been containerized. They have mostly been air freighted out of the country in recent years. As a result, the containerization of non-traditional containerized commodities, as well aa generational increase in container penetration, has aided in the growth of container traffic in India.

Containerization potential

It has brelativethat recent expansion has been aided by strong growth in general cargo containerization, which has climbed from 60% in 2001 to roughly 68 perccontainerizationording to Drewry, India's container penetration could reach 72 percent by 2020. Chemical, pharmaceutical, textiles, plastic, car and auto auxiliary units, tires/tubes, and re-rolling mills-related items are all businesses that, if not already, have a high proclivity for containerization.

1.4 RESEARCH METHODOLOGY

1.4.1 THE MEANING OF RESEARCH

Research can also be defined as a scientific and methodical search for relevant information on a given topic. Indeed, research is a form of scientific inquiry. A careful investigation or inquiry, notably via the search for new facts in any domain of knowledge, is defined as research.

1.4.2 OBJECTIVE OF RESEARCH

The goal of the research is to use scientific techniques to find answers to questions. The fundamental goal of the research is to uncover the truth that is hidden and has yet to be uncovered. Though each research project has its own unique goal, we can categorize research aims into the following categories.

- To become acquainted with a phenomenon or to obtain new insights about it.
- To accurately depict the features of a specific person, situation, or event.
- To conduct a simple percentage analysis of the data.

1.4.3 TYPES OF RESEARCH

The following are the basic sorts of research:

- Analytical vs. Descriptive
- Fundamental vs. Applied
- Quantitative vs. Qualitative Analysis
- Empirical vs. Conceptual
- Additional sorts of research
- Research in the field or the laboratory
- Clinical and diagnostic studies
- Historical investigation

A research technique is a method for methodically solving a research problem. It can bethought of as a science that studies how scientific research is conducted. The researcher must understand not just the research methods and procedures, but also the approach.Researchers must understand not only how to create specific indices or tests, but also how to use themand how to apply specific research procedures, but they also need to know which of these methods or approaches are relevant and which are not, and what they imply and suggest and why.

Researchers must also be aware of the assumptions that underpin particular methodologies, as well as the criteria by which they can determine whether certain techniques and processes are appropriate for specific situations and which are not. All of this implies that the researcher must develop his methodology for his problem, as it may differ from one to the next. For

example, an architect designing a building must deliberately assess the foundation of his decisions, i.e., why and on what basis he chooses specific sizes, numbers, and locations for doors, windows, and ventilators, utilizes specific materials rather than others, and so on. Similarly, in research, the scientist must evaluate the researcher's decisions before implementing them. He must clarify exactly what decisions he chooses and why he chooses them so that they can be examined by others as well.

According to what has been discussed thus far, research methodology has various dimensions, and research techniques are a part of research methodology. Research methodology has a broader reach than research methodologies. Therefore, while we describe research methodology, we don't simply discuss the research methodology; we also explore the logic behind the methods we employ in the context of our research study and explain why we chose one technique over another so that the scholar or others can review the research evidence.

1.4.4 RESEARCH DESIGN

The framework or plan that governs data collecting and analysis in a study is referred to as the research design.This study employs an analytical research design. It includes collecting data from two different ports. Analytical research's major purpose is to describe a study utilizing data that is already available. The data is collected from two ports and analyzed with multivariate analysis methods to describe the relationship between avarietys of variables linked to POL movement via the two major ports. The purpose of the analysis was to process the data and extract information to satisfy the study's goal.

1.4.5 COLLECTION OF DATA

The gathering of data is regarded as one of the most crucial components of the research technique. The researcher should consider two categories of data when deciding on the data gathering strategy to use for the study: primary data and secondary data. Primary data are those that are acquired from scratch, whereas secondary data are those that have been processed statistically and are ready to use. In order to achieve the objectives of the study, secondary data was utilized.

Gathering - gathering data and Present the Results—this usually entails some sorting,

analysis, and/or presentation.

1.5 LIMITATION

- The research was accomplished within just 20 days, which is minimal.
- The study is based on secondary data. Actually to complete a fully-fledged study. Primary data should also be considered.
- The scale of comparison is inappropriate because both the ports vary in size and functions.
- The 12 major Ports, as we all know are government bodies (body corporate).
- Disadvantages of government institutions are inevitable in making the study a bit biased.

CHAPTER-2
LITERATURE REVIEW

2.1 ANALYSIS OF LITERATURE

As secondary information, literature reviews do not report any fresh or original experimental work. A review of the literature usually comes before a research hypothesis and result portion in academic papers, such as a thesis. Its ultimate purpose is to keep the reader up to speed on current literature on a topic, and it serves as a basis for other goals, such as possible future research.

A literature review can serve as a prelude to a research paper's introduction, or it can stand alone as a whole article, commonly the first page of the most recent research project, allowing the supervisor to ensure that the student is on the right track. Among the various pieces of the literature analyzed, the researcher discovered the following literature review to be closely relevant to the study.

2.2REVIEW OF LITERATURE

The data represented during this project report has been integrated from secondary data available from numerous sources across the network. The most literature used and brief descriptions of data gathered from each of those are depicted as follows:

Vidhya G Mohan and Nasser M A, "Challenges faced by Indian ports in distribution mechanism of containers", National Institute of Technology, Calicut, May 2017.

This paper aims to constitute how the problem faced by ports in developing nations varies from developed nations. This paper focuses on infrastructural requirements like the dry port or consolidation centers in both economies. Furthermore, it focuses on the distribution mechanism of the container in developed nations and familiar patterns followed in countries like India concerning Kochi port and other Indian ports in the southern region. The data existing to this has been collected from case studies to various port authorities and

stakeholders in port operations, dry port owners/users, and various people who benefitted from numerous services.This has endeavored to emphasize the requirement refinement of all these dry port locations inform all to be durable.

"Concentration analysis of container ports in India," by K Chandrasekhar Iyer and V.P.S Nihar Nanyam, IIT, New Delhi, August 2021.

As per this analysis, Indian container terminals have surged about 46 % in the last five years, with a 9 percent year-on-year increase since 2015. Container terminals have sought to revamp equipment and deliver digital processes in order totoom idle capacity, resulting in a boost in the use of container ports across the country. The study adopted an empirical approach to evaluating both the concentration and de-concentration tendency of Indian container ports from 2015 to 2019. Which used the concentration ratio, HHI index, and SSA analysis on the container. The study aims to look at the proliferation of container terminals in India all throughout the stime span.

Containerisatiperiodfast track in India- Journal of Contemporary research in management January- March 2009.

Containerization of general cargo began in India around 1970, as opposed to the 1960s in industrialized countries, and gained traction in the 1980s. In India, containerization is still around 45-48 percent, compared to 65-75 percent in wealthy countries. During the last decade, India has kept up with global container trade growth; in fact, container traffic at Indian ports has expanded at a faster rate than the global average. During the five years ending in 2000-05, container traffic increased at a rate of 14.2 percent per year.

Due to the Indian economy's continuing liberalization and globalization, India's overseas trade accounts for roughly 18-20% of overall seaborne trade by volume, with a substantially greater value. India's liner commerce will undoubtedly be a high-growth era at this level of economic development, as there will be greater trading of semi-finished, finished commodities, and value-added items. Furthermore, India's potential as a manufacturing hub bodes well for the country's liner trade.

"Multi-layered hinterland categorization of Indian ports of containerized cargos using GIS visualization and regression trees analysis," Jean-Claude Thill and Kailas Venkata Subramanian, the University of North Carolina in Charlotte, USA, September 2014.

This research uses a novel strategy that merges geographic information system visualization and data mining to present a multi-layered hinterland classification of key ports

for containerized shipments. Containerization of maritime transport is increasing in developing nations such as India as a consequence of an increase in export-oriented areas of the economy and growing industries. In the framework of marine sector privatization and modernization measures, we strive to recognize how the hinterland of container shipping markets in India has grown in recent years. Moreover, this paper attempts to estimate the interference made by some privatized ports, like Pipavav and Mundra, on the major ports, which itself is unlikely given the lack of evidence.

"Productivity, Agility, and Technology Advancement in Indian Ports," Prabir de and BuddhadebGosh, Indian Institute of Technology, Kharagpur, December 2002.

