A STUDY ON THE IMPACT OF PORT EFFICIENCY ON INDIAN ECONOMY-WITH SPECIAL REFERENCE TO INDIAN MAJOR PORTS

PROJECT REPORT

Submitted to the School of Maritime Management,

Indian Maritime University, in partial fulfilment of the requirements for the award of degree of "Master of Business Administration" in International Transportation and Logistics Management

By

SIBIN ANAND

(Reg no: 1905305032)

Under the supervision of

Dr. Yogamala H.L.

(Assistant Professor, School of Maritime Management,

Indian Maritime University, Cochin**)**

SCHOOL OF MARITIME MANAGEMENT

INDIAN MARITIME UNIVERSITY, COCHIN

(*A Central University, Government of India*)

SCHOOL OF MARITIME MANAGEMENT

INDIAN MARITIME UNIVERSITY

(*A central university, Government of India*)

CERTIFICATE

This is to certify that project report entitled **"A Study On The Impact Of Port Efficiency On Indian Economy-With Special Reference To Indian Major Ports"** submitted to the School of Maritime Management, Indian Maritime University in partial fulfilment of the requirement for the award of the degree, MBA in International Transportation and Logistics Management is bonafide work of **Sibin Anand** under my supervision. I certify further that to the best of my knowledge, the work reported herein does not form part of any project or dissertation on the basis of which a degree/diploma or award was conferred on an earlier occasion on this or any other candidate.

Dr. Yogamala H.L.

(Assistant Professor, School of Maritime Management,

Indian Maritime University, Cochin)

DECLARATION

I, **SIBIN ANAND** (Reg no: **1905305032**) student of school of Maritime Management, **INDIAN MARITIME UNIVERSITY – KOCHI** hereby declares that this project titles "**A Study On The Impact Of Port Efficiency On Indian Economy-With Special Reference To Indian Major Ports"** submitted in partial fulfillment of requirement for the degree of "**Master of Business Administration in International Transportation and Logistics Management**" is my original work carried under the guidance of my project guide. It has not formed the basis for the award of any degree/diploma or associate ship of any University/Institution. The information submitted is true and original to the best of my knowledge.

DATE: 29/06/2020

PLACE: COCHIN **SIBIN ANAND**

ACKNOWLEDGEMENT

I wish to express my sincere gratitude to the Management of the **School of Maritime Management, Indian Maritime University – Kochi,** who has enhanced my knowledge in the field of International transportation and Logistics

Even though I have taken efforts in this project it, would have not been possible without the kind support and help of many individuals and organisations. I would like to express my sincere thanks to all of them.

I wish to express my sincere gratitude and take immense pleasure in thanking my **Mentor and Project Guide Dr. YOGAMALA H.L., Assistant Professor of School of Maritime Management,** for moral support, able guidance and useful suggestions which helped me in completing this project work in time. My sincere gratitude to **Dr. JAYAN P.A, HOD, MBA, School of Maritime Management** and other faculties of SMM.

I perceive this opportunity as a big milestone in my career development I will strive to use gained skills and knowledge in the best way possible, and I will continue to work on their improvement, in order to attain the desired career objectives. Hoping to continue cooperation with all of you in the future. I also thank my family and my friends for continuous support in completion of my project work.

SIBIN ANAND

TABLE OF CONTENT

LIST OF TABLES

LIST OF CHARTS

GLOSSARY

TEU	- Twenty-foot Equivalent Unit
MT	- Metric Tonne
PCS	- Port Community System
TRT	- Turn Round Time
PBD	- Pre-Berth Detention
IMF	- Indian Monetary Fund
GDP	- Gross Domestic Product
PPP	- Purchasing Power Parity

Chapter 1
Introduction

Introduction

The ports have always played an essential role in the growth of a country's national and international trade, which is now being challenged by globalisation, with consequences for the region's long-term economic development. Globalization, resulting from trade growth across continents, regions and countries, has caused the world' s maritime trade to expand with enormous consequences on ports. Increased rivalry between modes of transport and increasing capacity for better performance levels by unit of transport in ports, which primarily depend on the features, such as infrastructure, equipment, governance structure and logistical system integration. Ports have evolved into an intersecting node in logistic chains, where goods perform additional operations to take advantage of proximity or their stay in transit to other locations. These factors have an impact on their efficiency and performance, and they can give worldwide competitive advantages.

The ports are the major industrial and trade tools for countries' economic and social growth. In the port sector, new restrictions and development in the fields of economic, institutional, technological, environmental, maritime transport, are affected by socio-economic change characterised by developing demands in individual countries through commitments by free-trade countries and new contexts of globalisation. The seaports were thus constantly willing to shift

socioeconomic trends. These changes have produced a very unpredictable and complicated port environment, which has altered the port idea fundamentally.

In terms of economic and regional balanced growth and also having a major impact on national integration in the global economic market, the transport industry is a powerful component. India has a strong sea-wide trading history. In coastal locations, ports represent a significant economic activity. The larger the year-on-year volume of products and passengers, the greater the need for infrastructure, supplies and services. This will benefit the economy and the country in various degrees. For supporting the economic activity in the hinterland, ports are particularly significant since they serve as a vital link between maritime and land transit. . Port efficiency is the current form of international commerce, since the seaport is the nerve centre of a country's external trade. Seaports must be the obligatory transit point of the bulk of the commerce, allowing the imports, in adequate quantities, of products that the nation itself produces and the export of things that contribute to the growth of its economy. In addition, a port provides additional service that provides added value for carried items and therefore aids the growing demand for trade. Therefore, port operations contribute not only to a nation's economic independence but also to political independence, and play a key role in international commerce. Ports have not just an economic but also a social function as a source of jobs. Seaways are the cheapest and most efficient transport system in terms of loads transported in comparison with other systems.

Industries demand safe and cost-effective ways for the export and import of finished commodities. The global economy has led to an enormous growth in the worldwide trade of products. As shipping costs have declined as a result of introducing scale and developing technologies in shipping, world trade is also accelerating. Ports in each country will no sure continue to play a crucial and essential role in coping with ever-growing world trade. The bulk of the world's industries are thus concentrated around the major ports on the coast. In turn, these industries affect the lives of their employees and indirect beneficiaries.

Indian economy and Indian ports

India's development of port infrastructure is highly important and essential in order to enhance the volume of exports via maritime trade. Exports are a significant and key component of GDP, a measure of India's economic progress. Exports currently make about 25% of GDP (gross domestic products) and it is provisionally projected that by 2020 they will reach a level of $500 billion. As 90 percent of export goods goes by water, the port infrastructure must be constructed properly. The Indian cargo traffic has risen considerably. In 2014-15, 581,34 million tonnes of cargo handled by main Indian ports, 28 times as many as 1950-1951. The study evaluates cargo traffic increase over the selected 1994-95 period up to 2014-2015 and also examines the effect on cargo traffic handled by ports of selection in India of economic development indicators. The study includes a

temporal trend analysis of the cargo transportation handled by chosen 13 ports throughout the specified period in order to measure the growth of cargo traffic.

