

Erasmus University Rotterdam
MSc in Maritime Economics and Logistics
2018/2019

An analysis of the potential development of Indian
Seaports as container transshipment hubs

By

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Acknowledgement

I want to thank all people who have supported in completing this project, and first and foremost I want to express my sincere gratitude to my Thesis Supervisor, Professor Dr Michael Dooms, with whose expertise, support and motivation, I was able to complete my thesis.

My appreciation also goes to Renee Slater, Felicia De Jong and Martha Tjhin for providing me support and guidance, which helped me complete the Thesis.

Abstract

India is one of the fastest-growing economies and ranked globally at 13th position in container throughput. However, a significant share of the container shipments is transshipped internationally through nearby transshipment hubs such as Colombo, Singapore or Dubai. This carriage leads to additional charges to the traders and loss of income for Indian Ports, which is estimated to be around 400 to 600 million dollars per year. This study aims to find if there is a potential for a transshipment hub or more than one regional transshipment hubs amongst the 12 major Indian public ports. For this, the crucial characteristics that liner industry seeks in an ideal transshipment hub were gathered by using Literature Review Matrix, and these were ranked based on its relevance in the selected research studies. In the multi-case study following ports were used: three Ports from western India and three ports from eastern Indian region and two upcoming Port Projects. Using the SWOT technique and the characteristics of transshipment hubs found from Literature Matrix, the ports were evaluated. From the analysis, in the west, JNPT has the most potential to be a transshipment hub, along with Vishakhapatnam in the east. However, Colachel is the prominent transshipment hub for India, which is the outcome of the dissertation.

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List of Abbreviations

3 PL	Third Party Logistics
AICT	Adani International Container Terminal
APM	AP Moeller Terminals
BCG	Boston Consulting Group
BMCT	Bharat Mumbai Container Terminal
CAGR	Compound Annual Growth Rate
DPW	Dubai Ports World
ECR	Empty Container Repositioning
EEPC	Engineering Export Promotion Council
EODB	Ease of Doing Business
EODB	Ease of Doing Business
FCL	Full Container Load
FDI	Foreign Direct Investment
FMCG	Fast Moving Consumer Goods
GDP	Gross Domestic Product
GPI	Global Performance Indicators
GST	Goods and Service Tax
GTI	Gateway Terminals India
ICTT	International Container Transshipment Terminal
IIFT	Indian Institute of Foreign Trade
ITF	International Transport Federation
JNPT	Jawaharlal Nehru Port Trust
KPCT	Krishnapatanam Port Container Terminal
LCL	Less than Container Loads
LPI	Logistics Performance index
MOS	Ministry of Shipping
MRO	Maintenance, Repair and Operations
NSICT	Nhava Sheva International Container Terminal
NSIGT	Nhava Sheva India Gateway Terminal
PLSCI	Port Liner shipping connectivity index
PSA	Port of Singapore Authority
PTP	Pure Transshipment Port
RoFR	Right of First Refusal
RORO	Roll On - Roll Off
SWIFT	Single Window Interface for Trade
SWOT	Strength Weakness Opportunity and Threat analysis
T/S	Transshipment
TCE	Transaction Cost Economics
TEU	Twenty Equivalent Units
TIES	Trade Infrastructure for Export Scheme
UNCTAD	The United Nations Conference on Trade and Development
WECG	World Economic Center of Gravity
WTO	World Trade Organization

1. Introduction

1.1 Background

The Global economy's dependence on Maritime transportation has been thoroughly documented in many research articles. As one of the main drivers for economic growth, demand for maritime transport being one of the cheapest transportation modes for moving goods globally, is burgeoning at a steady pace (Brooks, 2010). It also must be considered that with this utility comes a disadvantage of higher lead time compared to other modes of transportation. Most of the products and services that are being used today are moved from its source directly or indirectly through maritime global supply chains. By "indirectly", it means the spare parts or raw materials for the final product is moved by Sea transport. Without Maritime trade or similar low-cost transportation, most of the consumer goods would be very expensive for the end-users. Similarly, the cost of certain services will also be driven higher, if its raw materials or equipment are required to be shipped in via air mode.

As per (United Nations, 2016) ocean transport is the driver of world economic growth and is linked to the everyday life of people. Even though ocean trade is one of the most prominent economic sectors, it is not as visible to ordinary people like other major economic sectors such as agriculture, mining, manufacturing, construction, energy generation, etcetera. However, on scrutinising these sectors' supply chain nodes, it can be inferred that maritime transport is associated at some stage with these major sectors more likely than any of these sectors with each other's. Due to this lack of knowledge about maritime transportation's influence on the economy, an investment project in ports and maritime transportation infrastructure is met with scepticism by ordinary citizens and even decision-makers. Most people outside the maritime industry do not have adequate insight into how the maritime industry particularly ports and sea transport are aiding in the economic growth of a nation. Another reason for this to be hidden from plain sight is that only inland transportation leg is visible for this industry and it might not be related to the maritime industry by the general public. Ocean trade has a great significance in the concentration of economic activity around the world. The ongoing shift of the World Economic Center of Gravity(WECG) from Mid Atlantic in the 1980s to the upcoming shift to Asia in the coming decades (Grether and Mathys, 2010) can be identified as a derivative of Asian regions economic boom. As of 2019, the top 10 busiest Container Ports in the world are all located in Asia (World Shipping Council, 2019). This can be identified with Asia's competitive advantage of the ability to ship cheaper products to a location, where it expensive to manufacture the same product or to source from elsewhere than Asia. It would not have been possible for most Asian countries to have such an advantage if transportation cost is higher or if their transportation infrastructure or network is weak.

Significance of infrastructures such as port can be elucidated adequately by comparing the advantage of having it against the absence of the same in a similar scenario. A side by side comparative review of landlocked countries economy with that of coastal countries which have fully functional ports can be used to clarify this further. A study (Jean-François Arvis, Jean-François Marteau, 2010) points out that landlocked countries have 30% lesser trade and subsequently suffer weaker growth compared to coastal countries. As shippers from landlocked countries face a lot of transportation, national border, and customs hurdles to ship the goods to the nearest port located in neighbouring coastal countries, the resultant logistics and transaction

costs arising from this issue are burdensome to their business. Even though these landlocked regions can resort to air or road transport instead, these options cannot feasibly and practically replace the low cost, connectivity, and flexibility, maritime transport offers. These points imply that a coastal country potentially has advantages if it has a functional port with potential or already developed maritime attributes. This can help in bringing domestic and foreign direct investment supporting the country's economy. As per (Haralambides, 1996), the Maritime transport industry has a positive and robust impact on the national economy, such a way that most maritime nations see a rise in output with relation to the input (or investment) it allocates. This itself can be one of the main motives why many countries are investing heavily in maritime infrastructure and ports. Aside from growth in economy several other favourable growth aspects such as trade facilitation, agglomeration, positive competition, supply chain integration, improved national logistics performance etcetera come as an outcome from the implementation of a successful maritime strategy.

Many countries are naturally endowed with deep ports having seamless nautical characteristics, such that they do not require to invest much further for port development such as dredging, widening, etcetera. Some countries do not have a top-notch port, but still, they manage to be competitive in the maritime sector. However, even for countries with excellent ports, if mismanaged can end up with decreased port revenue and loss of competitive position in the market. How authorities govern the port is as important as natural nautical features it has. To know if the port is successful or not, it needs to measure its performance indicators as done in any other business. The Ports need to measure their performance in two areas - Efficiency and Effectiveness(Brooks and Pallis, 2008). It also needs metrics to measure customer satisfaction and in many other areas, which is not just limited to throughput or turnaround time(Brooks and Pallis, 2008). Successful maritime policy at the national and regional level and business strategy at the port level are mandatory for the success of a country's port and position in the maritime sector. A nation's maritime strategy also decides what products and services its ports provide. This strategy also depends on the trade pattern of the country and how it envisions itself in the future in terms of market positioning. Some ports have huge refineries, storage or bunkering hubs in case they concentrate on 'Liquid Bulk trade' while other ports concentrate on processing plants and industrial clusters with agricultural silos and warehouses. This decision depends on the trade patterns and types the region or country predominantly has. Similarly, ocean transport is mainly categorized according to the type of products it moves. This is due to the lack of a practical one-size-fits-all approach and specialized nature of suppliers, transporters, and buyers using transportation. Specialization encourages optimization of transportation, which directly reduces the transportation cost and provides value addition to its buyers. An instance of these includes Container Carriers, Crude Oil Carriers, Roll on Roll Off, Dry Bulk Carriers, etc.

Container transportation is one of the most significant innovations in maritime trade as it reduced manual labour, realised economies of scale, ease of use and standardisation. Before containerization, most of the intermediate and final goods were transported in bulks which took several days for loading and was laborious.

With the advent of Containers even though it makes up only 12% of the whole maritime fleet, it is the fastest-growing segment, and it transports around 50% of the world trade value (Ducruet and Notteboom, 2012). In 1980, the world container throughput was 36 million TEU, 266 million TEU in 2002(Notteboom, 2009) and 753

million TEU in 2017(UNCTAD, 2019a). The main reason for this growth is globalisation and wide-scale use of containers in world trade.

Container ports have a different customer profile than dry bulk or RORO or liquid bulk terminal. This profile can vary from FMCG to Garment retailer to Automobile Spare parts. Customers dealing with higher volume finds it advantageous to have warehouses or processing plants near to ports. Also, many 3PL service providers buy or lease warehouses and yards near closer to the port or in special economic zones to rent out space and logistics to its customers. This increase of economic activity near a port is termed as agglomeration, and this is one of the main advantages of container transportation aside from lower cost-effectiveness and supporting globalisation support. Container transportation has its disadvantages, including security risk, road traffic increase, sea air and land pollution from transportation, etcetera. However, even with these setbacks' container transportation is seen as the most significant and irreplaceable mode of transport as of now.

Container transport from Origin to Destination is a door to door logistics service usually involving several parties. As per (Lun, Lai and Cheng, 2010) container network is made up of nodes and links, as shown in Figure 1.1. As seen in the process flow, container transport has several stakeholders with different goals, and in an ideal scenario, they all collectively operate with or without intent for regional trade facilitation which leads to economic growth. This process includes but not limited to; empty container booking and loading by the shipper, container transportation by the truck transportation company or 3PL, customs declaration and export processing by Shipper or 3PL, shipment screening or an inspection by Customs, Container routing and loading on vessel by Port authority, ocean transport by Container liner. It will be almost a similar process flow in the destination port when the shipment arrives, but the process will be in reverse order from that of origin process until it reaches the buyer. Leadtime to take the container out in destination is usually higher than the lead time to ship the same container due to documentation, customs clearance, inspection etcetera. The only difference in this process is if it is transshipment, wherein the container is offloaded in hub port and transported later in feeder vessel. This is the supply chain of goods in Container transport, but when it comes to Container, its flow and storage, particularly reverse flow to liners have an entirely different cycle. This pertains to a significant complex area in Container liner shipping called Empty Container Repositioning or ECR, and the main issue transpires from trade imbalance in different regions of the world(Gençer and Demir, 2019). As per this scenario, export-oriented regions can have a shortage of containers while import-prevalent region can have an excess container in their ports(Gençer and Demir, 2019), which requires strategies in place to balance the supply and ease operations. Containers moved by the feeder in transshipment can get lie idle in smaller ports (S&P Global, 2018)after they are returned from the consignee.

The concept of Transshipment and hubs came into existence from initiatives from container liner business to improve their network and reduce cost through economies of scale. These stages or links (as mentioned in Figure 1.1) in Container transportation are potential choke points in the maritime supply chain. An optimal maritime supply chain policy in a country can by improvise or provide solutions for these setbacks. From the transaction Cost Economics (TCE) perspective, this resistance in each node means higher inventory cost and sub-optimal supply chain, both of which can be measured as cost to business in financial terms(Veenstra, 2015). The role of government in trade facilitation and national logistics performance metrics

such as Ease of Doing Business (EODB) and Logistics Performance Index (LPI) are of higher significance here in such scenarios.

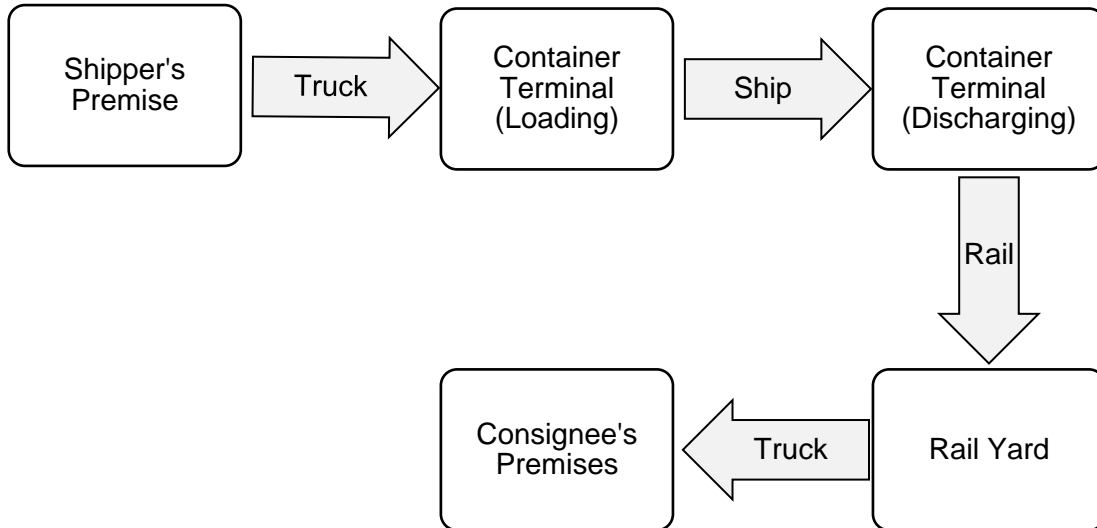


Figure 1.1- Nodes and Link concept in Container network, source: adapted from (Lun, Lai and Cheng, 2010).

1.2 Indian Shipping Sector

India has 12 major and 200 non-major ports and has a coastline of 7517 km (Indian Ministry of Shipping, 2019a). India used to be a significant major landmark in maritime history, and traders from west and east concentrated on having good relations with the ruling class and businesspeople for trade facilitation. It all changed with the colonisation of India where many nations primarily Britain, used and developed Seaport City such as Madras (now Chennai), Calcutta) Kolkata and Mumbai (Meera Kosambi and Brush, 1988) for their trade. After Independence, India regulated its maritime transport activities under the supervision of Ministry Shipping and developed several regulatory bodies and port authorities. However, compared to other Asian, European and American Ports, Indian ports have outdated infrastructure (Financial Express, 2018) and owns older vessels with 40% of the ships aged above 20 years (Indian Ministry of Shipping, 2018). Several issues are holding back India to achieve efficiency in Maritime Transportation, particularly the Container sector. The Government-led transportation development program, Sagarmala has been facing several hurdles to attain its goals due to older infrastructure, hinterland connectivity and higher logistics cost amongst other factors (Financial Express, 2018). India has only 1.8 percent of total world container throughput which is identified as one of the key indicators for port success. Aside from JNPT and Mundra Port, there are no Indian ports in Top 50 Container Ports (World Shipping Council, 2019). Indian Government has identified that having a port-led development is the key to have a significant lead in the maritime sector, particularly container trade (Indian Ministry of Shipping, 2016e). It has identified that several port cities have flourished due to its investments and port regulations and that Sagarmala aims a port-centric development, among which transshipment hubs is one of their main priority (Indian Ministry of Shipping, 2016e). In this research, the main aim is to find if there is scope for a transshipment hub in India and if the initiatives from government and business are helping with this regard.

1.3 Purpose of this research

This objective of this research is about transshipment hubs in India and to find if there is scope for the development of a competitive container transshipment hub or hubs in India and their positioning and connectivity. It aims to find the potential of the 12 major Indian ports to increase its throughput by concentrating on transshipment. This study also aims to find if these transshipment hubs have the potential to capture back the transshipment volumes shipped from Colombo and other neighbouring hubs and reduce the dependence on those countries to ship goods internationally. It also aims to find if initiatives from the Ministry of Shipping and regional port authorities can improve the market position and competitiveness in the maritime container transportation market, particularly transshipment. This includes analysis about projects such as Sagarmala, removal of cabotage law, etcetera, which are initiated by the Indian Ministry of Shipping, its coverage and implications for transshipment hubs. Finally, research about the impact of the current absence of a transshipment hub port in India is also conducted

1.4 Research Questions

Below is the main research question of the thesis:

Is there a scope for Top Ports in India to become a key container transshipment hub in the region?

To support the above question and for detailed research below, questions are included to analyse the topic further.

a) What would be the criteria required for this shift, and what needs to be done?

In this section, the primary criteria for a transshipment hub are examined and compared with the potential of Indian ports. Also, the action plan that is required for these ports to become a major transshipment hub is analysed in this part.

This action is mainly from the side of government and relevant authorities; wherein enough advantage is provided to Container liner business for them to choose Indian ports over ports such as Colombo and Singapore. From operations and profitability points of view will these transshipment hubs bring in profit or not and increases traffic and bring in more business in the future.

b) Which port or ports will be the main hub and which regions?

This question tries to answer which of the 12 major ports and upcoming ports projects has the potential to be a transshipment hub

c) How relevant is the positioning and connectivity of the ports?

Two major factors of a Container Terminal, particularly Transshipment hub is positioning and connectivity geographically. Transshipment hub can only succeed when they can provide low-cost services and the distance from major trade routes is also an important criterion. Here the best potential transshipment hubs positioning

and connectivity in the maritime route is considered to determine if Container liner business considers these hubs instead of the current major hubs like Colombo.

d) Can India survive without a major transshipment port?

India's major ports are mainly gateway ports, and some are mixed port. A competent transshipment hub requires to provide cheaper charges for their service and currently, Indian ports have higher port dues. In this section, an inquiry is made if India can still depend on foreign ports like Colombo for their transshipment transporting considering the cost for business and future trends of shipping.

1.5 Research Methodology

The research is based on primarily on qualitative methods to find the possibility for success factors of transshipment ports and its potential for a current Indian port to be a key player in South Asian ports as a trans-shipment hub.

- Primarily the research is going to be based on qualitative methods. Data from primary sources such as journals and thesis research and secondary sources such as reports and articles from Indian Shipping Ministry, Port Association and other sources is analysed.
- Data from various sources understand which area has strengths and weaknesses and what the result can convey about converting the port to a regional trans-shipment hub.
- The main Key performance indicators for a transshipment hub will be collected.
- SWOT analysis of potential transshipment hubs is conducted with relevance to the vital criteria of transshipment hub.

1.6 Thesis Structure

- This research study consists of five chapters, and the structure follows as:
- Chapter 1 Introduces the relevance of Container transport and transshipment hub to an economy and the role of government in creating the best maritime transportation policies to improve its performance. Based on this, the research questions and sub research questions were formulated in the context of India.
- Chapter 2 is the in-depth literature study about growth in economy and Shipping sector are connected, and how an increase in Logistics and Global performance indicators can attract Liner business, particularly in India. There is also review of Initiatives by Government of India and how it has helped to increase competitiveness in Transshipment market in the region. Next a literature review matrix is made from study of 16 research about Transshipment hub features. From this, the ranking of critical characteristics of a Transshipment hub is made, which will be used in the context of major Indian ports.
- Chapter 3 explains the features, advantages and disadvantages of SWOT Analysis and how it can be used in the context of Ports.

- Chapter 4 uses Multi case study and SWOT Analysis on Ports in Western and Eastern India and two new Port development Projects. This chapter analyses the Strengths, Weakness, Opportunities and Threats of the 8 Ports based on the six criteria found from the Literature review matrix and concludes by identifying the potential transshipment hubs in East and West region and the New Port Project.
- Chapter 5 Provides the conclusion, the limitation of the study and discusses further research required in this area.

2. Literature Review

About seventeen per cent of Global Seaborne trade is through Container Shipping(UNCTAD, 2018). The entire container market was valued at \$ 8.7 Billion and is expected to reach \$12 Billion by 2023, with a predicted CAGR of 4.5%(Allied Market Research, 2017). As the research area is on a focused topic of transshipment hub in India and since the topic is mostly associated with the Container liner industry and government entities, there is a necessity of literature review of research studies, journals and articles in port, maritime transport and research about the same. A literature review helps to understand a previously researched topic in-depth also it helps in understanding the research methodology employed in the study (Onwuegbuzie and Frels, 2016).

As mentioned in the earlier chapter, the importance of transshipment hub for a country can be realised only when the role of Ocean trade and trade facilitation is understood and why hub and spoke operation came into operation.

The following areas need to be reviewed to understand the dynamics of a transshipment port:

2.1.1 Role of Container transport and Ports in the countries economy.

The Role of trade in a countries GDP is critical and depends immensely on the ability of a firm can competitively export its products and services internationally (Dwarakish and Salim, 2015). The Link between GDP and World Trade, as mentioned in the earlier chapter is illustrated in Figure 2.1.

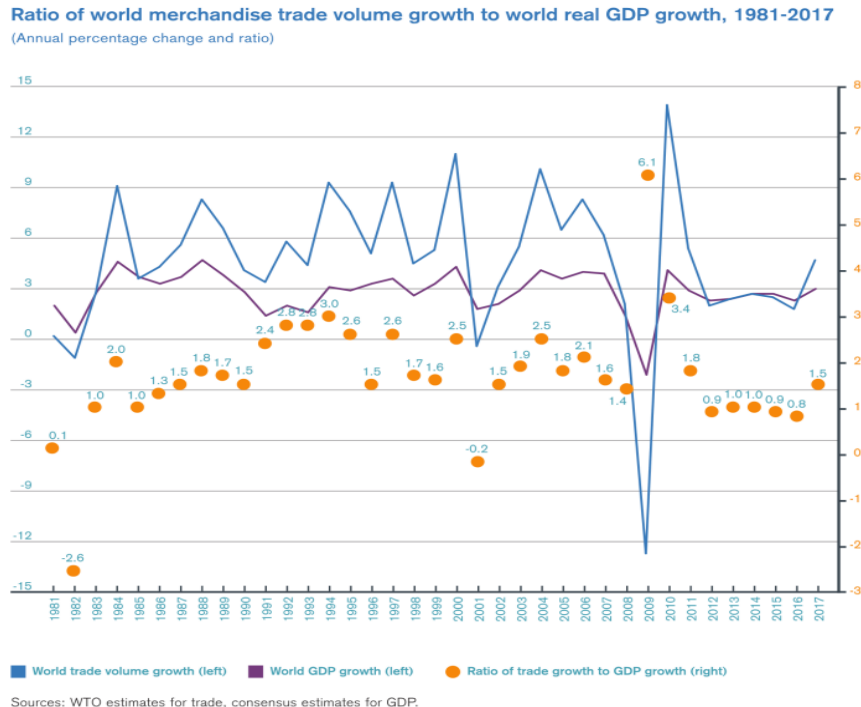


Figure 2.1- Ratio of World Trade to World GDP, source: (World Trade Organization, 2018).

The drop in the trade and GDP values during 2009 during the recession period is visible in Figure 2.1. Like global economic cycles, the shipping market is also cyclical, and it goes through the four stages of trough, recovery, peak, and collapse. This cycle regulates and affects maritime trade and helps the market to have efficient and competitive players (Stopford, 1997). Aside from protocols from UNCTAD and other regulators, this cyclical phenomenon helps to an extent in preventing the shipping industry alliances from regulating the freight rates to let it be on a perpetually higher level. Customers, other stakeholders and eventually, the economy benefit from this cycle due to this reason. The lower the logistics cost, the greater the likelihood for a nation's trade to flourish. Generally, it is observed that the logistics cost of a nation as compared to the percentage of GDP decreases with advancement and growth in the economy (ESCAP, 2017). When this same concept is applied in Maritime transportation from an exporter's perspective, the cost charged by a country's port and shipping Liner is vital. In a regional Maritime supply chain, lower logistics cost charged by service providers, the higher the potentiality for its shipper's products and services to be globally competitive. Aside from the cost, the competence of Infrastructures such as ports, railway depots, special economic zones (such as Duty-Free Zones) etcetera is a critical factor in a nation's GDP growth. Likewise, countries with competitive and cost-efficient ports turn out to have higher GDP than countries that lack it (Sleeper, 2012).

Aside from having reliable ports, it is also vital for a country to have an accompanying competitive port ecosystem that can serve liner business, charterers, 4PL services, port service providers, traders, and other relevant businesses. This as mentioned earlier is known as the Economy of agglomeration (Rodrigue, 2019b) and can happen as a planned activity by authorities or as an outcome from the success of a port. These clusters can range from Logistics parks, Container Depots, Special economic Zones, Refineries, Bunkering facilities, Bonded Warehouses, Specialist logistics facilities, etcetera. These facilities have their presence in port based on the concept of 'capitalisation of inefficiencies' of supply chain and value proposition for transportation (Rodrigue, 2019c). Depending on countries' port strategy, there can be significant investment in port-centric logistics clusters to attract customers, and most importantly trade facilitation and economic welfare.