This article looks into the relationship between port productivity, efficiency, and technological progress in India. Using a comparative static approach, it is demonstrated that there is a significant technological shift in capital utilization in Indian ports. Furthermore, the usage of overhead capital has resulted in substantial productivity gains. This overall revelation has major ramifications for the implementation of modern technologies in the port sector in low-income countries, particularly in India. As a result of the growing technology, the port's future development is greatly dependent on how quickly it absorbs new technology and improves services.

"Competition for transshipment containers by key ports in Southeast Asia: Slot capacity analysis," by Jasmine siu lee lam and Wei yim yep, February 2008.

As per this analysis, container ports in Southeast Asia accounted for 30.0 percent of global transshipment- shipment traffic in 2004. Between 1999 and 2004, all container shipping companies deployed annual slot capacity to three specific ports. The data is generated and sorted based on shipping trade routes. According to the report, Singapore's transshipment performance was affected by competition from Port Klang and Tanjung Pelepas. The administrative repercussions of both the ports are illustrated.

Rajasekar T, Ashraf P Sania, and Deo P Malabika, " Measurement of efficiency of a major port in India- a data envelopment analysis approach", Pondicherry University, January 2015.

The study used data envelopment analysis to look at the operational efficiency of a few major Indian ports from 1993 to 2011. The hypothesis explored in this study is that port efficiency is not determined by its size. According to the findings, both larger ports, such as Mormugao and the Jawaharlal Nehru Port Trust, and smaller ports, such as Ennore and Tuticorin, have consistently efficient port operations. The study discovered that the JNPT

port was the most super-efficient port among the main ports in India based on the results of the super efficiency analysis.

Anatoly Egorovh, Nadhezda pilipchuk, Igor Khmelev, Vitaly Shatokin, and Alexey koji kin, "World experience in development of container traffic",2019.

This paper focalizes on the global market for logistics services. The most important and priority concerns in the state transport strategy of all major exporters and importers in the international trade market are containerization of international cargo transportation and improving the growth of multimodal transportation on their basis. As a result of the Western sanctions, cargo turnover has increased dramatically, particularly in countries in the Asia-Pacific area. The majority of commodities are carried to the Russian Federation via container shipping, which is the most convenient, adaptable, and dependable method. However, many Russian container industry participants' infrastructure and experience were found to be unprepared for such a change.

Dr. J. Rengamani, Associate Professor, AMET business school, AMET University, "A study on the performance of major ports in India", 2015.

This paper mentions that there are 13 major ports in India, as well as 176 minor ports. The big ports handle almost 3/4 of all traffic. To this goal, all port trusts have formed working groups with officials from the National Highway Authority of India (NHAI), Railways, and state governments to develop comprehensive plans for strengthening port road-rail connectivity. Coastal trade and offshore supply boats (OSVs) for ONGC and GAIL are also catered for by the maritime sector. The study's goal is to assess the functioning of India's major ports.

Eliza Sharma and Subhankar Das, "Measuring impacts of Indian ports on environment and effectiveness of remedial measures towards environmental pollution", February 2020.

This paper shows as India's port sector grows as a result of increased external trade, it's important to consider the environmental impact it has on the country's coastal seas. Researchers have compared the environmental performance of big and little ports. Researchers used stratified random sampling and the questionnaire approach to collect primary data from six different types of stakeholders in the port sector across 15 of India's busiest major and minor ports. It was discovered that port operations caused significant environmental harm in terms of water pollution, wastewater disposal, dangerous pollutants, and other factors. In terms of the effectiveness of remedial methods to repair such harm, the

researcher conducted a comparison analysis and discovered disparities in the success rate of long-term operations between major and minor corporations.

Ancor Saurez Aleman, Javier Morales Sarriera, Toma serebrisky, and LaCarrierujillo, "Whenit comes to container port efficiency, are all developing regions equal", December 2014.

This Paper shows both parametric and nonparametric techniques to analyze the performance of container ports in the developing world between 2000 and 2010. We show that productivity growth rates varied significantly between 2000 and 2010 and that this heterogeneity is explained by pure efficiency changes rather than technical scale efficiency. As a result, we conduct a thorough efficiency analysis to uncover the factors that influence port efficiency. The results of the time series analysis suggest that port efficiency in developing countries has grown from 51% in 2000 to 61% in 2010. According to our findings, private sector participation, reduced public sector corruption, improved liner connectivity, and the presence of multimodal links all boost port productivity.

Brian Slack and Elizabeth Gouvernal, "Container Transhipment and Logistics in the context of urban economic development", November 2015.

It is commonly acknowledged that containerization and supply chains have tight linkages, resulting in huge clusters of logistics enterprises near major gateway ports, which help to cement many cities' reputations as global cities. Transshipment hubs should be able to create logistics enterprises, according to recent research, policy documents, and regional development goals. The difference between gateway ports and transshipment hubs is argued in this study, and while shipping lines have been ready to build transshipment in numerous areas, logistics corporations have been hesitant to follow. The weakness of hubs as logistics centers is demonstrated using empirical facts, exceptfor Singapore. According to the facts presented economic development.

Afaq Hussain, "Reforming the Indian Port sector", October 2019.

This paper indicates that the port industry is a key engine of economic and regional development, as well as national integration into global markets. In India's example, the port sector has been critical in maintaining the country's a trade and commerce growth. However, in India, the expansion of trade and, as a result, maritime traffic has outpaced the construction of port facilities. The goal of this essay is to contextualize the relevance of port sector development, specifically the influence that improvements in infrastructure quality can have on India's worldwide trade, against the backdrop of government activities in this sector. This

article also discusses the obstacles that must be overcome to realize the vision of a reformed and functioning Indian port sector.

2.3 LITERATURE GAP

The researcher reviewed a variety of literature on the subject and discovered that the majority of it focuses on container port efficiency, East Asian container port performance and competition, transshipment containers among Indian major ports, productivity and technological change in Indian ports, and so on. Because my study is unique, and I have not come across the above-mentioned study in any of the literature that I have reviewed, it gains significance. The researcher is interested in learning more about the import and export of 20'ft and 40'ft containers between India's major ports.

Infrastructure development is also important for the expansion of 20'ft and 40'ft container import and export. The research appears to be highly interesting, as the last chapter explains.

CHAPTER-3
INDUSTRY AND COMPANY PROFILE

3.1 INDUSTRY PROFILE

A port is a site on the coast or coastline with one or more harbors where ships can dock and transport passengers or cargo to or from land. Port locations are chosen to maximize access to land and navigable water, economic demand, and wind and wave protection. Ports with deeper water are less common, but they can handle larger, more cost-effective ships. Because ports have always handled a variety of cargo, support and storage facilities vary widely, can span miles, and have a significant impact on the local economy. The phrases "port" and "seaport" refer to various types of port facilities that handle ocean-going boats, whilst "river port" refers to river traffic such as barges and other shallow-draft vessels. Some inland ports, such as those on a lake, river, or canal, have access to the sea or ocean. A seaport can be classified as either a "cruise port" or a "cargo port."

Furthermore, "cruise ports" are also referred to as "home ports" or "ports of call." A "cargo port" can be classified as either a "bulk" or "break bulk" port or a "container port." Ports link us to the rest of the globe. Every day, goods pass through one of the hundreds of deep-draft ports that can accommodate ocean-going boats. They can be found along the coast, on the Great Lakes, and in inland river systems.

Ports are bustling, dynamic transportation centers that are continually evolving to suit global trade demands. Imported and exported goods pass-through ports, which serve as a hub for business activities. We rely on ports to boost international trade, develop local and national economies, create better-paying employment, and raise our living standards. Every country's citizens benefit from increased trade.

Ports also function as environmental guardians of our coastlines due to their position. Ports spend millions of dollars each year to reduce the impact of port activities on their surrounding communities and natural resources. Ports act as economic engines in their communities, producing jobs and opportunities that allow businesses to thrive. Private products are consumable and divisible, with few economic externalities associated with their usage.

Market transactions between private parties can capture the majority of the value of private items. However, arms-length transactions cannot capture a significant amount of the value of public goods. As a result, private companies have less motivation to make them. When public assets are utilized, they generate positive externalities; the societal benefits they provide outweigh the price that private parties can charge for them. As a result, some sort of government action in their production is necessary to ensure that an adequate level of public goods is maintained.