Port development

Bird's (1980) Anyport model, which describes how port infrastructures grow across time and space, is one of the most commonly accepted conceptual viewpoints on port development. Port growth has resulted from increasing marine technology and advances in cargo handling, beginning with the first port location with modest lateral quays near to the town centre. This is also reflected in shifting physical connections between the port and the urban centre, as ports are developed further from the major business area. In later stages, increased cargo handling specialisation, expanding ship sizes, and ever-increasing demands for cargo-handling and storage space result in port activity being concentrated at places far distant from the earliest facilities. As a result, initial port locations, which were frequently positioned near to urban districts, became outdated and were abandoned. Numerous options for repurposing port infrastructure (waterfront parks, residences, and commercial enterprises) were developed.

Anyport identifies three main phases in the port development process: setup, growth, and specialisation. The three phases accurately represent port development processes, particularly in big conventional ports. The model continues to provide a credible explanation for port development. However, the

model has several shortcomings when it comes to understanding modern port development. For starters, it fails to explain the recent expansion of seaport terminals, which serve largely as transhipment hubs in huge maritime hub-and-spoke and collection and distribution networks. Changes in vessel size, liner service schedules, and liner shipping structure have resulted from increased cargo availability. Carriers and coalitions have restructured their liner shipping networks by introducing new end-to-end services, round-the-world services, and pendulum services, particularly on the major east-west trade lanes. As a result, a new breed of terminals has arisen along the east-west shipping routes, at unexpected locations far from the nearby hinterland that formerly governed port selection. These locations have been chosen to service continents and for transhipment at trade lane crossing places. They rely substantially, sometimes entirely, on traffic flows created by the interaction of far separated locales and promoted by port end route position or intermediary. The Bird model does not offer a foundation for explaining the rise of hub terminals at offshore or island sites with minimal or no local hinterlands.

Second, the Bird model does not take the inland dimension into account as a driving force in port growth dynamics. This study suggests a new phase of port development, with greater linkages to the hinterland, as well as intermediary/transshipment ports with stronger links to the foreland. Although these two roles are not mutually incompatible, it appears that ports are

specialising in one function owing to geographical reasons such as proximity and intermediation to production and consumption. Regionalization broadens the port's hinterland reach through a variety of market tactics and regulations that connect it more closely to inland freight distribution locations.

Objectives

- To know what is port efficiency.
- To evaluate the impact of any improvement of port efficiency on the Indian economy.
- To identify how port efficiency is affecting Indian economy- negatively or positively.
- To know did the pandemic situation affects the port efficiency and Indian economy.

Scope and Coverage

The scope of the study is to study how the port efficiency impacts Indian economy, and knowing the sectors which are to be affected and the beneficial role of port efficiency in the economy.

Research Methods

Research is the search process for knowledge. The search for relevant information or a certain subject may be characterised as scientific and systematic findings. It is a systematic and in-depth research or search procedure based on the collecting, computation, presentation and interpretation of all pertinent facts, subject or field of inquiry. The study helps in gaining knowledge in the field of impact of port efficiency on Indian economy and gaining a deeper understanding in this field of study.

Sources of Data Collection

- **Secondary Data**

  Secondary data for this study are collected from:

  - Journals
  - Articles
  - Research reports
  - Websites Etc…

Limitation of the Study

- The primary data is not able be collected due to this pandemic situation.
- Lack of data and resources, because the data is only collected through secondary data.

Chapterisation

Chapter 1: Introduction

Chapter 2: Review of Literature

Chapter 3: Industry Profile

Chapter 4: Data Analysis and Interpretation

Chapter 5: Conclusion

Chapter 6: Bibliography

Chapter 2
Review of Literature

Review of Related Literature

Ximena Clark, David Dollar, Alejandro Micco – 2004 in his study "Port Efficiency, maritime transport costs, and bilateral trade" focused transport expenses are a larger barrier to US markets than import taxes for most Latin American countries. With more than 300,000 observations annually on shipments of the six-digit Harmonized System (HS) aggregated items from various ports across the globe, the shipping cost drivers in America are investigated. Distance, quantities and properties of the product are important. Furthermore, port efficiency is a key factor in shipping prices. Improving port effectiveness by 12 percent, from 25th to 75th percentile. Bad ports are 60 percent further away from the typical country's markets. Inefficient ports significantly raise expenses of handling, which are one of the shipping costs components. Factors that explain variances in port efficiency, however, include excessive regulation, organised crime predominance and overall state of infrastructure in the country. Reductions from 25 to 75 percentiles in the country's inefficiencies related with transport costs included a rise of around 25 percent in bilateral trade.

Yen-Chun Jim Wu, Mark Goh – 2010 on his study "Container port efficiency in emerging and more advanced market" focused on the efficiency of container ports in sophisticated markets or comparisons in areas has usually quantified. This research compares the effectiveness of port operations (BRIC and Next-11)

in developing markets with the more sophisticated ones (G7). The container ports based on the import and export cargo quantities in 2005 are evaluated using data enrichment technique. Our findings imply that no advanced ports are role models in the sector. This study represents a first step towards understanding port efficiency in emerging markets.

Peter Gripaios & Rose Gripaios – 2006 on his study "The impact of a port on its local economy: case of Plymouth" focused on two potentially essential papers that might be a key instrument for regional economic growth in regions like South West England through the development of ports. In this essay, we analyse this proposal by examining in depth the instance of Plymouth, one of the regions in which port development was proposed. The findings show that the present and future significance of ports in the development process might be easily overestimated using Plymouth evidence. Plymouth evidence. Ports are not large workers and no longer the interrelated industrial complexes they were were. Consequently, they service industry in places far from their own in most situations.

Khalid Bichou – 2011 on his article "Assessing the impact of procedural security on container port efficiency" is focused on no attempt was made to yet to empirically examine the ex-post impact of the security regulation on the operational efficiency of seaports and terminals on the expanding study into container-port safety rules. This study seeks an empirical evaluation and analysis of the procedural influence on the operational efficiency of container terminals arising from the needs of port security regulation. A step-by-step Malmquist Data Envelopment Analysis method uses a multi-year and regulatory approach in order to track productivity changes at 420 container terminal decision-making units from 2002 to 2008. Analyses of the impact of safety on operational efficiency show that this variable is significantly different from type of regulation and terminal, but there is strong evidence of widespread productivity gains from targeted pre-screening and reporting inspections and technological advances in new security technology investment.

Vitor Caldeirinha, J. Augusto Felicio, Antonia Sena Salvador, Joao Nabais, Tiago Pinho – 2020 "The impact of port community systems characteristics on performance" this study is to evaluate the impact on port performance of the port community system (PCS). The main component analysis approaches and structural equation modelling are used for 153 valid sample answers gathered by

port community specialists from the Portuguese port. The results show and measure the parameters that distinguish the PCS and influence port performance. The feature PCS, comprising levels of service, the network of partners, ship services, freight services and services, has an impact on port performance, defined as operational performance, efficiency. The major contribution of the work is to demonstrate the processes that enable ports to modify and develop the PCS features and to produce new features that impact port performance.

Leila Sujeta, Valentinaa Navickas – 2014 "Impact of port logistics system on a countries competitiveness (case of small countries)" The objective of the study is to analyse the influence of port logistics systems in small nations with the intention of increasing their competitive edge through the idea of port centric logistics systems.

