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A Study on the Port Hinterland Connectivity of Chennai Port Sector

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Abstract*: Port hinterland connectivity plays vital role for the growth of any seaport. The economic growth and trade in India depends on maritime transport which in turn depends on good port hinterland connectivity. Seaport hinterland connectivity contains various mode of transport like roadways,railways, airways, inland waterways and inland freight facilities for various cargos.The seaports are connected to inland freight facilities which act like transit place which connect both importers and exporters in the hinterland to seaports and facilitating regional and cross broader trade.The Major ports in India when compared with world class ports still lags behind in hinterland connectivity, this lead to port congestion and directly affects the port performance.The Public –Private model investment which is encouraged by the government showing better results in development of port hinterland connectivity. The Chennai port lacks good hinterland connectivity due to which the port faces lots of challenges. The study reiterates Port hinterland connectivity at present infrastructure development and challenges faced by Chennai port.

***Index Terms*: Chennai Port, Congestion, Vessel, Ports, hinterland connectivity, Draft, Berth.**

I. INTRODUCTION

The poor port hinterland connectivity is one of major challenge which maritime industry faces worldwide especially in old ports located at the heart of the city. The old city has developed due to good sea port originated like Chennai, Mumbai etc. The port which encounters this problem should take steps immediately and within stipulated period to overcome it otherwise the port will lose its business, this will directly affect the economic growth of the region. The growth in traffic of a port exceeds its capacity which leads to port congestion and low productivity. The port hinterland connectivity depend on many factors like, geographical location of the port, Port infrastructure, Port facilities, Port IT development towards Logistic support and roadway, railway, airway connectivity from port.

In the year 2016- 2017 the Indian major ports performance shows 647.6 in millions Tonnes traffic was handled, 5.77 hours average pre-berthing time on port account, 3.43 days of average turn round time , 14576 Tonnes of average output per ship berth .In FY18, major ports in India handled 679.36 MMT of cargo traffic, showing a CAGR of 2.73 per cent during FY08-18.

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Chennai Port, the third oldest port among the 13 major ports, is an emerging hub port in the East Coast of India. The Chennai Port has completed 135 years' service to the nation maritime trade by serving as gateway for all cargo. The Port has three docks Dr. Ambedkar Dock, Bharathi Dock,Jawahar Dock all together 24 berths and draft ranging 12 m to 16.5 m has become a hub port for Containers, Cars and Project Cargo in the East Coast. Two Oil terminal Bharathi Dock (BD1 & BD 111) , Two Container terminal –1(Chennai Container Terminal Private Limited (CCTPL) & 2M/s Chennai International Terminal Pvt.Ltd) .General Cargo Terminal has total 6 berth, West Quay 1, 2,3,4, and Jawahar Dock 1& 3.

The Chennai port has very good railway connectivity which comprises of 41 km and 8 sidings to handle different type of bulk cargo especially Granite, food grains, Dry Bulk etc. For handling containers separate sidings are available. The existing Cruise Terminal is being upgraded to International Standards as a part of Cruise Shipping Policy. CCTPL has a CFS, with a covered area of 6500sqm,operates within the port offering services such as inspection, LCL (Less than Container Load) de-stuffing and delivery of import cargo. The port enhances better service to importers and customers with swift transhipment of LCL cargo to various Inland Container Destinations when CFS is located within port. Chennai port faces hinterland connectivity problem, lack of parking space for truck within port areas when large volume of cargo handled .The Chennai Port suffers poor road connectivity especially when the trucks enters the city limit due heavy traffic congestion which city faces. The laden container faces problem after it enters city limits till zero gate apart from traffic congestion, reduced number of entry points, stoppage of vehicle at various point by traffic police and other agencies.The western & southern railway line not connected leading goods especially the industrial belts from sriperumbudur and orgadam through railway it takes long route to connect to other states. Chennai port has very good railway connectivity outside and within the port area. The congestion led to haphazard parking of vehicles, affecting the movement of office-goers and especially residents of north Chennai. The congestion also led to diversion of containers and other commodities to nearby ports such as Krishnapatnam (granite), Karaikal, Kakinada, Visakhapatnam (iron ore), Kamarajar (coal), L&TKattupalli and VO Chidambaranar Port Trust and led to a dip in the Chennai Port's volume of cargo handled. The Chennai Port due to poor hinterland connectivity lost car exports companies such as Nissan Motor India Pvt. Ltd and Toyota, Kirloskar Motor Pvt. Ltd have chosen the Ennore port, 20km away, over the Chennai port for car exports.