Ports handle both public and private commodities. Through their operations, they offer both direct and indirect economic gains such as trade enhancement, second-order boosts in production quantities, and ancillary increases in trade-related services. To justify direct public sector investment, many ports have invoked economic multiplier effects. The difficulties that come from the combined production of both public and private goods make defining roles and boundaries between the public and private sectors in the ports' business difficult. This is especially true in the sectors of marine and port safety, port security, and marine environmental protection.

Industrial clusters have sprung up around several ports. In specialized fields of production and distribution, industrial clusters are geographic concentrations of private enterprises that may compete with or complement one another as consumers and suppliers. Industrial clusters are a type of value chain, a network of interconnected operations that are mutually beneficial and increasing. Clustering-related activities boost cluster participants' competitive advantage by improving their productivity and lowering transaction costs. Boosting technical innovation and fostering the establishment of new businesses.

3.2COMPANY PROFILE

Kandla Port, Gujarat

Deendayal Port, formerly known as Kandla Port, is Gujarat's next major port and India's second busiest, located about 75 kilometers from Mundra. It is sheltered by a natural harbor and is locatedin Kandla Creek. This government-owned facility is one of four Indian ports named after notable personalities, the others being Mumbai's Jawaharlal Nehru Port, VO Chidambaranar Port, and Kamarajar Port. Deendayal Upadhyaya, the political leader after whom the Gujarat port is named, was a politician. It accounts for half of the cargo flow at the port. Oil, textiles, grain, and salt are all major exports.

Paradip Port, Odisha

It is a weather port with deep water (depth 12 meters) on the Orissa coast, about 100 kilometers east of Cuttack. This port can handle bulk vessels weighing over 60,000 DWT due to its vast depth. An exclusive oil jetty with a capacity of 6 to 8 million tons of petroleum products and crude tankers of 85,000 DWT was recently finished. This was built during the Second Five Year Plan period and handles iron ore, coal, and other dry cargo. This port exports a significant amount of iron ore to Japan.

The port's imports account for only half of its exports. It handled 16,910 thousand tons of exports in 2002-03, but only 6,991 thousand tons of imports. The hinterland of Paradip port is rather tiny, encompassing only Orissa.

Vishakhapatnam Port, Andhra Pradesh

It is Andhra Pradesh's deepest and most secure land-locked and fortified port. An outer harbor has been built to handle iron-ore exports. To manage crude oil and other petroleum products, elaborate facilities have been devised. It also works with fertilizers. Vishakhapatnam has a cargo handling capacity of 16.7 million tonnes. Mineral oil, coal, luxury items, and other industrial products account for the majority of imports. This port handled 18,544 thousand tons of imports and 20,279 thousand tons of exports in the fiscal year 2002-03.

Andhra Pradesh and the contiguous regions of Chhattisgarh, Madhya Pradesh, Maharashtra, and Karnataka make up the hinterland of Vishakhapatnam port, which covers an approximate area of 3.4 lakh sq. km. Mineral resources and agricultural produce abound in this region of

the country. 3.2.5 Chennai. The oldest manmade harbor on India's East Coast is Chennai. It lacks a natural harbor, thus an artificial harbor was built on an 80-hectare plot of land near the ocean. Petroleum products, fertilizers, iron ore, and miscellaneous freight are the principal items handled. Rice, textiles, leather and leather goods, tobacco, coffee, manganese ore, fish and fish products, coconut, copra, and other agricultural products are the main exports. Coal and crude oil are among the imports.

Jawaharlal Nehru Port, Mumbai

Jawaharlal Nehru (JLN) Port, India's premier container port with connections to 200 international ports, is located around 300 nautical miles from Mundra. It had topped the list of India's busiest ports for several years before slipping to second place in the most recent financial year. It now has five fully automated container ports, four of which are privately run, handling 55% of India's container traffic. It does, however, deal in liquid bulk and cement. JLN port, like Mundra, is a land-locked northern gateway.

Mumbai Port, Maharashtra

Mumbai Port, India's second oldest port has been in operation since 1873. For starters, it is located in the middle of the west coast. Second, it has a 400-square-kilometer natural deep-water harbor protected on the east by the Kankan mainland and the west by Mumbai Island. The harbor is 10-12 meters deep, making it simple for huge ships to enter and exit. Mumbai is India's largest natural port due to its deep naturalharbor. It has 32 berths and refueling stations throughout the vessel.

Haldia Port, West Bengal

Haldia port, some 105 kilometers downstream of Kolkata, was recently created at the junction of the rivers Hugli and Haldi. Its primary goal is to relieve traffic congestion in Kolkata. It receives larger ships that would otherwise have to travel to Kolkata. Large vessels that are unable to enter the Kolkata port can easily reach Haldia. A fertilizer factory and an oil refinery are located in Haldia. There is also a huge integrated petrochemical factory here. Haldia and Kharagpur are connected by a vital rail line. Mineral oil and petroleum products are the principal commodities traded. The Haldia-Dock complex is thinking of developing a BOT berth. Haldia's hinterland includes the same areas as Kolkata's, albeit to a lesser extent. Haldia's future has become uncertain as a result of the Bhagirathi River's recent course

modification. The entry of large ships has become problematic due to the large-scale buildup of silt near the port (Nayachar).

Chennai Port, Tamilnadu

Chennai Port, located in the southern metropolis of Chennai, is India's third oldest port. Although marine trading along its underdeveloped coastlines is reported to date back to the 1600s, it was founded in 1881. The state's manufacturing industry needs to grow. Wheat, machinery, iron, steel, and raw cotton are the most common imports. The port has a large railway infrastructure.

New Mangalore Port, Karnataka

The New Mangalore Port is the only major seaport in Karnataka's southern state, located on the backwaters of the Netravati and Gurpur rivers off the coast of Mangaluru (formerly Mangalore). Its name includes the word "New" to distinguish it from the city's historic port, which is known as Mangalore Bunder or Old Bunder and mostly serves fishermen and small cargo vessels. Petroleum products, iron ore pellets, and containerized cargo are among the major exports from New Mangalore Port. It can be reached through three national highways. The port's turnaround time (the time it takes for a ship to arrive and depart) is 46.79 hours, which is less than the national average of 63.74 hours. This is due to increased efficiency from allowing customs and forwarding agents to work together.

V.O.Chidambaranar Port, Tamil Nadu

Tuticorin Port was renamed VO Chidambaranar Port in 2011, after legendary independence fighter VO Chidambaram Pillai, whose epithet "Kappalottiya Thamizhan" translates to "the Tamilian man who rode the ship" in the native Tamil language. Tuticorin was a historic seaport dating back to the 6th century before its contemporary incarnation. It mostly dealt with pearls and seafood. Today, cargo ships from China, Sri Lanka, Europe, and the United States dock at this port in Tamil Nadu. Coal, cement, fertilizers, petroleum, coke, and food oils are the key imports.

Kochi Port, Kerala

Cochin Port, known colloquially as Kochi Port, is a prominent port located on the Arabian Marine - Laccadive Sea – Indian Ocean sea route in Kochi, India. It is also the first

transshipment port in India. The port is administered by the Cochin Port Trust a ministry of India corporation. It was developed in 1928 and has been bringing services to the community for 90 years. Other amenities have included Cochin Shipyard, India's largest shipbuilding and repair facility; Kochi Refineries' SPM (single point mooring) facility, an oil exploration carrier pier facility; and the Kochi Marina.

Marmagoa Port, Goa

Mormugao Port Trust (MPT) is a port in the state of Goa on India's western coast. It is one of India's oldest ports, having been built in 1885 on the location of a natural harbor. The port employs over 2,600 people and has approximately 4,000 retirees. The Mormugao Port Trust, which operates the port, is the region's main employer, with a whole mini-township in Headland Sada that includes schools, residential complexes, and services (such as a hospital) for port employees. Once afterthe liberation of Goa, the port was employed as a major port under the Major Port Trusts Act of 1963.

Kamarajar Port Trust, Tamil Nadu

Kamarajar Port Limited, previously Ennore Port, is 18 kilometers north of Chennai Port on the Coromandel Coast. It is India's 12th largest port and the country's first publicly traded port. The Kamarajar Port Limited is the only major port that has been corporatized and incorporated. On March 27, 2020, Chennai Port Trust purchased a 67 percent share in Kamarajar Port Limited from the centre. Kamarajar Port Limited, centeroriginally originated as a satellite port to relieve congestion and environmental quality at the crowded Chennai Port, has grown into a full-fledged port capable of handling a diverse variety of goods. With a peak draught of 13.5 meters, the port managed an overall volume of 11.01 million metric tons.