Meiling Liu – 2020 "Research on port infrastructure, port efficiency and urban trade" As science and technology progresses and productivity continues to evolve, economic globalisation and regional economic groups are irreversible developments. An essential guarantee for the sustained and quick development of the regional economy is the interactive development of port infrastructure and of the city economy. Improving port facilities like as cargo volume, births count and terminal length can encourage the growth of commerce. In today's worldwide

trade, port efficiency is specific. We cannot, after all, envision the long future if we believe port efficiency is not particular to world commerce or if we do not have a far-sighted projection of world trade. The competitiveness of port logistics evolved from cost difference to service difference with the expansion of the port economy. This study analyses the link of foreign commerce with port infrastructure level and port efficiency in the coastal towns of China in an attempt to determine the variables that all sectors in the past have overlooked yet play an essential role in trade development.

Gabriel Figueiredo De Oliveria, Oierre Cariou – 2015 The pressure from the competitive environment may lead to increased efficiencies in a port susceptible to strong inter-port rivalry. On the contrary, an over-investment of a port subject to strong competition may result in a decrease in efficiency. This Article explores this problem and studies the effects on efficiency on a container port on the level of competition assessed at several levels (local, regional and worldwide). We use the Parametric Bootstrapping Model to create a shortened regression. A model applied to the information obtained for 200 container ports in 2007 and 2010 leads to: port efficiency declines with competition in a range of 400-800 km (regional level) while competition in a local (less than 300 km) or global (more than 800 km) range does not have any important impact. Estimates also suggest an overall

decline in efficiency rates for ports which invested from 2007 to 2010 might be explained by the time lag between investment and future possible rise in container performance.

Xufan Zhang, Michael Roe – 2019 “Port competition” focused determinants of competitiveness, including port selection, port efficiency, port service and other relevant problems will be presented and debated on port competition and different competitiveness matters. In addition, shipping is essential to world trade, which is impacted by political activity. The shipping sector is closely impacted by the political economy that is regarded as providing the basis for and interpretation of this abduction research.

Rui Liang, Ziyang Liu – 2020 “Port Infrastructure Connectivity, Logistics Performance and Seaborne Trade on Economic Growth: An Empirical Analysis on “The goal of this study is to investigate the influence of port infrastructure linkage, logistics performance and commerce on economic growth. 21st Century Maritime Silk Road." This research uses the Structural Equation Model to carry out empirical analysis on the basis of the World Bank indicator data from 32 nations in the 21st-century Maritime Silk Road. The major findings are: (1)

Improved logistics performance and economic growth can increase the port infrastructure connection, but improving logistical performance has no substantial influence on economic growth. . However, logistic performance has an active role as an intermediate in connectivity to port infrastructure, promoting economic growth; (2) improvement in the logistics capacity can promote trade in the seaborne sector, whereas the connectivity of port infrastructure is negative to trade in the maritime sector due to low port efficiency. The development of logistics performance therefore plays a twofold function in boosting commerce. (3) Connectivity and logistics in port infrastructure concurrently develop and foster each other as a synergy to promote trade and economic progress.

Tsung-Chen Lee, Paul Tae-Woo Lee – "Economic impact analysis of port development" focused on Due to their essential position in a number of supply chains and distribution routes in relation to international commodities trade, ports are typically regarded as public and/or social infrastructure. In this sense, their values are appraised from a regional or national development viewpoint. In a country with less mature port systems, development of ports in relation to national economic security and basic infrastructure of the nation's economy should not be considered by commercial bodies required to recover the full costs of users, as suggested by Lee et al. (2008) and by Bennathan and Walters (1979).

Pompillu Golea - 2011 “The strategical management of port competition” This research highlights the major characteristics that throughout the previous two centuries have affected the development of the competitive port scene. The final results of the study indicate that port efficiency is significantly enhanced in the majority of situations, by improving the quality of connected port services and by fostering competition amongst important port companies. In this respect the characteristics of the shipping industry (mainly connected by the great flexibility and promiscuity of businesses due only to international service characteristics) impose the implementation in public-private relation of competing marketing strategies based on the ground rules of free market economy.

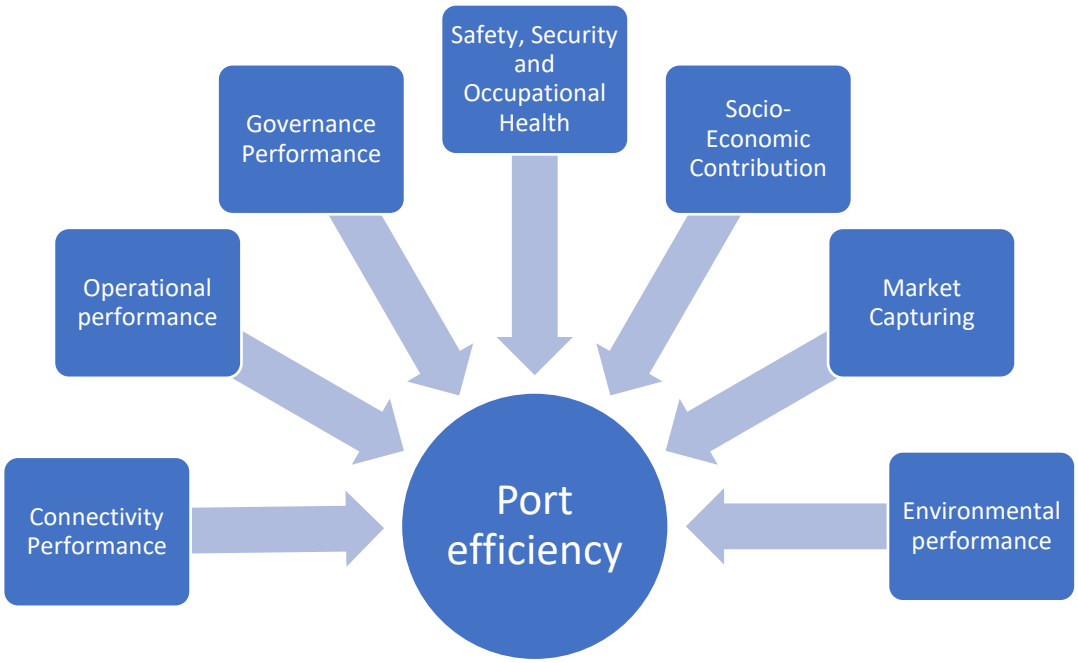
Chapter 3
Industry Profile

Port efficiency

Port efficiency is a multidimensional term that relates to operational performance, namely the maximising of generated output or the creation of a given output with restricted resources. It has developed to incorporate new elements of port performance. Efficiency is often used to describe port operating performance and the maximum of generated output with given resources or the creation of a given output with restricted potential resources.

Port efficiency is one of three components of port performance, along with effectiveness and resilience. Productivity is the emphasis of operational performance indicators, which relate to the physical quantities of goods, the amounts of effort exerted, the volume or scope of operations, and the efficiency in changing resources into some output (or service). Berth occupancy, revenue per tonne of cargo, capital equipment investment per tonne of cargo, turnaround time, and the number of gangs engaged to support cargo operations are conventional indicators used to assess terminal operations efficiency (productivity). Such efficiency indicators range from marine operations to terminal and hinterland operations along a performance continuum. This performance is too essential to be assessed at the terminal level since the facilitation of goods arrival, residing, and departing the terminal via various bundle services is a critical function in integrated transportation chains. Efficiency performance is also assessed at the port level. On the one hand, the

performance of various terminals may differ. On the other side, it is not unusual for users to pick the port first, followed by the terminal in the following phase.



