

A STUDY ON FACTORS AFFECTING PERFORMANCE OF CCTL

A dissertation submitted to the School of Maritime Management

Indian Maritime University in the partial fulfilment of

Master of Business Administration

By

SHREEMATHY

(Reg. No. 2103304021)

UNDER THE SUPERVISION AND GUIDANCE

OF

Dr. EMIL MATHEW

(Assistant Professor, School of Maritime Management)



School of Maritime Management

INDIAN MARITIME UNIVERSITY

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

CHENNAI CAMPUS

MAY 2023

SCHOOL OF MARITIME MANAGEMENT

INDIAN MARITIME UNIVERSITY




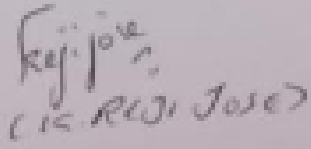
(A Central University under the Ministry of Ports, Shipping and Waterways)

CHENNAI CAMPUS



CERTIFICATE

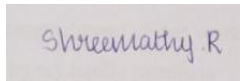
This is to certify that the project report titled “**A study on factors affecting Performance of CCTL**” is a bonafide work done by Shreemathy.R (Reg. No:- 2103304021) in partial fulfilment of the requirement for the award of the degree of Master of Business Administration in Indian Maritime University, Chennai.

 Dr. B. Swaminathan (Head of the department)		 Dr. Emil Mathew (Project Guide)
External Viva-voce examination conducted on: -		
External Examiner:-		
Place: Chennai		
Date: 16/05/2023		

DECLARATION

I, Shreemathy.R , do hereby declare that the dissertation entitled “**A Study on the Factors affecting the Performance Of container Terminal reference to CCTL**” is exclusively a bonafide work done by me under the supervision and guidance of Dr. Emil Mathew, Assistant Professor, School of Maritime Management and is submitted to Indian Maritime University in partial fulfilment of the requirement for the award of the degree of Master of Business Administration.

I further declare that no part of this report has been previously submitted to any other university or academic body for the award of any degree or diploma.



Shreemathy.R

Place: Chennai

Shreemathy .R

Date:/...../2023

(Reg. No:- 2103304021)

ACKNOWLEDGEMENT

I am deeply indebted to the “ALMIGHTY GOD” who guided me throughout the research work and blessed me for the successful completion of this study.

I sincerely thankful to Dr. B. Swaminathan, Head of the Department, School of Maritime Management, Indian Maritime University for the encouragement he has given in completing this study.

The dissertation entitled “A Study on factors affecting the Performance of container terminal reference to CCTL” has been done under the supervision and guidance of Dr. Emil Mathew, Assistant Professor, School of Maritime Management, Indian Maritime University and I express my sincere gratitude to her for the inspiration and guidance she has given for the accomplishment of this work. With great pleasure I acknowledge the help given to me by my family members and my friends.

Place: Chennai

Shreemathy .R

Date:/...../2023

(Reg. No:- 2103304021)

EXECUTIVE SUMMARY

Chennai Container Terminal is operated by the DP World Dubai based company there are well known for their container handling services Most of the port and terminals are plagued with problems like clearance delays, inadequate investments, captivity issues, increased freight rates, lack of effective strategies, and inappropriate international mandates. Some other challenges faced in respect of existing ports include inadequate road networks within the port area.

The projects have listed out some of the major and unpredictable factor that influences the terminal from performing the operations which specifically related to the Chennai container terminal and also the importance of container terminal and its advantage. The listed factors may vary from one container terminal to other. India has a advantage of having 7517 km of coastline moving most of its services to east china, Singapore, middle east, Europe. This study suggests and concludes with various affecting factors, trends, and initiatives by the government, SWOT, findings and ends with conclusion

Contents

Chapter no	Title	Page no.
1	1.1 Introduction	9-18
	1.2 Importance of container port	
	1.3 Advantages of containerization	
	1.4 Drawbacks	
	1.5 Objectives	
	1.6 Scope of the study	
	1.7 Research question	
	1.8 Limitation of study	
2	Literature Review	19-25
3	3.1 Introduction to the chapter	26-37
	3.2 Number of container terminals in India	
	3.3 Types of PPP model used in Indian port & terminal	
	3.4 How Major port authority act helped terminal	
	3.5 Private handling Container Terminal in India	
	3.6 Answer for the research question	

4	Analysis and Interpretation	38-47
	4.1 SWOT	
	4.2 Challenges	
	4.3 Initiatives	
	4.4 Key factors makes CCTL Special	
	4.5 NSICT	
	4.6 Throughput comparison of NSICT vs CCTL	
	4.7 Container dwell time in Chennai vs NSICT	
	4.8 Container handling cost NSICT vs CCTL	
5	5.1 Findings	48-51
	5.2 Suggestion	
	5.3 Conclusion	

LIST OF FIGURES

Figure no	Title	Page no
1	Container port	12
2	CCTL	26
3	Number of container terminals in India	28
4	Throughput table	33
5	Charges for container operations	34
6	Charges for shifting	37
7	SWOT	38
8	NSICT vs CCTL throughput	43
9	Dwell time of chennai	44
10	Dwell time of NSICT	45
11	Container handling cost of NSICT	46
12	Container handling cost of CCTL	46

FACTORS INFLUENCING THE PERFORMANCE OF THE CONTAINER TERMINAL WITH REFERENCE TO CCTL

CHAPTER-1

1.1 INTRODUCTION

India is one of the fastest-growing economies globally, and the country's trade volumes have been increasing steadily over the years. The container industry is an essential part of India's trade infrastructure, and its performance is closely linked to the country's economic growth.

In recent years, the container industry in India has experienced significant growth, driven by factors such as rising demand for consumer goods, e-commerce growth, and infrastructure development. The Indian government's efforts to promote the manufacturing sector through initiatives such as Make in India have also contributed to the growth of the container industry. Container businesses are more profit making than the other businesses. During 2021 the container storages suffered hugely which leads to increase in the price of containers normally container cost for \$2100 which soars up to \$18,700 before pandemic so many are in the land depot other pulled up in cargo ports so Asia and Europe also faces a deficit as a result it created a supply chain disruption .

The container industry is highly dynamic, and several factors could influence container supply in India in 2022. If the Indian economy continues to grow at a healthy pace, it could result in increased container demand. However, this may also lead to increased competition for containers globally, resulting in a shortage of containers.

On the other hand, if the economy slows down or experiences a recession, container demand may decrease, leading to a surplus of containers. Additionally, the COVID-19 pandemic's impact on the container supply chain may continue into 2022, resulting in further disruptions in container supply.

Infrastructure development and global trade patterns are also significant factors that influence container supply in India in 2022. In 2022 the world has faced a container surplus. If the government continues to invest in port infrastructure and inland logistics, it result in increased container supply. However, any changes in global trade patterns could impact container supply, either positively or negatively.

Later the Ukraine Russia war created supply chain disruption in the global markets when most of the countries was recovering from the economic downturn caused by pandemic it reversed recovery and pushed up the cost of living Ukraine and Russia is said be the bread basket of the world major supplier of barley, bread, corn had skyrocketed. Russia and Ukraine account for about 29% of the global wheat export market. Majorly the Berlin was highly depended on the oil and gas of Russia soars up. Many logistics companies have also suspended deliveries to and from Russia as well as Ukraine, while container shipping firms are shunning Russia. “With the Ruble devaluation, a lot of Russian companies cannot afford to pay for merchandise that is in ships and it is going to cause a lot of abandoned shipments and unpaid debts for orders on the water,”

One of the primary ways the conflict has affected container business is through the disruption of port operations. Several ports in the region, including Odessa and Mariupol in Ukraine and Novorossiysk in Russia, have experienced delays and disruptions due to military activity and increased security measures. This has resulted in longer wait times for ships and increased costs for shippers.

In addition, the conflict has led to changes in shipping patterns. Some shippers have diverted their shipments away from the Black Sea region to avoid the risks associated with the conflict. This has led to increased demand for alternative routes, such as through the Suez Canal or the Mediterranean Sea, which has resulted in higher shipping costs.

The conflict has also caused uncertainty among shippers and carriers, which has led to fluctuations in shipping rates. Shippers and carriers are hesitant to make long-term commitments due to the volatile nature of the conflict, which has resulted in increased volatility in shipping rates.

Overall, the Ukraine-Russia war has had a significant impact on the container business, particularly in the Black Sea region. The disruption of port operations, changes in shipping

patterns, and increased costs have all contributed to a challenging environment for shippers and carriers.

The container market can be described as a competitive market with a wide presence of players such as A.P. Moller and Maersk MSC Mediterranean Shipping Company, COSCO Shipping Development Co., Ltd China International Marine Container (Group) Ltd., and Hapag-Lloyd evergreen Marine Corporation, MSC Mediterranean Shipping Company S.A., Yang Ming, ZIM Integrated Shipping Services Ltd, DCM Hyundai Ltd. among others. However, Indian manufacturers held a 3% to 3.5% share in the global container market as India lacks the appropriate container manufacturing infrastructure and investments from the government. Hence, China and other countries supply the majority of the containers to India. Braithwaite and BHEL were two public sector owned container manufacturing company companies.

India was ranked 44th on the index in 2018 and has now climbed to 38th in the 2023 listing according to the (logistics Performance Index)report released by world bank. After the introduction of the National Logistics Policy (NLP) to ensure quick last-mile delivery, end transport-related challenges, save time and money of the manufacturing sector and ensure desired speed in the logistics sector. And had a great improvement of after the introducing this policy.