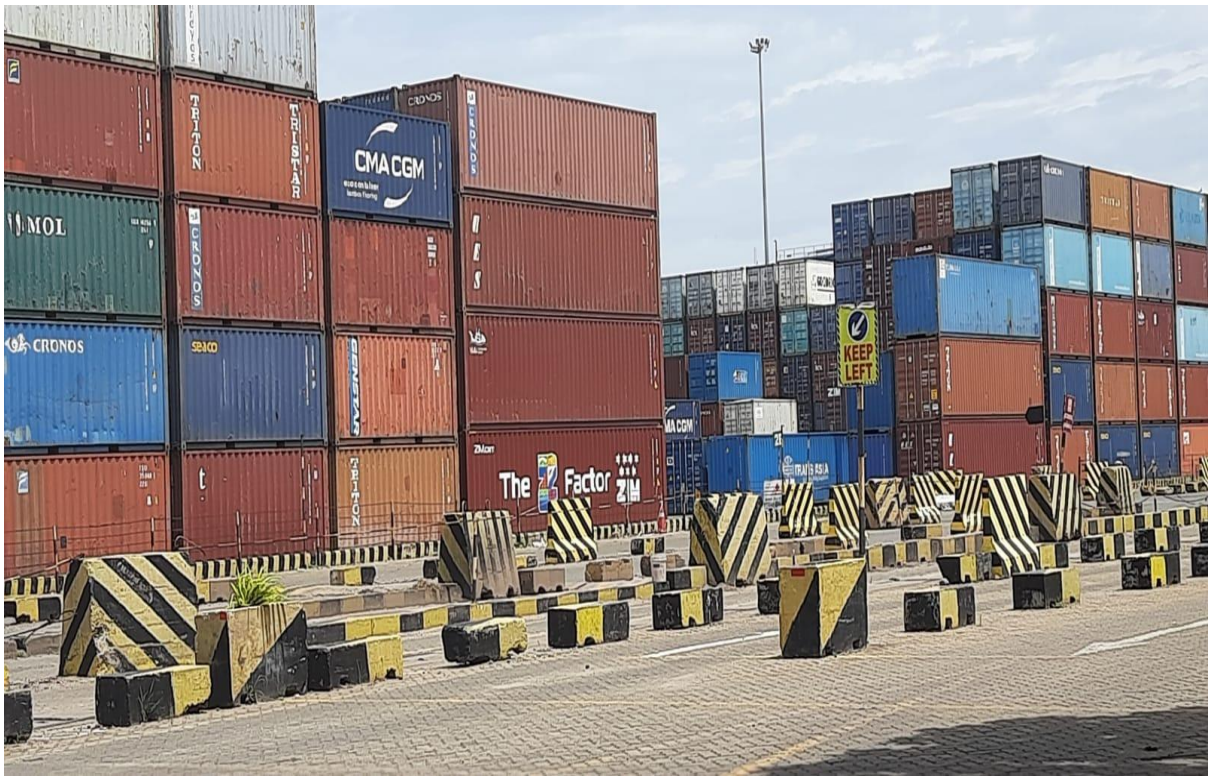
Kolkata Port, West Bengal

It is a riverine port on the left bank of the Hugli River, approximately 128 kilometers inland from the Bay of Bengal. The port of Kolkata handles cargo from Southeast Asian countries. New Zealand and Australia Kolkata are known as the Eastern India Gateway. It is the world's most important jute manufacturing center. Kolkata is a major port for the export of jute, tea, coal, steel, iron ore, copper, leather, and leather products, stiles, manganese, and a variety of other goods. The main items imported are machinery and crude oil.

Chemical goods, fertilizers, and oil-paper The Kolkata port have a lot of issues. It is located on the bank of the River Hugli, which has a silting problem since tidal bores frequently enter the port. In some locations, sand bars and islands have formed. The river is in an older stage and bends in multiple places, posing numerous difficulties for ships. They are unable to find a direct route from the coast to the port. To summarize, 'bends, bars, and bores' are severe problems at Kolkata Port... The water depth is steadily decreasing. This has demanded ongoing dredging forthe largest ships to enter the port. The ships must be piloted by experts, and the cost of maintaining the port has grown exorbitant. A barrage has been built across the Ganga at Farakka to alleviate some of the challenges that plague the Kolkata port. The purpose of this barrage is to redirect water away from the Bhagirathi-Hugli River. Despite the ratification of a water deal between India and Bangladesh, there is insufficient water in the Hugli River. The situation can only be improved by changing the treaty.

The Kolkata Dock System will be privatized to modernize and replace port boats, and cargo handling equipment, improve the use of dry docks and deep drafted areas and promote shipbreaking activities. The hinterland of Kolkata port is huge. The hinterland of this port encompasses almost the entire eastern and north-eastern sections of the country. West Bengal, Bihar, Jharkhand, Uttar Pradesh, Uttaranchal, Sikkim, Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Meghalaya, Tripura, and northern parts of Chhattisgarh and Madhya Pradesh are the primary territories that makeup Kolkata's hinterland.

3.3 CONTAINERIZATION



Containerization has emerged as a popular alternative to virtualization in software development. It entails encapsulating or packaging software code and all of its dependencies so that it may execute reliably and evenly on any infrastructure. The technology is rapidly growing, yielding substantial benefits for developers, operations teams, and the entire software infrastructure.

Containerization makes it possible for developers to construct and deploy apps more quickly and securely. Traditional methods need code to be written in a certain computing environment, which sometimes results in flaws and mistakes when transferred to a different place. Containerization solves this problem by combining the application code with all of the necessary configuration files, libraries, and dependencies for it to run. This single software

package, or "container," is separated from the host operating system, allowing it to stand alone and become portable—able to execute without problems on any platform or cloud.

Containerization and process separation are decades-old concepts, but the open-sourceDockers Engine, which emerged in 2013 as an industry standard for containers with simple developer tools and a common packaging method, has expedited acceptance. According to Gartner, more than half of businesses will be using container technology by 2020. And, according to the results of an IBM survey performed in late 2017, adoption is even faster, with 59 percent of adopters improving application quality and reducing defects as a result.

3.3.1BENEFITS OF CONTAINERISATION

Consistency

Containers make it possible to create reusable environments containing constraints that are insulated from one another. Because the container image specifies the underlying dependencies, you can rest assured that what works on a developer computer will also function in a variety of production scenarios and on any host OS system. As a result, development teams devote more effort to improving applications rather than debugging and fixing issues with personal infrastructure.

Security and Stability

Containers don't run in extreme isolation while different services interact with each other using API requests, service meshes, and other forms of discovery. Containers, on the other hand, isolate fundamental resources like access to the underlying CPU, memory, storage, and network resources. This not only reduces the chances of individual containers consuming excessive amounts of resources but also reduces the possibility of security breaches.

Team focus

Container-based applications, as well as the larger micro-services architecture, allow multiple teams to work on various components without interfering excessively. Containers allow you to specify the infrastructure that your applications operate on as code, allowing various teams to collaborate more on the application and infrastructure code.

Scalable

Containers enable application adaptation in previously unimaginable ways due to their minimal overheads and quick boot time. Using simple scripts or complex "orchestrators," you

can quickly recover crashed application components, launch extra instances to meet increased demand, or conduct rolling upgrades to update an application or dependent versions without any downtime. Developers can also experiment with new languages and patterns in application components without shutting down the entire system.

Cost-efficient

While there are many other free and open-source virtualization alternatives, most are commercial services with a high level of vendor lock-in, making operation and change expensive, complicated, or (in some circumstances) impossible. Almost every container open format is open source, and many of them adhere to the open container specification, enabling switching between runtimes and combining them easier. Commercial container orchestrators and hundreds of managed services are available, but because of the open container standards that underpin them, switching between vendors is much easier.

CHAPTER-4
ANALYSIS & INTERPRETATION

4.1 DATA COLLECTION

A process of preparing and collecting data, for example, as part of a process improvement or similar project, is referred to as data gathering. The goal of data collecting is to gather information to keep on file to make crucial judgments about information or others. Data is collected primarily to provide information on a specific topic.

Data collecting is frequently done early in a project and is often formalized through a data collection plan, which usually includes the following activity.