The Chennai port delays have led Lapp India Pvt. Ltd, which manufactures cables at a factory in Bangalore, to consider receiving its copper imports at the NhavaSheva port in Maharashtra. According to estimates, more than 40% of cargo originated in this region goes to other ports due to port issues. Chennai port initiated to improve the hinterland connectivity, planned a project launched on 2009 and work started on 2010 for four lane, 19 km stretch Elevated expressway from Maduravoyal to the Zero Gate (Chennai Port) unfortunately this project was not completed till now due to regulation issue raised by state government. The steps are taken by both center and state government such way they have agreed to this project and necessary clearance can be obtained. The project will be now six lanes instead of four lanes as previous. The Maduravoyal-Chennai Port project cost will amount to Rs 3,500 crore without taking into account the rehabilitation and resettlement under the new Land Acquisition Act. The CMDA will be developing parking yard for Trucks/vehicles at Maduravoyal.

The NHAI has proposed project for six-lane elevated road from Sriperumbudur to Maduravoyal will run along the Poonamallee High Road to overcome the traffic congestion in this road stretch. The project is well planned such way to avoid land acquisition and minimal social impact. The project will be elevated road exactly on the existing nation highways. National Highways Authority of India (NHAI) is pressing hard to implement another mega 265-km eight-lane Bengaluru - Chennai expressway. This project awaiting clearance or approval from Union environment ministry as the proposed road passes through reserve forest. This highway is alternative to at existing National Highways (Chennai – Bengaluru highway) which is divided in to 3 phases. The phase 1 starts from Bangalore to Bangarpet and Phase 2 starts from NG Hulkur village in kolar district of Karnataka to Ramapuram in Gudipala, AP. The Phase 3 starts from Ramapuram in chittoor district to Irungattukottai in Sriperumbudur, Kancheepuram. The Chennai port is also poised to set up a Multi Modal Logistics Park at Jolarpet to handle containers from Coimbatore and Bengaluru. Containers from these areas aggregate at the Park, cleared by customs and other agencies and sent directly to the Chennai port by rail. Both the container terminals of the port are geared to handle 8000 TEU capacity container vessels after the completion of capital dredging in Ambedkar docks and Jawahar dock basins. The alongside depth at the container terminals is now 15 meters after the completion of dredging.

The project on a 121-acre of land in Mappedu at cost of Rs 100crores , initially thought to be a non-starter after the elevated corridor was stalled, is now back on track. A dry port planned to develop near sriperumbudur , Rajiv Gandhi Dry Port Cum Multimodal Logistics Hub Through PPP Mode .The dry port was supposed to have an inland container depot or off-dock container freight station, container yard, rail and road connectivity to national rail and road network, trade centre, warehouses for containerised cargoes such as leather garments, textiles, automotive components and electronic hardware.

Work on development of a Common railway yard has been completed and it can receive full length rakes. The port has installed an in motion rail weigh bridge to facilitate weighing of wagons by the users handling bulk cargo through rail. Chennai Port and CONCOR has started a new initiative of transporting direct port delivery of imports and direct port entry of export containers from CONCOR yard at Tondiarpet about fifteen kilometers ahead of the port. Rail shuttle services will operate between the yard and the port to reduce road congestion.

II. REVIEW OF LITERATURE

The hinterland connectivity problem especially Port congestion issues faced by all port around global like Los angles, long beach, Manila and some Indian major ports like Chennai Port, Navi Mumbai, Vishakhapatnam. The port congestion are caused by growth of International trade which leads to port to run at their maximum capacity leading to traffic congestion (Vacca, Bierlaire and Salani 2007).The port congestion affects the port user's very badly their overall freight productivity as truck's long waiting time and lower port operation efficiency. The National Chamber Foundation of U.S. Chamber of Commerce (2003) carried out studies which states Congestion at Port gate is more when compared with traffic in freeways during peak hours in metro cities.