This list of measures used to assess port and terminal efficiency is growing, as port performance becomes more multidimensional. Performance measurements for efficiency-focused ports and terminals also compare financial, system-wide, and production and marketing activities to prior year performance and competition performance in order to meet efficiency goals. The financial performance of port companies (terminal operators and various port controlling bodies) as well as the effectiveness of the governance mechanism in place are critical. The list expands further, given the significance of integrating ports into supply chains and facing environmental sustainability challenges. Port

connectivity performance (in terms of capacity, prices, and congestion), as well as safety, security, and occupational health performance, are all part of a complete port performance measurement. The port's success in terms of market capture and its socio-economic impact are also two elements that define the essence of port presence.

Port efficiency is a key component in boosting port competitiveness and regional development. Seaports are dealing with increased challenges to modernise, and supply the latest technology with increasing international marine traffic and changing technology in the maritime transportation industries (containerized, integrated logistics services etc.). They are also compelled to enhance port efficiency to bring more traffic to comparative advantages. Some of the key challenges in ports include providing better handling of containers and goods, providing better and performant equipment, reducing berth times and delays, enabling large stowage capacity and ensuring multimodal connections to the countryside. The ports are responsible for ensuring safe transport and preventing diversion to nearby ports. Port efficiency advantages extend above and above traffic volume: because of its key location throughout the transportation chain, it has a direct and indirect impact on all connected operations, such as marine insurance, finance and logistics. They provide additional value and jobs that impact regional and urban growth prospects. Efficiency at the seaport is typically linked to productivity and performance; nevertheless, it focuses on limited,

operating technology measurement or overall sea port traffic levels which are not the sole indications. Additional elements relate to the more organisational aspects of production, including how inputs are efficiently utilised by ports to achieve current output levels, and whether ports use the most efficient technologies which are essential for port efficiency determination.

Port efficiency is somewhat dependent on the capital invested at ports (e.g., cranes and other loading and unloading equipment). However, the effectiveness of port operations and services like as pilotage, towing, tug assistance or cargo handling is equally important. Customs clearing regulations, which typically decrease port effectiveness and may even impact the schedule of port activities, also affect port efficiency. Moreover, the need for specific stevedoring licences, reducing the supply of this kind of labour and increasing expenses, favours port employees offering stevedoring services in many nations.

Port

A port is a coastal or shoreline area having one or more terminals, where ships may take people to or from the land and transfer them there. In order to optimise access to land and navigable water, port locations have been selected for commercial demand, wind and wave shelter. The ports might be artificial or natural. Artificial harbours have been purposely built by dragging breakwaters,

sea barriers, or jetties, and they need upkeep via continued regular dredging. In contrast, there are prominences of land around a natural port on many sides. The sailors on the eastern shore of India were aware of, and employed for nautical business by the Hippalus moonsoon winds in AD 45–47. Ports are a major part of the overall transport industry and are now related to a wide range of services, main being transit of products and persons. A variety of port services covered here (e.g., pilotage, tug and assistance services, emergency repairs, mooring and berthing services, etc.) and auxiliary or support services are also included in this sector (such as storage and warehousing, maritime cargo handling services, customs clearance services, etc.). Although several nations have opened certain subsidiary services to external service providers, such as storage and warehousing, custom clearing services are governed mostly by government rules. There is a wide range of operations in the port area: port infrastructure service, freight handling service, services offered in most ports by private businesses, and other services like as mooring, towage, etc. Each activity displays distinct characteristics and its own technology.

The primary function of a port is to efficiently and economically transfer, verify, store, change shape and regulate goods, both intramodally and intermodally. To this end, ships, barges and other transport vehicles that interface with the port must be adequately accommodated at the port. It should serve as an important element of a transport chain that moves cargo from source

to destination. The port should ideally enable freight handling for a continuous flow between land and water as well as for water-to-water modes of transit. Direct transfers that provide continuous freight flows may generally be carried only at or near a port that manage liquid or other bulk goods. Still though, the sporadic arrival of ships and the difference in hours-of-service lead to a flow interruption. The kind and number of shipments utilised for a particular trade are physically limited by ports; their freight handling and berth usage dictate the port time and thus the profitability of ships. Port efficiency, port capacity and utilised technology are therefore becoming ever more important in decision-making in shipping.

Major public ports of India

India is an active hub for global imports and exports as one of the largest peninsulas in the globe. With so many important ports in India that support India's expanding economy, companies from over the globe are looking more closely at India as a potentially global trading hub.

1. **Kandla Port**

Kandla Port was constructed as the first export processing port in India, 90 kilometres from the Gulf of Kutch in the Kandla Creek in the 1950s. It is the largest container port in India in terms of annual freight value and quantity. It is also recognised for its large profits for the export of grain and the import of oil, as it's the richest and busiest port. Today, oil, heavy equipment, salt, textiles and chemicals are all imports.

2. Paradip Port

In the district of Jagatsinghpur in Odisha, the Paradip Port is a natural, deep water port on the East Coast of India. It is near the confluence of the Bay of Bengal and the Mahanadi River.. It is located 210 kms south of Kolkata and 260 kms north of Visakhapatnam. The port is managed by the Paradip Port Trust (PPT), a fully owned independent company of the Government of India.

3. JNPT

The largest container port in the India, Jawaharlal Nehru Port, or JLN Port, sometimes referred to as the Nhava Sheva Port. This port in the Arab Sea is reached by Thane Creek, located east of Mumbai, in the district of Raigad in Navi Mumbai. This is Navi Mumbai's nodal city. The popular

name comes from the names of the villages of Nhava and Sheva located nearby. This port is also the western freight corridor terminus.

4. **Vizag Port**

The oldest shipyard in India is Vizag Port (or Visakhapatnam). The Bay of Bengal is one of the only natural ports. It was opened in 1933 and managed 1,2 million tonnes of cargo on its 24 berths per year, including maritime trade in iron ore, pellets, coal, aluminium and oil. It is a significant seaport. Plans for further port renovation are ongoing owing to continuous Indian government funding.

5. **Mumbai Port**

Mumbai Port is by size and shipping traffic the largest port in India. The Mumbai Port is situated in a natural port, west of Mumbai on the western coast of India. The water reaches depth of 10-12 m, making it easier for huge cargo ships to dock and pass through. Mumbai Port is a major hub for India's economy and commercial activities, which manages roughly 20 percent of India's international commerce. It is comprised of four jetties that handle many import and export operations, including crude oil, oil, liquid chemicals, textiles, manganese, tobacco, leather, and heavy equipment.

6. **Kolkata Port**

The Kolkata Port controls goods from South East asia and Australia, known as the Eastern Indian Gateway. Two dock systems have been used, Haldia docks and Kolkata docks. It is the most busy port of commerce for jute and a significant steel, iron, copper, leather, tea and coal exporter. Heavy equipment, paper, fertilisers, chemicals and crude oil are included in imports. It is a natural port on the river that can handle vessels with a length of up to 500 feet.