Pre-collection exercise Agree on objectives, data targets, definitions, and procedures. Data collecting, for example. Presenting Findings typically entails some sorting and analysis presentation.

Pre-collection activity is one of the most important elements in the data gathering process. A poor sampling of both questions and informants, as well as poor Elicitation methodologies, often result in the value of their interview material being discounted too late. After the pre-gathering activity is accomplished, data collection in the field can be done in a structured, systematic, and scientific manner, whether by interviewing or other ways.

A formal data gathering procedure is required because it assures that the data acquired is both

defined and correct, as well as the validity of subsequent judgments based on the results' justifications. The method establishes a baseline against which to measure and, in some situations, a target for improvement.

4.1.1 TYPES OF DATA COLLECTION

Types of data collection are primary data and secondary data primary data are those which are collected afresh and for the first time with the help of a questionnaire interview and so in this study I used secondary data to me the requirements of the purpose.

4.1.2 SECONDARY DATA

Data secondary data means that are already available i.e. they refer to the data which have already been collected and analyzed by someone else. When the researcher utilizes secondary data then he/she has to look into various sources from which he or can obtain them.

Secondary data may be either published data or unpublished data. Usually, published data are available in:

(a) Various publications of governments
(b) Various publications of foreign governments or subsidiary Organizations.
(c) Technical and trade journals
(d) Books, magazines, and newspapers
(e) Reports and publications of various associations
(f) Reports prepared by research scholars
(g) Public records and statistics.

The sources of unpublished data are many:

(a) Unpublished biographies

(b) Trade associations

(c) Others Public/Private individuals and Organizations.

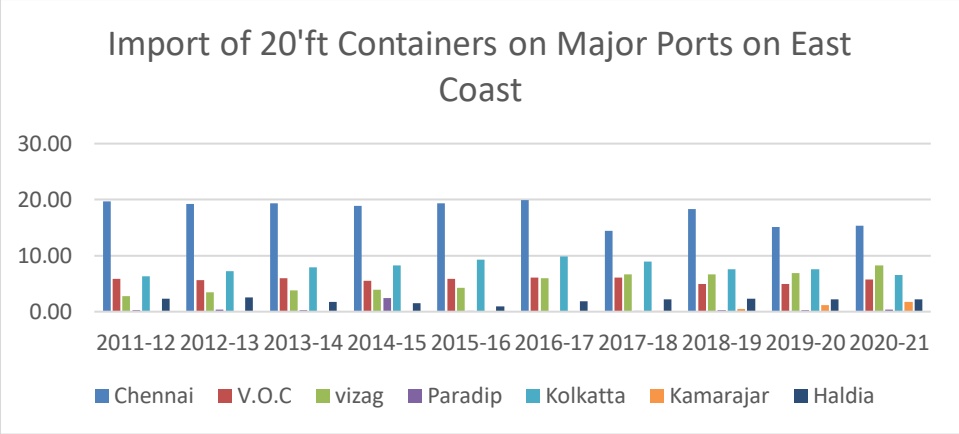
4.2 ANALYSIS AND INTERPRETATION

4.2. 1 Import of 20'ft Containers of Major Ports among East Coast

Years	Chennai	V.O.C	Vizag	Paradip	Kolkata	Kamarajar	Haldia
2011-12	360300	107281	49902	3795	116254	0	41272
2012-13	358189	104146	64046	6263	135624	0	47036
2013-14	342793	105633	66284	4323	139831	0	30519
2014-15	370422	108637	76521	47036	162466	0	28521
2015-16	369515	111421	81082	2474	177819	0	18983
2016-17	369013	112019	111334	837	182190	0	35175
2017-18	281304	118252	129089	3512	172810	2566	43511
2018-19	400785	108151	146168	6322	164690	10761	49616
2019-20	339423	109881	155182	5803	170868	24970	48543
2020-21	293864	108639	158692	7344	135639	36523	41377
2021-22	324988	112553	177311	5654	175181	26315	44060
2022-23	320702	113125	190671	5088	178702	29740	45079
2023-24	316416	113697	204032	4521	182222	33164	46098
2024-25	312130	114269	217392	3955	185743	36588	47117

[Source: Basic Port Statistics: 2011-2020]

Chart 1: Percentage of import of 20'ft containers of major ports on East coasthe t



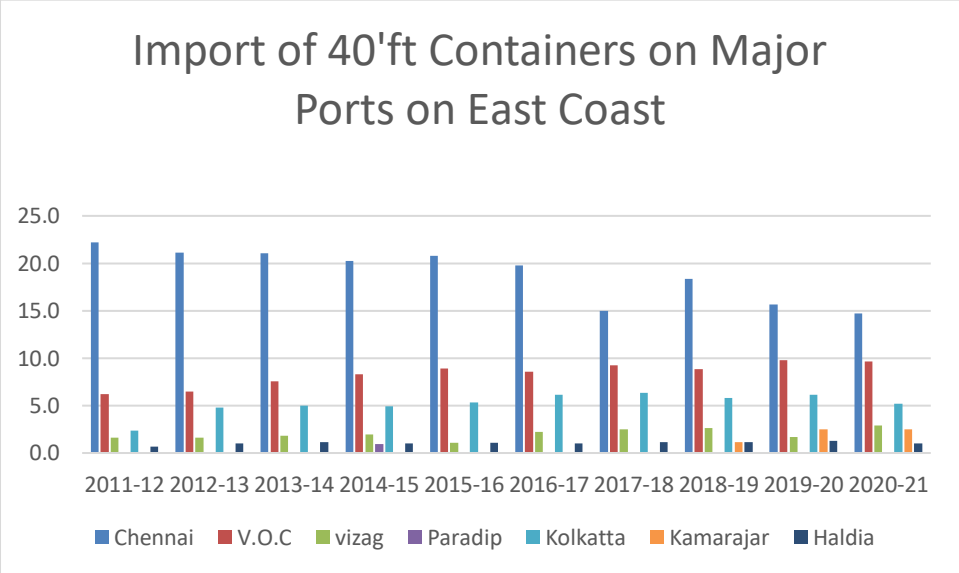
As we can see in this graph the percentage of annual growth of import of 20'ft containers among major ports on the east coast, the Kamarajar port tops the list with 94.23% of growth rate. Other ports, like V.O.C-(0.13%), Kolkata-(1.55%), Chennai-(2.02%), and Haldia-(0.03%) hold an average growth and import of 20'ft containers on Vizag Port hold comparatively stable growth among other major ports onthe East Coast of India.

4.2.2 Import of 20'ft Containers of Major Ports among East Coast

Years	Chennai	V.O.C	Vizag	Paradip	Kolkatta	Kamarajar	Haldia
2011-12	221697	62088	16453	0	23274	0	6368
2012-13	212228	64976	15920	0	48391	0	10380
2013-14	202568	72703	17195	130	48391	0	11088
2014-15	218699	89933	21219	10380	53503	0	11096
2015-16	232352	99384	12062	0	59986	0	12052
2016-17	235268	102020	26749	0	72642	0	11621
2017-18	186114	115013	30907	0	78728	56	14410
2018-19	260092	125284	37285	0	82458	15780	16279
2019-20	215124	134902	23417	0	84942	34596	17540
2020-21	195366	128520	38297	109	68889	33568	13396
2021-22	217153	147087	37060	35	92956	29178	17384
2022-23	217008	155743	39443	-152	98562	32956	18286
2023-24	216863	164398	41827	-339	104168	36734	19188
2024-25	216718	173054	44210	-525	109775	40512	20090

[Source: Basic Port Statistics: 2011-2020]

Chart 2: Percentage of Import of 40’ft containers of Major ports on the East coast