The various studies have been done on efficient truck appointment system to reduce truck waiting time. The studies carried out by (Huynh and Hutson, 2005) which states operation efficiency can be obtained when systematically appointment where given like specific guaranteed entry time, reduced queue lengths and shorter truck turn time. Another studies by Huynh and Walton 2008, analyse the effect of truck arrival patterns on truck turn times and utilization rate of crane through a heuristic search process.

A study carried out on Port and hinterland network in which Crescent Corridor intermodal freight program in the US was taken as case studies (Junko Sugawara) which concludes that even in US it not easy to develop and run efficient intermodal corridors . The crescent corridor faces many problems like lack of fund even though 1.5 millions fund where granted by US department of transport (USDOT) under TIGER (Transportation Investment Generating Economic Recovery) but the project required 2.5 billion to complete 2500 miles of intermodal network .Every country or region have their own regulatory systems , infrastructure , Technology, funding system , political issue and culture. The bigger projects like this can achieve only by integrated approach with Federal, state, local private sector involvement and multi modes are reflected within the corridor project. If these are applied then it will be first step to create efficient intermodal transportation In another study on Simulation of truck congestion in Chennai port (Gayathri Devi Gitakrishnan), it enumerates as per travel time the congestion or queuing of trucks is caused by longer document processing and security check times which results in less number of trucks serviced per hour. The latest technology should be adopted for checking process like RFID tags to trucks which will improve the monitoring and performance of security and customs checking which in turn will reduce the congestion and improve throughput at the port.

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The Chennai port has many gates in which only one gate is operational 24 hours a day and has one entry and exit path route. The truck drivers are forced to join queue at earliest possible time in order to pick up /drop containers in the terminal container yard due to unavailability of the container status. There also another delays which is due to security verification process as this queuing complicates the situation at the port gate and within port area also. The slip roads (the slip road acts as connector to switch from one road to another road) can be constructed to prevent truck congestion while they wait for container along the road and give more flexibility in route option for truck entering and exiting the port. Finally slip roads , operating different gates at different times and adopting to latest technology the port congestion due to trucks in Chennai port can be reduced.

The Chennai port has introduced Direct Port delivery programme (DPD) in which the importer or customer can take delivery of their cargo directly at container terminal. This programme has been welcomes by the importer nearly 19 %of all import cargo has been cleared under DPD.The DPD programme are beneficiary to the importers Chennai port faces issue for connecting cargo from port to till clears the city limit. When an importer container reaches the container terminal first it is taken to designated Container freight station (CFS) from there only importer take delivery . The importer saves approximately Rs.5,000 per box by adopting DPD as they take cargo and deliver to the respective factory directly. (Te Raja Simhan, Business line)

Roso.V (2007) for connectivity of seaport depends on effective distribution and environmental friendly which can be achieved by high capacity railway connectivity to ports. The railway connectivity to ports when established in much efficient and higher capacity then economically railways are much better than roadways. The port should utilize multimodal transport between Rail and roadway.

Congestion implies loss of time and money, and therefore undermines the competitive position of ports and maritime logistics chains. Consequently, maximum efforts must be made to avoid such maritime congestion. To this end, insight is required into present and future developments in maritime transport and port throughput, as well as into the strategic behaviour of the various market players involved. Hilde Meersman, Eddy Van de Voorde and Thierry Vane/slander (2012).

III. RESEARCH OBJECTIVES

The study has got the following research objectives:

- To identify the opinion of the seaport users about the Port hinterland connectivity with regards to Chennai Port.
- To identify the opinion of the seaport users about the Port IT & Logistics support Facilities with regards to Chennai Port.

IV. RESEARCH HYPOTHESIS

In order to achieve the objectives, the researcher has set the hypotheses:

- H1: There is a significant difference in the opinion given by the port users about the Port Hinterland Connectivity factors in Chennai Port.
- H2: There is a significant difference in the opinion given by the port users about the Port Hinterland IT Logistics factors in Chennai Port.