2.1.2 Container Terminal Selection by Liners

There are many elements for the transformation of a port to a regional maritime powerhouse. Ports can have several limiting factors to be a significant contender in container liner business depending on the port location and nautical features, national economy, competition, government role and regulation, geopolitics, the interest of liner business, quality of infrastructure, human capital, etcetera. The government of India is currently relaxing its cabotage policy, one of the critical factors that can increase of transshipment traffic (The Wire, 2018). To boost the Container transport sector, attracting Liner business to investing in their Ports for the longer-term should be countries main objective. Role of Container Terminal particularly ones dealing mainly in transshipment, is vital in a nation's maritime sector (Pham and Yeo, 2019). Service Quality of Transshipment Container is (Pham and Yeo, 2019) also vital in this regard which primarily includes terminal accessibility and proximity to main trade routes. This can be understood better from a Liner's perspective as they are the primary customers for a Port/Terminal entity. Port/Terminal business' market is unique due to several factors. These include few but prominent firms, close-knit supplier-customer base due to smaller market size, customers based regionally, demand based on regional industries, Inelastic Demand and complex buying decision process

(Wiegmans, Hoest and Notteboom, 2008). As shown in Table 2.1 (Wiegmans, Hoest and Notteboom, 2008) Liner business does much research for selecting a port/terminal and the buying decision is based on a) Container Port Choice Strategy and b) Terminal Selection strategy, of which the former is the most imperative. As the below Table 2.1 illustrates, each buying decision criteria are vital for Liner business for profitability and sustainability. For a port to break into already competitive container terminal market share, they must strategise differently and plan from its customer's perspective.

Port choice Strategy	Terminal Selection Criteria
Service Quality	Speed of service
Cost Structure	Handling Cost
Ports competence for the trade	Reliability
Requirements from alliances	Hinterland network
Current and Potential Customer profile	Terminal Capacity
Market competition and strategy	other performance indicators
Current Terminal Operators contract	
Sea/Hinterland network connectivity	
Competitive Tariffs	

Table 2.1- Port Choice Strategy and Terminal Selection preferences, source: adapted from (Wiegmans, Hoest and Notteboom, 2008).

When it comes to Container terminals, criteria are the same except that five main characteristics can be identified as critical:

1. The cost structure for handling container
2. Closeness to major Sea Trade routes
3. Closeness to Trade regions
4. Port Infrastructure and characteristics (Port Depth, access etcetera)
5. Availability of Feeder Network

Table 2.2- Five main characteristics for the Container terminal, source: adapted from (Lirn *et al.*, 2004).

2.1 Indian Economy and Maritime Transport Performance.

Several performance factors can be analysed to understand a country's position in the shipping sector:

- Port and related infrastructure (Quality, Speed, capacity utilisation and Size)
- National Ship Fleet (Size and volume, % of national Flagships, age)
- Trade Profile (% of trade against GDP, CAGR and size of GDP,)
- Trade facilitation (LPI, EODB, the effectiveness of regulations and policies)
- Service providers (cost and performance of 4pl, port services, govt. services)
- Competitors (Ports, Terminal Operators, Trade sectors)

These factors can be cross-examined with the actual performance of the shipping sector and can be correlated. Alongside Infrastructure, size of economy and shipping performance, the role of government in trade facilitation is a big factor to find the potential of the Indian Shipping Market.

With regards to India, it is the seventh-largest economy in the world(The World Bank, 2019e) but the Indian Shipping sector fleet size is relatively smaller (2%) compared to World fleet size and has only 16th position in top 35 nations(UNCTAD, 2018). Indian economy is 2.7 trillion dollars, and the percentage of export and import against GDP is 19.7% and 23.4% respectively. Also, India is in the top ninth position in total world imports(638 Billion \$) and 13th in total exports(536 Billion \$) (The World Bank, 2019e). India's 95% of trade by volume and 67% by value is conducted through maritime transport (Indian Ministry of Shipping, 2019).

These last two statistics show the sheer size of Indian trade and the potential for the Shipping Industry, particularly maritime.

Data from database : World Development Indicators(as of July 2019)
Indicator Name : GDP (current US\$) in billions

Pos	Country Name	2014	2015	2016	2017	2018	% of World Total	Top 5,10 &15 in %	Top 15 in %
1	United States	17,522	18,219	18,707	19,485	20,494	24.4%	55%	77%
2	China	10,439	11,016	11,138	12,143	13,608	16.2%		
3	Japan	4,850	4,389	4,927	4,860	4,971	5.9%		
4	Germany	3,899	3,381	3,495	3,693	3,997	4.8%		
5	U.K	3,035	2,896	2,659	2,638	2,825	3.4%		
6	France	2,852	2,438	2,471	2,586	2,778	3.3%	13%	
7	India	2,039	2,104	2,290	2,653	2,726	3.2%		
8	Italy	2,152	1,832	1,869	1,947	2,074	2.5%		
9	Brazil	2,456	1,802	1,796	2,054	1,869	2.2%		
10	Canada	1,801	1,553	1,527	1,647	1,709	2.0%	9%	
11	Russia	2,060	1,364	1,283	1,579	1,658	2.0%		
12	Korea, Rep.	1,411	1,383	1,415	1,531	1,619	1.9%		
13	Australia	1,467	1,352	1,210	1,331	1,432	1.7%		
14	Spain	1,377	1,199	1,237	1,314	1,426	1.7%		
15	Mexico	1,315	1,171	1,078	1,158	1,224	1.5%		
	World Total	78,637	73,899	74,985	79,668	83,910			

Figure 2.2- GDP of Top 15 Economies, source: adapted from (The World Bank, 2019e).

From the three graphs in Figure 2.3, of these 15 countries, a general trend of recession and slow recovery can be seen for most countries except Brazil. This data is only for five years, which is limited to understand it is a real economic cycle or recession, but still shows the relative performance of these 15 top economies. Indian GDP has one of the highest increase years on year in the Top 15 Economies as depicted in Figure 2.3. In this Graph to find the increase in GDP in 5years, 2014 was kept as the base year and the graph shows the per year increase in percentage is negative or positive, that is below or above zero. The data table below the graph below shows the percentage increase in GDP from the base year 2014. From the data presented, China has a growth of 30.3 percentage while the USA has a 16.96 per cent increase in GDP from the base year. Compared to both China and UAE, India has a higher percentage of growth of 33.7 per cent. In absolute values, India has an increase of 687 billion dollars, which is third in the world next to China with 3.1 trillion and the USA with 2.9 trillion. The same trend is present even when analysing ten years of GDP information, wherein India still has the third position in the world with an absolute increase in GDP of \$ 1.3 Trillion (The World Bank, 2019e). This is impressive growth and shows the potential for India to achieve a lead in global trade if planned appropriately.

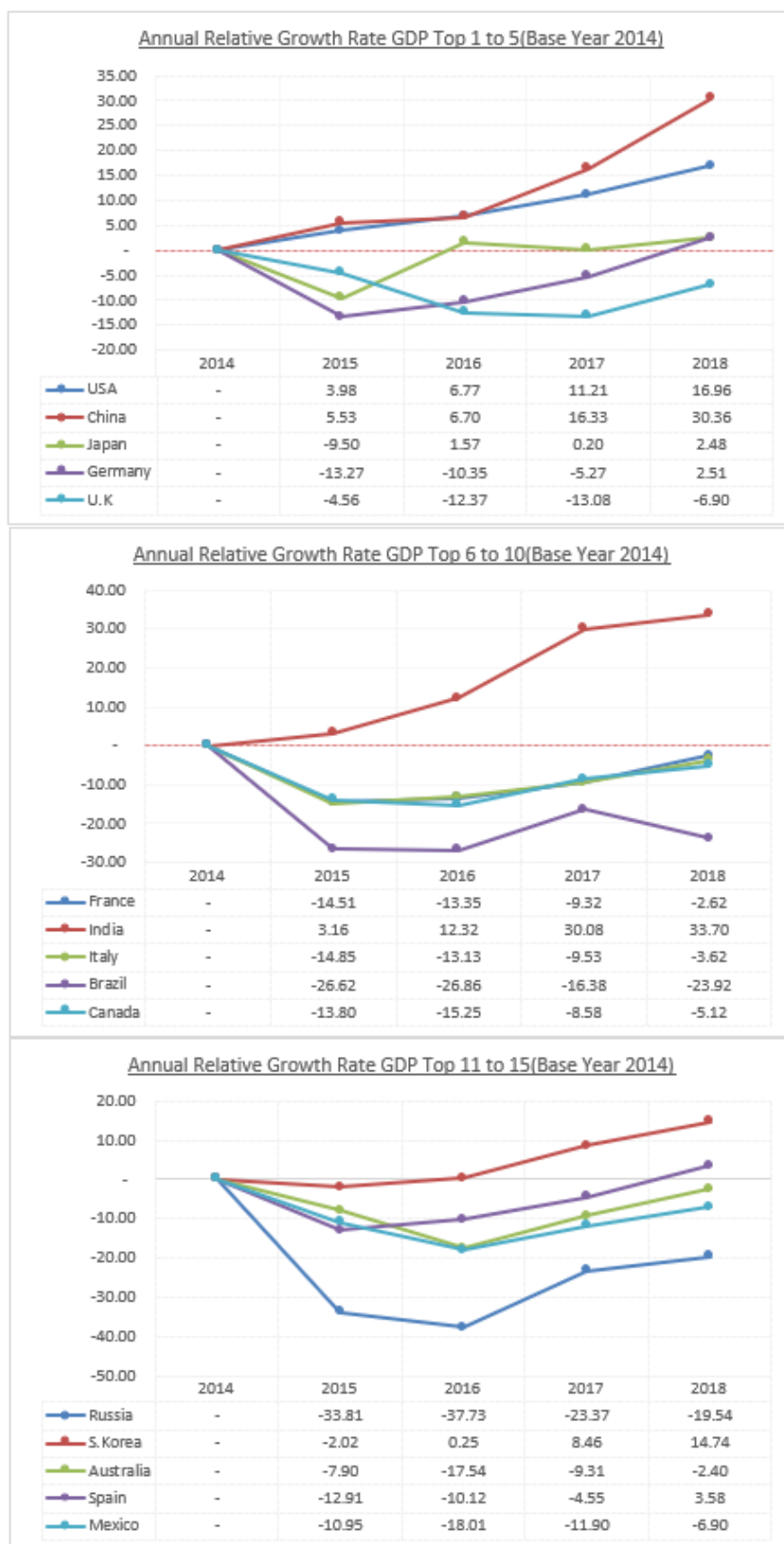


Figure 2.3- Annual Relative Growth of GDP from 2014: Top 15 Economies: the Base year 2014, source: adapted from (The World Bank, 2019e).

As mentioned in the previous section, trade and economic growth are interrelated. As this research is primarily about Container trade, it would make sense to compare the GDP information with Container throughput. From Figure 2.4 below, we can see that India is 13th in the world with regards to total Global Container throughput. However, the total percentage of container throughput is just 1.8%. This metric has the potential for improvement considering that India has 12 major and 200 non-major ports and has a coastline of 7517 km and 14500 km of navigable waterways (Indian Ministry of Shipping, 2019a).

Data from database : **World Development Indicators(as of July 2019)**
Indicator Name : Container port traffic (TEU: 20 foot equivalent units) in millions

	Country Name	2013	2014	2015	2016	2017	% of WorldTotal	Top 15 -%
1	China	175.9	186.7	195.3	199.6	213.7	28.4%	46.6%
2	United States	44.4	47.8	49.5	50.2	51.4	6.8%	
3	Singapore	33.4	34.7	31.7	32.7	33.6	4.5%	
4	Korea, Rep.	23.7	24.8	25.4	26.2	27.4	3.6%	
5	Malaysia	21.4	22.6	24.3	24.6	24.7	3.3%	
6	Japan	21.0	21.1	20.6	20.8	21.9	2.9%	13.3%
7	United Arab Emirates	18.7	20.2	21.2	20.6	21.3	2.8%	
8	Hong Kong SAR, China	22.3	22.3	20.1	19.6	20.8	2.8%	
9	Germany	19.3	20.1	19.1	19.4	19.4	2.6%	
10	Spain	13.9	14.2	14.3	15.3	17.1	2.3%	
11	Netherlands	11.8	12.5	12.4	12.7	14.0	1.9%	8.7%
12	Indonesia	11.9	11.6	12.0	12.5	13.9	1.8%	
13	India	10.6	11.3	11.9	12.1	13.3	1.8%	
14	Vietnam	9.0	10.2	11.5	11.9	12.3	1.6%	
15	Belgium	10.7	11.1	11.2	11.5	11.9	1.6%	
	World Total	656.3	687.1	695.8	710.1	752.7	100.0%	
								68.6%

Figure 2.4- Top 15 Countries' Container port traffic, source: adapted from (The World Bank, 2019b).

To find the five years growth or Compounded Annual Growth rate, 2013 is used as the base year (Figure 2.3). Of the top 15 countries with the highest container throughput, Vietnam has the highest growth rate (37%) followed by India (25%) and then China (21%). It has to be noted that container throughput data of 2018 was not included in the analysis. Two major drops in the top 15 positions were for Hongkong and Singapore(Figure 2.5).

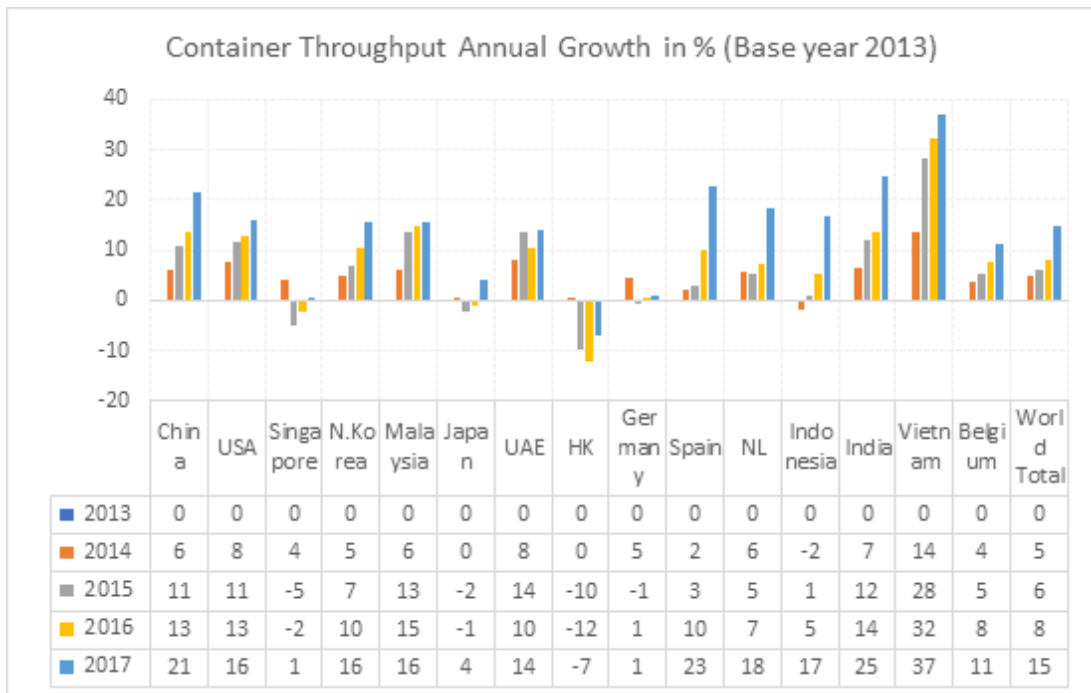


Figure 2.5- Top 15 Countries' Container port traffic Relative Growth in % (the Base year 2013), source: adapted from (The World Bank, 2019b).

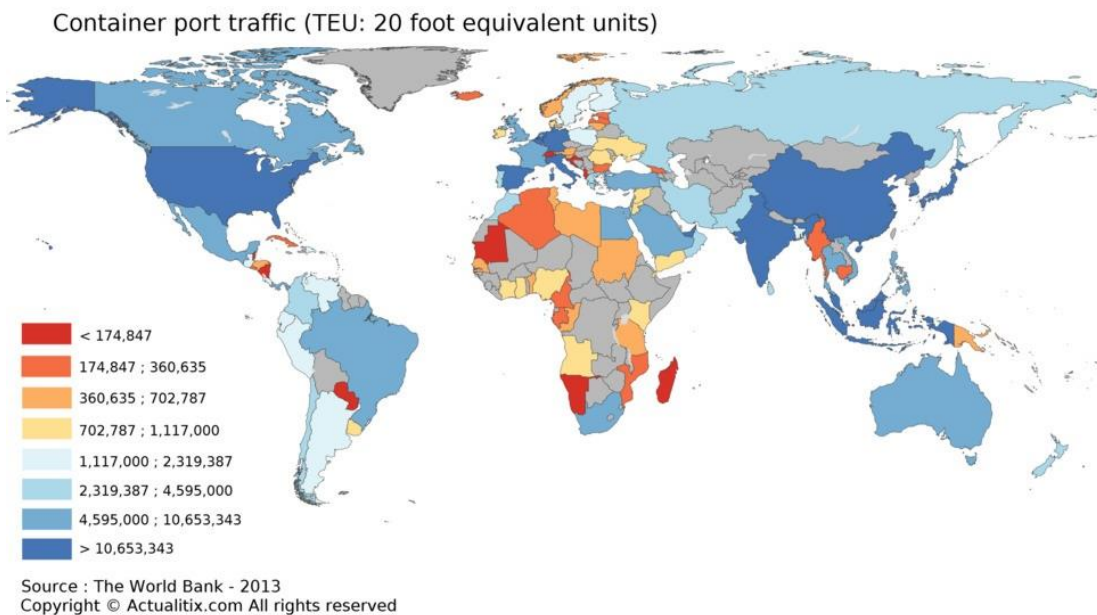


Figure 2.6- Container port traffic per Country, source: (Actualitix, 2013).

GDP and Container throughput gives an idea of India's general economic overview, and volume moved through Containers. Even though it shows a potentiality of container trade to grow, there is a requirement to delve deeper into the performance of government and authorities such as Port Authorities, Ministry of Shipping etcetera.

There are several sectors that the government is concentrating on development, including industrial, transportation, Information, Human Capital, Research and development, Education, etcetera. All these areas require active participation from the countries Policymakers, Public sector and Private sector(Habib, Beldona and Coombs, 2000). There are several initiatives by Government of India to achieve this including "Make in India", 'Trade Infrastructure for Export Scheme (TIES)', Digital India(Digital India, 2019) which has several projects such as ETRADE, Single Window Interface for Facilitating Trade(Swift, 2019), Ministry of Human Resource Development's Imprint India(Imprint India, 2019), Swayam etc.

Make in India is a Government of India initiative to boost the manufacturing sector, as the name suggests it concentrates on maximising domestic production in areas such as automobiles, electronics, pharmaceuticals, food processing etcetera(Make in India, 2019a). This not only increases domestic production but also provides employment, increases quality research, innovation and export. It is also aiming for reduced imports and dependence of goods from countries like China and giving more preference to exporting manufactured goods. One of its main aims is to attract industry leaders to make the investment in India for offshore facilities. The advantages that India has in this sector is that there is low-cost labour available, a requirement from domestic and international market and a necessity for several multinational companies to reduce their production cost by offshoring(Swaniti Initiative, 2017). The three core components Make in India are concentrating on are Easing of Licensing and Regulations, Developing Infrastructure and Foreign Direct Investment(Swaniti Initiative, 2017).

Trade Infrastructure for Export Scheme (TIES) is a trade infrastructure development scheme initiated by the Ministry of Commerce and Industry in 2017. The main objective of TIES is to boost export in the country by removing bottlenecks and harmful elements affecting the performance of related infrastructure, alongside creating new infrastructure that eases export efficiency and providing certification and grading to activities to ensure quality(Ministry of Commerce - India, 2017). Last year at least 16 projects were initiated in various regions under the TIES Scheme, including a cold chain(Economic Times, 2018). These initiatives alongside councils like EEPIC (Engineering Export Promotion Council) aims to increase export from India and increase the Balance of Payment, which as of 2017 is -38 Billion \$((The World Bank, 2019e). This can cause an increase in exports, and since 90% of the trade is via maritime transport, the primary benefactor will be the maritime transport industry.

Alongside Infrastructure development, one key component nowadays for any economic activity is information and its efficient flow. In Maritime Logistics, the absence of proper data interchange between stakeholders in Port, Liner, Customs and other related areas can lead to delays in the supply chain and reduces profits and efficiency. It is very crucial nowadays in this digital age, to have integration in information technology platforms used by logistics operators and related participants(Yavuz and Deligönül, 2017). As an initial step to ease up operations of exporters and importers, the Central Board of Excise and Customs, Government of India, implemented a single-window interface for trade (SWIFT). This allows the users to clear export and import shipments without physically visiting the relevant Customs offices. If there are exceptions during clearance and needs further inspection from appropriate ministries, this will be notified to the user, and this also will be approved online. From a Maritime Transportation perspective, this has a massive impact as Container movement speed can improve from Container Yard (import post-clearance) to Hinterland and vessels in case of exports, notably Less than Container loads (LCL).

Visakhapatnam Port, one of the major ports in India, was able to reduce average clearance lead time from 9 days to 4 days, within a year in 2019. This was done with the help of proper implementation and Single Window platform, Online Document submission portal E-Sanchit and Direct Port delivery (Times of India, 2019).

SWIFT along with other updated Customs initiatives such as EDI platforms E-Sanchit, Direct Port Delivery, Updated Authorized Economic Operator (AEO) and RFID e-seal Program comprises the radical reform 'Turant Customs'. This is in line with the national level regulation change to improve rankings in Ease of Doing Business (SRETTC, 2019). As with any country, their Customs and Border administration has a considerable impact on their effectiveness of trade, particularly international. Through Turant Bill of Entry and other documents are entirely online and removes issues related to paperwork which can lead to a reduction in dwell time.

With such development agendas and favourable economic, social and geopolitical environment, India can attract FDI to boost the economy. During five years comparison of FDI in India between April 2009-March 2014 and April 2014-March 2019, it was found to have more than a 60% increase (Make in India, 2019b). Most of the improvements in data flow and storage with regards to customs are in line with the national-level regulation change to improve rankings in Ease of Doing Business.

Another utmost factor in Port Sector or Maritime Transportation is Human Capital and knowledge management. Technical and management knowledge in Maritime Transport is very crucial in this dynamic and competitive field. For the survival of a maritime transporter, its workforce has to have knowledge either firm-specific or market knowledge, either of which can be learned through experience or undergoing training (Lee, 2010). Rather than learning through experience while on the job, it can be practical and cost-effective to give training in the form of workshops or executive education. The government of India has several initiatives in the field including Indian Institute of Foreign Trade (IIFT) and Indian Maritime University (Indian Maritime University, 2019) and NMIS (NMIS, 2019) Centre for Inland and Coastal Maritime Technology (CICMT) at IIT Kharagpur (Sagarmala, 2019).

2.2.1 Global Performance Indicators: Importance of Economic Performance Review

As with any commercial or non-commercial activity, it makes more sense to analyse its performance with review, measurements and finally ranking it amongst identical activities. Review and measuring are purely performance analytics, and ranking is finding the relative position amongst peers or competitors. Competition from ranking and social pressure is a known method to increase performance (Doshi, Kelley and Simmons, 2019), and it is evident from the fact that Indian ports use EODB as the main performance indicator in their operational strategies (Indian Ministry of Shipping, 2019a).

Ease of Doing Business (EODB) is a GPI developed by the World Bank to highlight the importance of regulatory performance. It ranks 190 countries. This GPI measures several sectors of business, including Starting a Business, Getting Credit, Enforcing Contracts, Trading across Borders, etcetera (The World Bank, 2019c). Amongst all these from a transportation perspective 'Trading Across Border' would be the essential measure the logistics sector would be interested in more. India ranks only at 80th position amongst the Sub GPI "Trading Across Borders" (The World Bank, 2019d).