7. **Chennai Port**

Chennai port, also known as Madras port, is the second largest port in India and handles more than 100 million tonnes per annum of loads. It was built as the third port in India in 1881. The port of Chennai is located on the Bay of Bengal's coromandel coast. The port of Tamandu and the local economy are a major contribution. Chennai Port attracts a great many tourists every year because to its surrounded lighthouses, in addition to its lively freight and container ship activity.

8. **New Mangalore Port**

The new port of Mangalore at Panambur in Mangalore is administered and governed by the new trust in Mangalore in Karnataka. It is one of the largest harbours, the 7th biggest in the country, in Karnataka. The then Prime Minister of India, Indira Gandhi, opened it on 4 May 1974. The harbour, the west coast of India, lies in Panambur. It is located in the Arabian Sea north of the Phalguni River.

9. Tuticorin Port

The port of Tuticorin is an all-weather port with high quantities of international commerce. It features a 10-meter anchoring depth within an artificial port. Once the primary port for marine trade and perl fisheries was called as tuticorin. Salt, maize, cooking oil, gasoline and coal are the major imports and exports.

10. Cochin Port

Cochin Port is one of India and the Arabian Sea's fastest developing ports. It moves 11 million metric tonnes of imported products each year, nestled between the Islands of Willingdon and Vallarpadam. In particular, tea, coffee, spices, fertilisers and mineral oil are imported and expanded. It can readily handle ships of over 500 feet in longitude, with an anchor depth of about 14 metres and a cargo depth of almost nine metres.

11. Ennore Port

Ennore Port is responsible for huge amounts of coal, both by rail and by road, for transport by sea (over 16 million metric tonnes per year). There are proposals to develop the port with 3 new multifunctional berths and 5 container lodges. Unlike many Indian ports controlled by the government, the port is private. It is 16 metres deep and is a coastal barrier harbour with a rather modest port. The port of Ennore is situated on the Coromandel Riviera 24 kilometres from Chennai.

12. Mormugoa Port

Mormugao is a maritime port in South Goa, Goa State, India, the eponymous taluka. The harbour is deep and natural and is the main port of Goa. In 1917, 31 villages from Salcete were established to create Mormugao taluka (subdistrict), and its headquarters were Mormugao harbour. The other thirty-five communities have been preserved in Salcete and comprise the current Salcete taluka with the seat in Margao.

13. Port Blair Port

Port Blair is located on the island of Andamans and Nicobar and is one of India's youngest significant seaports. The government named this port an important one since it helped to raise India's ports to 13th rank. The Port

Blair harbour is India's youngest marine port and is accessible by boat and aeroplane to India.

Phases of Port Development

Pre 1960s	1960s	1980s	1990s	2010s
1st Generation Isolated ports	**2nd Generation Expanded ports**	**3rd Generation Container ports**	**4th Generation Integrated ports**	**5th Generation Smart ports**
An interface between land and sea transport Mechanical Operation No commercial activity No cooperation with surrounding municipality No connection with transport and trading activities	A transport, industrial and commercial service center Commercial activities Closer relationship between ports and municipalities	Global containerization and intermodalism Dynamic nodes in international production/ distribution network Integrated transport centers and logistics platforms Electronic data interchange (EDI) services	Worldwide alliance of containership owners Centralized strategies to face the international market Information and communication technology Value adds Environment care	Skilled and well-educated workforce Intelligent infrastructure and automation or Digitization Knowledge development and sharing Optimized operations Enhanced resiliency Sustainable development Safe and secure activities. Energy Optimization

Characteristics of Efficient Port

- Port competitiveness and key performance
    - Efficient infrastructure
    - Market proximity
    - Good labour Climate
    - Service quality, reliability, frequency, leanness, agility
    - Competitive prices
    - Customisation
    - Responsiveness
    - Urban area fluidity
- Transport integration
    - Road and rail network efficiency
    - Direct overseas connection
    - Feeder services extension
    - Intermodal services
    - Hinterland chain efficiency
    - Vertical and horizontal integration
- Value Added Services
    - Value Added Logistics

        - General logistics services
        - Logistics chain integration services
    - Value Added Facilities

Indian economy

India's economy is characterised as a market economy with a middle income. It is the sixth-largest nominal GDP economy in the world and the third biggest by a purchasing power parity (PPP). India ranks 145th by GDP (nominal) and 122nd by GDP on a per capita basis, according to the IMF (PPP). From 1947 until 1991, successive administrations supported protectionist economic policies in the form of Raj's License, which were characterised as dirigisme by significant involvement from state and economic control. In 1991 a major economic liberalisation was established by the conclusion of the cold war and by an extreme crisis in the balance of payments. Since the start of the 21st century, the average annual GDP growth has stood at 6% to 7%, although India was the fastest growing larger economy worldwide from 2013 to 2018, overcoming China Historically, from the 1st to the 19th century India was the world's greatest economy for most two millennia.

Due to its young population and a corresponding low dependence, robust savings, and investment rates, further globalisation in India and integration in the global economy, the longer-term growth outlook of the Indian economy remains favourable. Due to "demonetisation" shocks in 2016 and to the implementation

of a tax on goods and services in 2017, the economy slowed in 2017. Close to 60% of India's GDP comes from domestic private consumption and is the sixth-largest consumer market in the world. In addition to individual use, India's GDP is also driven by government expenditures, investment and exports. India became the 9th-largest importer and the 12th-largest exporter in the world in 2019. 2050. According to the World Bank, India needs focus on government sector reforms, infrastructure, rural and agricultural development, removal from land and labour laws, financial inclusion, private investment and exports, education and public health in order to achieve sustainable economic growth.

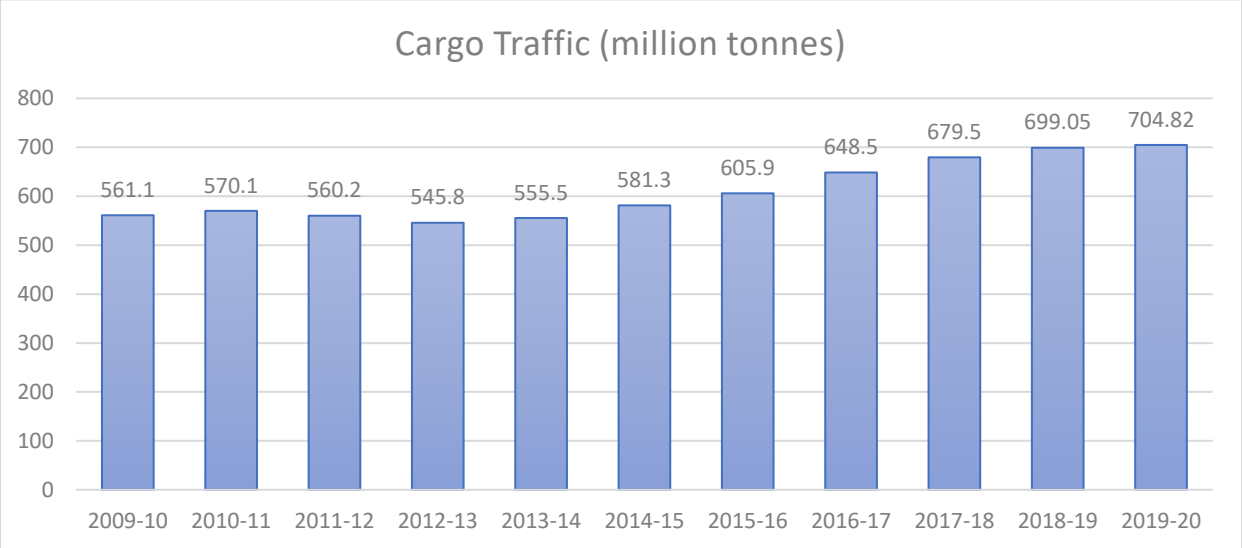
Chapter 4
Data Analysis and Interpretation