China is a leading trade partner for India for the export and import of containers Indian companies have already boosted their production of containers; however, these manufactured containers are not adequate to meet the current and estimated demand globally. China has held the leading position in containers manufacturing and supply and have consistently received tenders to supply containers to various countries across the world including India. However, in India, the government and CONCOR are aiming to produce the shipping containers in India as part of the Atmanirbhar Bharat initiative and create an import substitute for the new shipping containers.

The product segment is further divided into 20 feet, 40 feet, and 45 feet containers. The 40 feet segment dominated the India container market in 2020, accounting for more than 50% share of the overall revenue. These containers are the largest of the standard size containers, others being 20 feet and 10 feet containers. They are typically constructed from metal and are suited for

storage purposes at homes, offices, and apartments, among others. Being double the size and capacity of 20 feet containers, the 40 feet containers carry more cargo at once, representing an efficient and economical option for storage and transportation. Factors such as ample space and durability offered by the 40 feet containers are contributing to their high adoption across various applications.

The 20 feet segment is anticipated to register the second-highest CAGR over the forecast period. These containers can be used for shipping, storage, and conversion for multitudes of purposes. They are built to withstand rough conditions of the open sea, which makes them highly durable. Moreover, they are far more convenient in terms of handling and lesser expensive than the 40 feet containers. However, their lower storage capacity compared to 40 feet containers is expected to hinder the segment growth.

1.2 IMPORTANCE OF CONTAINER PORT

There are several advantages to having container ports, which are important for facilitating international trade and the global economy. Here are some of the key advantages:



Figure: 1.1

Source:http://in.images.search.yahoo.com/search/images;_ylt=AwrKAq7_Ze7HAX.;_ylu=Y29sbAzEEA3BpdnM-?p=container+terminal+of+dp+world+chennai

Efficient transport: Container ports are designed to handle large volumes of cargo efficiently, making it easier to transport goods from one location to another. By using standardized containers, cargo can be easily loaded and unloaded from ships, trains, and trucks, reducing the time and cost of transportation.

Improved supply chain management: Container ports enable efficient handling of goods throughout the supply chain, reducing the risk of delays and bottlenecks. This allows businesses to more effectively manage their inventory and plan their operations.

Increased trade: Container ports facilitate international trade by providing a hub for the movement of goods between countries. This helps to boost economic growth by increasing exports, imports, and foreign investment.

Job creation: Container ports create jobs for a range of professions, including stevedores, truck drivers, customs officials, and logistics professionals. This can help to stimulate economic development in the surrounding areas.

Reduced environmental impact: Containerization has been shown to reduce the environmental impact of transportation by reducing the number of individual cargo movements and reducing the need for packing materials. Container ports can also incorporate sustainable practices such as energy-efficient equipment and waste management systems.

Containerization has had a significant impact on India's economy and transportation infrastructure. It has enabled faster and more efficient movement of goods within the country and across international borders, leading to increased trade and economic growth.

Containerization has also created new job opportunities in India. The growth of containerization has led to the development of new industries, such as logistics, warehousing, and transportation. These industries have generated employment opportunities for people across different skill levels, from truck drivers to logistics managers.

Containerization has also facilitated the growth of the manufacturing sector in India. Manufacturers can now transport their goods across the country and across international borders with ease, which has led to increased competition and improved efficiency in the manufacturing sector.

1.3 ADVANTAGES OF CONTAINERIZATION

Flexibility

Containers can transport a very large variety of goods ranging from food grains or food products to machinery. Out-of-Gauge cargo (OOG) can be easily transported on flatbeds or platform containers. Cargoes that are of abnormal sizes and shapes that do not fit into the normal containers are called OOG cargo.

Economies of Scale

The cost of transporting goods by containers is said to be 20 to 25 times less than the cost of transporting the same goods as loose bulk or LCL. Containerization has drastically brought down the transport cost element in the pricing of goods.

Economies of scale are a major factor here. In general, economies of scale is the advantage companies get as a result of producing or dealing in bulk.

Safety and Security

Intermodal containers are safe and secure. These heavy-duty boxes are walled on all five sides except one end where the double doors are located. These double doors have double lock-rods each, that are used to lock and seal the container making it safe and tamper-proof.

Standardization

The container is a standard transport product that can be handled anywhere in the world (ISO standard) through specialized modes (ships, trucks, barges, and wagons), equipment, and terminals. Each container has a unique identification number and a size type code, allowing to be a unique transport unit that can be managed as such.

1.4 DRAWBACKS

Re-positioning of Empty Containers

Containers that come in with cargo are unloaded and eventually moved to the designated stack for empty containers at their destination. Shipping companies need their empty containers to be available where there is demand. Hence, empties (empty containers) have to be relocated in a timely manner to the desired locations. We must remember that a container whether full or empty requires the same space, both at storage, as well during transshipment. Unless empty containers are moved out of empty container yards to destinations where they can be put to use, it would result in demand-supply imbalance leading to a shortage of containers for shipments. Large sums of money are spent by shipping companies to reposition their empty containers.

Smuggling

Smuggling of contraband such as arms, drugs, and even human trafficking happens through containers. Typically, customs authorities the world over inspect containers at random. It is possible that contraband can sometimes slip through. Other reasons that prompt the authorities to inspect certain containers are tip-offs, irregular documentation, suspicious patterns of shipping goods, etc.

Private participation in Chennai Port started in 2001 when the government of India initiated a process of port privatization to bring in private sector expertise and investment into the country's ports. Chennai Port Authority, the government-owned entity that operates Chennai Port, subsequently invited private companies to participate in the development and operation of port infrastructure and services. Historically, the ports in India were operated and managed by the government, and private participation was not allowed. The government-owned ports faced several challenges, including inadequate investment, inefficiencies in operations, and delays in decision-making. This resulted in lower productivity and higher costs, which made Indian ports less competitive globally.

In the late 1990s, the Indian government recognized the need to improve the performance of the port sector and promote economic growth and development. It initiated a process of port privatization to bring in private sector expertise and investment into the country's ports. The

government's objective was to enhance the efficiency and competitiveness of the port sector, increase capacity, improve the quality of services, and reduce turnaround times.

Chennai Port, located on the east coast of India, was one of the ports selected for privatization. In 2001, Chennai Port Trust, the government-owned entity that operates the port, invited private companies to participate in the development and operation of port infrastructure and services.

Private participation in Chennai Port started with the construction of a container terminal by a consortium of private companies, which included P&O Ports, Hutchison Port Holdings, and PSA International. The consortium was awarded a 30-year concession to operate the terminal and invest in its development. This was the first time that private companies were allowed to participate in the operation of a major port in India.

The entry of private companies into Chennai Port brought in several benefits. Private companies brought in new technologies, management practices, and capital, which improved the efficiency and competitiveness of the port. The private sector's involvement helped to increase the capacity of the port, improve the quality of services, and reduce turnaround times.

Private companies also brought in new investments in the form of capital expenditure, which enabled the port to expand its capacity and upgrade its infrastructure. Private participation helped the port to attract foreign direct investment, which further boosted its growth and development.

The entry of private companies into Chennai Port also led to the development of specialized terminals, such as container terminals, bulk terminals, and liquid cargo terminals. The specialized terminals helped to improve the efficiency and speed of cargo handling, which reduced turnaround times and increased productivity. Private participation in Chennai Port also led to the introduction of new technologies and processes, such as container tracking systems, electronic data interchange, and online payment systems. These technologies and processes helped to streamline port operations, reduce paperwork, and improve transparency and accountability. Private participation in Chennai Port also led to the development of port-related infrastructure, such as roads, rail links, and warehouses. The development of port-related infrastructure helped to improve the connectivity of the port and reduce the cost and time of cargo transportation.

The entry of private companies into Chennai Port also brought in competition, which helped to improve the quality of services and reduce costs. Private companies competed with each other to provide better services at a lower cost, which benefited the port users and the overall economy.

The entry of private companies into Chennai Port also led to the development of a service-oriented culture. Private companies focused on providing quality services to their customers, which helped to improve the customer experience and build trust and confidence in the port. Overall, the entry of private companies into Chennai Port brought in several benefits, including increased capacity, improved efficiency, reduced turnaround times, improved quality of services, and lower costs. Private participation helped to transform Chennai Port from a traditional government-owned port to a modern and efficient port, which contributed to the growth and development of the Indian economy.

CCTL is the third container terminal which started to operated in India. It has invested substantially to develop a world class infrastructure with state of the art facilities and modern container handling equipments to cater the growing demand.

1.5 OBJECTIVES

- To study about the major factors affecting the performance of container terminal.
- To compare the performance of CCTL with NSICT.

1.6 SCOPE OF THE STUDY

Overall, the scope of the study can encompass a wide range of factors that can affect the performance of container terminals. If any organisation wants to grow further it has to analyze the past performance of it. A comprehensive study can provide insights into how to improve the efficiency and productivity of container terminals, which can have significant economic and social benefit to the economy.

- It helps to know the Container Terminal.
- The scope of the study is to compare the past performance with the present performance.

1.7 RESEARCH QUESTION:

It was decided to analyze what are the main factors that influence the performance of container terminals, and how can these factors be managed to improve the efficiency and effectiveness of terminal operations.