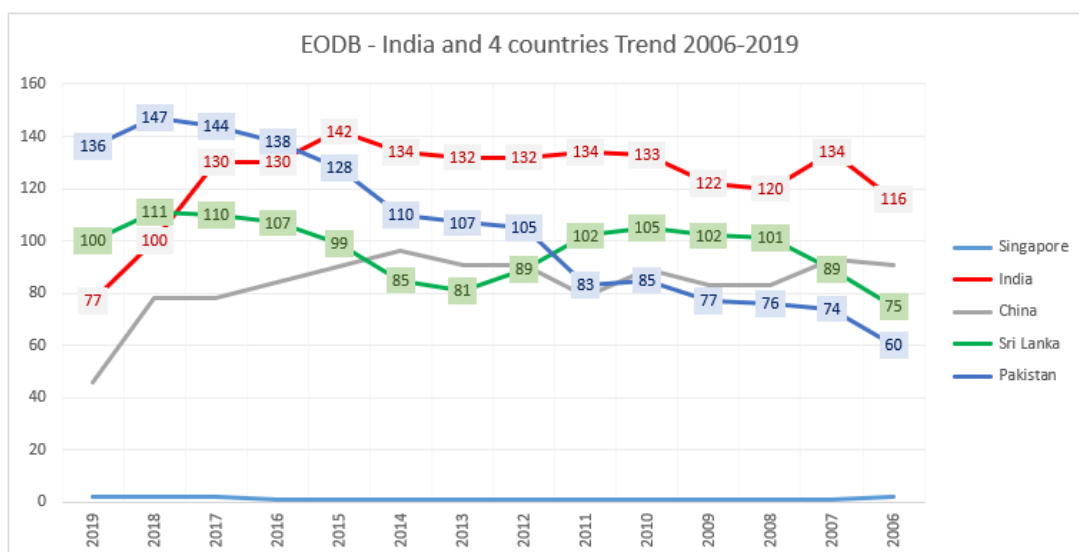


Figure 2.7 – EODB Rankings visualisation, source: adapted from (The World Bank, 2019d).

Jurisdiction	Singapore	India	China	Sri Lanka	Pakistan
Classification	Very Easy	Easy	Very Easy	Medium	Medium
2008	1	120	83	101	76
2009	1	122	83	102	77
2010	1	133	89	105	85
2011	1	134	79	102	83
2012	1	132	91	89	105
2013	1	132	91	81	107
2014	1	134	96	85	110
2015	1	142	90	99	128
2016	1	130	84	107	138
2017	2	130	78	110	144
2018	2	100	78	111	147
2019	2	77	46	100	136
12-year change	-1	43	37	1	-60

Table 2.3- EODB Rankings of 5 economies source: adapted from (The World Bank, 2019d).

To review the performance of India with regards to EODB, four other economies were used as reference: Singapore, China, Sri Lanka, and Pakistan. Singapore being the Top 2 in the EODB score(The World Bank, 2019d). China is a market leader and a role model in all economic activities for India. Sri Lanka being a country of interest in this thesis as it is the country India wanted to emulate or outperform when it comes to transshipment business. Pakistan was used as being its neighbouring country but also a country of various interests in various geopolitical, economic, and other reasons. The main changes in 12 years position with India and China, are that they both moved up by 43 and 37 respectively with regards to ranking. Singapore moved from the first position to second making way for New Zealand. Sri Lanka had fluctuating

ranking, but it came back one rank up within 12 years, not much increase in performance related to EODB in these spans of years. The biggest loser in ranks was Pakistan who came down 71 ranks to 147th position 2017. However, the current government did lots of reforms in 2018, particularly in 3 areas: starting a business, registering property and resolving insolvency and now they climbed 11 positions to 136th rank.

The main areas of Ease of Doing Business are: Starting a Business, Dealing with Construction Permits, Getting Electricity, Registering Property, Getting Credit, Protecting Minority Investors, Paying Taxes, Trading Across Borders, Enforcing Contracts, Resolving Insolvency and Employing Workers(The World Bank, 2019c).

To find the relation of GPI's to the maritime business every 11 measures can be studied, but for the sake of simplicity and relevance to Maritime transport, four factors have been selected including Trading across business enforcing a contract, getting credit and starting a business. As depicted in Figure 2.8 'Trading across Borders is concurrent with EODB final ranking, and India is ranked at 80th position, exactly half-way of the total 190 Countries. In 'Enforcing Contracts' India ranks second-last in the list, just ahead of Sri Lanka. This shows that the legal aspect of India is weaker considered to other countries; the time to resolve legal conflicts and complexity is burdensome. This might can deter many companies to invest in India as contract and Standard Operating Procedures are the primary legal instruments that bind the stakeholders or partners legally in each node and link in the maritime supply chain. Some nodes or links may be out of the country and might be ruled by international conventions like Hague-Visby Rule's etcetera. Majority of the transaction near in port and hinterland will come under the jurisdiction of national law.

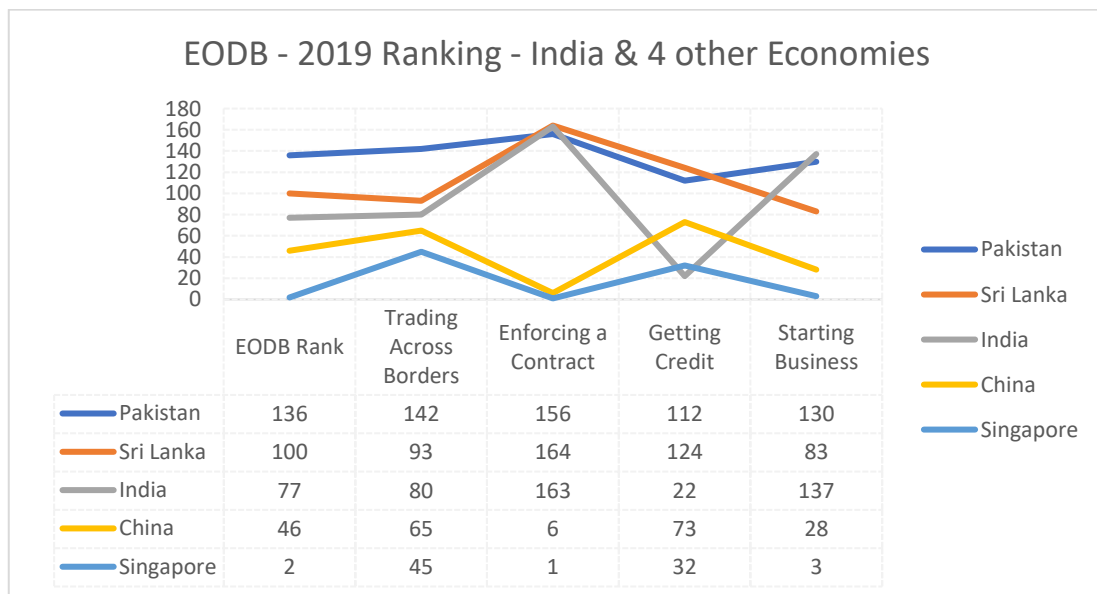


Figure 2.8 – EODB & Components 2019, source: adapted from (The World Bank, 2019d).

Another GPI that measures logistics performance is the Logistics Performance Index (LPI). It is implemented, assessed and maintained by The World Bank in an aim to find a ranking of nations with regards to trade logistics. Six areas(The World Bank, 2019a) are measured to find the LPI:

1	Customs: Performance of clearance with regards to Customs/Border
2	Infrastructure: Efficiency of Transport and Trade structure
3	International Shipments: The effortless availability of suppliers to arrange feasible shipments
4	Logistics quality and competence: Access to competitive and quality logistics service
5	Tracking and Tracing: Traceability and transparency for shipment status
6	Timeliness: Aggregate efficiency of logistics fulfilment

Table 2.4- Logistics performance Index's core components, source: adapted from (The World Bank, 2019a).

For a country, each of these six components is measured and ranked which also presents several aspects of logistics that can be improved. In Figure 2.9, India's 2018 LPI data is compared with four other relevant economies' LPI. Singapore is depicted as a competitor in the transshipment sector and Rank 7 in LPI. China is a direct competitor with India not only in transshipment but in several other sectors. Sri Lanka's data is relevant as they have Colombo the biggest transshipment hub in the region and competitor for Indian ports. Pakistan is India's neighbour, and both were a single nation before partition, it also competes with India in many sectors. From the ranking, China is number 26 in overall LPI Ranking and India at 44.

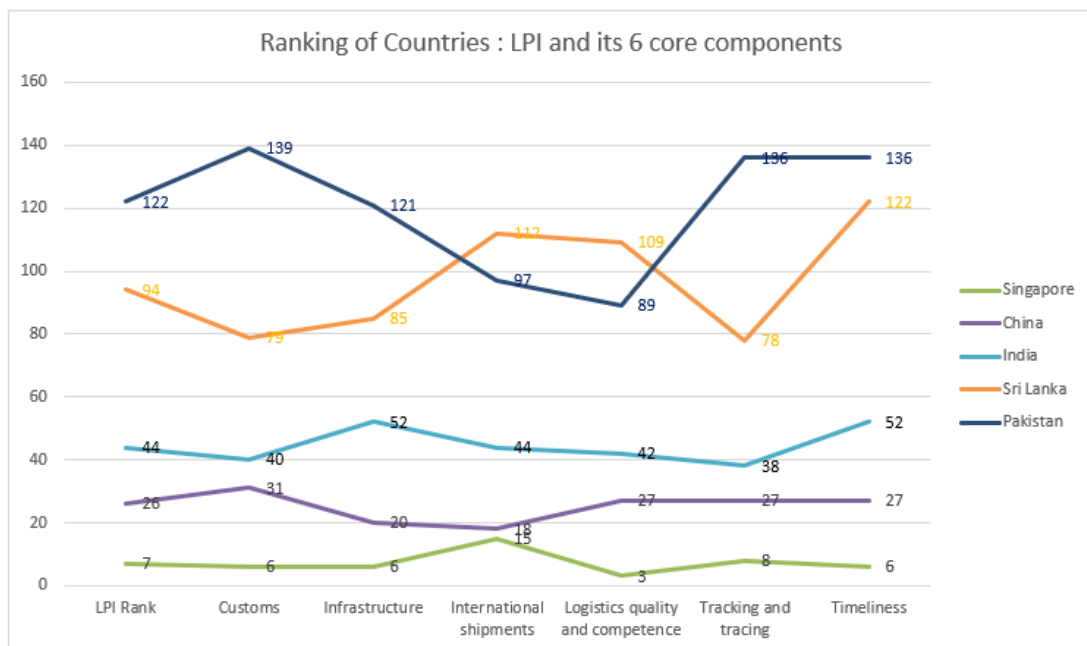


Figure 2.9- Comparison of India & 4 economies LPI Components (2018) source: adapted from: (The World Bank, 2019a).

In each of the six segments ranking, China leads in all the six segments of LPI when compared with India and the gap between each metric is big. Overall China is in Rank 26 and India at Rank 44 out of 160 countries (Figure 2.9). This highlights that even being the biggest economy does not mean Logistics performance can increase concurrently. India's competitor in transshipment is rank 94 out of 160 and India's

neighbouring country Pakistan is in the fourth quadrant with a rank of 122. Bangladesh is at hundredth rank position and comparatively they have enough the potential to increase the ranking considering many companies are preferring them for offshoring production and them are the economy that achieved 167 percentage increase in size (GDP size from 102 Billion \$ to 274 Billion \$) in the last 10 years(The World Bank, 2019e). This increase is ranked fourth in the world ranked just before the China position. Landlocked nation Nepal has a rank of 114, which is surprising as it overtook Pakistan, which has a strong maritime economy and has an economy ten times bigger than Nepal(The World Bank, 2019e). From the perspective of Terminal Operator/Liner Business, the most significant area will be Infrastructure as it deals with the efficiency of transport and trade facilities, including Ports, Roads, Inland waterways, etcetera.

Country	LPI		Customs		Infrastructure		International shipments		Logistics quality and competence		Tracking and tracing		Timeliness	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Germany	1	4.2	1	4.1	1	4.4	4	3.9	1	4.3	2	4.2	3	4.4
Singapore	7	4.0	6	3.9	6	4.1	15	3.6	3	4.1	8	4.1	6	4.3
China	26	3.6	31	3.3	20	3.8	18	3.5	27	3.6	27	3.6	27	3.8
India	44	3.2	40	3.0	52	2.9	44	3.2	42	3.1	38	3.3	52	3.5
Sri Lanka	94	2.6	79	2.6	85	2.5	112	2.5	109	2.4	78	2.8	122	2.8
Pakistan	122	2.4	139	2.1	121	2.2	97	2.6	89	2.6	136	2.3	136	2.7

Figure 2.10- Comparison of India & 4 economies LPI(2018) Components grades and relative score, source: adapted from (The World Bank, 2019a)

Practically an increase in EODB Rank means an ideal increase in LPI as well. When comparing the Ease of Doing Business Ranking with LPI, we can see that LPI increases with EODB Rankings or there are no extreme cases with weak LPI and strong EODB. However, the variance in lower EODB than LPI Ranking can mean that EODB is a harder metric to achieve than LPI, as it pertains to broader economic segments than LPI. Moreover, it all depends on which area the country wants to focus on

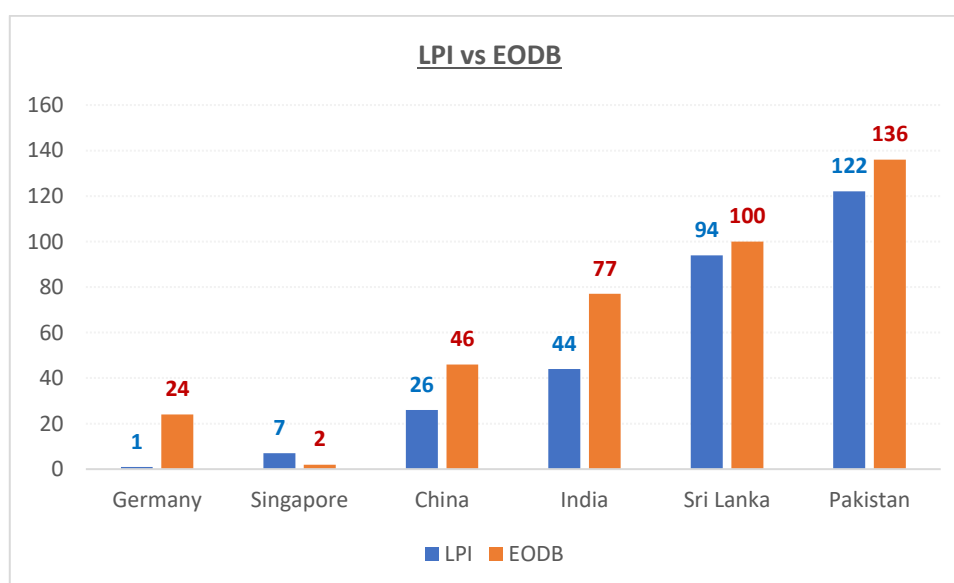


Figure 2.11- Comparison of India & 4 economies LPI vs EODB: adapted from (The World Bank, 2019a)(The World Bank, 2019d)

Comparing the four indicators together, we can see the relative position of India when it comes to throughput rank, economy size, Ease of Doing Business Rank and Logistics Performance Rank. As Container throughput is the leading ranking and second preference is GDP size rank, United Kingdom, France, Italy, Brazil, Canada and Russia, the countries included in the Top 15 largest economies Rankings are not listed as they are not in the list of Top 15 highest container throughput. Although metrics such as EODB and LPI cannot be an actual factor that will decide the market share and higher container throughput, these can be a valuable guideline for Liner and other trade businesses to decide when they plan to increase their investment in a country.

When a firm has a potential investment plan or expansion plan in a country, these GPI's are a guideline that can provide an idea of what would be the strategy they would need to implement. As mentioned in the literature review about the Port Choice strategy, there are several factors a Liner business needs to keep in mind before planning an investment in a country. Keeping this in mind, the government can improve each area by investing in the top priority sector with these types of GPI instruments provided by institutions such as The World Bank and WTO.

To understand why India has comparatively lesser throughput, other factors affecting trade performance should also be considered. Alongside the above indicators, there are Global Ranking tools to analyse the performance of a country. These Global Performance Indicators (GPI), such as Ease of Doing Business (EODB) and Logistics Performance Index (LPI) measures transaction values and standards across various sectors by institutions such as World Bank, World Trade Organization, etcetera. GPI rankings help a country to understand which area it is lacking and how it is performing as compared to its peers, helping it to plan necessary reforms and improve its position(Doshi, Kelley and Simmons, 2019).

Data from database : World Development Indicators(as of July 2019)
Indicator Name : Throughput Rank/GDP Rank/EODB Rank/LPI Rank

	Country Name	Income Group*	Cont. Throughput Rank	GDP Rank	EODB Rank 2019	LPI Rank 2018
1	United States	High income: OECD	2	1	8	14
2	China	Upper middle income	1	2	46	26
3	Japan	High income: OECD	6	3	39	5
4	Germany	High income: OECD	9	4	24	1
5	India	Lower middle income	13	7	77	44
6	Korea, Rep.	High income: OECD	4	12	5	25
7	Spain	High income: OECD	10	14	30	17
8	Indonesia	Lower middle income	12	16	73	46
9	Netherlands	High income: OECD	11	17	36	6
10	Belgium	High income: OECD	15	23	45	3
11	United Arab Emirates	High income	7	28	11	11
12	Singapore	High income	3	33	2	7
13	Hong Kong SAR, China	High income	8	34	4	12
14	Malaysia	Upper middle income	5	35	15	41
15	Vietnam	Lower middle income	14	44	69	39

Figure 2.12- Top 15 Countries' Container port traffic vs GDP Rank, EODB and LPI source: adapted from (The World Bank, 2019b) and (The World Bank, 2019e).

2.2.2 Significance of economic performance of India and Transshipment Hubs

For Liner businesses to be interested in increasing their area of operation and presence in India, the government would not only have to improve Seaport, reduce charges and other port-related activities, but also improve the hinterland economy and feeder services and economy associated with it. As India is one of the biggest export markets in the world, an overall improvement in the economy is required to attract major liner alliances to India. This increase in traffic would be in the pendulum service or the hub-to-hub direct trade in the transshipment network. As along with Containers to be shipped as transshipment there will be direct shipments from important hubs to Indian transshipment hub which goes into hinterland via rail or road. Rise of Port

The rise in trade volumes is a significant factor for Shipping Lines to concentrate in the sub-continent. In the case of Singapore it is known that aside from the strategic position in Strait of Malacca, a resourceful port community and associated port infrastructure was essential for the success of Singapore as a Transshipment Hub(Lee and Cullinane, 2016). In almost all the GPI rankings Singapore is on the top, and this is concurrent with the fact that to be a thriving transshipment Port, the first measure is to have an increased growth in trade which can increase investment in developing maritime transportation infrastructure and develop an active port community. Port is said to attract firms to get the advantage of proximity to the centre of economic activity, around 8% of economic effect from the port is from this type of firms(Yochum and Agarwal, 1987). A study on the factors for the emergence of North African Ports as a threat to Mediterranean ports transshipment business share was attributed to main four factors, a) Lower Cost, b) easier legislation c) port location and d) ports nautical features(Notteboom, Parola and Satta, 2013). For a country looking

for a competitive transshipment hub, the former two factors can be realized with reforms and from the latter two ports nautical features can be developed to an extent with financial implications, but port location is fixed and only thing authorities can attain is choosing the best location from the available coastal area and develop it.

To study the performance of a transshipment port or gateway ports, it is required to research the institutional setup which is the main factor for the development of the infrastructure and regulation, about the country or region. It depends mostly on their strategy, how the organisation can be successful (Appelbaum, St-Pierre and Glavas, 1998) in the long run. One of the main successes for Singapore is its early investment in container terminals (1980) and the government's interest in developing the Port and Maritime Transportation Industry (Lee and Cullinane, 2016).

Having a robust maritime activity other than in Transshipment helps the ports to be strong in value-added services including Ship Repair, Bunkering, Liner office etcetera. In the Case of India Government realised that to have a growth in Container volume, they need Transshipment Hubs. Transshipment Hubs required low-cost service and a bigger draft, but similarly imperative is the presence of port clusters just like in the case of Singapore. The government of India, with its Sagarmala project, has the vision to make India a major transshipment hub in South Asia and aims to be the next Singapore (The Wire, 2018).

2.2.3 Major Ports of India and New Port Projects under development

Indian Port Act 1908 defines that all major port has to be under the direct supervision of the Central government through an Act, Major Port Trust Act 1963 (Dappe and Suarez-Aleman, 2016). From around 200 Indian ports, 11 of the Major Ports are under the jurisdiction of Port Trusts under the Indian Port Act 1908 and Major Port Trust Act 1963, while Ennore port is a corporation under the Indian Companies Act (Dappe and Suarez-Aleman, 2016). These Ports handle around two-thirds of the country's cargo (Business Standard, 2016).



Figure 2.13- Twelve major Ports in India. source:(Maps of India, 2019)

As per Sagarmala Project, six major ports is to be developed in India(IBEf, 2019).

A 13th proposed major port is planned in Colachel, (Enayam Port) with a 3.9 Billion USD investment, which is poised to be a significant Indian transshipment hub(The Economic Times, 2016).

Greenfield Port project based in Vizhinjam, a state government project under Landlord Model, which is also projected to be a significant player as a transshipment market(Seanews, 2019). Vizhinjam has two of the main features of transshipment hubs, the deep draft of 18 meters and proximity to the east-west trade lane (AECOM, 2012). As per the projections that were done in 2012 (timelines not achieved due to delay in construction), around three-fourth of the container traffic is expected to be transshipment associated (AECOM, 2012).

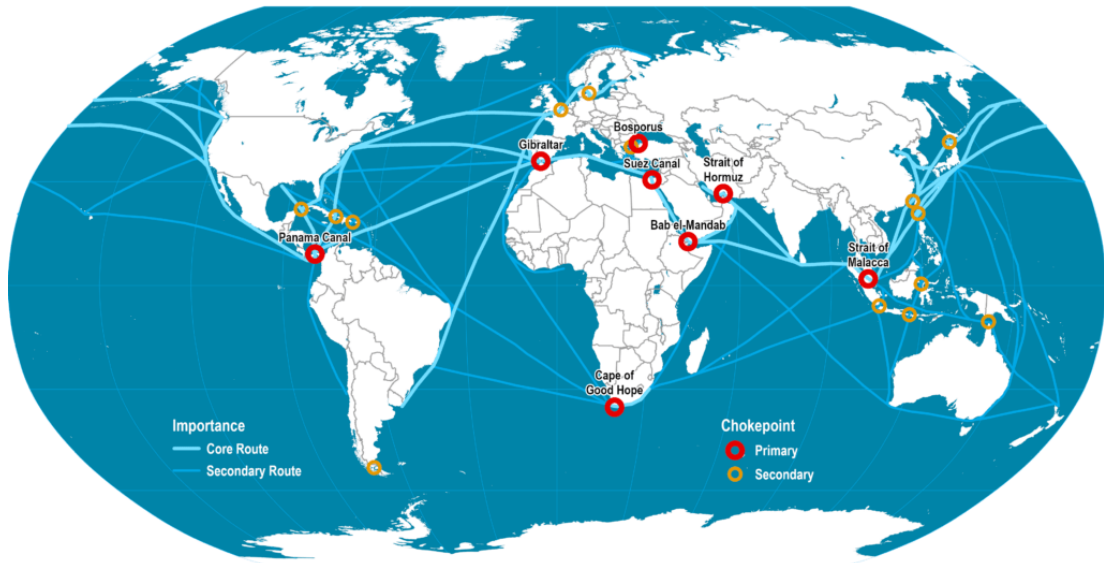


Figure 2.14- World Trade Lanes and Trade Centers. source:(Rodrigue, 2019d)

Container Traffic(TEU) 2017-18

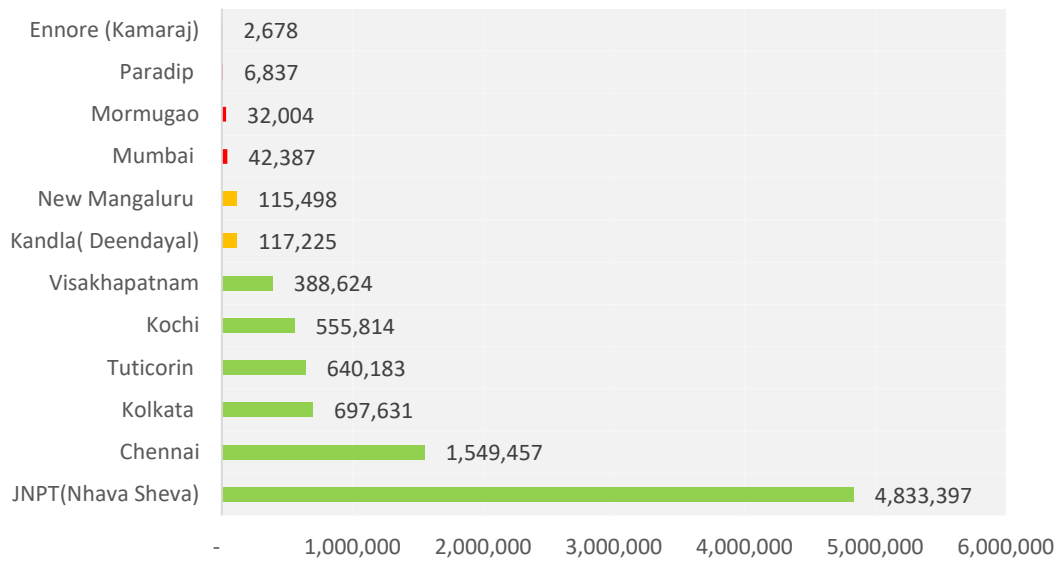


Figure 2.15- Top 12 Indian Ports Container throughput, source: adapted from (The World Bank, 2019b)

Container Traffic(Growth% YOY) 2017-18

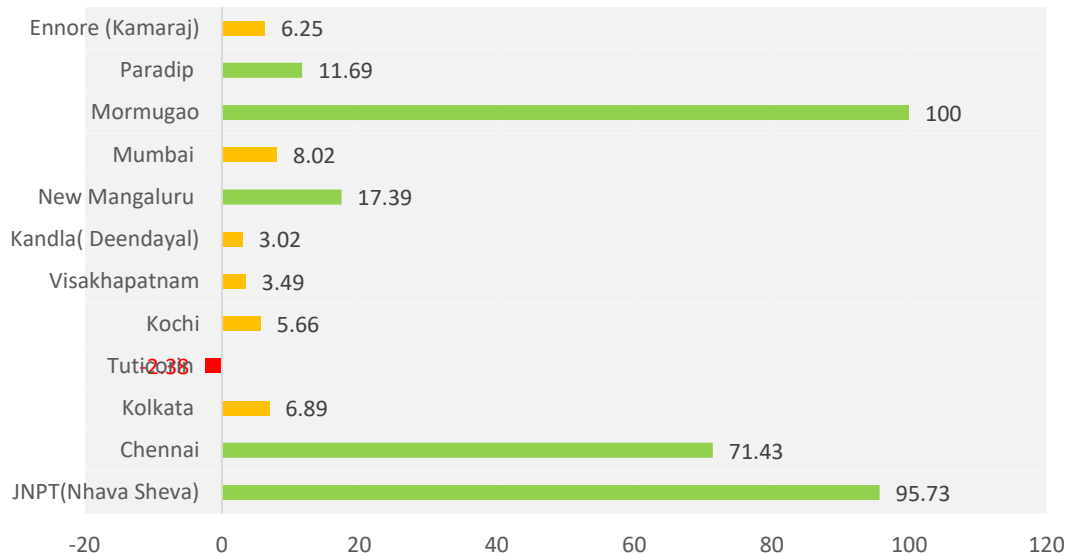


Figure 2.16- Top 12 Indian Ports Container throughput YOY increase 2018, source: adapted from (The World Bank, 2019b)

2.2 Role of Government of India in the Maritime Transport Sector

A study on the future of Container trade indicates the potential leading role of India in global trade and envisions offshoring shifting to India from East Asia (McKinsey, 2017). As per the report, which predicts major disruptions and technological changes India can achieve exceptional growth by investing and improving in Infrastructure, market transformation, reducing trade barriers, cost amongst others (McKinsey, 2017).