Cargo Traffic at Major Ports

Table 4.1

Year	Cargo Traffic (metric tonnes)
2009-10	561.1
2010-11	570.1
2011-12	560.2
2012-13	545.8
2013-14	555.5
2014-15	581.3
2015-16	605.9
2016-17	648.5
2017-18	679.5
2018-19	699.05
2019-20	704.82

Figure 4.1



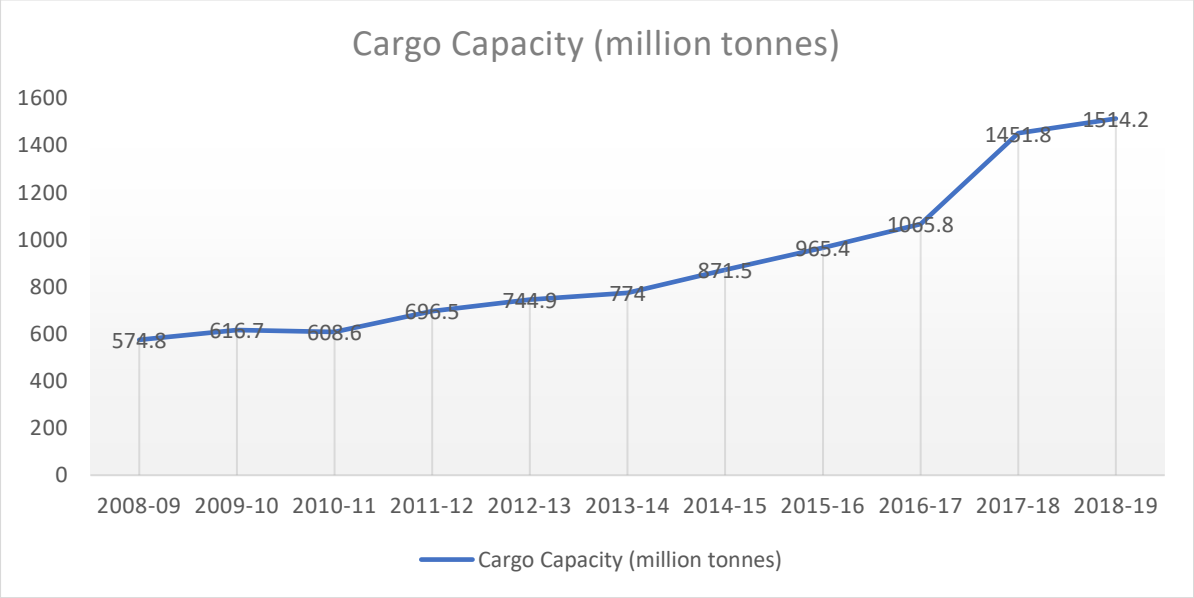
Interpretation: The graph represents the growth of cargo traffic. In 2009-10 cargo traffic is 561.1 MT. After, upcoming years it slightly decreased and then in 2019-20 it gradually increased to 704.82 MT. In 2018-19 to 2019-20 the growth of cargo traffic was not much increased as compared to previous year. This is because of the pandemic situation.

Cargo Capacity of Major Ports

Table 4.2

Year	Cargo Capacity (million tonnes)
2008-09	574.8
2009-10	616.7
2010-11	608.6
2011-12	696.5
2012-13	744.9
2013-14	774.0
2014-15	871.5
2015-16	965.4
2016-17	1065.8
2017-18	1451.8
2018-19	1514.2

Figure 4.2



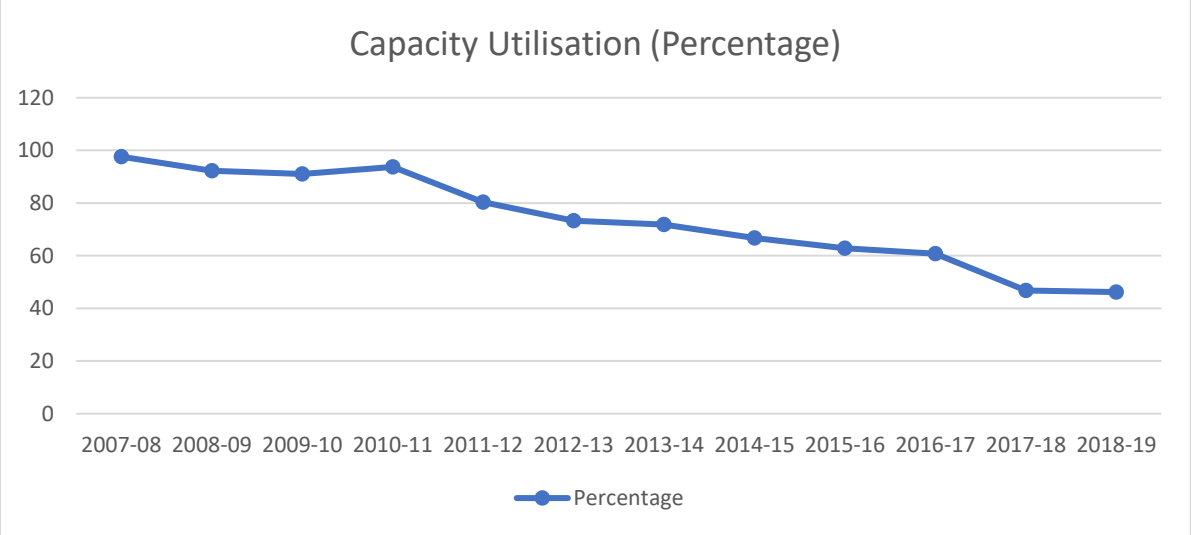
Interpretation: The graph represents cargo capacity. In 2008-09, it was 574.8 MT. It gradually increased year by Year. In 2018-19 cargo capacity was 1514.2 MT per annum. As per the maritime agenda 2021-20, it a was a target of 3130 MT of port capacity. The port was unsuccessful for achieving the target.