1.8 LIMITATION OF THE STUDY

- The study is not based on primary data and it relies on secondary data.
- It is prepared on the basis of certain prevailing condition. If the condition change performance of the terminal will vary and outcome will be different.
- The data for this study is collected only from the concerned authority, various reports and publishing.

CHAPTER-2

LITERATURE REVIEW

The literature review chapter is an essential component of any research study, as it provides a critical evaluation of the existing body of knowledge on the research topic. In this chapter, we will examine the existing literature on the factors affecting the performance of container terminal. This chapter is critical as it provides a context for the research study and identifies gaps in the existing literature, which the research aims to address. Additionally, the chapter helps to identify relevant theories, frameworks, and models that can be applied in the research study.

The article titled "Port Challenges and Issues of Port and Container Terminal" by Ariffin and Shamsuddin (2021). The authors begin by discussing the role of ports in the global supply chain and highlight the importance of efficient port operations for international trade. They then lists the various challenges and issues faced by ports and container terminals, including capacity constraints, labour shortages, environmental concerns, and security issues.

One of the main challenges discussed in the article is the issue of port congestion, which is a result of the increasing demand for shipping services and limited port infrastructure. The authors highlight the need for innovative solutions to address this issue, such as the use of automated cargo-handling systems and the development of intermodal transportation systems.

The article also addresses the issue of labour shortages, which is a result of the changing nature of port work and the aging workforce in many countries. The authors discuss the need for training and development programs to address this issue and ensure that the workforce is equipped with the necessary skills to meet the demands of the modern port industry.

In addition, the article discusses the environmental concerns associated with port operations, such as air pollution and noise pollution, and the need for sustainable port development practices. The authors also highlight the importance of security measures to protect ports from potential terrorist attacks or other security threats.

Overall, the article provides a comprehensive overview of the challenges and issues faced by ports and container terminals and highlights the need for innovative solutions to address these issues. The author states the importance of efficient and sustainable port operations in the global supply chain and emphasizes the need for ongoing research and innovation in this field.

The article titled "Factors Influencing Container Terminals Efficiency e-journal by Samuel Monday Nyema (2014). In this journal, the author talked about the container terminals and highlighting their importance in the global logistics and supply chain industry. They then discuss the various factors that influence container terminal efficiency, including the availability of resources, infrastructure, technology, and management practices.

One of the key factors discussed in the article is the importance of infrastructure in container terminal efficiency. The authors highlight the need for adequate road and rail networks, as well as port facilities and equipment, to ensure that cargo can be moved efficiently and effectively.

The article also addresses the role of technology in improving container terminal efficiency, including the use of automated systems and data analytics to streamline operations and improve decision-making. The authors discuss the importance of investing in technology to improve container terminal efficiency and remain competitive in the global market. In addition, the article addresses the importance of effective management practices in container terminal efficiency. The authors discuss the need for strong leadership, effective communication, and collaboration among stakeholders to ensure that container terminal operations are efficient and effective.

Overall, the article provides a comprehensive review of the factors that influence container terminal efficiency. The authors make a compelling case for the importance of infrastructure, technology, and effective management practices in improving container terminal efficiency, and emphasize the need for ongoing research and innovation in this field.

The article titled "Factors to Consider when Designing and Constructing Container Terminals and How These Factors Affect Terminal Location" by Oke and Alhassan

The authors begin by introducing the concept of container terminals and their importance in the global supply chain. They then discuss the various factors that must be considered when designing and constructing container terminals, including the available land, water depth,

proximity to transportation networks, and labour availability. One of the key factors discussed in the article is the importance of water depth in determining the location of container terminals. The authors highlight the need for terminals to be located in areas with sufficient water depth to accommodate large vessels, as well as the need for dredging to maintain this depth over time.

The article also addresses the importance of proximity to transportation networks, such as roads, rail, and airports. The authors discuss the need for container terminals to be located in areas with easy access to these networks to ensure efficient transportation of cargo to and from the terminal.

In addition, the article discusses the importance of labour availability in determining the location of container terminals. The authors highlight the need for terminals to be located in areas with a sufficient supply of skilled labour to ensure efficient and effective terminal operations. He Highlights the importance of careful planning and consideration of these factors in ensuring the success of container terminal operations, and emphasize the need for ongoing research and innovation in this field.

The article titled "Factors Affecting Seaport Capacity" by Ghani and Rao (2011). They discuss the various factors that affect seaport capacity, including physical factors, operational factors, and economic factors. One of the key physical factors discussed in the article is the availability of land and water resources. The authors highlight the need for seaports to have sufficient land and water resources to accommodate the growing demand for cargo handling and storage. The article also addresses the importance of operational factors in determining seaport capacity, such as the efficiency of terminal operations, the availability of equipment and technology, and the management of port activities. The authors discuss the need for seaports to adopt innovative and efficient practices to maximize their capacity and improve their competitiveness. In addition, the article discusses the economic factors that can influence seaport capacity, such as changes in global trade patterns, government policies, and financial resources. It highlight the need for seaports to adapt to these changing economic conditions to remain viable and competitive in the global market.

The article titled "Modeling and Design of Container Terminal Operations" by Truong, Notteboom, and Monios (2014). The article also addresses the importance of layout design in determining the efficiency of container terminal operations. The authors discuss the need for

terminals to be designed in a way that maximizes the use of available space and minimizes the distance that containers have to travel between different stages of the operation. In addition, the article discusses the importance of operational planning and management in ensuring the efficiency and effectiveness of container terminal operations. The authors highlight the need for terminals to have effective management structures, operational procedures, and performance measurement systems in place to ensure the smooth flow of cargo through the terminal.

Overall, the article provides a comprehensive review of the modelling and design of container terminal operations. The authors make a compelling case for the importance of considering equipment and technology, layout design, and operational planning and management in designing and modelling container terminal operations, and emphasize the need for ongoing research and innovation in this field.

The article "Technical Efficiency Analysis of Container Terminals in India" by K Chandrasekhar Iyer & V P S Niyar Nayam (2020) They highlight that container terminals are critical for facilitating the movement of goods, reducing transportation costs, and increasing the competitiveness of the countries. India has a significant potential for growth in container traffic, but the country's container terminals face various challenges, such as poor infrastructure, insufficient capacity, and inefficient operations. The authors review the existing studies that have evaluated the efficiency of container terminals in India using various methods. The policymakers have to identify the factors that influence container terminals' efficiency and develop strategies to improve their performance.

The effect of port and container terminal characteristics on terminal performance by J. Augusto Felício, Vítor Caldeirinha and Andreia Dionísi (2014) Several studies have found that the use of advanced technology can significantly improve the productivity and efficiency of terminal operations. For example, a study by Han et al. (2016) found that the use of automated stacking cranes and container transport vehicles can improve the productivity and efficiency of container terminals. Similarly, a study by Ng et al. (2018) found that the use of automated yard cranes and automated guided vehicles can reduce the turnaround time of containers in a terminal, leading to increased efficiency.

Another important factor that influences terminal performance is the layout and design of the terminal. Several studies have investigated the impact of terminal layout on efficiency. For example, a study by Ting (2017) found that a simple and efficient layout can significantly reduce the average waiting time for containers in a terminal. Similarly, a study by Shi et al. (2019) found that a well-designed terminal layout can reduce congestion and improve the flow of containers within the terminal.

a study by Lee (2018) found that effective management practices, such as proper scheduling of vessels and resources, can significantly improve the productivity and efficiency of container terminals. Similarly, a study by Zheng (2019) found that effective coordination between different stakeholders in a terminal, such as shipping lines and port operators, can improve the efficiency of container operations. The factors that can influence terminal performance, including the size of the terminal, the volume of container traffic, and the type of cargo handled. They note that these factors can vary widely depending on the specific characteristics of the port and terminal, and that a detailed understanding of these factors is essential for improving terminal performance.

The article Improvement of container terminal productivity with knowledge about future transport modes (2021) It highlighting the importance of having information on further transportation modes and the benefits of having an integrated data-sharing system. The authors recommend an integrated data-sharing system where all stakeholders can share their information with no fear of losing their market share.

The article titled "Conceptual Model for the Operational Performance of the Container Terminals in India" written by Pramod Singh and Ravi Kant(2022) focuses on the analysis of the operational performance of container terminals in India and proposes a conceptual model to enhance their performance.

They highlighted the importance of operational performance in container terminals and the need for continuous improvement to remain competitive in the global market. The authors suggest that the proposed conceptual model can serve as a useful tool for container terminal operators and policymakers to enhance the performance of container terminals in India.

The article titled Factors affecting the vessel turnaround time in the seaport by Dayananda Shetty, Vijayanand. Gurudev and Dwarakish.G.S says that it is a measure of port capability and ability to provide tremendous services with high productivity and performance to port user. The most important objective for a Port is to increase its throughput or in other word is to decrease the turnaround times of vessels. The Shorter the turnaround time, it is beneficial to both the ports and port users. The turnaround time of a vessel is depending on the effectiveness of allocating and scheduling key resources such as, quay cranes, yard cranes, berths and trucks.

He even mentions Singapore, even a small nation is able to surpass its natural constraint by evidently successfully applying information technology in critical areas with the reason to increase the island's capacity to handle huge throughput in port container terminal. Apart from that, Singapore is also providing supportive government policies to shipping line, getting investment from government and private, as well as operations, location, and deep water draft for vessel, and simultaneously sustains Singapore's port among port users.