In the future, India is expecting an increase in Maritime Trade and 20% of this is expected to be in Container Trade (Indian Ministry of Shipping, 2016a). However, this potential increase in trade flow cannot be handled efficiently with current infrastructure, and there could be potential bottlenecks, including transport shortage or increased dwell times for vessels. Aside from normal gateway operations, to increase the quality of connectivity and decrease the cost most

One chief problem identified with slow transshipment growth is identified as cabotage rules in India.

2.3.1 Cabotage Rules impact on Transshipment and Coastal Trade

A change in policy that was implemented in India, to improve Transshipment volume is Cabotage relaxation. Indian Cabotage law which comes under the Merchant Shipping Act 1958, was implemented as a protectionist measure to give competitiveness edge for Indian flagged vessels in coastal trade within India (Safety4sea, 2018). Under Section Cabotage rules required foreign-flagged vessels to obtain a license from Directorate General of Shipping to engage in coastal trade or to move containers in feeder vessels from the hub. Relaxed cabotage rules imply that foreign-flagged ships can now operate its feeder vessels in container transshipment operations which can boost port volumes for transshipment., and this will reduce cost and lead time to traders in India (The Hindu, 2018).

Same as in the case of the United States of America's Merchant Marine Act of 1920 or Jones Act, cabotage rules protect national shipping industry, but it, in turn, reduces the supply of shipping services and increase the vessel chartering cost or freight (Agama and Alisigwe, 2018). Although the objective of cabotage is purely to support the Domestic shipping industry, in this age of globalisation, such strict regulations can affect the cost and ease of international trade.

This move is criticised by Domestic Shipping Liner Business who sees this as a threat from an entry of foreign liners who have better feeder fleets and can provide competitive rates, which can deteriorate already weak Indian Shipping Companies (Bloomberg, 2019). There are several other valid points against removal or relaxation of cabotage rules, mostly from the owners of national flag bearing ships, National Seafarers Associations and advocates of the strong national fleet. As per International Transport Workers Federation, a nation concentrating on being a power player in maritime transport should have a firm policy to protect its national shipping industry and support an ample supply of indigenous workforce, as both of these add value to the national economy (Nautilus International, 2018). GST also plays an integral part for foreign-flagged vessels as a competitive advantage with regards to cabotage rule, Indian flagged vessels will be charged 5% GST while foreign vessel will be exempted who can lower the freight cost further lower (Bloomberg, 2019). ITF also stresses that allowing the foreign flag to have equal standing in the country can flout environmental regulations and support the exploitation of the workforce through Flag of convenience, and can be a threat to national security (Nautilus International, 2018). Shipping Industry uses Flag of convenience to reduce expenses and remain competitive in the field, allowing cabotage relaxation allows these players to exploit the labour, environment and other regulations to have the upper hand on the Indian Shipping fleet. Following the announcement of the revision of cabotage, several fleet owners have threatened to reflag their Indian fleet to Sri Lankan flag to remain competitive (Businessline, 2018).

One another main reason cabotage rule is being implemented is due to the incapability of Indian Container vessel fleets to support the potential increased shipment volume in the coming years (Ship Technology, 2018). The current feeder market cannot provide the flexibility, feasibility, and connectivity with a heterogeneous market with foreign players can give. It will also remove the strain from rail and road networks by cheaper coastal transportations which helps in reducing Greenhouse Gas emissions by a third (Ship Technology, 2018). Also, this new fleet will boost bunker sales (S&P Global, 2018) and provide additional investment and revenue in areas such as Maintenance, Repair, and Operations (MRO), Spare parts, etcetera. Repositioning of empty containers is a significant hurdle in port operations and is directly related to the cost and performance of both port and liners. Liner's principal goal in container management is continuity of paid movement and idle containers are seen as asset underutilization (Rodrigue, 2019a), and it is evident for the port that empty container takes up space and effort to reposition it. A significant issue faced by Liners, where the empty container in several Indian ports while there was a shortage of container shortage at nearby foreign ports, and with the implementation of cabotage relaxation, these empty containers are allowed to be picked up and repositioned feasibly by foreign vessels (S&P Global, 2018).

Despite of all the protests, Indian government is determined to make Indian feeder operation easier not just with easing cabotage rules but also from the forthcoming plan for Ministry of shipping to ease 'Right of First Refusal' or RoFR, so foreign flag vessels can compete with Indian vessel operators for national transportation of bulk,

liquid, RORO etcetera. The plan was to give equal preference to Foreign Flag vessel with Indian Vessels so that more international feeder operations can invest in the market. Very recently the RoFR was eased in favour of Indian built Vessels for Chartering(Press Information Bureau, 2019), due to protest from the Shipyards, Vessel Owners and other organisations.

The main objective of Government of India is to increase participation from foreign vessels in the feeder market which can The increase in low cost and ample feeder service supply was very relevant in the case of Port Tanjung Pelepas , where many Container liners preferred and transferred their transshipment operations from Singapore to this port(Lam and Yap, 2008). Even though Hub to Hub direct volumes will attract liner business, availability of feeder service is the priority for a transshipment hub(Lam and Yap, 2008).

After the rule was passed for cabotage, there was a substantial increase in transshipment activity in ports, such as ICTT, Kochi the only pure transshipment hub in India. There was an increase of 67.7 per cent in August, month on the month against July 2018(JOC, 2018c). The impact of firms or nations strategy can be analysed by the effect it has on its competitor much similar to game theory, after the reform Srilanka realising the potential it has on attracting traffic, reduced the transshipment charges by 9.5 percentage(Lankaweb, 2018).In a recent study, it is estimated that around half a million TEU of domestic cargos are shipped direct without depending on foreign transshipment hubs(JOC, 2019a).

Even with Cabotage reforms and softening, it may not lead to an increase in transshipment volumes in the long run if the country's Port infrastructure and regulations are not productive (Llanto and Navarro, 2014). The Indian government is concentrating on its policy and Infrastructure by initiating a Port led development project 'Sagarmala'.

2.3.2 Sagarmala: Port led Development

The current government has many initiatives to advance the position of India in maritime transportation, and the most critical Port-based development is Sagarmala. This program was announced in 2016 during Maritime Summit 16, the first one of its kind in the nation(Indian Ministry of Shipping, 2019a). The beneficiaries for this program are Ports and its workforce, Population in port-centric areas which can have CEZ (Economic Zones), Logistics sector and all the supporting services related to the Maritime industry(Vision IAS, 2018). With the project Sagarmala India aims for the below:

Concentration on increasing Intermodal options to reduce domestic freight
Reducing the Logistics price of bulk commodities by planning coastal industrial facilities
Bringing more investment in for port-centric industrial and logistics clusters
Reducing Container transports lead time for exporting and importing

Table 2.5- Objectives of Sagarmala Project source: adapted from (Vision IAS, 2018)

Components of Sagarmala comprises of below:

1. Transformation and Updating Current Ports and Building New Ports: Removing chokepoints in Port supply chains, updating Capacity and quality of Port Infrastructure. Investment in New Port and supporting infrastructure.
2. Improving Port Connectivity: Improving network both in Maritime and hinterland regions including Inland and Coastal water transport.
3. Investing in Port centric logistics clusters: Focusing on port-centric logistics and attracting investment from manufacturing and trading sectors in special economic zones and logistics clusters
4. Coastal Community Development: Advancement of Coastal communities through education and employment, enhancing access for local people to tap into the blue economy

Table 2.6- Components of Sagarmala Project source: adapted from (Indian Ministry of Shipping, 2019b)

Out of these first two components are crucial for transshipment hubs, Port Modernization/New Port Development, and Port Connectivity enhancement.

Summary of projects under Sagarmala

Project Theme	2018-2019		2019-2020		2021-2025		2025-2035		Total	
	Total Projects	Project Cost (Million \$)	Total Projects	Project Cost (Million \$)	Total Projects	Project Cost (Million \$)	Total Projects	Project Cost (Million \$)	Total Projects	Project Cost (Million \$)
Port Modernization	133	6,955	74	3,540	37	7,510	8	1,495	252	19,500
Port Connectivity	110	10,756	63	7,305	60	14,866	3	54.6	236	32,982
Port Led Industrialization	18	20,626	6	670	31	34,121	0	-	55	55,417
Coastal Community Development	36	367	29	644	2	21	0	-	67	1,032
Total	297	38,705	172	12,159	130	56,518	11	1,550	610	108,931

Figure 2.17- Projects under Sagarmala and its Budget: adapted from (Indian Ministry of Shipping, 2019c).

One of the solutions from Origin to Destination Study by the Ministry of Shipping is to have a transshipment hub with 10-12 million TEU (Indian Ministry of Shipping, 2016a).

2.3 Transshipment Volumes from Neighboring Countries.

As Transshipment relies mainly on the main trunk routes connectivity about major trade lane and the cheap and flexible availability of feeder connection from hub ports, Government of India need to provide a feasible solution in both areas.

One of the prominent upcoming trading economies is Bangladesh, for which India is a key trading partner with increasing bilateral relations. Bangladesh's economic growth related to GDP, throughout the past years is highly commendable becoming 42nd largest economy from 62nd largest economy in just ten years. Bangladesh is the second-fastest growing economy in the world considering a span of 5 years (from 2014 to 2018) with an increase of 59% increase in GDP from 2014.

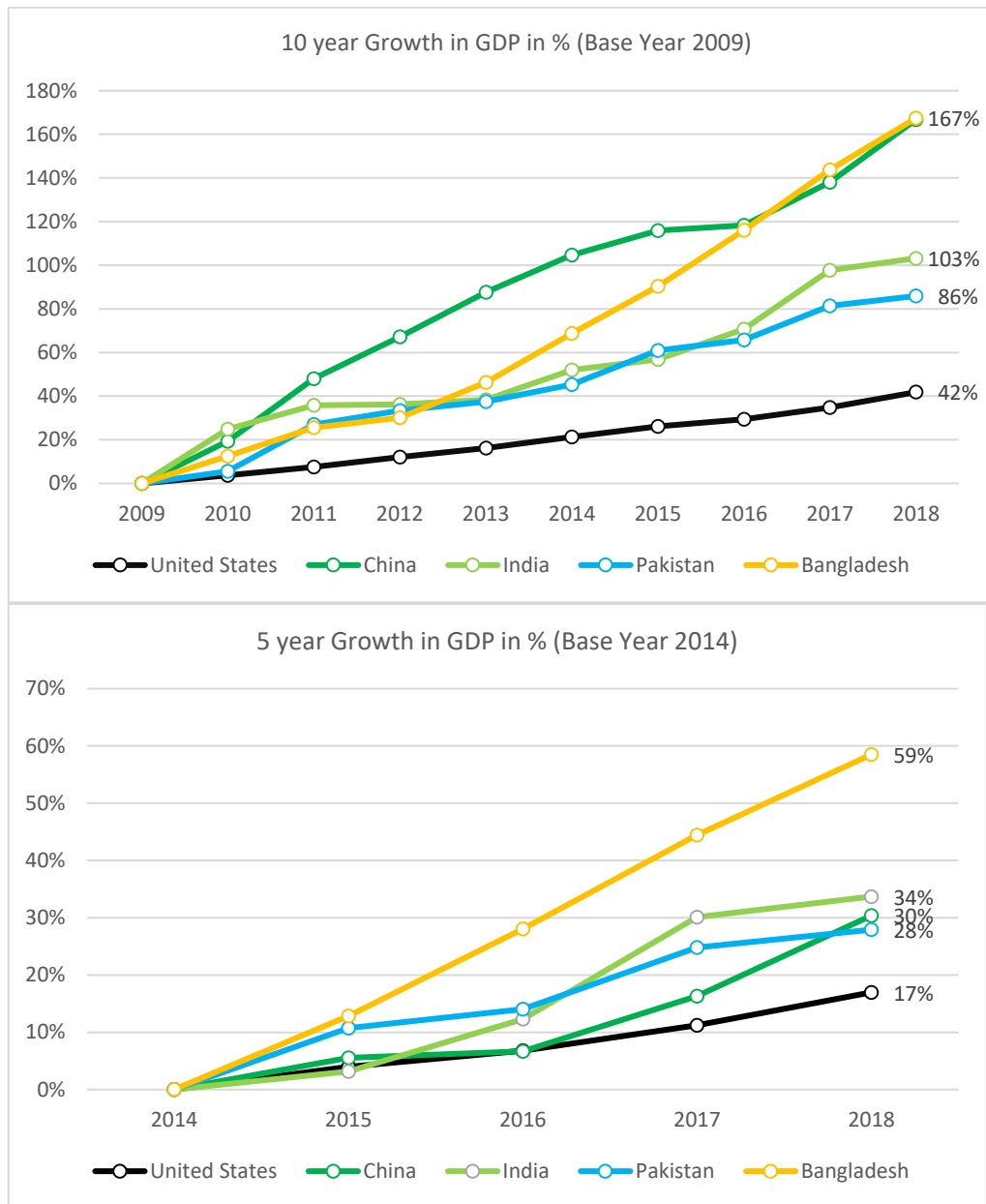


Figure 2.18- GDP Growth(Relative) of Bangladesh -5 & 10 years, source: adapted from(The World Bank, 2019e).

Bangladesh exported 39.2 Billion \$ worth of goods and out of that 91% is textiles(OEC, 2019a) which is a commodity that typically relies on Container transportation(International Trade Center, 2019) even in its raw form cotton or finished goods. Bangladesh imports were 44 Billion Dollars, and 16% of it is from India(OEC, 2019a). India is the second-largest cotton producer in the world exports on a large scale to Bangladesh, and since sending by sea is quicker and cheaper, exporters resort to sea ship it(Maritime Gateway, 2019). The goods from different parts of India are shipped from Gateway Ports like Nhava Sheva Port to transshipment hubs such as Colombo, and from there to Bangladesh(Maritime Gateway, 2019), this is due to lack of a major transshipment hub in India. Liners do not want to operate in this route due to the imbalance of massive export from India to Bangladesh and lesser volume

in return(Maritime Gateway, 2019). Agreements between India and Bangladesh does not allow the coastal vessel to carry a third country's goods, and for this reason, Main Line operators do not offload foreign goods destined to Bangladesh in India and instead ship it to transshipment hubs such Colombo or Singapore(Maritime Gateway, 2019).

Another biggest potential for transshipment for India is export the size of 39 Billion \$ from Bangladesh to Europe, US, Middle East etcetera, of which 91% is textiles(OEC, 2019a) which are shipped by containers. Bangladesh has a great outlook on container throughput with an average 10% growth yearly with a 2.6 million TEU in 2017(The World Bank, 2019b).

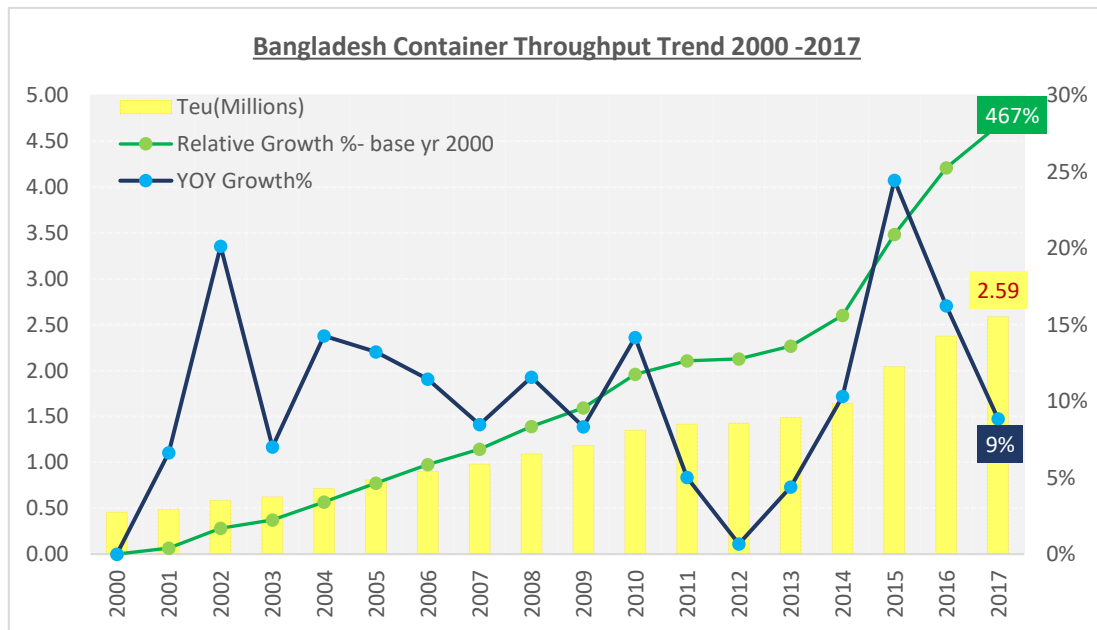


Figure 2.19- Container throughput trend -Bangladesh -2000-2017.source: adapted from(The World Bank, 2019b).

Currently, Bangladesh lacks Deep Seaport and uncertainty of Return of investment is preventing them from developing a major deep-sea port(Ship Technology, 2019). Due to a lack of transshipment port in India, Bangladesh is resorting to using Colombo as a transshipment hub(Port News, 2018). Ideally, a transshipment hub on the East coast of India would help to tap into this market which is currently lacking at present. Currently, GOI is proposing neighbouring countries to use ports on the west coast to transship goods, and three ports are being built including Vizhinjam Port to rope in the transshipment traffic (Ship Technology, 2019).

India is the principal trade partner for Nepal, as 63% of its imports and 54% of its total exports are with India(OEC, 2019b). Nepal has been using Indian Port in Calcutta, and the lead time is 90 days(Reuters, 2018). Nepal sees India monopolising with its ports and providing Poor service lead times, and China taking advantage of this situation has offered access to its Dry port and Seaport and proposed a railway project for connectivity to its Seaports(Quartz, 2019).

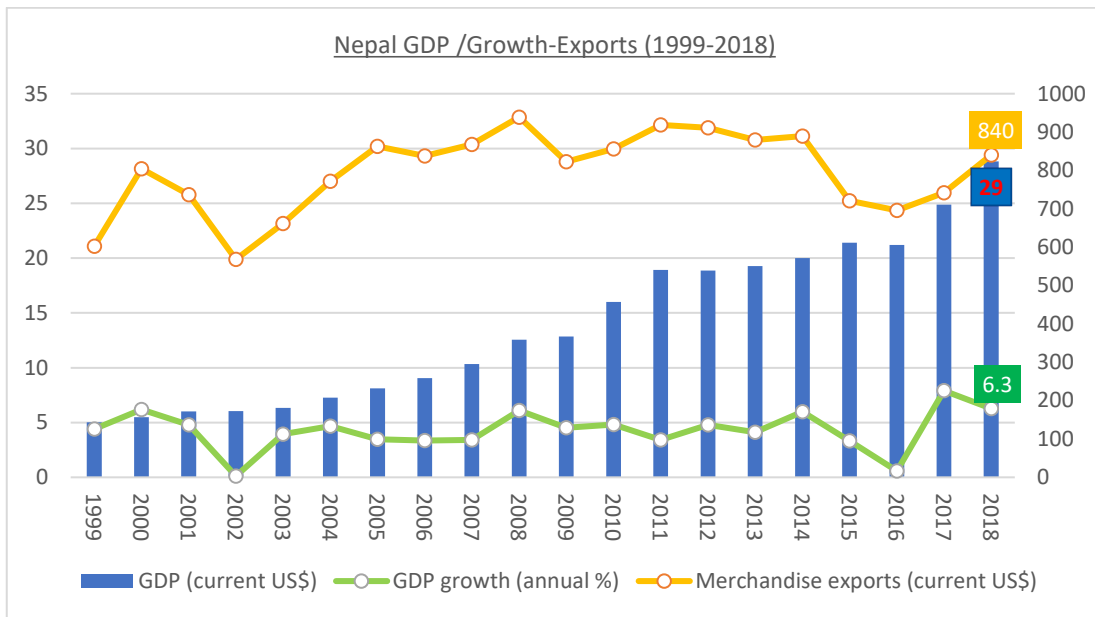


Figure 2.20- Nepal GDP (in Billions), GDP Growth and Export (in Millions). Source: adapted from(The World Bank, 2019e).

Although the trade volumes are less for Nepal, approaching a neighbouring competing country such as China, as the services India provide are not helpful to their economy, is highlighting the ineffectiveness of diplomatic and bilateral and economic relations with that country. If India had an efficient Transshipment hub, all these traffics would have been diverted to those ports and helped in increasing the traffic.

In the upcoming sections, a study on transshipments operations its criteria's and how it applies in the situation of India will be reviewed.

2.4 Transshipment types and Operation

As transportation particularly maritime has a derived demand, it is continuously optimising and improvising itself to meet the fast-paced and evolving global supply chain. To tap into the economies of scale of operations, container liner industry is increasing the size of the container vessels with each new vessel and are using the latest technologies in navigation, loading and route selection. All these updated specifications put a strain on the resources and infrastructure of the ports. With the advent of mega container ships, the ports that are affected are one with shorter drafts. These ports do not have enough draft for a mega-ship to berth. The Container liner business in order to avoid connectivity issues in the network started implementing the Hub and spoke model. In this model, the mega vessels connecting to the hub port (or transshipment port), offloads the required containers which are then dispatched to spokes or smaller ports using feeder vessels. The key alliances and liner networks are using the service called pendulum service which connects the major hub ports in US West Coast- Europe -Far East trade route with a Post-Panama vessel (Notteboom, 2009), from these hub ports the smaller feeder vessels connects to smaller ports. As per (Notteboom, 2009) this factor has not arisen from cost reduction but supporting customer requirement, wherein they are willing to pay for extra charges for quicker connectivity to smaller ports. Also, it is in the best interest of Container Liner business to render service with a widespread and competitive maritime network

covering most major ports, even the ones that have shorter drafts. Around 28% of global container throughput is Transshipped (Notteboom, Parola and Satta, 2013).