Capacity Utilisation of Major Ports

Table 4.3

Year	Capacity Utilisation
2007-08	97.6
2008-09	92.3
2009-10	91.0
2010-11	93.7
2011-12	80.4
2012-13	73.3
2013-14	71.8
2014-15	66.7
2015-16	62.8
2016-17	60.8
2017-18	46.8
2018-19	46.2

Figure 4.3



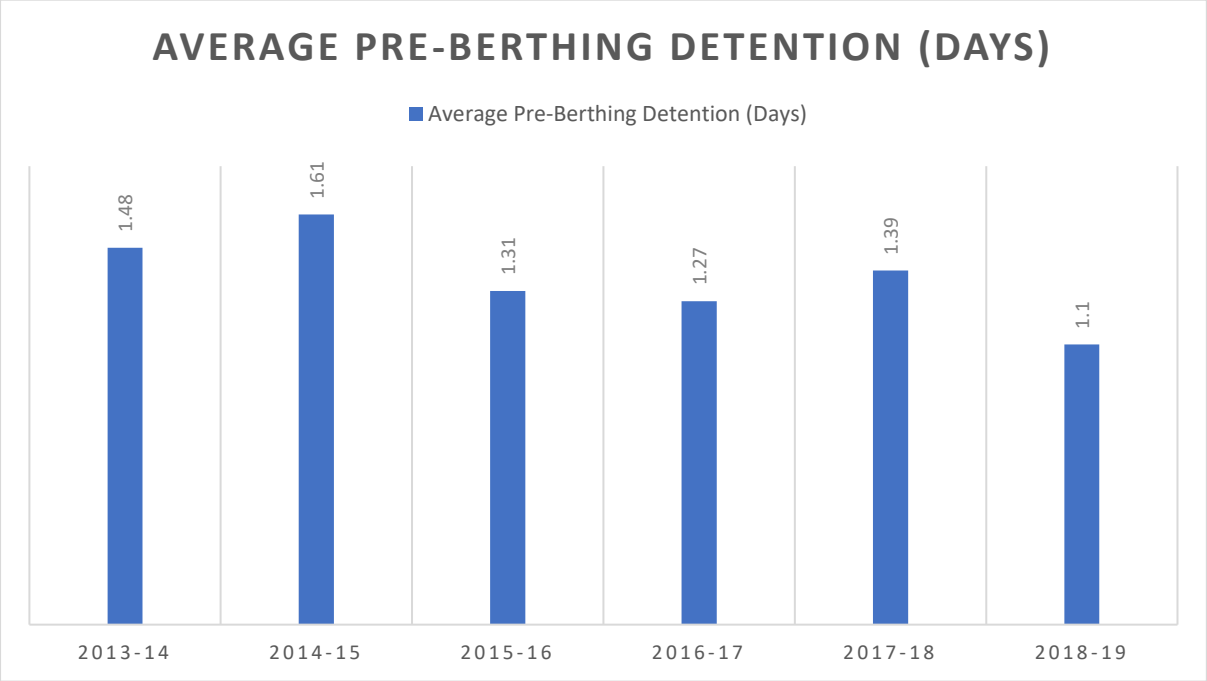
Interpretation: The graph depicts capacity utilisation. In 2007-08 the percentage of port capacity utilisation was 97.6. It moderately decreases and reach to 46.2 on 2018-19.

Average Pre-Berthing Detention

Table 4.4

Year	Average Pre-Berthing Detention (Days)
2013-14	1.48
2014-15	1.61
2015-16	1.31
2016-17	1.27
2017-18	1.39
2018-19	1.10

Figure 4.4



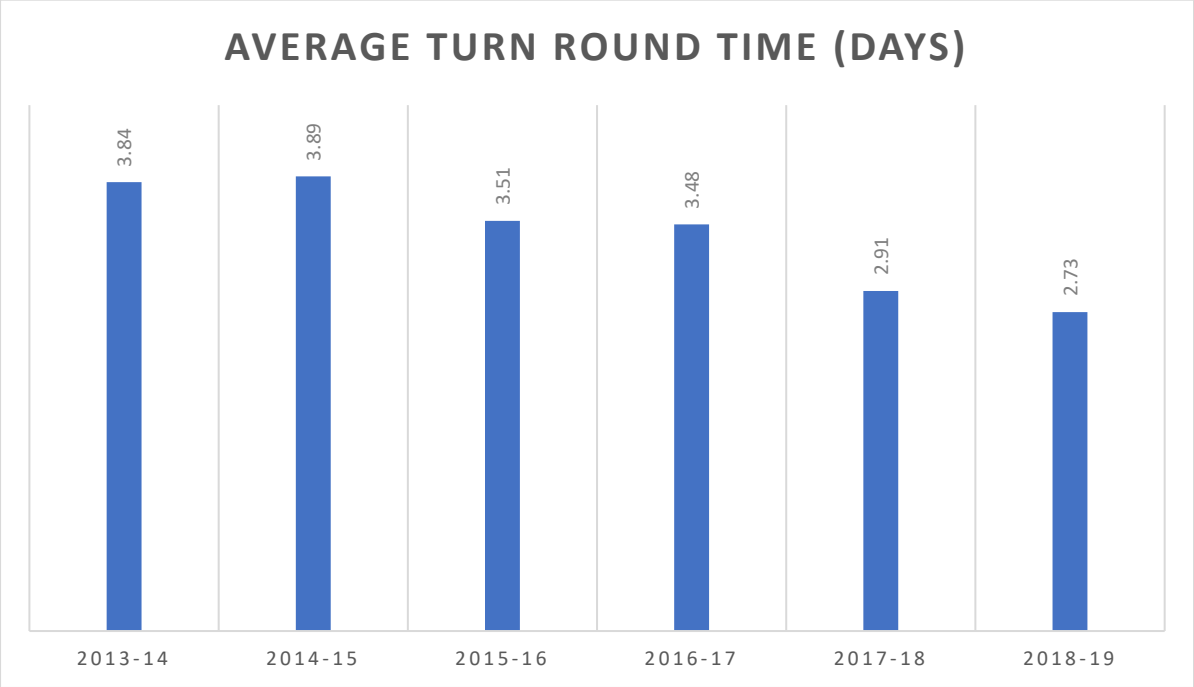
Interpretation: The graph shows Average PBD. In 2013-14 it is 1.48 days. Average PBD increased to 1.61 on 2014-15 then it slightly decreased. By 2017-18 the graph goes upward to 1.39 and decreased to 1.10 at 2018-19.

Average Turn Round Time

Table 4.5

Year	Average Turn Round Time (Days)
2013-14	3.84
2014-15	3.89
2015-16	3.51
2016-17	3.48
2017-18	2.91
2018-19	2.73