Factors like pre-berthing delays (non availability of berth, night navigation, Tidal/weather restriction, delay in pilot boarding) and second factor is pre and post commencement factor like customs formalities, sealing and inspection and third factor is the port constraint like draft restriction, equipment breakdown, priority berthing, labour strike.

The article titled Assessment on container handling services practice and its affecting factors by Amare Tigabu (2020). There are too many ways of quantifying port container handling service productivity, which would be classified into three categories physical indicators, factor indicator and financial indicator. Physical indicators generally refer to the measures and are mainly concerned with the container (e.g. truck turnaround time, yard occupancy, co-ordination with other factor like transport is measured.

Factor productivity pointers also tend to focus on the maritime side of the port, for example to measure both labour and capital required to load and unload goods from a ship. Similarly, economic and financial indicators are usually related to the sea access, for example, operating

surplus or total income and expenditure related to gross registered tons (GRT) or net registered tons (NRT), or charge per twenty foot equivalent unit (TEU).

The article titled A Study of container terminal planning by Nam Kyu Park and Branislav Dragovic says that container terminal planning is identified with several critical planning issues, including terminal location, terminal design, and operational planning. The study found that the optimal selection of terminal location and design can lead to significant improvements in the efficiency of container terminal operations

The article focused on the planning of container terminal operations through the use of simulation models. The study proposed a simulation model that can be used to evaluate different planning scenarios and identify the most efficient operations plan. This study says that simulation models can be a useful tool in container terminal planning.

It focused on the planning of container terminal operations through the use of a multi-objective optimization approach. The study proposed a model that incorporates several objectives, including minimizing vessel waiting time, minimizing vessel turnaround time, and maximizing container throughput. The study found that the use of a multi-objective optimization approach can lead to more efficient and effective container terminal planning.

CHAPTER-3

3.1 Introduction

Chennai Container Terminal (CCT) is a vital gateway for trade on the east coast of India, and is considered one of the most efficient and modern container terminals in the country. Managed by DP World (Dubai Port), the terminal is located at the Chennai Port Authority, which is the third private container terminal operated in India.



Figure 3.1

Source:http://in.images.search.yahoo.com/search/images;_ylt=AwrKAq7_NzZzMEcG9znMEc2VjA3BpdnM?p=container+terminal+of+dp+world+chennai

Strategic Location

One of the key advantages of Chennai Container Terminal is its strategic location on the east coast of India. The terminal is well-connected to major ports in the Asia-Pacific region, the Middle East, and Europe. It is located near major industrial and manufacturing hubs, such as Bangalore, Hyderabad, and Chennai, which makes it an attractive destination for shipping lines and cargo owners.

The terminal is situated close to major highways and rail networks, which makes it easy to transport goods to and from the port. This strategic location has contributed to the growth of the Indian container industry, and has helped establish Chennai as a major hub for containerized trade.

Infrastructure

Another advantage of Chennai Container Terminal is its state-of-the-art infrastructure. The terminal is equipped with advanced technology and modern equipment, including gantry cranes, quay cranes, and a fully automated stacking system. This equipment allows the terminal to handle large container vessels with ease. It has 22 Rubber Tyre Gantry Cranes for yard operation, 7 quay cranes for vessel operation, 1 empty container handler, 1 reach stacker for CONCOR (Container Corporation Of India) operation which is relatively higher than other terminals. The terminal has a Quay length of 885 meters and have a maximum draft of 15 meters, which makes it capable of handling large container vessels. The terminal is also equipped with a modern IT system that allows for efficient cargo handling and tracking. The terminal has invested heavily in its infrastructure to ensure that it remains competitive and efficient. For example, the terminal has installed an automated stacking system that has increased the terminal's productivity and efficiency.

The terminal has implemented several initiatives to optimize its operations and improve its efficiency. The terminal also uses real-time tracking systems to monitor the movement of containers and cargo, which allows for better planning and coordination. Additionally, the terminal has implemented electronic data interchange (EDI) for cargo clearance, which has reduced the time it takes for cargo to clear customs. These initiatives have helped Chennai Container Terminal become one of the most efficient container terminals in India. The terminal has won several awards for its efficiency and has contributed to the growth of the Indian container industry. The terminal has a dedicated team of professionals who work with customers to understand their needs and provide customized solutions. This has helped the terminal build a strong reputation for its customer service and has helped it attract new customers. The terminal has also implemented a green belt project that aims to plant trees and create green spaces in and around the terminal. This project has helped improve the local environment and has contributed to the terminal's reputation as a socially responsible company.

3.2 NUMBER OF CONTAINER TERMINAL IN INDIA

APMT-M	: APM Terminals Mumbai
AICT	: Adani International Container Terminal
JNPCT	: Jawaharlal Nehru Port Container Terminal
AMCT	: Adani Mundra Container Terminal
CITPL	: Chennai International Terminal
NSIGT	: Nhava Sheva India Gateway Terminal
APMT-P	: APM Terminals Pipavav
MICT	: Mundra International Container Terminal
ACMT	: Adani CMA Mundra Terminal
CCTL	: Chennai Container Terminal
BKCT	: Bharat Kolkata Container Terminal
ICTT	: Vallarpadam International Container Transshipment Terminal
KICT	: Kattupalli International Container Terminal
NSICT	: Nhava Sheva International Container Terminal
AHCT	: Adani Hazira Container terminal
BMCT	: Bharat Mumbai Container Terminals
NCT	: Navayuga Container Terminal
VCT	: Visakha Container Terminal
DBGT	: Dakshin Bharat Gateway Terminal
TCT	: PSA SICAL Tuticorin Container Terminal
KICT	: Kandla International Container Terminal
HICT	: Haldia International Container Terminal
NMPT-C	: New Mangalore Port - (Containers)
AECT	: Adani Ennore Container Terminal -
MPT-C	: Mormugao Port -Containers
MbPT-C	: Mumbai Port
KCTI	: PSA - Kakinada Container Terminal
PICT	: Paradip Port - Containers

Figure 3.2

Source: INDIAN%20CONTAINER%20MARKET%20REPORT-2019.pdf

3.3 TYPES OF PPP MODEL USED IN INDIAN PORTS AND TERMINAL

Build-Operate-Transfer (BOT) Model

The BOT model is a popular PPP model used in the development and operation of ports in India. Under this model, a private sector entity is granted the right to build and operate a port facility for a specified period, typically 30-50 years. At the end of the concession period, the ownership of the facility is transferred back to the public sector entity.

The BOT model is suitable for green-field projects or the expansion of existing facilities. The private sector entity is responsible for financing and building the port facility and operating it for the duration of the concession period. The private sector entity earns revenue from the operation of the facility, such as the collection of port charges from ships calling at the port. Usually container terminals are come under this model CCTL is also come under the 30 years concession period of this model.

Advantages of BOT Model

- The private sector entity assumes the risks associated with financing and building the facility.
- The private sector entity is incentivized to operate the facility efficiently to generate revenue.
- The BOT model can attract significant private sector investment in infrastructure development.

Build-Operate-Share-Transfer (BOST)

BOST is similar to BOT. A government grants a concession or a franchise to a private company to finance and build or modernize a specific port/terminal for a designated time period. The revenue obtained from terminal operations is shared with a designated public authority throughout the concession period. The government/public authority should ensure a specific quantity of throughput for revenue. The commercial risks are shared between the government

and the concessionaire. At the end of the concession period, the government retakes ownership of the improved asset.

Build-Lease-Operate (BLO).

The government or port authority leases the construction and operation of the whole port or part of it to a private company through a long-term concession. The private company constructs facilities such as berths and terminals. In turn, the port authority controls the rights throughout the concession period and receives an annual lease payment.

Build, own, operate, transfer

In a BOOT project, the contracted company maintains ownership of the subsidiary for many years to decades to recoup the costs of the build. After the contacted period is over, ownership is then transferred. BOOT is mainly used by governments for large infrastructure projects. A BOOT is a public-private partnership.

3.4 MAJOR PORT AUTHORITY ACT 2021

The Major Port Authorities Bill, 2020 was introduced in Lok Sabha on March 12, 2020. The bill was passed in the Lok Sabha on September 23, 2020, and in the Rajya Sabha on February 10, 2021. It received President's assent on 17th February 2021 after which it became the Major Port Authorities Act 2021. It has repealed the Major Port Trusts Act, 1963.

- It aims to promote the expansion of port infrastructure and facilitate trade and commerce
- Its objective is to decentralize the decision making and to infuse professionalism in the governance of major ports
- The act is aimed at reorienting the governance model in central ports to landlord port model in line with the successful global practice

The Bill will apply to the major ports of Chennai, Cochin, Jawaharlal Nehru Port, Kandla, Kolkata, Mumbai, New Mangalore, Mormugao, Paradip, V.O. Chidambaranar, and Vishakhapatnam. Under the 1963 Act, all major ports are managed by the respective Board of Port Trusts that have members appointed by the central government. The Bill provides for the

creation of a Board of Major Port Authority for each major port. These Boards will replace the existing Port Trusts.

It provides that the Board may use its funds for providing social benefits. This includes development of infrastructure in areas such as education, health, housing, and skill development. These benefits could be provided for the Board's employees, customers, business partners, local communities, environment and the society at large.

PPP projects as projects taken up through a concession contract by the Board. For such projects, the Board may fix the tariff for the initial bidding purposes. The appointed concessionaire will be free to fix the actual tariffs based on market conditions, and other conditions as may be notified. The revenue share in such projects will be on the basis of the specific concession agreement.