The types of transshipment include Hub and Spoke, Interlining and Relay and the former comprise 85% of the total while the latter two combined is only 15% (Notteboom, Parola and Satta, 2013). Hub and Spoke use a smaller feeder vessel for the second leg from the hub while Interlining and Relay use Deep Sea vessel (Notteboom, Parola and Satta, 2013), the latter two came into effect as a solution to higher feeder vessel charges. Due to its operational characteristics, gateway ports cannot handle more transshipment than their direct origin-destination shipments; hence, hub ports called pure transshipment ports came into existence (Rodrigue and Ashar, 2016a). As provided in Figure 2.21, ports with its level of Transshipment incidence can be categorised either as Gateway, Regional Gateway, Hub Port or Pure Transshipment Hub (Reda, Harraz and El-Tawil, 2016).

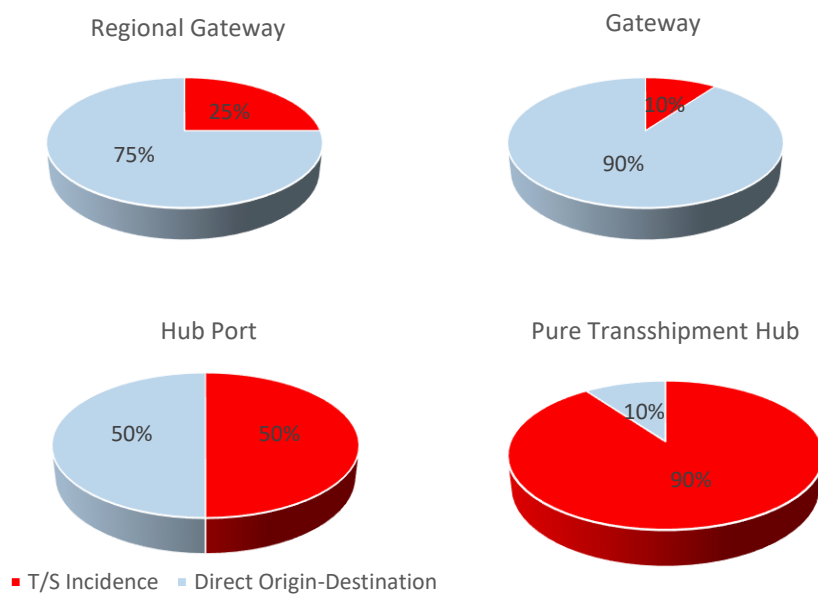


Figure 2.21- Ports and Transshipment Incidence, source: adapted from (Reda, Harraz and El-Tawil, 2016)

As we can see from Figure 2.21, a Pure Transshipment Hub (or Pure Transshipment Port, PTP) requires having transshipments, more than 90% of its total container throughput. To remain as a competitive Pure transshipment port, one of the main criteria is lower margins aside from large scale infrastructure requirements to handle motherships and prevent liners from shifting to competitor ports (Ashar, 1999).

Since this study is about the possibility of a potential Transshipment hub, the main characteristics for a Transshipment hub need to be reviewed from past literature.

As requirements in various studies are based on specific ports or a group of ports, there is a varying array of technical and physical characteristics being ranked, so a Literature review matrix is being used to understand further:

Name	Author	Method	Characteristics
The relationship between transshipment incidence and throughput volatility in North European and Mediterranean container ports	Theo E. Notteboom, Francesco Parolae, Giovanni Satta	Mixed Quantitative Methods-Trendline Approach/STDEV Approach	Position/Connectivity-Ownership
A Model for Analysing the Transshipment Competition Relationship Between the Port of Hong Kong and the Port of Kaohsiun	CHOU Chien Chang	Mathematical Programming Model/Sensitivity Analysis	Lower Port charges-Quality of Port Services
A Model of Container Transshipment Port Competition: An Empirical Study of International Ports in Taiwan	Wen-Chih Huang, Hsu-Hsi Chang, and Ching-Tsyr Wu	Quantified SWOT Method/ Integer Programming Method	Position/Connectivity-Feeder Network
Competition for transshipment containers by major ports in Southeast Asia: slot capacity analysis	Jasmine Siu Lee Lam & Wei Yim Yap	Mathematical Model – Annualised slot capacity	Position/Connectivity-Feeder Network
Container Transshipment and port competition	Min Ju Bae, Ek Peng Chew, Loo Hay Lee & Anming Zhan	Gaming Theory/ Port Collusion Model/ Social Optimum Model	Lower Port Charges-Less Route charges-Port Volume and Size
Economic Analysis of Container Transshipment in the Eastern Mediterranean Region	Enver Yetkili, Ertugrul Doğan, Sencer Baltaoğlu, and Ilkay Salihoglu	Economic Analysis	Feeder Network
Evaluation of Transshipment Container Terminals' Service Quality in Vietnam: From the Shipping Companies' Perspective	Thi Yen Pham and Gi-Tae Yeo	(MCDM, Consistent Fuzzy Preference Relations (CFPR) the method, Consistent Fuzzy Preference Relation	Hinterland Connection-Position/Connectivity
Transshipment hub port selection criteria by shipping lines: the case of hub ports around the Bay of Bengal	Chathumi Kavirathna ^{1*} , Tomoya Kawasaki ² , Shinya Hanaoka ³ and Takuma Matsuda ⁴	Mathematical Model for Selection criteria	Quality of Operation-Feeder network /Frequency of Delays(H&S)
A new rule-based integrated decision-making approach to container Transshipment terminal selection	Cigdem Kadaifci, Umut Asan, Seyda Serdarasan and Umut Arican	Analytic Hierarchy Process (AHP) and Fuzzy Rule-Based System	Operation Cost-Position/Connectivity-Infrastructure-Feeder Network-Hinterland Connection-Capacity

Site and Situation Factors In Transshipment Ports: The Case Of The Caribbean Basin	Robert J. Mccalla	Weighted Deviation Distance Method	Position Connectivity-Quality Port Service-Port Management
Terminal Operations in Container Transshipment Hubs: Literature Review And Research Directions	Omnia Reda, Nermine Harraz , Amr El-Tawil	Qualitative Approach	Position Connectivity-Infrastructure-Quality Port Service
The size effect of a port on the container handling efficiency level and market share in internation Transshipment flow	Jeong-Rak Sohn And Chang-Mu Jung	stochastic frontier analysis (SFA) and panel data analysis	Position Connectivity-Quality Port Service-Operation Cost- Size of Port
The worldwide maritime network of container shipping: Spatial structure and regional dynamics	César Ducruet and Theo Notteboom	Graph theory and Network Analysis	Position Connectivity
Transshipment Hub Port Competitiveness of the Port of Colombo against the Major Southeast Asian Hub Ports	Chathumi Ayanthi KAVIRATHNA, Tomoya KAWASAKI, Shinya HANAOKA	. Generalised Cost Approach for Market Share Estimation	Infrastructure-Operation Cost-Bunker Cost*for relay from Colombo
Transshipment hub selection from a shipper's and freight forwarder's perspective	Gang Chena , Waiman Cheung , Sung-Chi Chu , Liang Xud	Analytic Hierarchy Process (AHP)	Operation Cost-Customs Regulations Policies-Position Connectivity
T/S Port Characteristics	George Kobina van Dyck		Quality Port Service-Political Environment-Infrastructure

Table2.7 Literature Review Matrix, Source: Author

From the studies, the key feature of the Transshipment hub was analysed using the main features recommended by the research. For instance, Position and Connectivity were appearing in 10 research papers as one of the critical criteria for Transshipment Hub. The table below 2.8 has a summary of the findings:

Rank	Mandatory T/S Features mentioned in research	Count of Papers	%
1	Position/Connectivity	10	24%
2	Operation Cost	4	17%
	Lower Port Charges	3	
3	Quality of Port Features	6	15%
4	Feeder Network	5	12%
5	Infrastructure	4	10%
6	Port Volume	2	7%
	Port Capacity	1	
7	Hinterland Connection	2	5%
8	Port Management	1	2%
9	Customs Regulations Policies	1	2%
10	Political environment	1	2%
11	Bunker Cost	1	2%
		41	

Table 2.8 Significance of T/S Features in the studies, Source: Author

The very first five factors are similar to the findings from research done by (Lirn *et al.*, 2004) in Table 2.2, which use the Analytical Hierarchy Process to find the requirements of Liners in Container Terminals. This is not very different from Transshipment hubs as well, but the rankings or priority of the characteristics changes mainly to primarily Position/Connectivity and then costing followed by others, as mentioned in Table 2.8.

2.5 Framework for a Transshipment Hub

Based on the above table 2.8, the following framework is developed.

These features comprise of many sub-criteria and the main ones include Position and Connectivity include Location of Ports with relation to Trade Route, Location with regards to other hub ports and smaller ports, Connectivity factors including LSCI etcetera. Quality of Port Features comprises reliability of terminal and port in Seaside operations, feeder dispatch, frequency of delays, etcetera. Feeder Networks include the availability of Feeder service, their cost, and reliability. Infrastructure includes but not limited to the Port infrastructure including Cranes, Berth, Terminals, navigation aids, IT integration, etcetera. Operation Cost includes marine charges in port, the cost for deviation to port, Port charges include all the charges from the port with regards to operation, bunkering, etcetera.

From Table 2.8, it can be concluded that Position & Connectivity is one the key factor that liners consider when looking for a transshipment hub. As Port Charges and Operation costs come under a single cost structure for Liners, both can be considered as a single factor and second important factor for liners when selecting a port.

The third important factor is the Quality of Port features and reliability of the services rendered, including minimal delays in services rendered. Liners consider the strength of the feeder network in Hub and Spoke Network and low-cost competitive service is a significant factor for a transshipment hub. The fifth important factor that liners consider, from reviewing these papers is Infrastructure, which includes the Cranes,

AGVs, Trucks etcetera and the Port facilities that support the liner operations. Even though Port Size and Volume is not among the key five factors in the selected studies, but Liners look for available capacity/current throughput (Port Volume) and Size of Port (Port Size) with relation to berthing, storage yard area etcetera when deciding on Port/Terminal Selection. Another factor Hinterland connectivity is not a significant factor directly impacting Transshipment operations. Mainly as its operations are on the Seaside of Port and for this reason, it is not directly affected. However, a choke point in the outward movement of import containers (entering hinterland from the port) can affect the performance of port yard operations and affect the transshipment container as well(Pham and Yeo, 2019). As per Pham and Yeo (2019), hinterland connectivity is the second most crucial factor in a study done on Ports in Vietnam, after Proximity to the trunk route.

Other factors, such as Port management, are also an essential factor for a liner to select a transshipment hub, but the priority is given to the first Six factors.

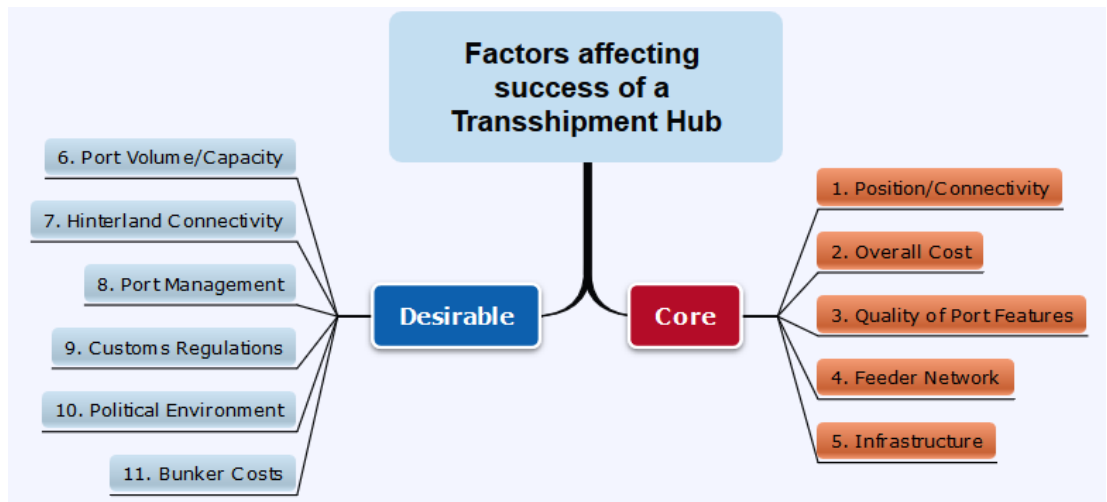


Figure 2.22 – Factors affecting the success of T/S Hub, source: Author

2.6 Conclusion

This chapter presents a review of the available literature on the Indian container market and transshipment market. It begins with the global container market and narrowing it down to the Indian container shipping sector, thereby realising the potential of Indian ports to evolve as a transshipment hub. Followed by the literature consisting of the transshipment deciding factors for liners and ports were reviewed upon and summarised in table 2.8, based on which the essential factors for a transshipment hub was ranked.

Based on the above two significant parts of the reviewed literature on Indian ports' potential to provide transshipment service and the ranked characteristics of the deciding factors for both Liner and Port in terms of Transshipment, a framework was formulated which will be used in the analysis.

Methodology

3.1 Introduction

The chapter outlines the research design of this thesis. It presents the reasons for the Multiple case study approach and the method of qualitative analysis. For analysing the qualitative data SWOT analysis was the prominent method. Since the Indian Ports are just in the initial stages of Transshipment, there is no availability of quantitative data such as Transshipment data of the major Indian container ports, rather only the qualitative textual data like the port documents, reports from the port websites and third-party reports on Indian transshipment available. Hence for the qualitative analysis, SWOT was preferred to examine the available reports, thereby answering the formulated research question of this dissertation.

3.2 Multi-case study analysis

This thesis is being approached with Multiple case studies. (Bhattacharjee, 2012) states that multiple case design is suitable for creating generalizability of reasoning and to develop ample and more nuanced interpretations of a phenomenon. This is more relevant and supports the decision of this approach with this study since developing the transshipment hub being an upcoming phenomenon in Indian ports. Also, the other reason lies with the research question in which there is any potential of transshipment in major Indian ports. Thus, it eventually relies on more than one case study of ports; hence, the multiple case study is the prominent method.

3.3 SWOT analysis

SWOT methodology was used to find the status of the current scenario in Indian Ports and its potential for being a Transshipment hub. SWOT Analysis is one of the main strategic management tools to understand an organisation or sector's internal and external factors(Sammut-Bonnici and Galea, 2015) which decides the current situation, future potential, and forms strategies to remain competitive and ensure survival. This Analysis does an internal analysis of the firm's strengths and weaknesses in various facets; while external analysis surveys its threats from competitors, external environment etcetera and other potential opportunities it can take advantage of(Gürel and Tat, 2017). Internal Analysis includes analysing the capabilities and resources of the firm, which can be a competitive advantage for it (Sammut-Bonnici and Galea, 2015). Resources are either tangible or intangible; tangible ones include machinery, goods, assets, etcetera and intangible includes capital, information or knowledge, proprietary rights, workforce, brand value, etcetera(Sammut-Bonnici and Galea, 2015). Capabilities in the same context are the ability of a firm to feasibly and competitively use the internal resources to provide goods and services (Sammut-Bonnici and Galea, 2015).

SWOT	Organisational Characteristics
Strengths	Characteristics that give a competitive advantage in the market
Weaknesses	Characteristics that give a competitive disadvantage in the market
Opportunities	Factors external to firm that can aid in achieving its targets
Threats	Factors external to firm that can cause setbacks to achieve its targets

Table 3.1 SWOT characteristics, source: adapted from (University of Minnesota, 2016)

SWOT analysis has been used around the same time strategic planning was being used in the management field. It has been used by different schools of thought, including entrepreneurial school, planning school etcetera, which uses different formulation techniques but the idea and the result are similar (Gürel and Tat, 2017). Even though this technique is simple as it looks from its plain matrix model, the analysis gives two of the most critical factors required for a firm to remain competitive, which is the current position and future options available for it to remain competitive.

The Context of Port SWOT Analysis aims to find the internal and external characteristics that affect the Business as a whole and formulate a strategy to retain or expand its market share. SWOT Analysis can not only be done on a level of certain Port but also Port Sector that a country has and even a group of competing ports belonging to different countries which exist in a specific region.

An example of SWOT Analysis for a Port is given in Table 3.1, from this all the internal and external factors affecting a port are categorised in the 2x2 matrix. Even though this is just an example, in the strength matrix we can see that the Port has high throughput and Strong Cash flow resulting from it. Another decisive factor is that the port is near to the trunk route and has a deeper draft to accept motherships. However, aside by side comparison of the weakness shows that the port lacks a strong hinterland and feeder network and that the maintenance and staff remunerations are expensive. Likewise, if the opportunities or positive external factors are considered, there is expected to increase in trade growth and investment and decrease in bunker cost, both of which increase traffic and attract liners.

Similarly, external threats include new Ports entry in the region and investment by Liners in the same. This could lead to increased competition and a decrease in market share. On top of that, unfriendly government regulations can make operations more robust.

From analysing the complete macro and microeconomic elements, the port can take a strategy to invite liners to invest in their terminal or provide a cheaper service than upcoming port projects. The options are plenty, but the strategy made should address the weakness and threats using the Ports strength and selling point and analysing the opportunities can be exploited to the maximum.

<p><u>STRENGTHS</u></p> <ul style="list-style-type: none"> • Higher throughput • Near to Trunk Route • Deep Draft in Port • Strong Cash Flow 	<p><u>WEAKNESS</u></p> <ul style="list-style-type: none"> • Lack of hinterland connection • Expensive maintenance • Less Feeder Activity • Scarce workforce
<p><u>OPPORTUNITIES</u></p> <ul style="list-style-type: none"> • Positive Trade Growth • Bunker Cost decrease • Increased FDI in the Export area • Cabotage Regulation change 	<p><u>THREATS</u></p> <ul style="list-style-type: none"> • The entry of New Ports, • Investment by Liner in other Ports, Regulations change • Unfriendly Government Regulations

Table 3.2: SWOT analysis in-context of a Port. source: (Author)

Some weaknesses, like expensive maintenance, cannot be bypassed as quickly as the scarce workforce. However, then realising this weakness and threats as a stubborn or adaptable element can help in planning a foolproof tactic.

External elements that are Opportunities and Threats are hard to influence than internal elements, strengths, and weakness. However, on a holistic level, it can be inferred that Internal elements are affected by past and current state of the external elements.

3.3.1 Advantages of SWOT analysis

SWOT analysis provides several advantages to the researcher if applied appropriately, Gürel and Tat (2017) explicitly mention the advantages of SWOT Analysis is an overall view of the situation and presents solutions for issues faced from the same. Its techniques provide a broader perspective and macro evaluation of the same. In a two by two matrix, as shown in Table 3.2, it provides an overview and an ability to focus on the adverse and constructive elements in its environment. SWOT Analysis provides the firm with potential opportunities and helps to capitalise on it as a part of future strategy, and by understanding the weakness and threats, it provides a foresight which can avoid any setbacks that is related to internal and external factors of the same. The SWOT analysis can act as an initial step to create a strategic framework required by the company to remain competitive in the market. SWOT Analysis integrates and complements other management techniques such as Porter's five forces model, Balance Score Card, etcetera. SWOT Analysis is applicable at various levels including Macro or microeconomic, firm-level, regional level or national level (Gürel and Tat, 2017)

3.3.2 Limitation of SWOT Analysis

There are several critiques for this Analysis and is at times seen as very simple and sometimes poorly formulated. This includes:

SWOT Analysis depends on the perspective of the person analysing the firm and critiques of this technique claim that this analysis cannot be completely unbiased. Particularly with opportunities and threats which are an outside factor, there can be a tendency to overlook or underestimate relevant factors, which can result in poor analysis and failure of resultant strategy. Some critiques claim that SWOT Analysis is outdated as it does not consider the dynamic and structural changes in the firm. Several studies show that SWOT Analysis is not easy to use effectively and requires skills and understanding in a global level about all factors affecting

the firm. In SWOT Analysis, a general understanding of the factors is made and not a thorough ranking system or scale level is not available to understand the scale or importance of each factor.

3.4 Chapter Conclusion

The chapter outlines the overview of the multiple case study being the preferred research design and the SWOT being the potential method to analyse the data to answer the research question. Based on the explained research design and the method of qualitative analysis, the following chapter examines the port data obtained from the relevant sources. The advantages of the SWOT analysis are also explained, and this chapter is concluded with the limitations existing in SWOT analysis.

Analysis of Indian Ports

4.1 Introduction

India has very less Transshipment Volumes compared to direct import and export.

	Imp.	Imp. % of Throughput	Exp.	Imp. % of Throughput	T/S	T/S % of Throughput	Throughput	% of Throughput
1 JNPT	2,410,966	49.9%	2,359,681	48.8%	62,750	1.3%	4,833,397	53.81%
2 Chennai	653,532	42.2%	895,925	57.8%	-	0.0%	1,549,457	17.25%
3 Tuticorin	348,278	49.9%	349,353	50.1%	-	0.0%	697,631	7.77%
4 Kolkata	330,266	51.6%	309,917	48.4%	-	0.0%	640,183	7.13%
5 Cochin	261,856	47.1%	258,595	46.5%	35,363	6.4%	555,814	6.19%
6 Vishakapatnam	190,903	49.1%	192,287	49.5%	5,434	1.4%	388,624	4.33%
7 Kandla	60,391	51.5%	56,762	48.4%	72	0.1%	117,225	1.31%
8 New Mangalore	58,520	50.7%	56,978	49.3%	-	0.0%	115,498	1.29%
9 Mumbai	36,008	85.0%	418	1.0%	5,961	14.1%	42,387	0.47%
10 Mormugoa	16,360	51.1%	15,644	48.9%	-	0.0%	32,004	0.36%
11 Paradip	3,512	51.4%	3,325	48.6%	-	0.0%	6,837	0.08%
12 Ennore	2,678	100.0%	-	0.0%	-	0.0%	2,678	0.03%
	4,373,270	48.7%	4,498,885	50.1%	109,580	1.2%	8,981,735	

Figure 4.1- Indian Ports throughput and T/S Incidence, source: adapted from (Indian Ministry of Shipping, 2019a)

As we can see from Figure 4.1, all the 12 major ports in India are Gateway Ports and not even Regional Gateway, which has at least 25% T/S Incidence. It must be noted that Haldia Port the 13th major port as per MOS India is not included in this research. The Biggest Container Port in India JNPT in Mumbai has a trivial 1% of their total throughput as Transshipment. Even though this is only 1.3% in quantity, it is 62000 TEU. Cochin ICTT (International Container Transshipment Terminal) which is the only purpose-built Transshipment Container Terminal in India handles only 6% of their total throughput as Transshipment resulting it become a Gateway Port. The highest Transshipment incident is from Mumbai Port which has 14% of their total throughput as Transshipment. This is because Mumbai Port mainly handles Bulk Cargo and their container throughput is only 42000 TEU.

So, why is India not able to establish a Transshipment hub? One of the main issues that India faces is the dependence on other transshipment hubs to send containers to different parts of the world. The factors that were mentioned in literature review including Position, cost, feeder network, all are better in a foreign port, and Indian exporters and importers must depend on this hub ports for connecting their shipment to major trade lanes. As per a study, 33% of the total container from India is either shipped from or to via major Transshipment hubs (Ship Technology, 2018).