Figure 4.5



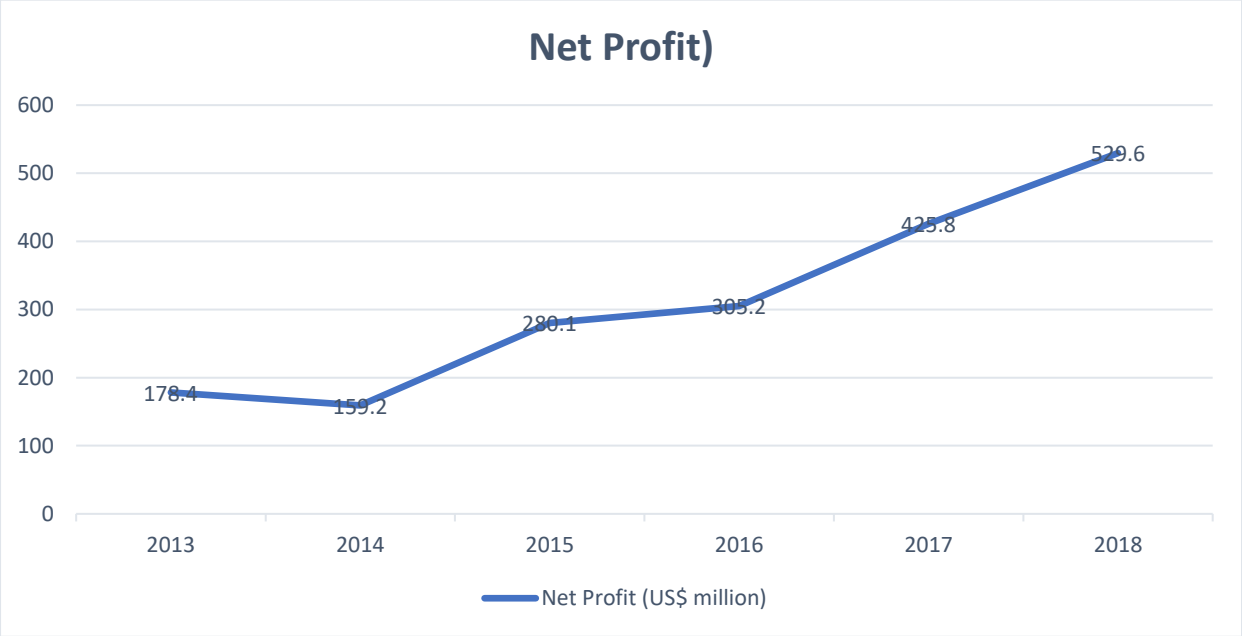
Interpretation: Average turn round time is influenced by factors such as type of cargo, parcel size and entrance channel. The graph represents Average TRT. In 2013-14 the Average TRT was 3.84 days. It decreased at a rapid pace to 2.73 days in 2018-19.

Net Profit at Major Ports

Table 4.6

Year	Net Profit (US$ million)
2013	178.4
2014	159.2
2015	280.1
2016	305.2
2017	425.8
2018	529.6

Table 4.6



Interpretation: The graph depicts net profit at major ports. In 2013 Net Profit was 178.4 then it increased to 529.6 in 2018.

Increasing Connectivity

Table 4.7.1 - Road connectivity Projects under Sagarmala

State	Number of projects	Length (kms)	Cost (US$ billion)
Gujarat	4	690	3
Maharashtra	14	2351	8.33
Goa	2	110	0.21
Karnataka	7	781	0.95
Kerala	21	220	0.69
Tamil Nadu	19	1913	8.50
Andhra Pradesh	36	2184	4.68
Odisha	4	62	0.10
West Bengal	5	275	1.44

Table 4.7.2 - Rail Connectivity Projects under Sagarmala

Status	Number of projects	Length (kms)	Cost (US$ billion)
Completed	13	426	0.40
Under Implementation	27	1967	2.92
Pre-Implementation	30	1854	3.93

Interpretation: The connectivity of the port is represented in the table. Road connectivity projects under Sagarmala of different states is shown in table 4.6.1. Road connectivity projects worth US$ 27.89 billion is being implemented in coastal states. 55 rail projects worth US$ 6.57 billion and 15 road projects worth US$ 0.41 billion for improved port community at various major and minor port. The objective of this project is to promote port led development and to provide infrastructure to quickly transport goods to and from ports, with higher efficiency and at lower cost. Approximately 10,000 jobs were created through projects initiated under Sagarmala during the last three years.

Chapter 5
Findings &Conclusion

Findings

- The international trade volume was increased.
- Infrastructural development in port sector results to the technological development, to improve port capacity, port productivity, port operations and port efficiency
- The cargo capacity is increased and capacity utilization is decreased.
- The Average PBT and Average TRT is decreased.
- The Net Profit of the major ports was increased. It helps in the growth of GDP.
- Under the project Sagarmala, the road connectivity and rail connectivity are increasing. The objective of this project is to promote port led development and to provide infrastructure to quickly transport goods to and from ports, with higher efficiency and at lower cost.
- Approximately 10,000 jobs were created through projects initiated under Sagarmala during the last three years.
- Special Economic Zones (SEZ) are being developed near several ports, comprising of coal-based power plants, steel plants and oil refineries.
- Generally, the efficiency of ports is increasing, so it positively affects the growth of economy.

Conclusion

The Indian shipping sector has grown over the previous two decades; however, the Indian shipping industry's competitive position has to be reinforced. Government of India, several policies have supported the sector's growth. The Government has a role to play in developing the Indian port industry, contributing to the Indian shipping growth. The emphasis should be on improving efficiency so that potential capacity can be attained automatically in the short term and later absolute capacity may be increased depending on development initiatives. The fundamental contributions of port infrastructure quality and logistics effectiveness to a country's economic growth. However, there are connections between the quality of port infrastructure, logistics performance, and seaborne trade, as well as their impacts on the yearly development of the country's economy.

An efficient system of connections to ports in India is very important because centres attracting goods for shipment are mainly located inland rather than in coastal regions. A vast distance between the shipment's origin and destination increases the logistical cost and time for cargo delivery. Connectivity between Indian ports and their hinterlands is largely reliant on road and rail transit, with coastal and inland waterway shipping playing a minor role. Therefore, it is of the utmost significance to expand the country's national economy for a well-connected logistics system, with the use of new technology and the rising port

management capability. This is one of the key variables to enhance competitiveness, encouraging traffic flows both today and expected to increase at international trade levels.

In addition to its extensive economic impact, the COVID-19 epidemic has also undermined Indian ports' efficiency gains from an all-inclusive effort in the last few years to improve infrastructure, mechanization and digitalization. Indian government plans have been concluded to enhance the efficiency of all 13 main ports. Projects focusing on capacity building will be implemented progressively throughout the following 20 years. However, there are prospects for recovery and generate a positive and steps taken it is possible to hope optimistically that there will be insufficient economic recovery to restore marine and maritime operations.

Bibliography

Bibliography

Websites

- http://shipmin.gov.in/sites/default/files/bps%20corrected.pdf
- https://www.ibef.org/download/Ports-November-2020.pdf
- https://www.wctrs-society.com/wp-content/uploads/abstracts/lisbon/selected/03320.pdf
- https://www.ibef.org/industry/ports-india-shipping.aspx
- https://www.ideasforindia.in/topics/trade/how-operational-efficiency-of-indias-ports-impacts-its-manufacturing-exports.html
- https://jshippingandtrade.springeropen.com/articles/10.1186/s41072-018-0027-0
- https://link.springer.com/article/10.1057/mel.2011.19
- http://shipmin.gov.in/division/transport-research
- http://niti.gov.in/post-covid-economic-growth-will-come-through-indias-ports
- https://lawexplores.com/revisiting-the-productivity-and-efficiency-of-ports-and-terminals-methods-and-applications/
- https://www.moneylife.in/article/developing-world-class-ports-is-necessary-for-success-of-make-in-india/39869.html
- https://www.marineinsight.com/know-more/10-major-ports-in-india/
- https://en.wikipedia.org/wiki/List_of_ports_in_India

- https://en.wikipedia.org/wiki/Economy_of_India
- https://en.wikipedia.org/wiki/Port_management#:~:text=Large%20ports%20need%20to%20deal,ships%20and%20containers%2C%20customs%20activities.
- https://www.lawinsider.com/dictionary/port-activities
- https://www.innovez-one.com/solution/job-management/?gclid=Cj0KCQjw5uWGBhCTARIsAL70sLL3MRacZqmo_ZCA6_Nn9pHzUV_98XhxN5EqAzNKdeqpc6H5wAg6yL4aAqYbEALw_wcB