It imparts faster and transparent decision making benefiting the stakeholders and better project execution capability

3.5 PRIVATE HANDLING CONTAINER TERMINAL IN INDIA

A.P MOLLER TERMINAL

The APM Terminals Mumbai has been placed in the star performance quadrant of January 2023 – for its combination of high volumes and outstandingly low vessel dwell times. APM Terminals Mumbai also known as Gateway Terminals India (GTI) is part of APM Terminals global ports/terminal network. It is a joint venture between APM Terminals and the Container Corporation of India (CONCOR-A Government Of India undertaking). APM Terminals Mumbai applies the company's global approach to continuous improvement, known as the APM Terminals Way of Working. One element of this is to use Kaizen (Continuous Improvement) Events to map processes in detail and use the combined expertise of people on the front line to identify opportunities to, for example, shave precious minutes of tasks, reduce waste or improve safety. Kaizen Events are directly linked to the company strategy and as such, a critical enabler to success.

DP WORLD

It is a Dubai's government owned company where they have port & terminals in many parts of the world and also the end to end logistics provider. In India they have container terminals, ICD, CFS. They handle Bulk cargoes, RO RO cargo, project cargoes etc.. outside India. NSICT (Nava Sheva International Container Terminal), NSIGT (Nava Sheva International Gateway Terminal), CCTL(Chennai Container Terminal), MICT (Mundra International Container Terminal) ICT(International Transshipment Container Terminal) are the only DP world terminals operated in India.

ADANI PORTS & TERMINAL

Adani is the only Indian company which has more ports and terminals in India than other private International operator (Mundra port, Dahej port, Mormugao terminal, kattupalli, dharma port, Gangavaram port, Tuna terminal Hazira port, Vizhijam port, Ennore terminal, Krishnapatinam port, Dighi port.

These terminals handle a variety of cargo, including containers, coal, crude oil, LNG, and fertilizers. Adani Hazira Port, in particular, is a major hub for container traffic and is one of India's busiest ports.

The Adani Group has faced controversy over its environmental record and land acquisition practices related to the development of these terminals. Some critics have also raised concerns over the Group's close ties to the Indian government and its alleged monopoly over India's port infrastructure. However, supporters of the Group point to its role in developing India's transportation infrastructure and creating jobs in the country.

Past ten years data of throughput handled in CCTL. In the below data table In the year of 2019 to 2020 the throughput was very low in the decade because of the pandemic latter it started to recover in 2021 and latter it soars back to the pre-pandemic level.

Table 3.3

Chennai Container Terminal & Chennai International terminal	Year	NSICT Throughput in TEU	Through put in TEU's
	2012-2013	1042439	881974
	2013-2014	969393	735062
	2014-2015	1160219	825907
	2015-2016	999680	867549
	2016-2017	728560	646319
	2017-2018	641122	646482
	2018-2019	560661	653675
	2019-2020	531355	483518
	2020-2021	750979	539074
	2021-2022	947887	730297

3.6 FACTORS AFFECTING THE PERFORMANCE

There are various factors affecting the performance of the container terminal here there are some of them are

COST

Cost always plays a crucial role in every business not only in the container terminal. Earlier a decade back there was not so many port or terminal were operating in India. Cargoes has to be discharged only in the major ports so port use to have lot of congestion. So vessels have to wait in outer anchorage to get berthing so whatever the price the port authority or terminal is quoting has to be paid. However now the scenario has been changed still there are some terminal which charging higher charges for container handling even though it flourishes and can withstand with other terminal.

In some cases For example, the port authority that levies high land fees to terminal concessionaires might force the latter to charge higher cargo handling fees to the shipping lines, negatively affecting the port's attractiveness and the competitiveness of local firms. In CCTL the container handling cost is higher but still the shipping lines willing to visit the terminal.

<u>CHARGES FOR CONTAINER OPERATIONS</u>			
Charges for handling FCL import and export containers and empty containers.			
Handling by Quay Crane including lashing/unlashing charges.			
	Foreign-going Vessel others	Foreign-going Vessel Long Haul	Coastal Vessel
	US\$	US\$	₹.
Per FCL Container			
- Not exceeding 20' in length	22.78	21.65	574.18
- Exceeding 20' and upto 40' in length	34.16	32.45	860.88
- Over 40' in length	45.56	43.28	1,148.09
Per empty Container			
- Not exceeding 20' in length	22.78	22.78	574.18
- Exceeding 20' and upto 40' in length	34.16	34.16	860.88
- Over 40' in length	45.56	45.56	1,148.09

Services include handling by quay crane and lashing/unlashing.

Figure 3.4

Source: www.tariffauthority.gov.in

The above mentioned data table is the price structure used in 2020 to move the container from one place to another. There are other charges like transportation of quay crane to container yard a separate charge, separate price structure for transshipment container generally based on the type of container and its cargo the price may vary for (e.g). if it's a flat track an separate charge is used because it is need to be stored in a separate area allocated for it in case if it's a refer container it has to be stored near the plug point area.

DWELL TIME

The charges are applied by container terminal operators when containers are stacked on the terminal. Container terminal operators typically provide a 'free time' period for containers stacked in the yard (for example, the first five days). Once a container stays longer than the free time, the cargo owner has to pay a dwell time charges (Demurage) per day, which increases exponentially for each day above the free time. In the case of CCTL 0-3 days free time is given for import containers(FCL, LCL, & Empty) and 0-7 days free time is given for export containers include (FCL, LCL,& Empty container)

FORCE MAJEURE

The outbreak of the COVID-19 pandemic has caused disruptions in global trade and shipping, resulting in force majeure events at container ports worldwide. Basically force majeure events can include natural disasters, labour strikes, war, pandemics, and other unforeseeable events that disrupt normal operations. It does not occur frequently.

One of the main impacts of the pandemic on container ports has been the disruption of the global supply chain. The closure of factories and production facilities in many countries has led to a reduction in the volume of goods being shipped, resulting in a decline in the number of vessels calling at ports. Additionally, the pandemic has caused a shortage of labour at ports, with many port workers falling ill or being forced to quarantine, leading to delays in cargo handling. During the pandemic the worldwide traffic was fell down in the above mentioned data table of CCTL the throughput hit the bottom rock and it recorded as the lowest through put handed in the decade of CCTL. The other event of 2022 is Ukraine Russia war which affected the global supply chain the bulk trade were majorly affected than the container business the world started to recover from it.

COMPETITION

Globalization paved a way to allow private player and investment which leads to higher competition in India. After establishment of CCTL the government provided concession that for the first ten years period of the concession agreement the port authority will not allow other container terminal to operate within the port premises in order to flourish and support CCTL. For example within a port at least two to three terminals are there in order to survive terminals are providing concession to shipping lines. Lowest container handling charges (destructive pricing) is not good for the terminal it may kill other competitor they should be always a healthy competition between terminals. In Chennai port both the container terminal PSA and CCTL are the reasonable amount of throughput heavy competition between terminals.

UNDER UTILIZATION OF EQUIPMENTS

Still in many terminals in the world innovation and machinery were lacking. Another reason why equipment may be underutilized is due to inadequate maintenance. When equipment is not properly maintained, it may break down or malfunction, resulting in downtime and underutilization.

Some times over usage of the same equipment for a long time because ports and terminals are functioning 24/7. Seasonal fluctuations can also affect the utilization of equipment in ports and terminals. During peak periods, equipment may be in high demand, leading to overutilization and the need for additional equipment. Conversely, during low periods, equipment may be underutilized, resulting in wasted resources and increased operating costs. This can lead to increased operating costs as repairs are needed, and equipment may need to be replaced sooner than expected. However in CCTL they have 22 rtg's in the yard which all are not utilized effectively mostly the equipments are getting breakdown frequently. This can impact the financial viability of the port or terminal.

SHIFTING OF CONTAINERS

Shifting of containers is the unproductive movement shifting means (e.g) if the port A's container has to transported in the vessel which is stored below four container for that the gantry crane has to take four container out of the stack to pull out that one container this is the extra cost

to terminal. Shifting happens both in vessel and in container yards also in order to avoid this a proper yard planning and vessel planning has to be made. So CCTL aim is to reduce shifting to less than 4% because an Rtg consumes 1.5 litres of fuel to move the container from yard to truck (ITV's) mostly the gantry cranes running in fuel which releases carbon emission to environment. By the way of reducing shifting it is beneficial for both the terminal and the environment.