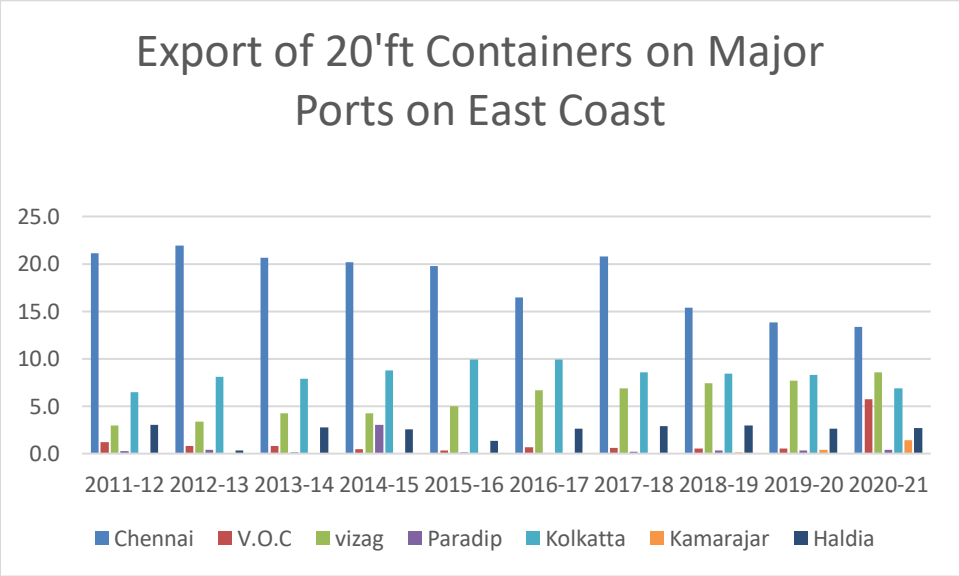
It is understood from the above graph that the growth rate of Chennai port has got gradual decrease from (2011-12) to (2020-21) at a rate of -1.26%, other ports like V.O.C, Vizag and Haldia hold comparatively stable growth and Kolkata port showed a gradual rise with the rate of 11.46% and then comes the Kamarajar port which registered a pinnacle of 394.81% within the four years of initiation of container terminals.

4.2.3 Export of 20’ft Containers of Major Ports among East Coast

Years	Chennai	V.O.C	Vizag	Paradip	Kolkatta	Kamarajar	Haldia
2011-12	344255	19976	48273	4058	105525	0	49450
2012-13	351312	13222	53666	6809	130100	0	5224
2013-14	327384	12799	67029	2291	124431	0	43313
2014-15	344840	7572	73108	52244	149666	0	43313
2015-16	328155	5033	82887	2499	164432	0	22661
2016-17	284284	11250	114676	1076	171102	0	45617
2017-18	387315	11250	128179	3325	159837	0	53729
2018-19	293010	10050	141701	6187	160459	3054	56895
2019-20	272458	9957	151353	6187	163673	7860	51110
2020-21	254381	109512	163171	8249	131447	27134	51616
2021-22	270434	47278	178679	6115	168922	14288	57720
2022-23	261651	52044	192548	5537	173077	16194	60525
2023-24	252868	56811	206416	4959	177232	18100	63330
2024-25	244086	61577	220284	4381	181388	20006	66135

[Source: Basic Port Statistics: 2011-2020]

Chart 3: Percentage of Export of 20’ft containers of Major ports on the East coast



As we can observe from the above chart that the export of 20’ft containers at major ports on the east coast like Tuticorin port has a cumulative growth of 18.55% then comes the Paradip port with the growth rate of 7.35% and Chennai, Kolkata port shares the growth of 2.98% and

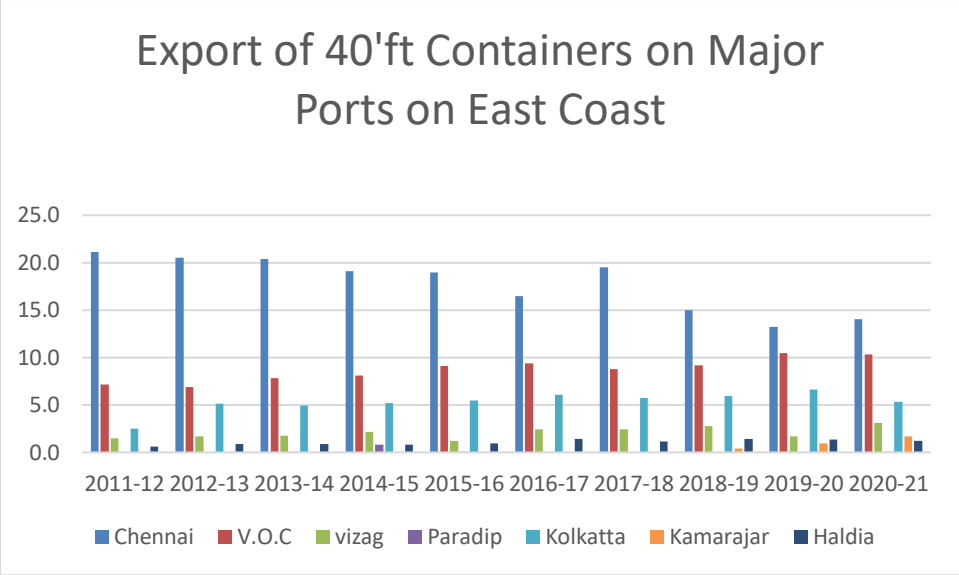
2.22%, Haldia holds comparatively equal growth rate from the beginning of 2011-12 to 2020-21 and at the end kamarajar port leads in the export with the growth of 107.12%.

4.2.4 Export of 40'ft Containers of Major Ports among East Coast

Years	Chennai	V.O.C	Vizag	Paradip	Kolkatta	Kamarajar	Haldia
2011-12	203536	68924	14341	0	24304	0	5906
2012-13	202659	67858	16734	0	50353	0	8587
2013-14	196271	75620	17071	20	47577	0	8356
2014-15	199444	84151	22493	8587	54514	0	8356
2015-16	201378	96923	13047	5	57763	0	9697
2016-17	185499	105527	27215	0	68636	0	15897
2017-18	254305	114014	32054	0	75040	0	14984
2018-19	202939	124263	37287	0	80742	5837	19432
2019-20	170921	135261	21751	0	85507	12186	17295
2020-21	175574	129473	38510	4	66512	21446	14947
2021-22	189527	145474	37269	1	89902	14197	19805
2022-23	187758	153705	39673	-156	95140	16061	21162
2023-24	185990	161936	42076	-312	100378	17924	22518
2024-25	184222	170168	44480	-469	105616	19788	23874

[Source: Basic Port Statistics: 2011-2020]

Chart 4: Percentage of Export of 40'ft containers of Major ports on East coast



From the given the graph and table above, we could see that the growth rate of 40'ft container export at Chennai port is on a gradual decrease with (-1.47%), then comes Vizag, Kolkata port with an equal growth rate of 10.38% and 10.50%. Fourth comes Haldia port with 9.73% and V.O.C port with 6.51%. Paradip port shows a 0% of growth rate and again Kamarajar Port holdsa 54.31% of growth rate within three years of the period.

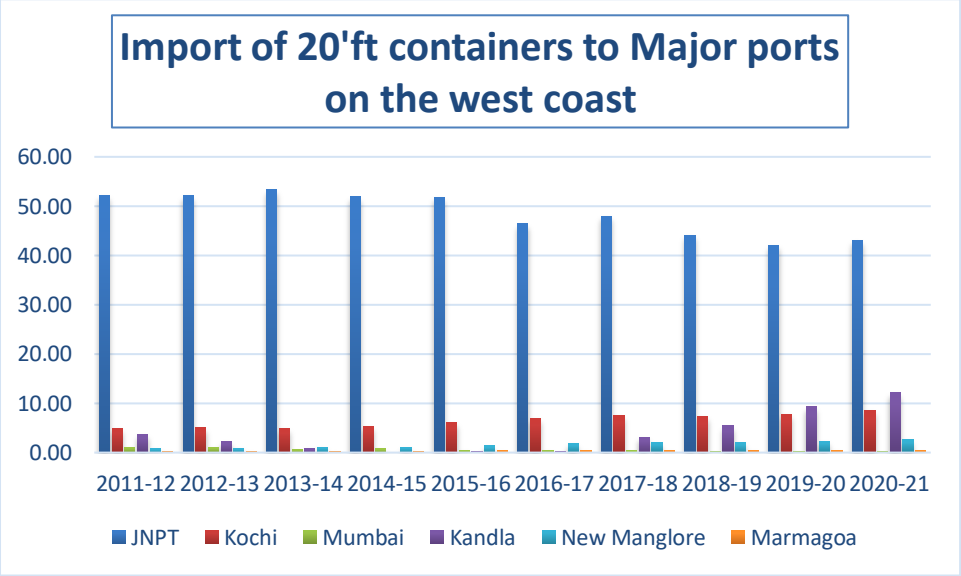
4.2.5. Import of 20'ft containers to Major ports on the west coast