Although Krishnapatanam Port and Adani International Container Terminals are capturing some Transshipment traffic and resulting in stronger connectivity, these can change according to their company strategy if they decide to concentrate on gateway traffics. Many public Ports in India are not inclined towards Transshipment due to lower margins from transshipment operations and high port. Another point as per

Captain Deepak Tiwari, Chairman of the Container Shipping Lines' Association, is that most of the Public Ports Container Terminals (Except JNPT) are run by private firms such as DP World, APM etcetera, and for them to remain profitable, gateway traffics are relied upon (The Hindu Businessline, 2018) . This can partly explain the low Transshipment incidence in India as in Figure 4.1

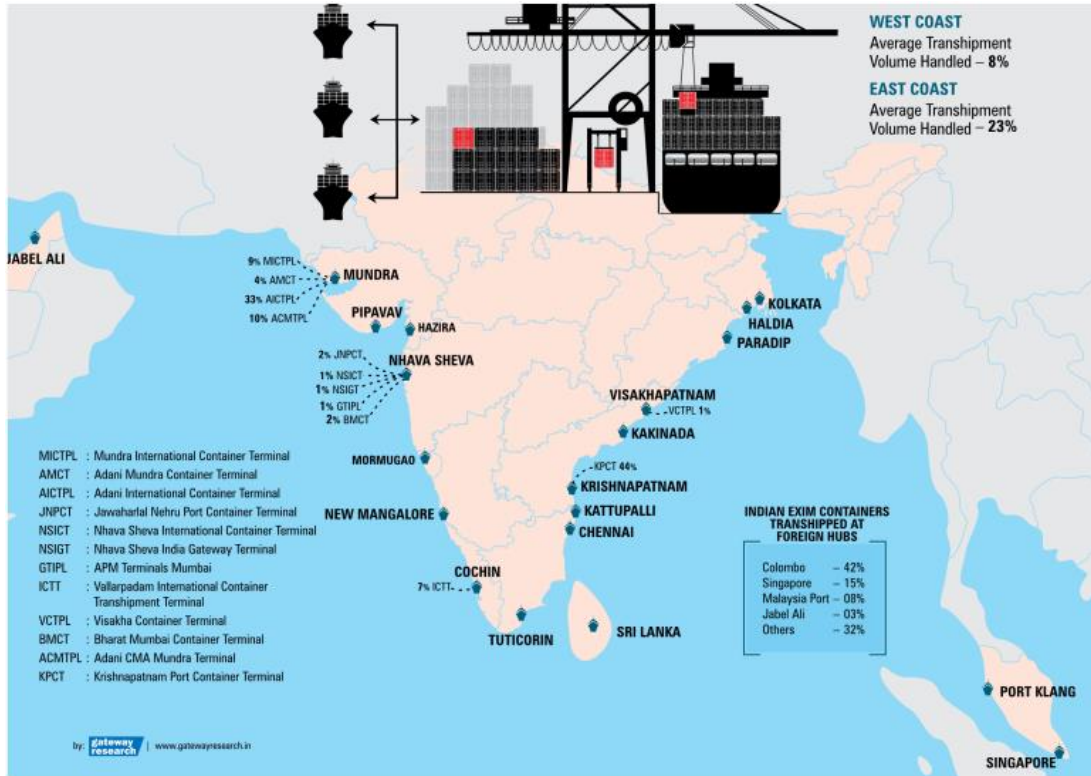


Figure 4.2- Indian Container Transshipment Hubs-Indian & Foreign, source: (Gateway Research and Drewry, 2018)

Research by Gateway Research and Drewry (2018) shows that the most prominent share of Indian Transshipment volume is handled by Colombo Port. Singapore and Malaysia also handle a substantial percentage of Indian transshipment volumes. T/S Volumes percentage from India is given in Table 4.1, in this Other Ports includes upcoming new hub ports such as Salalah (Oman), Khalifa (Abu Dhabi) etcetera.

Within the domestic market, in the west coast, private Ports such as Adani International Container Terminal (AICT) handles transshipment of about one-third of their throughput or around 420,000 TEU. The next most significant private player in Indian Transshipment market is Krishnapatanam Port (KPCT) which handled around 220,000 TEU and 44% of their total throughput (Gateway Research and Drewry, 2018).

Port	% of Transshipment by Foreign Hubs	
	2017-18	2016-17
Colombo	42%	40%
Singapore	15%	21%
Malaysia	8%	9%
Jebel Ali	3%	3%
Other Ports	32%	27%

Table 4.1- Indian Container Transshipment volumes % by - Foreign hubs, source: (Gateway Research and Drewry, 2018)

Considering the transshipment incidence, KPCT is technically a regional gateway port, which has the potential to be a Hub port (if its T/S incidence reaches above 49%). Same is the case with AICT with 33%, which is still a regional gateway.

Aside from international movements, Coastal shipping is also essential for a Transshipment hub, for this Table 4.3 has the 12 major ports container details(weight) in total tonnes moved via coastal shipping.

	Import	Import%	Export	Export%	Coastal Total	Total%
1 Cochin	3,276	55.0%	456	12.3%	3,732	38.6%
2 Tuticorin	1,278	21.5%	1,939	52.3%	3,217	33.3%
3 Chennai	392	6.6%	399	10.8%	791	8.2%
4 New Mangalore	538	9.0%	98	2.6%	636	6.6%
5 Vishakapatnam	145	2.4%	169	4.6%	314	3.2%
6 JNPT	13	0.2%	273	7.4%	286	3.0%
7 Kandla	32	0.5%	251	6.8%	283	2.9%
8 Mumbai	197	3.3%	-	0.0%	197	2.0%
9 Mormugoa	63	1.1%	9	0.2%	72	0.7%
10 Paradip	6	0.1%	60	1.6%	66	0.7%
11 Kolkata	11	0.2%	53	1.4%	64	0.7%
12 Ennore	4	0.1%	1	0.0%	5	0.1%
	5,955	100%	3,708	100%	9,663	100%

Figure 4.3- Indian Container Coastal Shipping(in '000 tonnes), source: adapted from (Indian Ministry of Shipping, 2019a)

Figure 4.3 provides the Import and Export coastal container movement of 12 major ports. Cochin and Tuticorin have an extensive coastal network in terms of container transportation.

4.2 Reasons to have a Transshipment hub in India.

Generally, Transshipment hubs which are proximate to Major trade hubs and which has low cost attract Liner Business. This is shown to increase the volume of maritime transportation in the area and brings in economies of scale. Studies in Transshipment Hub in Turkey(Yetkili *et al.*, 2016) evaluates feeder network and other factors among several, to conclude that specific port can be a transshipment hub and increase the traffic volume and decrease cost for traders. Also in an analysis on the economic impact of transshipment hub(Mounime and Loffi, 2014), a case study was done to shed light on the how Tangiers has brought in dynamism and economic advantage to Morocco, mainly due to its location near to major trade route. Another study by Rodrigue and Ashar(2016b) shows the dynamics of increase in Vessel Size will

increase transshipment , and due to panama canal and other geographical features how it eventually helps Caribbean region ports and its economy.

In the case of India it is now just increasing the maritime connectivity or liner business, but the dependence on other Transshipment hubs are costing much extra money to exporters in India. It is estimated that by using an Indian Transshipment Hub, Indian Exporters/Importers save anything from 80\$ to 220\$ per TEU(The Hindu Businessline, 2017). This amount is not just about cost but also international competitiveness for Indian Exporters in International Trade. Considering these extra charges and that 33% of total Indian Containers are transshipped annually(Ship Technology, 2018), the total disadvantage to the Indian economy is enormous. It is estimated that the Indian Port Industry loses around 200 million \$, and the economy loses 420 -630 million \$ yearly due to this dependence on foreign transshipment ports(BCG, 2015).

With the proximity factor in consideration, Indian Ministry of Shipping has approved go-ahead for two major transshipment hubs in the southern tip of India, which is near to East-West Trade Lane. These two ports, Colachel in TamilNadu State and Vizhinjam in Kerala is poised to be a major transshipment hub, one reason being location and second is the deep draft for mother vessels to berth easily. However, since these are under construction, only feasibility reports are available for it and no actual performance indicators to analyse the throughput or transshipment traffic.

With a strong case for a transshipment hub in India, the next question is which port or Ports can be considered and what should be the strategy. From figure 4.1, three ports from West and three ports from East are analysed using SWOT, and additionally, two future projects are included as these are projected to be significant Transshipment hubs in India. The Ports that will be reviewed are as given in Table 4.2

West Coast	East Coast	New Ports Projects
JNPT	Chennai	Vizhinjam
Mumbai	Tuticorin	Colachel
Cochin	Vishakhapatnam	

Table 4.2- Major Ports in India, source: (Author)

4.3 West Coast Ports

4.3.1 JNPT Port

Jawaharlal Nehru Port Trust is India's largest Container Port handling more than half of the total Container throughput (Figure 4.1) of Indian Container market. Also known as Nhava Sheva or JNPT, and is ranked 28th in top 100 Container Ports in the world(JNPT, 2019). JNPT comprises of 6 terminals including 1 Liquid Bulk and 5 Container Terminals. The Container terminals are JNPCT (Jawaharlal Nehru Port Container Terminal), Nhava Sheva International Container Terminal (NSICT-DP World), Gateway Terminals India (GTI-APM Terminals), Bharat Mumbai Container Terminal (BMCT), and Nhava Sheva (India) Gateway Terminal (NSIGT) .

	Operated by	Draft	Berths	Quay Length	Installed Capacity	Throughput 2017-18	Capacity Utilisation
JNPCT	JNPT (Govt)	14	3	680/445	1,500,000	1,481,768	98.78%
NSICT	DPW	14	2	600	1,200,000	641,112	53.43%
GTIPL	APM/Concor	14	5	840	1,800,000	2,027,896	112.6%
BMCT	PSA Intl	16.5	3	1000	2,400,000	23,212	0.97%
NSIGT	DPW	14	1	330	800,000	659,000	82.38%

Table 4.3- JNPT Port Features Part 1, source:(Gateway Research and Drewry, 2018)

BMCT is having a utilisation rate of less than 1% as it started operation only last year.

	Total Ground Slots	Reefer Plugs	Yard Area (HA)	Quay Cranes	RTGC	RMGC	Reach Stacker	Forklifts
JNPCT	10,482	576	61.5/9.9	9	18	5	10	3
NSICT	6,222	778	25.8/4	8	29	3	3	2
GTIPL	9,723	880	52	10	40	3	2	6
BMCT	9,366	1,620	90	12	4	36	-	-
NSIGT	-	336	27	4	12	0	1	-

Table 4.4- JNPT Port Features Part 2, source:(Gateway Research and Drewry, 2018)

JNPT has many Liners interested in operating mainly due to its proximity to industrial hinterland of Mumbai and link to rail and road to other states of India(The Hindu Businessline, 2018). It is one of the most significant advantages for Liners to concentrate their operation. However, the average draft of 14 has its limitation for bigger ships to come, and thus primary transshipment operations have lesser option to shift to JNPT. It is an advantage to be closer to the trade lane going to middle east via Strait of Hormuz but transshipments directed to the middle east is low from Table 4.1.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10-year increase
JNPT	34.75	34.87	31.51	31.81	33.29	37.44	44.51	42.91	44.24	43.92	26.4%

Table 4.5- JNPT Port Liner Shipping Connectivity Index, source:(UNCTAD, 2019b)

A look into the Port Liner shipping connectivity index (PLSCI) can reveal the current status of the port as to where it lies in the global shipping liner network(UNCTAD, 2019b). A rank of 100 is the base, and it is the highest-ranking in 2006 that China had. It helps in comparing the port rankings with relation to Connectivity. For reference of ranking Colombo is 63.53 and Singapore is 124.63 in 2019(UNCTAD, 2019b).

Quality of Port Service and Infrastructure is world-class, that being the reason it was ranked as 28th in Top 100 in the world(The Economic Times, 2019b). Feeder network, in general, is not as strong enough for an international port mainly as they concentrate on import and exports (Table 4.3).

<p><u>STRENGTHS</u></p> <ul style="list-style-type: none"> • Highest throughput • Near to Route to the Middle East • World Class Infrastructure • Competitive Port Price • Best LSCI in India • Best Hinterland Connectivity 	<p><u>WEAKNESS</u></p> <ul style="list-style-type: none"> • Short Draft – 14 m • Lack of feeder network • Far from East-West Trade lane • 5 T/O handling the different capacity utilisation • Port Management not keen on T/S
<p><u>OPPORTUNITIES</u></p> <ul style="list-style-type: none"> • Cabotage Relaxation • Presence/Interest of Liner networks • Government Funded Sagarmala 	<p><u>THREATS</u></p> <ul style="list-style-type: none"> • Private Ports handles T/S in area, • Less Westwards (less Middle eastbound transshipment) T/S Traffic • Upcoming Major T/S Ports in South which will handle T/S

Table 4.6- JNPT Port SWOT Analysis, source: (Gateway Research and Drewry, 2018)(Indian Ministry of Shipping, 2019a)

4.3.2 Mumbai Port

Mumbai Port (MbPT) has been the most important port in India for several centuries. The dock was built in the 1870's and Bombay Port Trust was formed around the same time as well(Mumbai Port, 2019).

Mumbai Port mainly handles Liquid Bulk, Dry Bulk and other commodities, but what makes it interesting is that 14% of its containers are transshipment, even though the container in TEU is only around 5000, a potential to become a Transshipment hub cannot be ruled out. As per Sagarmala project, there are additional offshore container terminals being build and expect an increase in container traffic from 0.05 million TEU to .10 Million in 2020 and 0.15 Million TEU in 2035.

There are five container docks in the port, and the maximum draft is 9.14 meters(Indian Ministry of Shipping, 2016d).

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10-year increase
Mumbai	12.21	10.91	9.79	7.2	7.53	6.21	6.21	6.51	6.91	6.6	-45.9%

Table 4.7- Mumbai Port Liner Service Connectivity Index, source: (UNCTAD, 2019b)

Connectivity of Mumbai Port within the last ten years has decreased from 12.21 to 6.6, which is a sign that international liners are not connecting many vessels there and that the port is not as relevant as it used to be. Comparing it with JNPT which has a PLSCI of 43.92 and it is increasing year on year. Feeder network coastal is also not a strong point for Mumbai as it has only 2% of total container coastal transport network. Other than that the development for this Port is targeted to berths handling Break Bulk and Iron and Steel(Indian Ministry of Shipping, 2016d).

Mumbai Port is well connected to Hinterland to NH8 and NH3 to North India and NH4 and NH 17 to South India(Indian Ministry of Shipping, 2016d). The Port is also having an extensive connection to the rest of India with railways.

Container handling costs at MbPT is predicted to be more than JNPT, as per research was done by AECOM(Indian Ministry of Shipping, 2016d), so bringing in customers might require lower port charges.

<p><u>STRENGTHS</u></p> <ul style="list-style-type: none"> • Good Position as close to JNPT • Good Hinterland Connectivity • The highest share of T/S in major ports • New Offshore Container Terminal • Excellent Position with direct links to Industrial Area 	<p><u>WEAKNESS</u></p> <ul style="list-style-type: none"> • Short Draft – 9 m • Port LSCI very low 6.6 • Low throughput to attract liners • Outdated Infrastructure • Expensive charges than JNPT
<p><u>OPPORTUNITIES</u></p> <ul style="list-style-type: none"> • Cabotage Relaxation • Investment from Sagarmala • Proximity to JNPT 	<p><u>THREATS</u></p> <ul style="list-style-type: none"> • Private Ports handles T/S in area, • Less Westwards (less Middle eastbound transshipment) T/S traffic • Upcoming Major T/S Ports in South which will handle T/S

Table 4.8- MbPT Port SWOT Analysis, source: (Gateway Research and Drewry, 2018) (Indian Ministry of Shipping, 2019a)

4.3.3 Kochi Port

Port of Cochin has several Dry Bulk and Liquid Bulk Terminals along with ICTT in Vallarpadom. International Container Transshipment Terminal is operated by DP World and is the only purpose-built Transshipment Terminal in India. Below are the details for the same:

	Operated by	Draft	Berths	Quay Length	Installed Capacity	Throughput 2017-18	Capacity Utilisation
ICTT	DPW	14.5	2	605	1,000,000	514,997	51.5%

Table 4.9- ICTT Port Features Part 1, source:(Gateway Research and Drewry, 2018)

	Operated by	Total Ground Slots	Reefer Plugs	Yard Area (HA)	Quay Cranes	RTGC	RMGC	Reach Stacker
ICTT	DPW	2,500	450	12	4 Super Post Panamax	15	-	3

Table 4.10- ICTT Port Features Part 2, source:(Gateway Research and Drewry, 2018)

Based on the T/S incidence of Kochi ICTT, the port has only 7% of Transshipment incidence, which makes it a Gateway Port. ICTT has excellent Infrastructure due to its operator DP World, and their IT systems are on par with international levels. One of the main issues ICTT faces is that Draft is only 14.5, which is not enough for Larger Container vessels to call at the port. Also, the Dredging cost is very high due to an issue of erosion from rivers to sea.

Port charges for ICTT are approximately 30% higher than Colombo(JOC, 2019b), one of the main reason is dredging costs is borne by DP world and is being indirectly charged to liners as marine charges to cover the expenses.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10-year increase
ICTT	6.3	6.1	14.5	14.6	14.7	15.5	22.0	20.4	20.5	22.5	255%

Table 4.11- Kochi ICTT Port Liner Service Connectivity Index, source: (UNCTAD, 2019b)

One of the main features of Kochi is that it is just 11 nautical miles from the main route to Australia and Far East routing from Europe(The Hindu Business Line, 2011).

ICTT has gateway traffic of mainly agricultural commodity including Coffee, Spices, Seafood, etcetera. ICTT is connected to the West and East side of India through NH47, NH49 and NH17(Indian Ministry of Shipping, 2016c). A 4 lane Container Road has been constructed linking to NH17, which saves much time to reach these main highways(Projects Today, 2007).

ICTT has a year on year growth of 12.6 percentage in 2017-18(Gateway Research and Drewry, 2018). ICTT handled by DP World also has the best productivity rates and feeder connectivity. Kochi Port has the best connectivity with 33% of the total coastal container traffic, as mentioned in Figure 4.3. Also, ICTT has been able to maintain an industry best container handling of 30 containers per hour(Gateway Research and Drewry, 2018).

Two upcoming Transshipment hubs in the southern part of India just kilometres away are being planned, which can pose a threat to Transshipment traffic for Kochi.

<p><u>STRENGTHS</u></p> <ul style="list-style-type: none"> • Location near to Trunk route • Good Hinterland Connectivity • Best Productivity in Terminal • Port LSCI increase 250% in 10 years • Excellent Position with direct links to Trade Areas 	<p><u>WEAKNESS</u></p> <ul style="list-style-type: none"> • Short Draft – 14.5 m • Dredging Charges High which causes extra charges for liners • Expensive charges than nearest Transshipment hub Colombo. •
<p><u>OPPORTUNITIES</u></p> <ul style="list-style-type: none"> • Cabotage Relaxation • Investment from Sagarmala • Economic Growth in India 	<p><u>THREATS</u></p> <ul style="list-style-type: none"> • Two upcoming mega-hub projects within a short distance, • Less Westwards (less Middle eastbound transshipment) T/S traffic • Private Ports planned in parts of Kerala

Table 4.12- Kochi Port SWOT Analysis, source: (Gateway Research and Drewry, 2018)(Indian Ministry of Shipping, 2019a)

4.4 East Coast

4.4.1 Chennai

In East Section 2 major Ports in TamilNadu are Chennai and Tuticorin. Chennai Port Trust has 2 Container Terminals CCTL (Chennai Container Terminal) and CITPL (Chennai International Terminal), operated by DP World and PSA respectively. Chennai Port has the second-largest container throughput amongst the 12 major ports.

	Operated by	Draft	Berths	Quay Length	Installed Capacity	Throughput 2017-18	Capacity Utilisation
CCTL	DPW	15	4	885	1,200,000	646,482	53.8%
CITPL	PSA	15.5	3	832	1,250,000	901,584	72.1%

Table 4.13- Chennai Terminals Features Part 1 source:(Gateway Research and Drewry, 2018)

	Total Ground Slots	Reefer Plugs	Yard Area (HA)	Quay Cranes	RTGC	RMGC	Reach Stacker	Forklifts
CCTL	3,960	355	18	8	23	3	21	1
CITPL	5,424	306	35	7	18	0	6	0

Table 4.14- Chennai Terminals Features Part 2 source:(Gateway Research and Drewry, 2018)

Even though they are the second biggest container terminal, which makes it stand out in Transshipment Container market is that they have no Transshipment volume at all.

From Table 4.13, it can be understood that the container terminals in Chennai have enough draft for medium vessels to berth and arrange transshipment activities. Chennai Port is well connected to rest of India through NH4 and NH5. The port has an internal rail network of 70 km and is connected to Southern Trunk Line which connects to major cities like Kolkata, Delhi, Bangalore etcetera(Indian Ministry of Shipping, 2016b). The Infrastructure of Chennai is one of the best in India with adequate Gantry Cranes and Stackers. Although there is no transshipment, Chennai Port is looking to attract this sector by providing concessions and discounts(JOC, 2018b). Maersk, a main client of Chennai Port, left to nearby Adani Ennore Port, which is one of the main reason for Chennai to consider transshipment volumes, and in July 2018 first-ever transshipment was moved which is steadily increasing now(JOC, 2018a).

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10-year increase
Chennai	16.8	19.9	20.3	19.3	19.1	21.0	20.9	21.6	21.9	22.22	32%

Table 4.15- Chennai Port LSCI source: (UNCTAD, 2019b)

Chennai has only a 32% increase in its lowest 16.8 PLSCI in 2010 to 22.22 in 2019. This is very low compared to be the second-largest container port in India. Chennai has a robust coastal container transportation share with third in India. This can be advantageous to have an existing coastal network when Transshipment volumes increase. There is a plan for a Mega Container Terminal in Chennai in 2010, but there was no further development to this. If completed this would be the biggest Container Terminal in India and would have adequate infrastructure and pricing to compete with nearby Transshipment hubs.

<u>STRENGTHS</u>	<u>WEAKNESS</u>
<ul style="list-style-type: none"> • Second Largest Container throughput in India • Excellent Hinterland Connectivity • Good Productivity in Terminal • Third largest Container traffic in the coastal region in India. 	<ul style="list-style-type: none"> • Zero Transshipment LY • Expensive charges than nearest Transshipment hub Colombo. • PLSCI is only 22.22 and far from trunk route • Low Capacity Utilization

<ul style="list-style-type: none"> Excellent Position with direct links to Biggest Trade Areas in South India 	<ul style="list-style-type: none"> Dependence on Colombo for T/S
<p><u>OPPORTUNITIES</u></p> <ul style="list-style-type: none"> Cabotage Relaxation Investment from Sagarmala Possible Transshipment volumes from neighbouring countries Economic Growth in India Plans to Build the Biggest Terminal in Chennai 	<p><u>THREATS</u></p> <ul style="list-style-type: none"> Maersk left for nearest Port last year. Two upcoming mega-hub projects within a short distance, Less Eastwards T/S traffic volumes

Table 4.16- Chennai Port SWOT Analysis, source: (Gateway Research and Drewry, 2018)(Indian Ministry of Shipping, 2019a)

4.4.2 Tuticorin

Tuticorin has third-biggest container throughput amongst the 12 major ports.

	Operated by	Draft	Berths	Quay Length	Installed Capacity	Throughput 2017-18	Capacity Utilisation
TCT	PSASICAL	10.9	1	370	450,000	495,264	110.6%
DBGT	DBGT	14	1	345	600,000	201,093	33.5%

Table 4.17- Tuticorin Terminals Features Part 1 source:(Gateway Research and Drewry, 2018)

	Total Ground Slots	Reefer Plugs	Yard Area (HA)	Quay Cranes	RTGC	RMGC	Reach Stacker	Forklifts
TCT	1,000	84	4	3	8	0	2	1
DBGT	400	-	6.5	3	9	0	2	0

Table 4.18- Tuticorin Terminals Features Part 2 source:(Gateway Research and Drewry, 2018)

VOC Tuticorin Port Trust has two container terminals TCT (PSA SICAL Tuticorin Container Terminal) and DBGT (Dakshin Bharath Gateway Terminal), operated by PSA/SICAL and DBGT respectively. Tuticorin has relatively smaller berth of around 350 meters enough to berth vessels less than 5000 TEU. Tuticorin TCT has plenty of volume from Garment Export sector which helps it to get enough volume and has the second-highest Capacity Utilization of 110%, out of all 12 major ports(Gateway Research and Drewry, 2018).

Tuticorin is capitalising on its proximity to Garment Manufacturing Industry in South India(Dredging Today, 2010). This is one of the reasons for lack of Transshipment volumes aside from small berth and other facilities. VOC Tuticorin Port Trust has

invested 200 million dollars in improving infrastructure as a part of Sagarmala project and plans to develop a 400 Hectare Industrial area to attract major business. (Deccan Chronicle, 2018)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10-year increase
Tuticorin	6.6	6.4	8.3	7.2	6.7	6.6	8.6	9.5	12.8	14.1	114%

Table 4.19- Tuticorin Port LSCI source: (UNCTAD, 2019b)

Same as Chennai, Tuticorin also has very little transshipment traffic and steps are being taken by Port Authorities to increase the traffic. Tuticorin is expecting bigger vessels to call at the port, and they are also very keen to increase transshipment as most of their international shipments need to be transshipped at Colombo, making it expensive for the shippers. In 2018, the port started accepting vessels with 14-meter draft instead of 12-meters, and Wan Hai Lines agreed to take its garment exports to the US in larger vessels than previous sailings (Exim Academy, 2018).

<p><u>STRENGTHS</u></p> <ul style="list-style-type: none"> • Third Largest Container throughput in India • Increased draft by 2 to 14m. • Excellent Hinterland Connectivity • Good Productivity in Terminal • Highest Capacity Utilization in one Terminal • Excellent Position with Garment Trade Clusters nearby 	<p><u>WEAKNESS</u></p> <ul style="list-style-type: none"> • Zero Transshipment LY • Expensive charges than nearest Transshipment hub Colombo. • PLSCI is only 14.1, very low for third-largest throughput • Low Capacity Utilization • Infrastructure, not the greatest. • Dependence on Colombo for T/S
<p><u>OPPORTUNITIES</u></p> <ul style="list-style-type: none"> • Gains if the Sethusamudram Canal Project is completed. • Cabotage Relaxation • Investment from Sagarmala • Possible Transshipment volumes from neighbouring countries • Economic Growth in India • Plans to Build the Biggest Terminal in Chennai 	<p><u>THREATS</u></p> <ul style="list-style-type: none"> • Maersk left for nearest Port last year. • Two upcoming mega-hub projects within a short distance, • Less eastwards T/S traffic as most goes to Colombo

Table 4.20- Tuticorin Port SWOT Analysis, source: (Gateway Research and Drewry, 2018) (Indian Ministry of Shipping, 2019a)

Tuticorin is expected to gain from the Sethusamudram Project once completed, which creates a channel between Srilanka and India. This channel can save sailing time for vessels coming from West India to Eastern India, as currently, it must circumvent Srilanka (The Economic Times, 2005). This project will not only boost Tuticorin but entire coastal trade happening between East and West India. However, the current government of India has put a halt to its dredging and is looking for an alternative solution (Business Standard, 2018).