Charges for shifting containers within vessel (Restows).		
	Foreign- going Vessel	Coastal Vessel
	US\$.	₹.
Within hatch (without landing and reshipping) per container		
- Not exceeding 20' in length	11.07	279.06
- Exceeding 20' and upto 40' in length	16.60	418.20
- Over 40' in length	22.13	557.61

Figure 3.5

Source: www.tariffauthority.gov.in

CHAPER-4

ANALYSIS AND INTERPRETATION

4.1 SWOT ANALYSIS

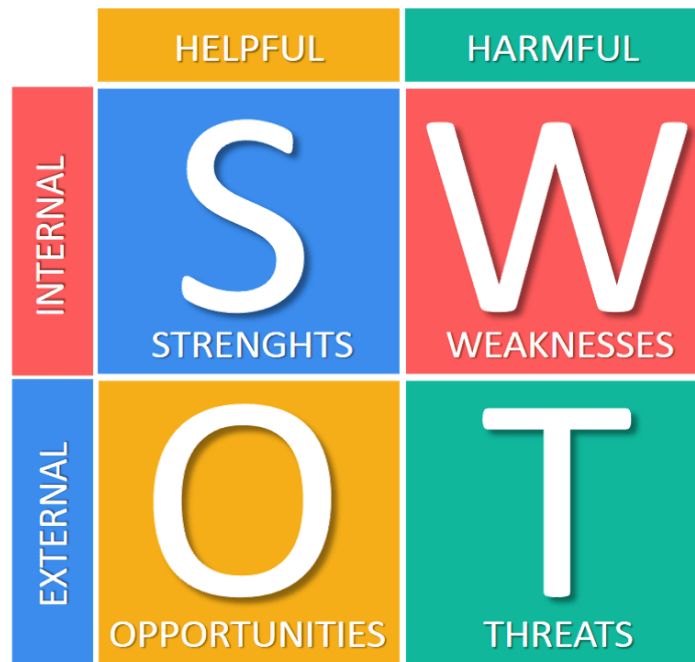


Fig 4.1

Source:https://in.images.search.yahoo.com/search/images;_ylt=Awr1TOalpk2g47HAx.;_ylu=Y29sbwNzZzMEcG9zARpZAMEc2VjA3BpdnM-?p=swot+picture

STRENGTHS

- Berthing on arrival i.e. vessel does not require to wait on outer anchorage.
- Wide and deep entrance channel enables easy manoeuvring of the ships.
- Since it is a private terminal, the security was very high to avoid illegal activities.

- In many cases the safety is optional whereas in DP World safety is first i.e. the employee are prohibit to walk in the yard , people who are working in the gate its Mandatory to wear the safety shoes ,vest and helmet
- Valuing employees and conducting health check up yearly once.
- Conducting mock drill to analysis and boost up the skill of employees, it gives an idea of how to react in danger situation.
- DP World has 22 RTG, 7 QC were as other private terminals have less than this , So it May help to perform better.

WEAKNESSES

- Cost of handling a container is very high whereas Adani and PSA are lesser.
- Pandemic affected business, earlier the container traffic was high after this COVID the business drastically fell down.
- Entire business is depends only on handling the containers.
- Even though their having more crane more breakdown also occurs because of continuous work time.

OPPORTUNITIES

- Better to reduce the cost of handling containers may attract more shipper.
- It can provide additional services like bunkering, repairs because it has four berths all the berths are not occupied instead of leaving the berth empty their can make use of it.
- They have the capability of handling mainline vessels however majority of the vessels approaching the terminal are only the coastal vessel main line vessel is also approaching but not at the large level.

THREATS

- Increasing in competition of adjacent terminals and port like PSA (Port of Singapore Authority, Adani, Ennore).

- Uncertain in trade environment.
- Increase in fuel prices may increase the container handling charges this is a unpredictable factor in our country

4.2 CHALLENGES

Minor factor like labor disputes: Industrial action, strikes, and other labor disputes can also affect container terminal operations in India. These disputes can cause delays, damage equipment, and disrupt supply chain and container operations in terminal this is a common factor which occurs in all the industry. It is not a common factor that occurs on periodic basis.

Recently on 7th July 2022 transporter strike took place in three ports in Chennai which includes Adani katupalli, Chennai port, and kamarajar ports. Thousands of containers are reportedly stranded. Organizers are demanding an hike in fees due to rising fuel costs. Because of the strike of the transporter the vessel call was suspended on the following days still the strike gets over. So the operations were in idle. Same incident like this is already happened in 2004.

Government policies: Government policies and regulations can impact container terminal operations in India. Changes in policies related to tariffs, taxes, and other fees can affect the competitiveness of ports and their ability to attract investment. For (e.g) As mentioned in earlier chapter major port trust act was acted as a regulator function imposing strict rules and regulation on private terminal However only after the implementation of major port authority act it gave the private container terminal operator a right to fix pricing. Terminal & port operator like Adani is the only Indian monopoly operator operating in India rest of them are global private players like APM terminal, DP World, PSA.

Congestion: Bulk terminals in India often suffer from congestion due to high volumes of cargo, limited berths, and insufficient handling capacity. This can lead to delays in vessel turnaround times, longer waiting times for trucks and containers, and ultimately impact the entire supply chain. Usually the bulk cargo discharge takes more time than the containerized cargo. Since Indian has 28 container terminal with more number of efficient players which removes the waiting time in outer anchorage.

Weather conditions: Extreme weather conditions such as heavy rain, snow, and high winds can affect terminal operations. As far as our Indian ports are concern all the ports are all weather ports heavy rain was the only problem in India that affects the loading and discharge of cargoes. For example, strong winds can prevent cranes from operating safely, while heavy rain can make it difficult to move containers around the terminal. These are the minor factor that affects the performance from implementing. If there is heavy wind it may be not a problem to the equipments but it might be dangerous for the crane operator to operate the crane visibility will not be there in case of heavy wind and rain the berthed vessel will be moved out to the out anchorage because heavy movement in tidel waves may leads to damage of wharf area.

In 2018, the worst flooding in a century across the state of Kerala in India, the port city of Cochin, many ship call to Cochin port were cancelled because of this natural disaster.

4.3 INITIATIVES

- Container traffic at Indian ports has grown at a CAGR of about 8% between 2015-16 and 2020-21. Major ports have lost a significant share of their container traffic to non-major ports.
- The government aims to reduce the logistics cost from 13% of the country's GDP at present to a single digit for a period of five years. The National Logistics Policy aims at promoting seamless movement of goods across the country and create a single point of reference for all logistics and trade facilitation matters.
- Indian Railways has announced a number of initiatives to attract more container traffic. These include the introduction of double stack long haul container train, which recently started in India last year 2020 this helps to carry double the vagan of containers which reduces the transport cost and an effective movement of goods to CONCOR. Through this the container movement will be faster and reduces the dwell time in the yards so more space will be available to store containers in the yard.
- According to maritime vision 2030 our Indian government identified initiatives such as developing world class mega ports, transshipment hubs and infrastructure modernisation of ports. These initiatives would help in lowering overall operational cost of ports,

reducing turnaround time for vessels, increasing efficiency and throughput, providing ability to handle larger ship. And government even allocated 3.5 lakh crore to port shipping and inland waterways categories.

4.4 KEY FACTORS MAKES CCTL SPECIAL

There are still many advantages in this terminal, focusing on the drawback is a part of this study but at the same time there are provides most prominent services to its customers.

Easy documentation

The terminal documentation center has been adequately staffed to ensure faster clearance and minimum waiting time for trucks. The documentation procedures have been simplified.

Terminal Operating System

CCTL uses an in-house-developed Terminal Operating System, i.e., Zodiac, which is maintained and developed by DP World and is widely used across DP World Ports & Terminals. Zodiac container management software is used to capture real-time information of containers getting discharged, loaded, gated in and gated out, and shifting to different locations in the yards.

The Zodiac application used for planning also optimizes productivity by managing and maintaining terminal business transactions and data processing while accurately recording and invoicing all transactions and services. The Zodiac application automates billings, data exchange and reporting functions while capturing a complete history of all transactions and work.

Dynamic reporting capabilities put key information at the terminal managers' fingertips, enabling them to track performance, improve customer service and increase profitability.

Flexible cut-off time

Export containers can be gated six hours prior to the berthing of the nominated vessel. Relaxation on a case-to-case basis is allowed on Special Service Request (SSR). This allows last-minute shipments to connect to the desired vessel.

Theft/pilferage-free operations

Round-the-clock inside-terminal security ensures theft and pilferage-free operation at strategic locations.

4.5 NSICT

One of the oldest terminals of DP World in JNPT port is Nhava Sheva International Container Terminal (NSICT). It features a berth length of 1,969 feet, yard area of 26 acres, 6 Post Panamax and 2 Super Post Panamax quay cranes, 3 rail-mounted gantry cranes, and 29 rubber-Tyre gantry cranes, with a capacity to handle 1.2 million TEU annually.