Years	JNPT	Kochi	Mumbai	Kandla	New Mangalore	Marmagoa
2011-12	953678	90825	18860	66891	14795	5829
2012-13	973182	94067	19161	40942	16323	5236
2013-14	944429	87190	10806	13782	19769	4621
2014-15	1016305	105394	14845	0	21328	6108
2015-16	987563	116793	8983	1137	25706	7078
2016-17	860303	128788	9605	2212	33691	7607
2017-18	931554	147524	6606	58731	40380	8616
2018-19	963442	160053	2602	117827	43746	10249
2019-20	942624	173820	1520	208496	51789	9717
2020-21	820662	174392	834	231821	49827	6312
2021-22	882791	188320	-2312	186009	56688	9534
2022-23	872503	199309	-4439	206340	61225	9970
2023-24	862215	210297	-6565	226672	65762	10406

2024-25	851927	221285	-8691	247004	70298	10842

[Source: Basic Port Statistics: 2011-2020]

Chart 5: Percentage of Import of 20'ft containers of Major ports on the West coast



From the above graph, we could decode that starting the financial year of 2011-12 up to 2020-21 the growth rate of import of 20'ft containers in JNPT is on the negative side with (-1.49%) and Kandla port possesses comparatively higher performance with 13.23%, then New

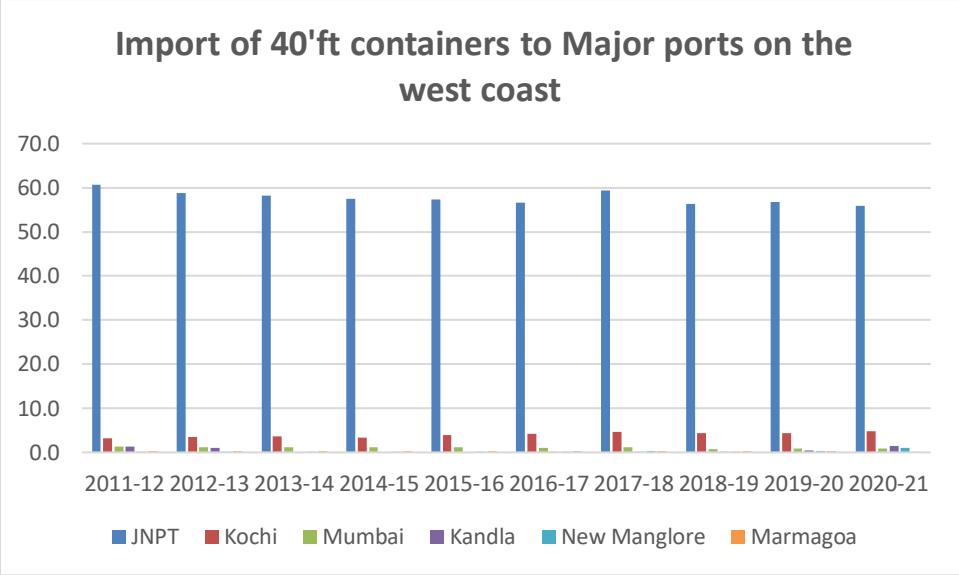
Mangalore port slightly equals the growth rate with 12.91% and Kochi port with 6.74% of growth. Marmagoa with some uneven growth of 0.80% and last comes the Mumbai port accounts the biggest downfall with (-26.74%).

4.2.6 Import of 40'ft containers to Major ports on the west coast

Years	JNPT	Kochi	Mumbai	Kandla	Mangalore	Marmagoa
2011-12	605882	32241	13146	12634	1851	2692
2012-13	590814	35445	11574	10644	1657	2670
2013-14	560274	35664	11260	0	1159	2732
2014-15	620886	36567	13306	0	2059	3355
2015-16	641822	43499	12380	0	2001	3269
2016-17	672443	49809	12393	30	2571	3653
2017-18	739706	57166	14701	830	3261	3872
2018-19	799383	60952	11175	2239	3092	4433
2019-20	781603	59406	12164	6751	3104	3438
2020-21	741977	63373	11552	18521	13095	2489
2021-22	813579	68828	12150	6480	7557	3727
2022-23	838688	72721	12111	6719	8316	3811
2023-24	863797	76615	12072	6958	9074	3896
2024-25	888906	80509	12033	7197	9833	3981

[Source: Basic Port Statistics: 2011-2020]

Chart 6: Percentage of Import of 40’ft containers of Major pothe rts on West coast



As plotted in the graph New Mangalore port tops among all the ports on the west coast with the growth rate of 21.61% from 2011-12 up to 2020-21. Then, the Kochi port and Kandla port reached a positive growth rate of 6.99% and 3.09% respectively, and JNPT also with some positive growth at 2.05%. Surprisingly Marmagoa holds the position of -0.78%.

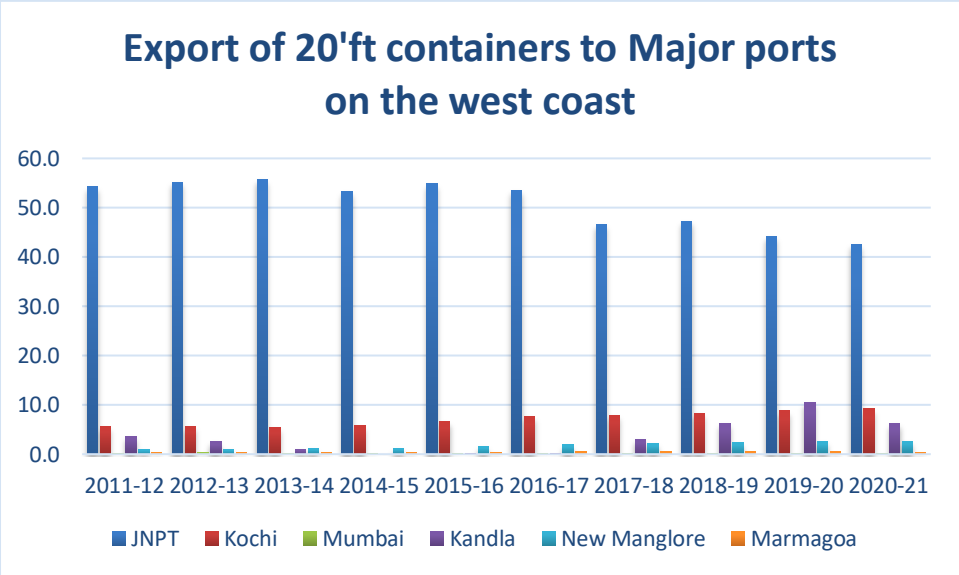
4.2.7 Export of 20'ft containers to Major ports on the west coast

Years	JNPT	Kochi	Mumbai	Kandla	Mangalore	Marmagoa
2011-12	885288	92053	1153	59950	15314	5542
2012-13	884844	91327	5008	40113	16460	4887
2013-14	881005	85387	695	15684	19027	4169
2014-15	911335	98019	2101	0	20960	5696
2015-16	910197	110268	415	2026	25437	6101
2016-17	921680	130935	123	2896	33130	8071
2017-18	870251	147465	212	54828	39732	8578
2018-19	899278	158277	99	117634	45077	9946

2019-20	868361	173266	174	206395	50204	8937
2020-21	811612	175057	2	117634	49162	6253
2021-22	857756	188008	-773	140324	55954	9293
2022-23	852915	199244	-1095	154616	60409	9743
2023-24	848073	210481	-1417	168908	64864	10193
2024-25	843231	221718	-1739	183201	69319	10643

[Source: Basic Port Statistics: 2011-2020]

Chart 7: Percentage of Export of 20’ft containers of Major ports on the West coast



From the financial year (2011-12) up to (2020-21) the average growth rate of 20’ft export containers in Mumbai port has seen a significant downfall with (-47.04%) then Kandla port registered stable growth among the major ports in the west coast with (6.97%) and comes and new Mangalore with the high growth rate of 12.37%, Kochi and Marmagoa performed securely with 6.64% and 1.21% and then comes JNPT with -0.87%.