V. METHODOLOGY

The study considered the users of the Chennai Port as the target population. The sample size fixed up for the study is 150. The sample responses were obtained by using Multistage Random Sampling Method. The infrastructural facilities were measured on a five-point scale (Likert scale) from 1 (strongly disagree) to 5 (strongly agree). The conceptual model of the study is given below:

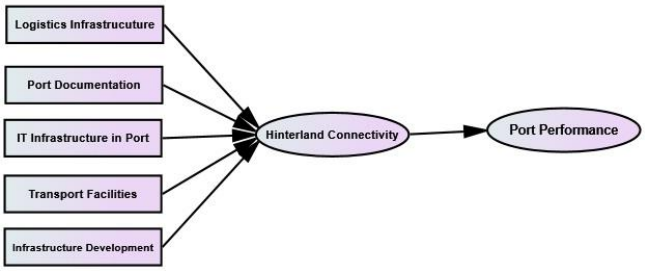

Fig-1: Conceptual Model of Hinterland Connectivity

VI. DATA ANALYSIS

The demographic details of the port users of Chennai Port are given in Table-1. It can be inferred that more percentage of port users of all the three ports falls under 30-40 age category. Moreover the majority of the type of port users is NVOCC/MTOs. The majority of the port users have Diploma education and the port users experience with port operation happens to be 5-10 years.

Table-1: Demographic Factors

Demographic Factors	Chennai Port (in %)
Age of Port User	
20 – 30	14
30 – 40	48
40 – 50	20
50 – 60	14
> 60	4
Type of Port User	
Port Agent	11
Freight Forwarder	18
NVOCC / MTO	24
Logistics Service Provider	22
Exporter / Importer	18
Others	7
Education of Port User	
10th Standard	2
12th Standard	22
Diploma	42
UG Degree	21
PG Degree	13
Experience in Port Operation	
Below 2 years	12
2-5 years	22
5-10 years	28
10-15 years	32
Above 15 years	6

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The constructs in the questionnaire were tested for reliability and consistency by calculating cronbach's alpha for Port hinterland connectivity factors it was found to have satisfactory values of 0.92 respectively. This shows that the constructs are consistent and reliable.

In order to test the hypotheses, Analysis of Variance was applied. The F-values and the corresponding p-values are given in Table-2.In order to test the hypotheses, one way Analysis of Variance is used. By carefully analysing the p-values, it can be inferred that the p-values for some of the attributes are on the higher side and it shows that the hypothesis can be accepted for some of the attributes and for other attributes, it can be rejected as given in Table-2. It can be interpreted that the various Port connectivity factors affecting Chennai Port as specified by the port users.

With regard to Logistics infrastructure facilities for Port, the factors such as Container freight station & control tower facilities are provided at Port, No congestion or queuing of Trucks/vehicle at the port /zero gates(landward access to the port via trucks scheduled arrivals at the port/zero gate), No congestion of Vehicle/trucks within port area, Sufficient parking areas are provided at port for Truck & other trailer are significant factors of port hinterland connectivity.

With regard to Port documentation procedure, the factors such as No time delay caused by cumbersome registration, licensing or documentation process, The custom procedures and regulations for the cargo are carried out at efficient & shorter time frame, Language & communication difference in logistics at port are taken care and effective handled are significant factors of port hinterland connectivity.

With regard to IT infrastructure Facilities to Port, the factors such as the Port is well connected to ensure communication between Port/ customs / CFS and other port users, Port IT infrastructure for Trucks tracking with increased security without compromising gate efficiency , example it can be achieved by Logistics company, uses secure log in and password to register, Port has IT system incorporated with online payment for truck payment fees at Gate, Port has IT system is developed such a manner the Exporter can track his goods departure port, then to each Port, Scaleable Technology used at port like Trucker's name –last / first, Assigned PIN–SCAC CDL number –state/province of issue, expiration date, Tractor plate number(s),Numeric identifiers -Verifying appt. numbers, Biometrics Fingerprints, Digital photos, FID numbers are significant factors of port hinterland connectivity.

With regard to Transport facilities towards port, the factors such as Port hinterland connectivity, Poor road connectivity especially within city limits as port is located at the centre of the city. The railway connectivity is well established and maintained which competes with other major ports in India. Port has good connectivity to nearest airport so that goods can be shipped through flight as well, Port has good facility in connectivity through coastal shipping are significant factors of port hinterland connectivity.