4.6 Throughput comparison of NSICT vs CCTL

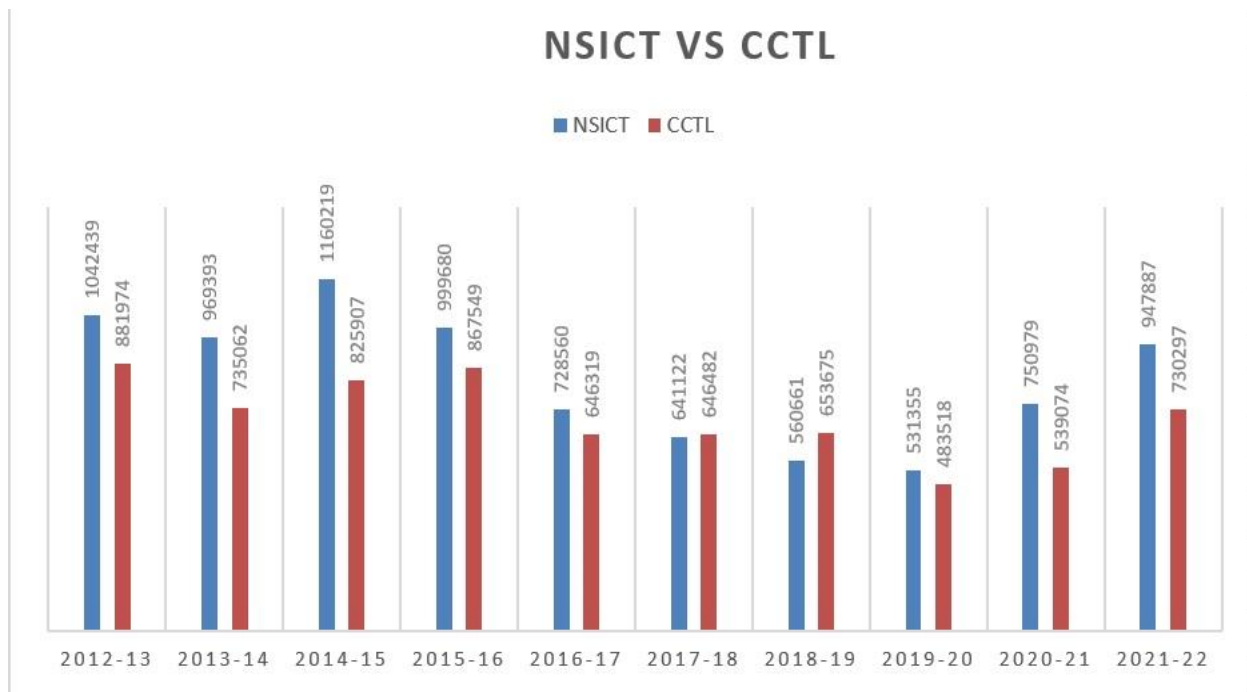


Figure 4.2

This bar chart shows the graphical representation of throughput handled by the DP World Chennai and DP world Mumbai. In the Financial Year 2018-2019 the volume of NSICT was drastically reduced than the CCTL mainly because of pandemic and in the following year it got recovered. The terminal has recorded container volume of 560,661 TEU's in the FY 2018-19, registered negative growth of 12.5% compared to the previous year.

Short run dip of containers for specific months attributed to the slow down of operations of unionized crane workers due to their issue with implementation of a new wage contract. This terminal registered negative growth in terms of Compounded annual growth rate (CAGR) which is -10.4 per cent during the last five years from FY 2014-15 to FY 2018-19

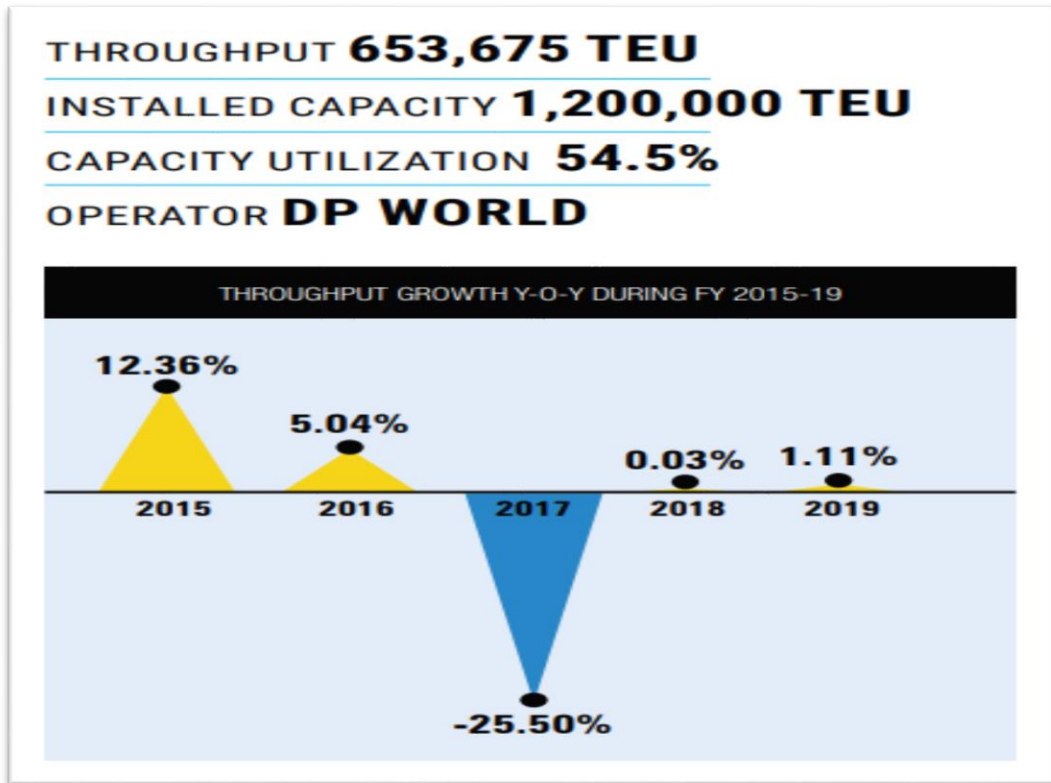


Figure: 4.3

Source: Indian container market report 2019

CCTPL handled 0.65 million TEUs in FY 2018-19 with a paltry growth of 1 per cent against previous year volume of 0.64 million TEUs. Import volume is 3,56,370 TEU's and Export volume is 2,92,035 TEU's and the terminal handled 381 vessels, along with transshipment volume of 452 TEUs. Capacity utilization of the terminal is 54.4 per cent. CCTPL handled total of 2,73,747 TEU's with Imports of 1,45,238 TEU's and Exports of 1,28,509 TEU's upto the mid of September 2019 for the current financial year 2019-20.

4.7 Container Dwell Time in Chennai vs NSICT

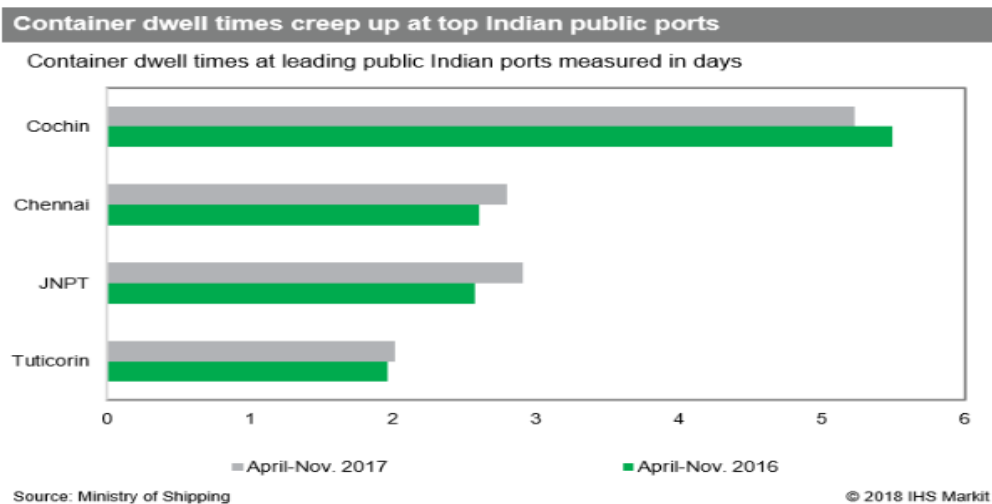


Figure 4.4

Source: https://www.joc.com/article/container-dwell-times-indian-major-ports-increase_20180115.html

In this data the container Dwell time of Chennai is measured in days its moreover near to 3 days while looking at the Dwell time of Nava Sheva International Container terminal is measured in hours and its closer to 50 hours which more same in both scenario. This data may vary over a period of time. The data included in this report is a old data.

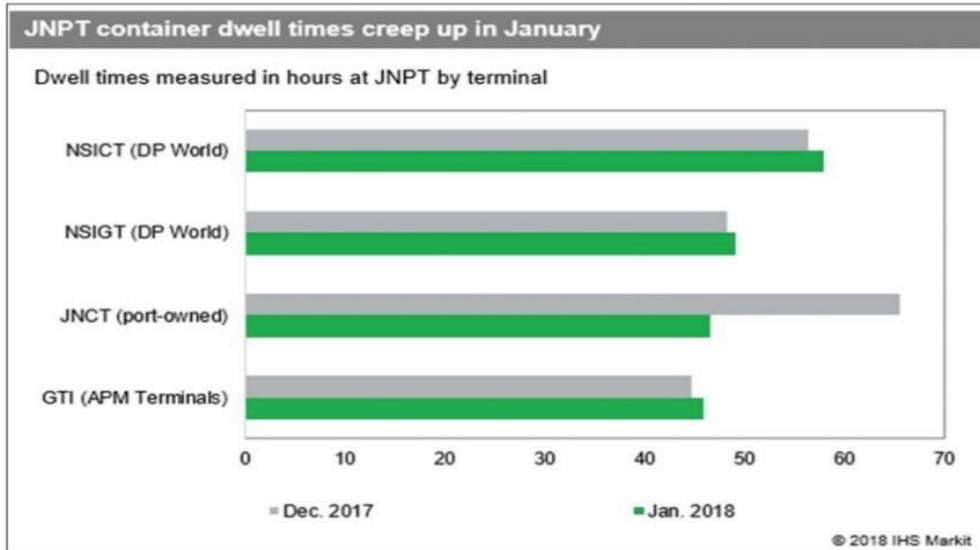


Figure 4.5

Source: https://www.joc.com/article/container-dwell-times-indian-major-ports-increase_20180115.html