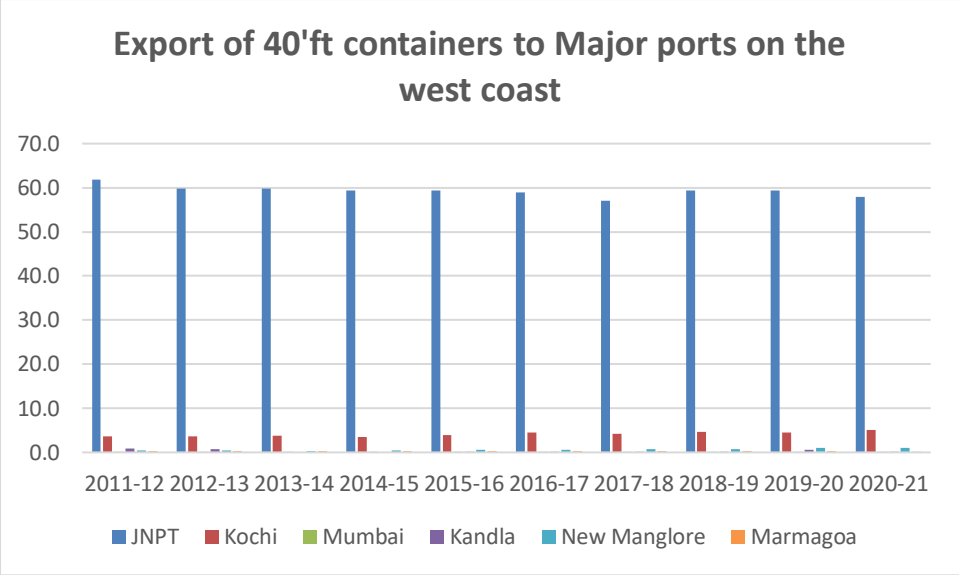
4.2.8 Export of 40'ft containers to Major ports on the west coast

Years	**JNPT**	**Kochi**	**Mumbai**	**Kandla**	**New Manglore**	**Marmagoa**

2011-12	596252	35291	688	7795	3576	2626
2012-13	590882	35615	727	7812	3904	2484
2013-14	574665	36146	395	0	2921	2461
2014-15	619794	36411	960	0	5059	3000
2015-16	629436	42226	408	2	6087	2911
2016-17	664403	50124	278	7	7000	3324
2017-18	744715	55565	103	967	8623	3533
2018-19	803986	62100	55	1887	10822	4007
2019-20	767439	58990	57	6682	12550	3133
2020-21	725691	63106	20	1884	12633	2250
2021-22	803632	67860	-134	1078	13756	3336
2022-23	827615	71552	-226	782	14926	3402
2023-24	851598	75243	-317	487	16097	3468
2024-25	875581	78935	-409	191	17267	3534

[Source: Basic Port Statistics: 2011-2020]

Chart 8: Percentage of Export of 40’ft containers of Major ports on West coast



The growth rate of 40'ft container export from (2011-12) to (2020-21) of Mumbai port has declined to (-29.80%), Kandla port registers with the negative growth rate of (-13.24%) and Marmagoa port comes with little minimum growth rate of (-1.53%), then JNPT maintains a stable growth over the years of 1.98% of growth rate and same like Kochi port with 5.98% of growth rate and last comes New Mangalore port with a maximum amount of growth rate among all the other Major ports in Western coast with the rate of 13.45%.

CHAPTER-5

CONCLUSION

5.1 FINDINGS

Among all the Major ports in the east coastal region, Kamarajar port shows anexorbitant growth level in terms of both Import and Export of 20'ft and 40'ft containers within four years of time from 2017 handled (2678 import containers), (103659 containers) on 2020 and Export containers handled was (14728) on 2018 and reached 70026 on 2020 and the projected rate of growth of container handling would be 36588.

Vishakhapatnam port holds an healthy growth both in terms of Import and Export of 20'ft and 40'ft containers with number of (164832) in 2011 to (235286) on 2020 of Import containers and in terms of export containers handled (169106) on 2011 up to (240191) on 2020 at the CAGR of 21%.

Kolkata port sticks at the third position with the CAGR of 13.01% of Import and 12.72% of Export. In spite of congestion they have managed to attain a positive growth with (162802) of Import containers in 2011 to (273407) in 2020 and handled (29215) number of export containers in 2011 up to (264471) in 2020.

Fourth comes in the list is V.O.C port with 7.55% of CAGR in Import and 23.05% in Export. Handled around (231457) import containers in 2011 and reached up to (365679) on 2020 and (245639) Export containers were handled in 2011 and attained growth of (368458) containers in 2020.

Haldia port comes next with 7.75% of CAGR over ten years in terms of Import of containers and holds 11.13% growth in terms of Export containers.

Then, comes the Paradip port which only handles 20'ft containers and reached 6.82% of growth in terms of import and 7.35% in Export.

Chennai port in present days have not getting enough traffic in terms of container handling. As we compare the Import of 20'ft and 40'ft containers in 2011 was (803694) which is reached up to (684596) at 2020 and handled (751327) of export containers in 2011 to a huge

decline of (386458) number of containers in 2020. The projected trend will be (248671) by 2025.

Coming to the Major ports among west coast of India, New Mangalore port holds higher growth rate of 24.51% of Import containers and with 26.18% of growth on Export containers and is expected to reach 35.53% of overall growth by 2025.

Kandla port attains positive growth rate in terms of Import of 20'ft and 40'ft containers with13.23% and 3.09% respectively. In terms of export 20'ft containers reached positive growth of 6.97% and 40'ft containers export came down to the level of -13.24%.

Third comes the Kochi port trust with a stable growth of Import 13.64% and Export 12.54% over the past ten years from 2011-2020. Number of import containers handled by Kochi port was (155307) 0n 2011 and (301667) on 2020. Export containers handled was (162635) on 2011 and (201369) on 2020.

Even though JNPTholds positive growth rate among Import and Export of 40'ft containers with 2.05% and 1.98%, the Import and Export of 20'ft containers declined about -0.87% and -1.49% respectively.

Marmagoa port maintains a stable growth rate in import and export of 20'ft containers with 0.80% and 1.21%. But, the performance of 40'ft containers is on the path of decline with -0.78% of import and -1.53% of export.

Mumbai port which is said to be a gateway of India has an immersive negative growth rate of both the import and export of 20'ft and 40'ft containers. They handled (45152) import containersin 2011 and declined to (25848) in 2020. In terms of export of 20'ft and 40'ft containers which were (2529) on 2011 and only (42) on 2020. The growth rate declined by about 28.02% in import of containers and 76.84% in terms of container export.

5.2 SUGGESTIONS

Container handling in India is predominantly East coast dominated. It has changed in the last decade. It is likely to be gets continued in the next decade.

Infrastructure bottlenecks, connectivity, and trade imbalance are hampering the growth of the number of containers handled and the capacity of the west coast.

The port Authority should award the leasing of container terminals to the private terminal operator with the contract of minimum guaranteed throughput of container traffic.

Future container infrastructure growth in India will be driven by the PPP model at policy as well as at the implementation level.

Setting up of SEZ (special economic zones) should be takenmore seriously as it can increase the container traffic to a significant level.
Growth of container handling has declined among some major ports like Mumbai port, and Chennai port as the capacity has been driven by non-major ports in the present decade.

5.3 CONCLUSION

The container traffic in India over recent years has led to considerable modifications in the form of terminals. Terminals have required change to meet these growing volumes of traffic and the new super container vessels were built to promote economies of scale provided by maritime transportation. Private players like Adani container terminal limited and DP world, PSA holds a reasonable amount of container traffic in comparison with major ports.

The project study on the container traffic among major ports has been completed and the conclusion for this, as per reference to the data collected and interpreted the container traffic growth has been projected upward with the help of forecasting techniques, but the traffic in major ports has been unevenly distributed.

For example, some major ports on the east coastline like Chennai port are getting a decline in container traffic, whereas Kamarajar port performs far better than any other ports in this region. Some ports need infrastructural development in order to accommodate more containers. Overall the efficiency of ports should be improved by implementing modern digital technologies, and port-centric logistics and CRM.

5.4 DIRECTION FOR FUTURE RESEARCH

This study here is only a bit of an iceberg. It is based on Basic port statistics published by the

Transport Research Wing of the Ministry of Port, Shipping, and waterways, here the study can be more elaborated by using the first hand data's like average turnaround time, infrastructural development of the port and list of equipment's handled by the Major ports in India could bring on a better outcome for the research.

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