4.4.3 Vishakhapatnam

Vishakhapatnam is a crucial port in Eastern India with some transshipment activity.

VCTPL has enough draft of 16.5 meters for bigger vessels to berth and have adequate infrastructure for 700k TEU Terminal. Currently, an expansion plan for 0.5 Million TEU is being carried out in the port.

	Operated by	Draft	Berths	Quay Length	Installed Capacity	Throughput 2017-18	Capacity Utilisation
VCTPL	ICTIPL/DPW	16.5	2	450	700,000	388,289	55.5%

Table 4.21- Vishakhapatnam Terminals Features Part 1 source:(Gateway Research and Drewry, 2018)

	Total Ground Slots	Reefer Plugs	Yard Area (HA)	Quay Cranes	RTGC	RMGC	Reach Stacker	Forklifts
VCTPL	2,500	204	16.4	4	6	0	5	3

Table 4.22- Vishakhapatnam Terminals Features Part 2 source:(Gateway Research and Drewry, 2018)

Vishakhapatnam is having a CAGR of 22.9% and doubled its infrastructural abilities doubled since its commencement in 2003(Gateway Research and Drewry, 2018). A most significant advantage for Vishakhapatnam is cabotage relaxation and its position in the east as one of the leading container coastal transportation. This Port has high productivity in India Port Sector with regards to Vessel Turnaround time (17 hours average) or Crane Productivity (24 moves per hour) and Average Pre-berthing time is 1.9 hours (Gateway Research and Drewry, 2018)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10-year increase
Tuticorin	9.8	14.1	14.0	13.0	13.2	14.3	17.6	14.8	15	15.2	55%

Table 4.23- Vishakhapatnam Port LSCI source: (UNCTAD, 2019b)

Port Liner Connectivity Index for Vishakhapatnam is a meagre 15.2, considering Colombo has an index of 63.5. Vishakhapatnam has the vision to become an active transshipment hub, and with the relaxation of cabotage, they are expecting more transshipment volumes and increased feeder services. Vishakhapatnam has the fifth position in India for total weight carried over coastal transportation. They could attract transshipment from Bangladesh and Myanmar if the liners are getting better offers and shipment volumes.

One of the significant threats they face is from Krishnapatanam Port which is handling the most significant transshipment volume in India. They are almost a Transshipment hub with 44% of throughput being Transshipment Containers. Moreover, to top it Adani Group, the biggest India Terminal Operator is in plans to get 72% of stake in Krishnapatanam Port(Lloyds List, 2019). With the Market share of Adani Group, it will be a very competitive scenario for Vishakhapatnam with regards to Transshipment volumes.

<p><u>STRENGTHS</u></p> <ul style="list-style-type: none"> • Extended Capacity in Port • Excellent Hinterland and Feeder Connectivity • ISO Certified • Excellent Productivity in Terminal • Good Position with regards to trade lane from SE Asia. • Improved IT Systems 	<p><u>WEAKNESS</u></p> <ul style="list-style-type: none"> • 1.4% Transshipment incidence • Expensive charges than nearest Transshipment hub Colombo. • PLSCI is only 15.2 which is very low to compete with Colombo • Low Capacity Utilization • Dependence on Colombo for T/S
<p><u>OPPORTUNITIES</u></p> <ul style="list-style-type: none"> • Gains if the Sethusamudram Canal Project is completed. • Cabotage Relaxation • Investment from Sagarmala • Possible Transshipment volumes from Bangladesh/Burma • Economic Growth in India • 	<p><u>THREATS</u></p> <ul style="list-style-type: none"> • Adani Port is purchasing Krishnapatanam and two other ports in the eastern region. • Two upcoming mega-hub projects in south India. • Less Westwards (less eastbound transshipment) T/S traffic

Table 4.24- Vishakhapatnam Port SWOT Analysis, source: (Gateway Research and Drewry, 2018)(Indian Ministry of Shipping, 2019a)

4.5 Upcoming Port Projects

4.5.1 Vizhinjam

Vizhinjam Port is mega transshipment hub built in Southern India in the state of Kerala, and its first phase is expected to be completed by October 2020(The NewsMinute, 2019). This Port is a Government of Kerala Initiative and is aided by Sagarmala Project as well and costs around 1 billion USD(The NewsMinute, 2019). The First phase of Vizhinjam is expected to have a capacity of 1.8 million TEU(Gateway Research and Drewry, 2018)

	Operated by	Draft	Berths	Quay Length	Installed Capacity	Throughput 2017-18	Capacity Utilisation
Vizhinjam	Adani Ports	18	2	800	900,000	0	0

Table 4.25- Vizhinjam Port Features Phase 1, source: (AECOM, 2012)



Figure A3. 1 Route map of International Marine Route (Google Earth)

Figure 4.4- Location of Vizhinjam vs Colombo source:(AECOM, 2012)

The most significant advantage for Vizhinjam is its natural depth of 18 meters, and Motherships of up to 18000 TEU can be handled easily in this port(AECOM, 2012).

	Phase 1	Phase 2	Phase 3
Gateway Traffic	138,459	392,371	768,904
T/S Traffic	683,798	1,292,842	2,054,545
Total	822,257	1,685,213	2,823,449

Table 4.26- Traffic Forecast Vizhinjam in 3 phases, source(AECOM, 2012)

The Next advantage that Vizhinjam has is the proximity to major trade lanes (Figure 4.4). In Phase 1, the T/S incidence is forecasted to be 83%, and in the final phase, the forecast is 73%. An overall average of 75% is forecasted in this project, which technically makes this a regional hub and not a pure transshipment hub.

Another advantage of having natural depth is that there is a minimal cost for dredging. Vizhinjam is well connected to rest of India via NH47 and NH17 and also has railway connectivity to other parts of India. One crucial factor for potential success for this project is its Terminal Operator Adani Ports, who is one of the most successful Terminal operators in the country and has good business relations with key Liners in India. A disadvantage that Vizhinjam faces is lack of direct export/imports, as even ICTT Kochi already has only 50% capacity fulfilment due to lower volumes.

<u>STRENGTHS</u>	<u>WEAKNESS</u>
<ul style="list-style-type: none"> • 18 m Natural Draft • Adani Ports handling the project • Proximity to major trade lanes. • Good Hinterland and Feeder Connectivity • Excellent Infrastructure 	<ul style="list-style-type: none"> • Very Less Exim Cargo due to presence of Kochi ICTT • Expensive Project • Construction delays • Delay in Customs

<ul style="list-style-type: none"> • Can handle traffic to East and West India 	
<p><u>OPPORTUNITIES</u></p> <ul style="list-style-type: none"> • Gains if the Sethusamudram Canal Project is completed. • Cabotage Relaxation • Investment from Sagarmala • Possible Transshipment volumes from Bangladesh/Burma • Economic Growth in India 	<p><u>THREATS</u></p> <ul style="list-style-type: none"> • Colachel Port few nautical miles away will start operating. • Environmental Issues for Construction and Operation • DP World operating ICTT • Colombo will reduce rates

Table 4.27- Vizhinjam Port SWOT Analysis, source: (AECOM, 2012)

Vizhinjam is proposed to be the answer to Colombo, which handles the 40-50% of transshipment send from India. It has all the features of a transshipment hub including lack of Exim Cargo. Another significant advantage is Adani Ports influence in Indian Liner business which can be a critical factor in winning new routes and using all their ports resource and throughput to offer liners a bigger package.

4.5.2 Colachel

Colachel is also a Mega Transshipment hub in Southern tip of India, and it is located in the state of TamilNadu. The Ports construction is overseen by Tuticorin Port Trust and is estimated to cost around 3.4\$ Billion(Livemint, 2016b)

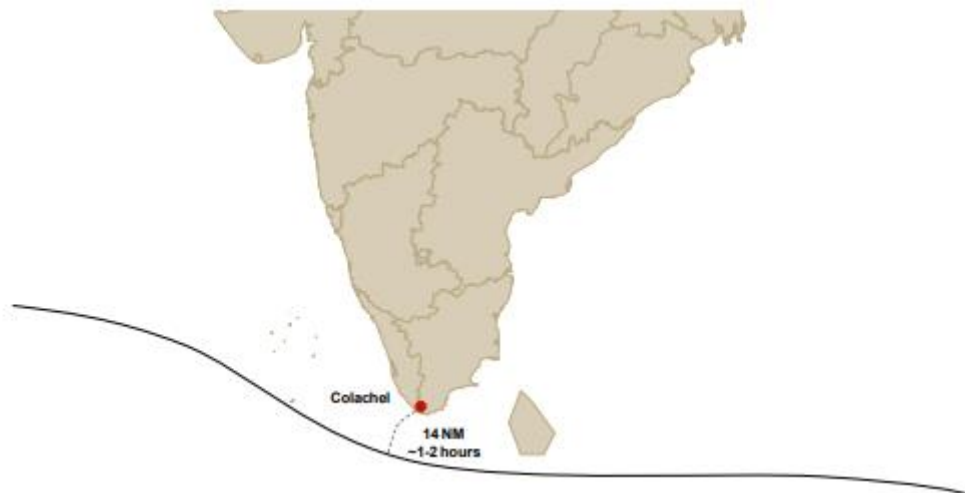


Figure 4.5- Location of Colachel source:(BCG, 2015)

The Port is just 36 km away from Vizhinjam and much closer to trade lanes than Vizhinjam Port. Another Key advantage for Colachel is that it is located near to Industrial and Trade hubs such as Tirupur, Erode, Sivas Kasi etcetera. All these cargos are being transshipped via Colombo, and once Colachel is operational, this traffic can be caught back as shown in Figure 4.5

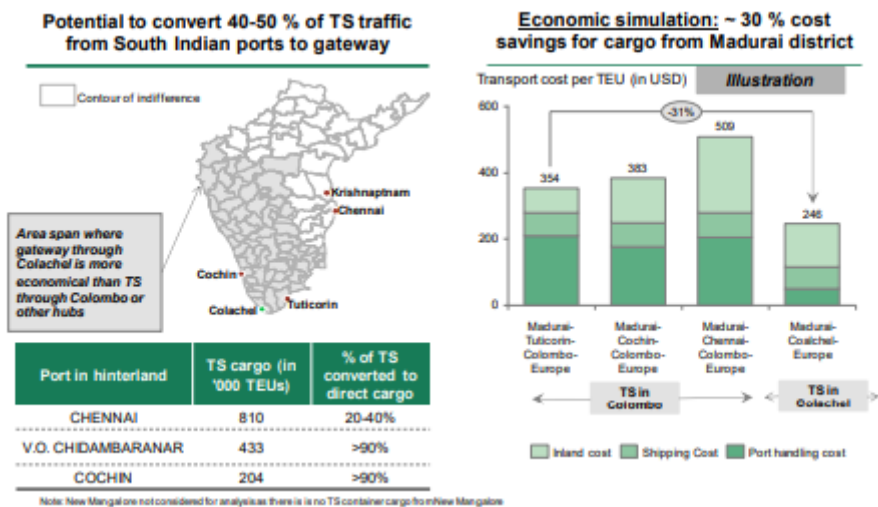


Figure 4.6- Potential for Gateway Cargo source:(BCG, 2015)

Connectivity to other states is one of the crucial factors for this and Colachel has link via Railway and National Highways. It is expected to attract significant traffic from other states through its pricing and ease of transshipping. The Estimated volume of Colachel even in the base case is substantial, with 1.7 million TEU in 2020 and 4.9 million in 2025. The reason for this is due to the knowledge that to compete with other Transshipment Ports; the said port needs to have similar or better capacity/volume that the competing ports are projecting in the future(BCG, 2015).

	2020	%	2025	%	2030	%
Gateway	1	59%	2.1	43%	2.9	43%
T/S	0.7	41%	2.8	57%	3.9	57%
Total	1.7		4.9		6.8	

Table 4.28- Estimation of Cargo source: adapted from (BCG, 2015)

As per the Projections this Port plans to be Regional Gateway rather than a transshipment hub or pure transshipment port as T/S incidence is around 50%.

The Capital invested in Colcahel Project is three times bigger than its neighbouring Port Vizhinjam, so the scale that the Port plans to develop and achieve is immense.

STRENGTHS	WEAKNESS
<ul style="list-style-type: none"> • 18 m Natural Draft • Huge Investment plan • Proximity to major trade lanes. • Good Hinterland and Feeder Connectivity • Proximity to regional Exim containers for Gateway traffic • Excellent Infrastructure • Can handle traffic to East and West India 	<ul style="list-style-type: none"> • Expensive Project • Proximity to 2 Transshipment ports in India • Delay in Customs operations

<u>OPPORTUNITIES</u>	<u>THREATS</u>
<ul style="list-style-type: none"> • Gains if the Sethusamudram Canal Project is completed. • Cabotage Relaxation • Investment from Sagarmala • Possible Transshipment volumes from Bangladesh/Burma • Economic Growth in India 	<ul style="list-style-type: none"> • Vizhinjam few nautical miles away will start operating. • Environmental Issues for Construction and Operation • Private Ports in South India • Colombo will reduce rates

Table 4.29- Vizhinjam Port SWOT Analysis, source: (BCG, 2015)

4.6 Conclusion

Based on the SWOT Analysis, below are the conclusions made:

West Coast	East Coast	New Ports Projects
JNPT	Chennai	Vizhinjam
Mumbai	Tuticorin	Colachel
Cochin	Vishakhapatnam	

Table 4.30 – Major India Ports region-wise, source: (Author)

West Coast – JNPT can be the main Transshipment hub, as it is the largest Container Port in India with an excellent ranking in Port LSCI index, Good Infrastructure and enough gateway cargo volumes to attract liners. JNPT has a rank of sixth in coastal traffic volumes, which is very low for the biggest container port in India (Figure 4.3). BMCT a terminal in JNPT, which started its operation in 2018, has 16.5 meters of Draft and has the potential to take the lead amongst the 5 Terminal operators to attract Transshipment volumes This can be a significant setback to have a collective strategy regarding Transshipment volumes for JNPT port as a whole. Also, Terminal operators are not interested in handling Transshipment traffic due to sufficient gateway cargo and lower margin for Transshipment(The Hindu Businessline, 2018). An Involvement from Ministry of Shipping is required to find a solution for this as five different Terminal operators with different strategy is involved in the operation of Terminals.

Mumbai Port (MbPT) even though it has the highest Transshipment incidence in public ports in India, has only very less throughput and short draft that makes it have very less chance to be a Transshipment hub. At present MbPT is mainly focusing on Dry and Liquid Bulk (POL).

Cochin (ICTT) is a solid contender in Transshipment market, but it has not been able to compete directly with its neighbouring transshipment hub Colombo due to higher charges from Dredging charges and smaller draft(The Business Standard, 2018). Also it takes an additional 8 hours deviation time than Colombo due to its distance from Suez route(Livemint, 2016a). Due to siltation, Cochin Port requires huge overheads in dredging after every monsoon, and this makes the port charges very high(Indian Ministry of Shipping, 2016c). The only option for Cochin is for government subsidies for port dredging to keep the costs low. However, two upcoming Transshipment hub projects near Kochi might make the port lose out, as both the competitors have deeper drafts and proximity to major trade lanes.

On the west coast, due to features mentioned above including connectivity, infrastructure and already existing liner business, JNPT and particularly the terminal BMCT has the potential to be a transshipment hub in the coming years.

East Coast- Chennai is the second biggest container port with regards to throughput, but it has only very less transshipment traffic as it is a pure gateway port.

It has very strong hinterland connection and Exim volumes and has better Port LSCI of the three selected major ports in East Coast. Chennai port also had a major investment planned in the biggest container Terminal in India, but it has not yet for the go-ahead.

Tuticorin even though is the third-largest container port in India does not have enough draft for bigger vessels to berth and cannot compete with Colombo to capture the transshipment volumes going out of the country.

Out of the three major ports selected Visakhapatnam is the fastest growing port with better productivity and infrastructure since its commencement. It already has Visakhapatnam has some transshipment volume and has a draft of 16.5 meters enough for larger vessels to berth. If the port can become a major transshipment hub, it can attract Exim cargo from both Bangladesh and Myanmar.

Comparing the 3 Ports in the East region, Visakhapatnam has the best potential to be a Transshipment hub due to the draft, productivity and transshipment activity.

New Port Development- Both Vizhinjam and Colachel are the deep seaports being developed as two separate projects in the southern tip of India. Both have advantages of 18 meters of draft, which is enough to berth vessels of up to 18000 TEU. The advantage that Colachel has on Vizhinjam is its robust hinterland connectivity to major industrial cities and its projected throughput from these regions. Colachel has 3.5 Billion USD investment throughout its phase of development, while Vizhinjam has an investment of about 1 Billion USD. Although both ports have similar nautical features Colachel is closer to the main trade route than Vizhinjam. Also, the operational feasibility of Vizhinjam with lesser Gateway traffic can be only be analysed once it is operational. Transshipment volumes are generally considered volatile due to the tendency of liners to shift their operations according to the availability of competitive services(Ashar, 1999). Vizhinjam with a proposed Transshipment model can experience this volatility if their service as not as par with their competitors. With all these features and more significant investment, Colachel is more likely to lead in the transshipment volumes than Vizhinjam.

5. Conclusion

As India has a coastline of 7500 km, having just one Transshipment hub would not be feasible due to the distance that needs to be covered. Ideally, a transshipment hub should be operated in the West and another in East.

Since two Transshipment hubs are being constructed in Southern tip of India, any of this Port would be advantageous to have, to compete directly with Colombo.

Colombo is having major expansion plans and competing with this port will require not only to have just lower port charges and connectivity but also have a cohesive national strategy such as that of Singapore and other maritime nations. In the case of Singapore, which is ranked second in EODB and seventh in LPI, they are the best

maritime nation in the world(DNV-GL and Menon Economics, 2019),not by mere coincidence but having in place well planned national strategies which took advantage of their location in Malacca Strait extraordinarily. On contrast having a poor GPIs or weak maritime support services such as stringent Customs checks and inefficient Port management authorities can affect countries economy on several levels.Gwadar Port in Pakistan, which is known as jewel in the crown of CPEC(China–Pakistan Economic Corridor) is facing several operational issues including Customs inefficiencies and high inland transportation cost,which has led to Cosco liners in cancelling its services from the port(The Economic Times, 2019a).Gwadar port has a prominent position in CPEC and One Belt One Road Initiative and this set back can be linked to Pakistans lower rating in GPI's such EODB and LPI. In case of India with government initiatives such as Sagarmala, cabotage relaxation, bilateral relations with neighbouring countries, India has all the potential to develop some of the Indian Ports to a major transshipment hub. Government of India has recognised that along with investment in infrastructure and necessary policy changes, strategies to increase the GPI such as EODB and LPI would directly influence FDI and foster confidence amongst investor and business such as Liners and Terminal Operators to invest more in the economy.

From the Port features the best Port to handle transshipment would be JNPT as it has all the infrastructure and available capacity available (63% utilisation). However, the mix of Terminal Operators and shorter draft for many Terminal operators can deter transshipment business happening here. The next option is Mumbai which has only very less throughput and capacity, and its expansion of an offshore terminal has not much scope for a transshipment hub due to limited capacity, and also because the draft is only 9 meters. ICTT with DP World seems to be logical choice for being a transshipment hub, as it is a purpose-built Transshipment Terminal, but the cost of dredging is very high, and they cannot compete with international transshipment hub with almost double charges.

	Vallarpadam (Cochin)	Colombo	Singapore	Klang
Vessel Related Charges - Liner	8	9	6	6
Vessel Related Charges - Feeder	5	2	2	2
Cargo handling charges	149	86	122	84
Service Tax (14%)	21	-	-	-
Total	183	97	130	92

Figure 5.1- Comparison of Ports Charges 2015 source:(BCG, 2015)

The only option here is subsidising the dredging cost as Government of Srilanka does. If we consider Port connectivity the best option to be a T/S hub is JNPT.

	Operated by	Draft	Berths	Quay Length	Installed Capacity	Throughput 2017-18	Capacity Utilisation
JNPT	Mixed	14	14	3895	7,700,000	4,832,988	63%
Kochi	DPW	14.5	2	605	1,000,000	514,997	51.50%
Chennai	DPW	15.5	7	1717	2,450,000	1,548,066	63.19%
Tuticorin	PSASICAL	14.9	2	715	1,050,000	696,357	66.32%
Vishak	ICTIPL/DPW	16.5	2	450	700,000	388,289	55.50%

Table 5.2- Selected Ports Features, source: (Gateway Research and Drewry, 2018)

With regards to the East part of India if we consider Position/Location and Connectivity Vishakhapatnam is the best option with 16.5 m draft. Chennai can be a contender, but it is mainly concentrating on Gateway traffic. Vishakhapatnam, with its already active Transshipment traffic, seems to be the Port apt to be a Transshipment Port considering its expansion plans as well.

From the new Ports as per the projections, the best Transshipment hub would be Vizhinjam considering the transshipment incidence. This is since Colachel is a regional gateway that handles transshipment as half of its throughput. With regards to depth Colachel and Vizhinjam is similar with 18 m draft. Position wise, Colachel has an advantage over Vizhinjam with only 4 nm nearer to main trade lane. As the Colachel has a fallback plan of gateway traffic, which Vizhinjam does not have, Colachel Port's plan is seen as more feasible than Vizhinjam. The only advantage that Vizhinjam has on Colachel is the Terminal operator Adani Port which has more influence on Liner business than public ports do have.

Currently, India can survive without a Transshipment Port or afford the failure of a T/S hub, as the cost to the economy from transshipping to outside the country is only 400 -600 million dollars. In the future if the trend changes and if transportation becomes expensive then this can change entirely, and failure of a T/S hub will directly impact the economy.

With the government of India's initiative to make Indian trade easier and economical by implementing Sagarmala and other projects, this investment in mega transshipment hub is going to enhance the position of India in the coming decades. With the relaxation of cabotage and other policies, the frequency and volume of transshipment are going to increase in the coming years. India has all the potential to have transshipment hub including JNPT on West, Colachel on South and Vishakhapatnam in the East. The main factor is the reduction of Port charges for Vessels, as shown in Figure 5.1, to match with international hubs.

Considering the scenario of all the three ports recommended above Colachel has the two main criteria for a transshipment hub that have been highlighted prominently in various research: Proximity to trade lane and deep draft. With enough investment and infrastructure development Colachel can be the best Transshipment hub in South Asia even capturing back the volumes from Colombo and Singapore. Another factor required for success for transshipment hub is investment from Liners as a terminal operator, which can help to get more vessel callings and transshipment activity in the port (Notteboom, Parola and Satta, 2019). Colachel can consider this option of having Liner as a Terminal operator which can result in more vessels calling in this port resulting in economies of scale and reducing shipping charges for traders.

5.1 Limitations of this research study

The study did not consider actual liner data and routing information's, which can be a crucial factor for a Liner to select a port as its transshipment hub. In case of a Liner to select a hub port there are several criteria including deviation time and cost, Vessel turnaround time, waiting time in port, Port Cost, Time and Cost in feeder link, Number of services calling at the port, etcetera (Yetkili *et al.*, 2016) which were not considered

in this study. There were no research studies found on Indian transshipment hubs, which is a major limitation to this research.

Since Liners decides the optimal location for their transshipment hubs, Ports can only try to match liners requirements. In this study, the requirements for a Transshipment hub were studied with regards to Major Indian Ports, but it did not have primary data from Indian Liner industry including interview, and secondary data including liner reports to analyse if Shipping Liners will select any Indian Ports as their transshipment hub. The study is also limited to 12 major public ports in India, and private ports are not included.

5.2 Suggestions for future research

Transshipment services are becoming an upcoming phenomenon as far as the Indian Shipping Industry is concerned. By providing transshipment service in the south East Asian region, the Indian Ports want to be competitive in the port business. As mentioned in the limitation, there was a lack of relevant studies on the transshipment sectors; hence, the Indian Port Authorities should initiate more research in this area.

Bibliography

Actualitix (2013) *Container Port Traffic*. Available at:

<https://en.actualitix.com/country/wld/container-port-traffic.php>.

AECOM (2012) *Integrated Port Master Plan Report - Final Prepared for Vizhinjam International Seaport Ltd.*

Agama, F. O. and Alisigwe, H. C. (2018) 'Cabotage regimes and their effects on states' economy', *Nnamdi Azikiwe University Journal of International Law and Jurisprudence*, 9(1), pp. 71–82.