With regard to Infrastructure Development Project, the factors such as Elevated expressway from poonamallee / maduravoyal to the Zero Gate at ChPT, Ennore manali road project, ennore & kattupalli port road project, outer ring road project will help road connectivity to port, The road connectivity to port satisfies when cargo volume handled by port is increased to its maximum capacity, The rail connectivity to port satisfies when cargo volume handled by port is increased to its maximum capacity. The many Road Project connectivity to Chennai port are stalled, delayed leading port congestion affects ports performance, The Dry port project at Mappedu is stalled till now which affects the cargo volume and performance of Chennai port, At present there is no cargo transported through inland water ways whether port cargo volume can be increased by restoring Buckingham canal from Kakinada, AP to Marakkanam, TN, are significant factors of port hinterland connectivity.

Table-2: One way ANOVA of Port hinterland connectivity factors

SNo	Port Hinterland Connectivity Factors	F-Value (p-Value
	Logistics infrastructure facilities for Port	
1	Container freight station & control tower facilities are provided at Port	3.41 (0.001)
2	No congestion or queuing of Trucks/vehicle at the port /zero gates	3.12 (0.000)
3	No congestion of Vehicle/trucks within port area	2.44 (0.006)
4	Sufficient parking areas are provided at port for Truck & other trailer.	3.14 (0.008)
	Port documentation procedure	
5	No time delay caused by cumbersome registration, licensing or documentation process.	2.35 (0.004)
6	The custom procedures and regulations for the cargo are carried out at efficient & shorter time frame	3.83 (0.015)
7	Language & communication difference in logistics at port are taken care and effective handled.	2.52 (0.016)
	IT infrastructure Facilities to Port	
8	The Port is well connected to ensure communication between Port/ customs / CFS and other port users.	2.35 (0.004)
8	Port IT infrastructure for Trucks tracking with increased security without compromising gate efficiency	3.63 (0.015)
9	Port has IT system incorporated with online payment for truck payment fees at Gate.	2.12 (0.006)
10	Port has IT system is developed such a manner the Exporter can track his goods departure port , then to each Port .	2.13 (0.015)
11	Scaleable Technology used at port	3.12 (0.006)
	Transport facilities towards port	
12	Port hinterland connectivity from road bottle necked near port area 15-20 km due city traffic	2.41 (0.019)
13	Port has good railway connectivity meet international standards railway connectivity further it extends within port area as well.	2.19 (0.009)
14	Port has good connectivity to nearest airport so that goods can be shipped through flight as well.	2.12 (0.186)
15	Port has good facility in connectivity through coastal shipping	2.34 (0.018)
	Infrastructure Development Project	
16	Elevated expressway	3.18 (0.009)
17	The road connectivity to port satisfies when cargo volume handled by port is increased to its maximum capacity.	3.22 (0.001)
18	The rail connectivity to port satisfies when cargo volume handled by port is increased to its maximum capacity.	2.15 (0.008)

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VII. CONCLUSION

The study has identified the lack of availability of the required infrastructure development for port connectivity in Chennai port when compared to the International seaports. This has led the customers to reduce the usage of Chennai ports for the transportation of cargoes. The lack of infrastructural facilities in port connectivity has led to serious port congestion. The delay in various Infrastructure developments Project related to port connectivity is affecting Chennai port user and shifting to neighboring port like Kamarajar Port, Kattupalli Port and krishnapattinum port. The Chennai Port has to take swift action to bring back their port user such way that they are benefitted like various concessions or attractive tariff till the various port connectivity project completed and hinterland connectivity issue is resolved. Chennai port should upgrade latest IT system such way ease the traffic congestion within port and zero gate area. Chennai port should facilitate the port user such way all Chennai Container freight station upgraded to latest development like CFS- operational 24x7, payment time frame 24x7, reduced Customs role at CFS, etc at least this will help in reducing port congestion. The Neighboring Private operated ports like Kattupalli and Krishnapattinum planned for a huge expansion of port infrastructure facilities under various major project upon completion will be major challenge to Chennai port growth if port hinterland connectivity and infrastructure facilities not developed in due course of time. The Chennai Port under PPP model should develop Port Hinterland connectivity and port infrastructure facilities to retain its port user so that progressive growth of the port is achieved.

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