4.8 Container Handling Cost NSICT vs CCTL

SECTION – 1 CHARGES FOR ALL NORMAL AND REEFER CONTAINERS

A. Ship to yard / yard to ship using port crane.

Particulars	Foreign-going (in Rs.)	Coastal (in Rs.)
Per Loaded Container		
Not Exceeding 20' in length	2699.84	1619.90
Exceeding 20' and upto 40' in length	4049.76	2429.85
Over 40" in length	5399.67	3239.80
Per ICD Container		
Not Exceeding 20' in length	2699.84	1619.90
Exceeding 20' and upto 40' in length	4049.76	2429.85
Over 40" in length	5399.67	3239.80
Per Empty Container		
Not Exceeding 20' in length	2180.64	1308.39
Exceeding 20' and upto 40' in length	3270.96	1962.58
Over 40" in length	4361.29	2616.77

Figure 4.6

Source: www.tariffauthority.gov.in

CHARGES FOR CONTAINER OPERATIONS			
Charges for handling FCL import and export containers and empty containers.			
Handling by Quay Crane including lashing/unlashing charges.			
	Foreign-going Vessel others	Foreign-going Vessel Long Haul	Coastal Vessel
	US\$	US\$	₹.
Per FCL Container			
- Not exceeding 20' in length	22.78	21.65	574.18
- Exceeding 20' and upto 40' in length	34.16	32.45	860.88
- Over 40' in length	45.56	43.28	1,148.09
Per empty Container			
- Not exceeding 20' in length	22.78	22.78	574.18
- Exceeding 20' and upto 40' in length	34.16	34.16	860.88
- Over 40' in length	45.56	45.56	1,148.09

Services include handling by quay crane and lashing/unlashing.

Figure 4.7

Source: www.tariffauthority.gov.in

This data show the price variation between the two terminals it represents a huge price difference between the NSICT and CCTL were the cost of handling container in NSICT is relatively very high compared to CCTL its just the movement of container from one place to another example various other charges like container storage charge in case of direct delivery an separate charges at last the overall cost can be more higher than what we see.

CHAPTER 5

DISCUSION AND CONCLUSION

5.1 FINDINGS

- NSICT is strategically located in the financial capital of India, Mumbai so it receives cargo from the landlocked states like Uttar Pradesh, Madhya Pradesh, etc. as in the eastern coast all the states have ports which creates huge competition within ports that a geographical disadvantage for Chennai Container Terminal.
- So NSICT have automated gate system (RFID) which avoids human intervention and error at the gate were as in CCTL all the gate have Checker at the gate collects documents from the truck operator and allow them the entry.
- NSICT having the quay length of 600 metres which is lesser than CCTL However it has more equipments than CCTL because of handling higher volume of cargoes but still Both the container terminal operators offers a better service to the user.
- CCTL has utilized the capacity of handling 54.5% in the year of 2019 because of Covid the volume fallen in second quarter and it reached very low in the year 2019-2020 and recovered in the following years.
- Increases in accidents in terminal leads to strict implementation of penalty and safety rules this helped the terminal to reduce the accidents in future.
- Software was developed for allocation of containers in the yard and vessel it helped to reduce the human error.
- Implementation of EDI (Electronic data Interchange) in the ports and terminal this movement really helped the employees to reduce the paper work and demolished the corruption and bribery in the terminal.
- They have implemented IFS (Integrated Finance system) and Spine Payroll. The Spine payroll module takes care of Payroll computation of the organization. And they also giving the option of container tracking either through website or Sms.

- India has twenty eight container terminals which handles the enormous amount of cargo in daily basis it has the efficiency to handle large number of volume. CCTL is one of third container terminal in India that operates under the Built Operate Transfer model it is one of successful PPP (Public Private Partnership) model
- CCTL has the one of the best infrastructure and equipment count and has the capacity to handle cargo in an effective manner. In many cases the necessary infrastructure was absence in some terminal.
- If India's transshipment port has become successful then India can attract more container volume. By the CCTL geographical location advantage it can move cargo mostly to middle east, hamburg , Colombo location. Colombo majorly acquiring the cargo from Chennai(CCTL).
- The Indian government has introduced various policies and initiatives, such as the Coastal Shipping Agreement, to increase the use of coastal shipping for the transportation of goods.
- The Indian government has launched the Sagarmala Programme to modernize port infrastructure and enhance port connectivity to address this issue. The Sagarmala Programme is a flagship initiative of the Indian government aimed at promoting port-led development and enhancing the country's coastal economy. As part of this programme, the government has identified several key projects for the development of container terminals across India's coastline, including the construction of new terminals, modernization of existing ones, and establishment of supporting infrastructure.
- The Indian government has launched the Maritime India Vision 2030, a comprehensive plan to develop and promote the country's maritime sector. This vision includes the development of container terminals as a key component, with a focus on increasing the handling capacity of existing terminals and the establishment of new ones.
- The Indian government has offered various incentives and subsidies to promote the development of container terminals, such as tax exemptions, reduced tariffs, and financial assistance for infrastructure development.
- The importance of effective planning and management strategies to optimize the utilization of resources and reduce operational costs. The role of technology in improving

port and container terminal operations, such as the use of automation, digitalization, and data analytics to enhance efficiency and reduce human error.

5.2 SUGGESTIONS

Sustainable Development: The authorities should adopt sustainable practices in the operation and maintenance of the container terminal, including the use of renewable energy sources and eco-friendly technologies. Gantry crane in the yard uses fuel energy in movement or operation so in future it should moved to renewable energy.

Draft facilities The container terminal can increase the draft of the berths so that they might get a competitive advantage compared to other terminal sine they are equipped with good number of modern equipments.

Automated Gates This technology automatically scans the trucks when it enters into the terminal. Its more over like a scanner some of the container terminal like DP World Mumbai is using this technology reduce the waiting time in gate and has to submit documents etc.

Expansion In case the container terminal has achieved the capacity of handling 1.5 million TEU in the following years they can request to the port authority for need of extra land for usage in case they felt of congession.

Installation of box bay system The Box Bay system utilizes a grid of stacked steel modules, with each module being able to store up to four 20-foot containers or two 40-foot containers. The modules are arranged in a rectangular pattern, forming a box-like shape, hence the name "Box Bay." The modules can be stacked up to 11 levels high, providing high-density storage capacity while minimizing the footprint required. Box Bay system is designed to optimize land use and improve container handling efficiency in container terminals, helping to reduce costs and increase productivity.

It has the ability to attract more mainline vessels but coastal vessel and transshipment cargo contributes a major volume to the container terminal. It is better to negotiate or to make agreement with mainline vessel.

CONCLUSION

A larger role of technology and services in value chains and logistics, intensified and more frequent natural disasters and climate-related disruptions, and an accelerated environmental sustainability agenda which increased awareness.

The trend in the container shipping industry has been changing over the time. As such, competition is going to a big challenge as many transport companies are growing fast and making a reputed position can be a bit difficult. But it can be achieved by satisfying customers with quality services.

The container terminals play a vital role in global trade, serving as key nodes in the supply chain for the movement of goods. However, there are several factors that can affect the performance of container terminals, and these factors must be carefully managed to ensure efficient and effective operations.

One critical factor is the need for modern and efficient infrastructure, including berths, quays, cranes, and terminal handling equipment. Another important factor is the availability of skilled labour and management, as well as effective planning and management strategies.

Regulatory frameworks can also play a significant role, with tariffs, customs procedures, and environmental regulations all impacting the operations of container terminals. Additionally, market fluctuations and changing trade patterns can present challenges, requiring flexibility and adaptability on the part of container terminals to remain competitive.

Advancements in technology, such as RFID and automation, can also significantly impact the performance of container terminals by improving efficiency and reducing errors. Overall, effective management of these factors is crucial for the performance of container terminals, as they work to optimize operations, reduce costs, and improve the overall competitiveness of the port. With careful attention to these factors, container terminals can continue to play a vital role in the global economy, supporting the movement of goods and facilitating international trade.

REFERENCES

WEBSITES

www.container-xchange.com/blog/container-manufacturers-india

<https://prsindia.org/billtrack/the-major-port-authorities-bill-2020>

REPORTS

Indian Container Market Report 2019

Indian Container Market Report 2021

CCTPL scale of rates

Articles

1. Port challenges and issues of port and container terminal (September 2021)

https://www.researchgate.net/publication/354354239_PORT_CHALLENGES_AND_ISSUES_OF_PORT_AND_CONTAINER_TERMINAL

2. Eajournals.org/journals/European-journal-of-logistics-purchasing and supply-chain-management (2014) <https://www.eajournals.org/journals/european-journal-of-logistics-purchasing-and-supply-chain-management-ejlpbcm/vol-issue3december-2014/factors-influencing-container-terminals-efficiency>

3. Factors to consider when designing and constructing container terminal (May 2021)https://www.researchgate.net/publication/359926_FACTORS_TO_CONSIDER_WHEN_DESIGNING_AND_CONSTRUCTING_CONTAINER_TERMINALS_AND_HOW_THESE_FACTORS_AFFECT_TERMINAL_LOCATION

4. Factors affecting seaport capacity (December 2011)

https://www.researchgate.net/publication/275340880_Factors_affecting_seaport_capacity

5. The effect of port and container terminal characteristics on terminal performance (January 2014)

https://www.researchgate.net/publication/272529786_Modeling_and_Design_of_Container_Terminal_Operations

6. Improvement of container terminal productivity with knowledge with knowledge about future transport modes (august 2020)

https://www.researchgate.net/publication/343407544_Technical_efficiency_analysis_of_container_terminals_in_India