Allied Market Research (2017) *Shipping Containers Market by Size of Container (Small Container (20 feet), Large Container (40 feet), and High Cube Container (40 feet)), and Product Type (Dry Storage Container, Flat Rack Container, Refrigerated Container, Special Purpose Container) - G*. Available at:

<https://www.alliedmarketresearch.com/shipping-containers-market>.

Appelbaum, S. H., St-Pierre, N. and Glavas, W. (1998) 'Strategic organizational

change: The role of leadership, learning, motivation and productivity', *Management Decision*, 36(5), pp. 289–301. doi: 10.1108/00251749810220496.

Ashar, A. (1999) 'Long - Term Trends in Container Shipping – the Revised Evolution and Revolutions : Scale and Scope Economies', in *Terminal Operations Conference*, pp. 1–16.

BCG (2015) *Preparation of Rapid Techno-Economic Feasibility Report for Development of Colachel Port in Tamilnadu*.

Bhattacharjee, A. (2012) *Social Science Research: Principles, Methods and Practices*. 2nd edn. Tampa, Florida, USA.

Bloomberg (2019) *Relaxing Cabotage Rules To Hurt Indian Liners, Says Chamber Of Commerce* Read more at: <https://www.bloomberqqint.com/business/relaxing-cabotage-rules-to-hurt-indian-liners-chamber>. Available at: <https://www.bloomberqqint.com/business/relaxing-cabotage-rules-to-hurt-indian-liners-chamber>.

Brooks, M. R. (2010) *THE HANDBOOK OF MARITIME ECONOMICS AND BUSINESS*. 2nd edn. Edited by C. T. Grammenos. London: Lloyd's List.

Brooks, M. R. and Pallis, A. A. (2008) 'Assessing port governance models: Process and performance components', *Maritime Policy and Management*, 35(4), pp. 411–432. doi: 10.1080/03088830802215060.

Business Standard (2016) *Tamil Nadu to get 4th major port*. Available at: https://www.business-standard.com/article/economy-policy/tamil-nadu-to-get-4th-major-port-116070501191_1.html.

Business Standard (2018) *Won't damage Ram Sethu for Sethusamudram project, Centre tells SC*. Available at: https://www.business-standard.com/article/current-affairs/won-t-damage-ram-sethu-for-sethusamudram-project-centre-tells-sc-118031600295_1.html.

Businessline (2018) *Indian ship owners threaten to flag out if cabotage is eased and RoFR removed*. Available at: <https://www.thehindubusinessline.com/economy/logistics/indian-ship-owners-threaten-to-flag-out-if-cabotage-is-eased-and-rofr-removed/article23395090.ece>.

Dappe, H. and Suarez-Aleman, A. (2016) *Competitiveness of South Asia 's Container Ports*, *World Bank Group*. doi: 10.1596 /978-1-4648-0892-0. License:

Deccan Chronicle (2018) *VOC Port competes with Colombo in transshipment*. Available at: <https://www.deccanchronicle.com/nation/current-affairs/131218/voc-port-competes-with-colombo-in-transshipment.html>.

Digital India (2019) *Infrastructure*. Available at: <https://digitalindia.gov.in/infrastructure>.

DNV-GL and Menon Economics (2019) *The Leading Maritime Capitals of the World*.

Doshi, R., Kelley, J. G. and Simmons, B. A. (2019) *The Power of Ranking: The Ease of Doing Business Indicator and Global Regulatory Behavior*, *International Organization*. doi: 10.1017/s0020818319000158.

Dredging Today (2010) *Chennai Port confirms construction of Rs 3,686 crore mega*

terminal. Available at: <https://www.dredgingtoday.com/2010/01/12/chennai-port-confirms-construction-of-rs-3686-crore-mega-terminal/>.

Ducruet, C. and Notteboom, T. (2012) 'Developing Liner Service Networks in Container Shipping', *Maritime Logistics: A complete guide to effective shipping and port management*, (January 2012), pp. 77–100.

Dwarakish, G. S. and Salim, A. M. (2015) 'Review on the Role of Ports in the Development of a Nation', *Aquatic Procedia*. Elsevier B.V., 4(Icwrcoe), pp. 295–301. doi: 10.1016/j.aqpro.2015.02.040.

Economic Times (2018) *Commerce Ministry approves 15 projects for export infrastructure under TIES*. Available at: <https://economictimes.indiatimes.com/news/economy/foreign-trade/commerce-ministry-approves-15-projects-for-export-infrastructure-under-ties/articleshow/64450490.cms?from=mdr>.

ESCAP (2017) *Review of Development in Transportation in Asia and the Pacific*. Bangkok.

Exim Academy (2018) *Shipping Ministry Stages A Coup, Develops Thoothukudi VOC Port As Transshipment Hub*. Available at: <https://eximacademy.in/shipping-ministry-stages-coup-develops-thoothukudi-voc-port-transshipment-hub/>.

Financial Express (2018) *Indian ports: Victim of inward vision?* Available at: <https://www.financialexpress.com/opinion/indian-ports-victim-of-inward-vision/1124449/>.

Gateway Research and Drewry (2018) *Indian Container Market Report*.

Gençer, H. and Demir, M. H. (2019) 'An Overview of Empty Container Repositioning Studies and Research Opportunities', *Business and Management Horizons*, 7(1), p. 1. doi: 10.5296/bmh.v7i1.14670.

Grether, J. M. and Mathys, N. A. (2010) 'Is the world's economic centre of gravity already in Asia?', *Area*, 42(1), pp. 47–50. doi: 10.1111/j.1475-4762.2009.00895.x.

Gürel, E. and Tat, M. (2017) 'SWOT ANALYSIS: A THEORETICAL REVIEW', *The Journal of International Social Research*, 10(51).

Habib, M., Beldona, S. and Coombs, J. E. (2000) 'National economic performance and its determinants: An empirical analysis', *International Journal of Public Administration*, 23(4), pp. 435–460. doi: 10.1080/01900690008525470.

Haralambides, H. E. (1996) 'THE ECONOMIC IMPACT OF SHIPPING ON THE NATIONAL ECONOMY', in *International Conference on Shipping, Ports and Logistics Services: Solutions for Global Issues*. Vancouver Canada: International Association of Maritime Economists (IAME), pp. 1–17.

IBEF (2019) *Shipping Industry & Ports in India*. Available at: <https://www.ibef.org/industry/ports-india-shipping.aspx>.

Imprint India (2019) *Homepage*. Available at: <https://imprint-india.org/projects/funding-agency-wise-list-of-approved-projects/projects-supported-by-ministry-of-road-transport-and-highways>.

Indian Maritime University (2019) *Programmes*. Available at:

https://www.imu.edu.in//index.php?prod_id=93.

Indian Ministry of Shipping (2016a) *Final Report for Sagarmala (Vol.I)*.

Indian Ministry of Shipping (2016b) *Master Plan for Chennai Port Ministry of Shipping / Indian Ports Association*.

Indian Ministry of Shipping (2016c) 'Master Plan for Kochi Port- Ministry of Shipping / Indian Ports Association'.

Indian Ministry of Shipping (2016d) 'Master Plan for Mumbai Port Ministry of Shipping / Indian Ports Association'.

Indian Ministry of Shipping (2016e) *Sagarmala - National Perspective Plan*. New Delhi.

Indian Ministry of Shipping (2018) *Indian Shipping Statistics*. New Delhi.

Indian Ministry of Shipping (2019a) *Annual Report - Ministry of Shipping Government of India (2018-19)*. New Delhi.

Indian Ministry of Shipping (2019b) *Concept & Objectives*. Available at: <http://sagarmala.gov.in/about-sagarmala/vision-objectives>.

Indian Ministry of Shipping (2019c) *Projects under Sagarmala*. Available at: <http://sagarmala.gov.in/projects/projects-under-sagarmala>.

International Trade Center (2019) *Freight*. Available at: <http://www.cottonguide.org/cotton-guide/cotton-marketing-freight/>.

Jean-François Arvis, Jean-François Marteau, and G. R. (2010) 'The Cost of Being Landlocked: Logistics, Costs, and Supply Chain Reliability', in. The World Bank.

JNPT (2019) *JNPT Overview*. Available at: http://jnport.gov.in/jnpt_info.

JOC (2018a) *After Maersk exit, Chennai pins hopes on transshipment*. Available at: https://www.joc.com/port-news/asian-ports/port-chennai/after-maersks-exit-chennai-pins-hopes-transshipment-cargo_20181106.html.

JOC (2018b) 'Chennai Port slashes shortsea and transshipment rates'. Available at: https://www.joc.com/port-news/asian-ports/port-chennai/chennai-port-slashes-short-sea-and-foreign-carrier-transshipment-rates_20180713.html.

JOC (2018c) *Transshipment at India's ports surges after cabotage reform*. Available at: https://www.joc.com/port-news/asian-ports/transshipment-india's-ports-surges-after-cabotage-reform_20180911.html.

JOC (2019a) *India cabotage reform boosting transshipment*. Available at: https://www.joc.com/port-news/asian-ports/india-cabotage-reform-boosting-transshipment_20190508.html.

JOC (2019b) *JNPT aiming to attract larger ships with deeper draft*. Available at: https://www.joc.com/port-news/asian-ports/port-nhava-sheva/jnpt-looking-attract-larger-ships-deeper-draft_20190513.html.

Lam, J. S. L. and Yap, W. Y. (2008) 'Competition for transshipment containers by major ports in Southeast Asia: Slot capacity analysis', *Maritime Policy and Management*, 35(1), pp. 89–101. doi: 10.1080/03088830701849043.

Lankaweb (2018) *Colombo cuts rates after India eases cabotage rules*. Available at: <http://www.lankaweb.com/news/items/2018/08/02/colombo-cuts-rates-after-india-eases-cabotage-rules/>.

Lee, E. S. (2010) 'Knowledge resource in maritime transport industry : A case analysis', *Asian Journal of Shipping and Logistics*, 26(2), pp. 297–340. doi: 10.1016/S2092-5212(10)80007-0.

Lee, P. T. W. and Cullinane, K. (2016) *Dynamic Shipping and Port Development in a Globalised economy*. London: Palgrave Macmillan. doi: 10.1192/bjp.111.479.1009-a.

Lirn, T.-C. *et al.* (2004) 'An Application of AHP on Transshipment Port Selection : A Global Perspective', *Maritime Economics & Logistics*, 6, pp. 70–91. doi: 10.1057/palgrave.mel.9100093.

Livemint (2016a) *Can India's container transshipment hubs take on Colombo?* Available at: <https://www.livemint.com/Politics/zUkTONWkFy8Iczol0rcBgK/Can-Indias-container-transshipment-hubs-take-on-Colombo.html>.

Livemint (2016b) *Colachel Port to become transshipment hub, boost fisheries*. Available at: <https://www.livemint.com/Politics/uR41gLOCEI6mXNTkutkyLM/Colachel-Port-to-become-transshipment-hub-boost-fisheries.html>.

Llanto, G. M. and Navarro, A. M. (2014) *Relaxing the Cabotage Restrictions in Maritime Transport 1*.

Lloyds List (2019) *Adani set to acquire stake in Krishnapatnam port*. Available at: <https://lloydslist.maritimeintelligence.informa.com/LL1128867/Adani-set-to-acquire-stake-in-Krishnapatnam-port>.

Lun, Y. H. V., Lai, K.-H. and Cheng, T. C. E. (2010) *Shipping and Logistics Management*, Springer. New York: Springer. doi: 10.1007/978-1-84882-997-8_7.

Make in India (2019a) *6 Superstar Sectors Boosting Make In India*. Available at: <http://www.makeinindia.com/six-superstar-sectors-boosting-make-in-india>.

Make in India (2019b) *Significant Foreign Direct Investments*. Available at: <http://www.makeinindia.com/significant-foreign-direct-investments>.

Maps of India (2019) *What Are the Major Ports in India?* Available at: <https://www.mapsofindia.com/answers/india/what-are-the-major-ports-in-india/>.

Maritime Gateway (2019) 'Bangladesh: Exploring Transshipment through Indian Seaports', *Maritime Gateway*, June, pp. 24–30. Available at: <http://www.maritimegateway.com/june-2019/>.

Mckinsey (2017) *Container shipping : The next 50 years, Travel, Transport & Logistics*.

Meera Kosambi and Brush, J. E. (1988) 'American Geographical Society Three Colonial Port Cities in India Author (s): Meera Kosambi and John E . Brush Published by : American Geographical Society Stable URL : <https://www.jstor.org/stable/214304>', *Geographical Review*, 78(1), pp. 32–47.

Ministry of Commerce - India (2017) *Trade Infrastructure for Export Schme*

Guidelines -2017-2020. New Delhi.

Mounime, E. and Lotfi, M. (2014) 'Maritime transport and international trade : a study of transshipment opportunities and their impacts on The mediterranean region growth', *The Business & Management Review*, 4(4), pp. 252–258.

Mumbai Port (2019) *History*. Available at:
http://www.mumbaiport.gov.in/index2_n.asp?slid=843&sublinkid=479&langid=1.

Nautilus International (2018) *The strong case for shipping nations to implement cabotage protection laws*. Available at: <https://www.nautilusint.org/en/the-strong-case-for-shipping-nations-to-implement-cabotage-protection-laws/>.

NMIS (2019) *Academic Partners*. Available at:
<https://www.nmis.net/index.php/academic-partners/>.

Notteboom, T. E. (2009) 'Container Shipping And Ports: An Overview', *Review of Network Economics*, 3(2). doi: 10.2202/1446-9022.1045.

Notteboom, T. E., Parola, F. and Satta, G. (2019) 'The relationship between transshipment incidence and throughput volatility in North European and Mediterranean container ports', *Journal of Transport Geography*. Elsevier, 74(January), pp. 371–381. doi: 10.1016/j.jtrangeo.2019.01.002.

Notteboom, T., Parola, F. and Satta, G. (2013) *Partim transshipment volumes*.

OECD (2019a) *Bangladesh*. Available at: <https://oec.world/en/profile/country/bgd/>.

OECD (2019b) *Nepal*. Available at: <https://oec.world/en/profile/country/npl/>.

Onwuegbuzie, A. J. and Frels, R. (2016) *7 Steps to a Comprehensive Literature Review*. London: Sage Publications.

Pham, T. and Yeo, G.-T. (2019) 'Evaluation of Transshipment Container Terminals' Service Quality in Vietnam: From the Shipping Companies' Perspective', *Sustainability*, 11(5), p. 1503. doi: 10.3390/su11051503.

Port News (2018) *Bangladesh to use Colombo port as transshipment hub*. Available at: <http://en.portnews.ru/news/265672/>.

Press Information Bureau (2019) *Ships built in India to get priority in chartering under revised guidelines of Shipping Ministry*. Available at:
<https://pib.gov.in/newsite/PrintRelease.aspx?relid=188683>.

Projects Today (2007) *Vallarpadam ICTT: Work on road and rail links to commence soon*. Available at: <https://www.projectstoday.com/News/Vallarpadam-ICTT-Work-on-road-and-rail-links-to-commence-soon>.

Quartz (2019) *Is Nepal falling into a Chinese debt trap?* Available at:
<https://qz.com/india/1466287/is-nepal-falling-into-chinas-belt-and-road-debt-trap/>.

Reda, O., Harraz, N. and El-Tawil, A. (2016) 'Terminal Operations in Container Transshipment Hubs : Literature Review and Research Directions', in *The International Conference of Engineering Sciences & Applications (ICESA 2016)*. Aswan, Egypt.

Reuters (2018) *Nepal says China to allow access to ports, ending Indian monopoly on transit*. Available at: <https://www.reuters.com/article/us-china-nepal-ports/nepal->

says-china-to-allow-access-to-ports-ending-indian-monopoly-on-transit-idUSKCN1LN1KJ.

Rodrigue, J. P. (2019a) *4. Repositioning Strategies, The Geography of Transport Systems*. Available at: https://transportgeography.org/?page_id=9481.

Rodrigue, J. P. (2019b) *Agglomeration Economies*. Available at: https://transportgeography.org/?page_id=1559.

Rodrigue, J. P. (2019c) *Freight Distribution Clusters (Logistics Zones)*. Available at: https://transportgeography.org/?page_id=8133.

Rodrigue, J. P. (2019d) *Main Maritime Shipping Routes, Transport Geography*. Available at: https://transportgeography.org/?page_id=2067.

Rodrigue, J. P. and Ashar, A. (2016a) 'Transshipment hubs in the New Panamax Era: The role of the Caribbean', *Journal of Transport Geography*. Elsevier Ltd, 51, pp. 270–279. doi: 10.1016/j.jtrangeo.2015.10.002.

Rodrigue, J. P. and Ashar, A. (2016b) 'Transshipment hubs in the New Panamax Era: The role of the Caribbean', *Journal of Transport Geography*, 51, pp. 270–279. doi: 10.1016/j.jtrangeo.2015.10.002.

S&P Global (2018) *India's new cabotage law positive for shipping, bunkering; hurdles remain*. Available at: <https://www.spglobal.com/platts/en/market-insights/latest-news/shipping/061918-indias-new-cabotage-law-positive-for-shipping-bunkering-hurdles-remain>.

Safety4sea (2018) *Overview of cabotage rules in India*. Available at: <https://safety4sea.com/overview-of-cabotage-rules-in-india/>.

Sagarmala (2019) *Coastal Community Development*. Available at: <http://sagarmala.gov.in/project/coastal-community-development>.

Sammut-Bonnici, T. and Galea, D. (2015) 'SWOT Analysis', in *Wiley Encyclopedia of Management*. doi: 10.1002/9781118785317.weom120103.

Seanews (2019) *Vizhinjam Deep Sea-Port: India's Proposed Trans-shipment Hub*. Available at: <https://seanews.co.uk/uncategorized/vizhinjam-deep-sea-port-indias-proposed-trans-shipment-hub/>.

Ship Technology (2018) *A storm is brewing for India's domestic shipping industry*. Available at: <https://www.ship-technology.com/features/storm-brewing-indias-domestic-shipping-industry/>.

Ship Technology (2019) *India considers giving Bangladesh access to west coast ports*. Available at: <https://www.ship-technology.com/news/india-bangladesh-access-west-coast-ports/>.

Sleeper, D. M. (2012) 'Port Significance: Contributions to Competitiveness in Latin America and Asia', *Journal for Global Business and Community*, pp. 22–28.

SRETPEC (2019) *CBIC announces a next generation reform for Ease of Doing Business named "Turant Customs"*. Available at: <http://www.sretpc.org/gallery/view/50079>.

Stopford, M. (1997) *Maritime Economics Second Edition*. doi: 10.1016/S0966-

6923(98)00021-0.

Swaniti Initiative (2017) *Make In India – Unleashing India On The Global Manufacturing Map*. Available at: <http://www.swaniti.com/1959-2/>.

Swift (2019) *About Us*. Available at: <https://www.icegate.gov.in/SWIFT/about-us.html>.

The Business Standard (2018) *Vallarpadam Port loses out to Colombo on smaller draft, higher charges*. Available at: https://www.business-standard.com/article/economy-policy/smaller-draft-high-vessel-related-charges-make-vallarpadam-s-tariff-sticky-118022300349_1.html.

The Economic Times (2005) *What is this Sethusamudram Project? Read more at: //economictimes.indiatimes.com/articleshow/1160315.cms?from=mdr&utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst*. Available at: <https://economictimes.indiatimes.com/what-is-this-sethusamudram-project/articleshow/1160315.cms?from=mdr>.

The Economic Times (2016) *Deep sea trans-shipment Colachel port to cost Rs 27,570 crore*. Available at: <https://economictimes.indiatimes.com/news/economy/infrastructure/deep-sea-trans-shipment-colachel-port-to-cost-rs-27570-crore/articleshow/53432049.cms>.

The Economic Times (2019a) *China-Pakistan Gwadar Port runs into rough weather*. Available at: <https://economictimes.indiatimes.com/news/international/world-news/pakistan-china-gwadar-port-runs-into-rough-weather/articleshow/71041565.cms?from=mdr>.

The Economic Times (2019b) *JNPT becomes India's only port to be ranked among world's top 30*. Available at: <https://economictimes.indiatimes.com/industry/transportation/shipping-/-transport/jnpt-becomes-indias-only-port-to-be-ranked-among-worlds-top-30/articleshow/67645919.cms?from=mdr>.

The Hindu (2018) *Relaxation in cabotage law to benefit Indian ports*. Available at: <https://www.thehindu.com/business/Industry/relaxation-in-cabotage-law-to-benefit-indian-ports/article24067871.ece>.

The Hindu Business Line (2011) 'Kochi hits the main shipping lane with new box terminal'. Available at: <https://www.thehindubusinessline.com/economy/logistics/kochi-hits-the-main-shipping-lane-with-new-box-terminal/article23046184.ece>.

The Hindu Businessline (2017) *India losing out for lack of hub ports*. Available at: <https://www.thehindubusinessline.com/economy/logistics/India-losing-out-for-lack-of-hub-ports/article20380247.ece>.

The Hindu Businessline (2018) *Major port trusts not keen on container transshipment*. Available at: <https://www.thehindubusinessline.com/economy/logistics/major-port-trusts-not-keen-on-container-transshipment/article24607693.ece>.

The NewsMinute (2019) *Keralas Vizhinjam Port commissioning deadline extended to october 2020*. Available at: <https://www.thenewsminute.com/article/kerala-s-vizhinjam-port-commissioning-deadline-extended-october-2020-96738>.

The Wire (2018) *Modi Wants India to be a Trans-shipment Hub. But Can it Beat Sri Lanka and Singapore?* Available at: <https://thewire.in/economy/modi-wants-india-to-be-a-trans-shipment-hub-but-can-it-beat-sri-lanka-and-singapore>.

The World Bank (2019a) *About LPI*. Available at: <https://lpi.worldbank.org/about>.

The World Bank (2019b) *Container port traffic (TEU: 20 foot equivalent units)*. Available at: <https://data.worldbank.org/indicator/IS.SHP.GOOD.TU>.

The World Bank (2019c) *Methodology*. Available at: <https://www.doingbusiness.org/en/methodology>.

The World Bank (2019d) *Rankings*. Available at: <https://www.doingbusiness.org/en/rankings>.

The World Bank (2019e) *World Bank Open Data*. Available at: https://data.worldbank.org/?most_recent_value_desc=true.

Times of India (2019) *Vizag port aims to lower consignment clearance time*. Available at: <https://timesofindia.indiatimes.com/city/visakhapatnam/vizag-port-aims-to-lower-consignment-clearance-time/articleshow/70707192.cms>.

UNCTAD (2018) *Review of Maritime Transport 2018*. UNCTAD.

UNCTAD (2019a) *Maritime transport indicators*. Available at: <https://stats.unctad.org/handbook/MaritimeTransport/Indicators.html>.

UNCTAD (2019b) *Port liner shipping connectivity index, annual*. Available at: <https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=170026>.

United Nations (2016) *Maritime Transport is 'Backbone of Global Trade and the Global Economy'*. Available at: <https://www.un.org/press/en/2016/sgsm18129.doc.htm> (Accessed: 21 July 2019).

University of Minnesota (2016) *Mastering Strategic Management, Mastering Strategic Management*. doi: 10.24926/8668.1401.

Veenstra, A. (2015) *Handbook of Ocean Container Transport Logistics : Ocean Transport and Facilitation of Trade*. Edited by C. Y. Lee and Q. Meng. Springer.

Vision IAS (2018) *Government Scheme 2018*. Delhi.

Wiegmans, B. W., Hoest, A. Van Der and Notteboom, T. E. (2008) 'Port and terminal selection by deep-sea container operators', *Maritime Policy and Management*, 35(6), pp. 517–534. doi: 10.1080/03088830802469329.

World Shipping Council (2019) *Top 50 World Container Ports*. Available at: <http://www.worldshipping.org/about-the-industry/global-trade/top-50-world-container-ports>.

World Trade Organization (2018) *World Trade Statistical Review, World Trade Organization*. Geneva. Available at: www.wto.org/statistics.

Yavuz, M. and Deligönül, B. (2017) 'The importance of logistics information technologies and knowledge management capabilities on intermediaries' performance', *Global Intermediation and Logistics Service Providers*, (December), pp. 208–225. doi: 10.4018/978-1-5225-2133-4.ch011.

Yetkili, E. *et al.* (2016) 'Economic Analysis of Container Transshipment in the Eastern Mediterranean Region', *International Journal of Environment and Geoinformatics*, 3(1), pp. 12–21. doi: 10.30897/ijegeo.304418.

Yochum, G. R. and Agarwal, V. B. (1987) 'Economic Impact of a Port on a Regional Economy: Note', *Growth and Change*, 8(3), pp. 74–87. Available at: <http://www.port-of-nagoya.jp/english/aboutport/economic/1001412.html>.