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Acquisition and Conversion of Kamarajar Port into a Green Port by Chennai Port Authorities: A Case Study on Sustainable Operations

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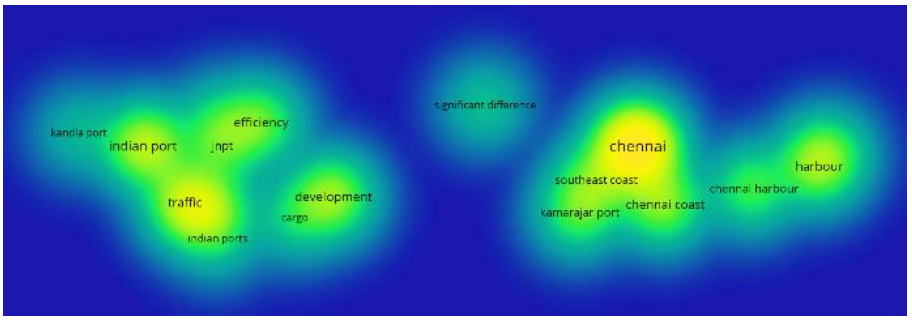
Abstract
As part of a strategy that led it to purchase the Government's 67% stake in Kamarajar Port for $2,383 crore through a government-to-government disinvestment deal a year ago, the Chennai Port Trust has brought vessel-related charges and concession schemes for container ships on par with Kamarajar Port Ltd (located about 18km to the North). In order to effectively combat competition, prevent cargo from being diverted to the neighbouring private and non-major ports, and improve the total cargo volumes of the two ports, Chennai Port Authorities bought Kamarajar Port and made it a wholly-owned unit. The purpose of this case study is to identify the frequently cited sustainable environmental success factors of the Kamarajar Port acquisition by Chennai Port Trust, to describe them within the context of supporting evidence, and to compare the strength of the two ports within identified factors. The authors of this work provide a Terminal Decision Support Tool (TDST) for the construction of a container terminal that takes environmental effects and operational efficiency into account.

Keywords: Cargo terminals; Liquid cargo; Break-bulk cargo; Hinterland; Kamarajar Port Limited (KPL); Chennai Port Authority (ChPA); Build-Operate-Transfer

Introduction
In March 1999, the Indian Government designated Kamarajar Port, formerly known as Ennore Port Limited, as the country's 12th major port. On October 11, 1999, it was officially formed as Kamarajar Port under the Indian Companies Act of 1956 (Model, 2021). The port is being run as a landlord port by Kamarajar Port Limited (KPL), which restricts its operations to general planning for development, port conservation, regulatory issues, environmental monitoring, berth area dredging, port basin dredging, installation of navigational aids/fire-fighting facilities, and road and rail connectivity (Kamaraj Port About us, 2023). Individual cargo terminal construction and management are the responsibility of private operators.

Only the Kamarajar Port is based on the Companies Act and acts as a corporation, whilst all other major ports now in operation operate in accordance with the Trusts Act. The Union Government owned 67% of the Port as of March 28, 2020, while Chennai Port held the remaining 33% (Monie, 1995). At the start of the KPL development, the Government of Tamil Nadu offered over 1,300 acres of land and the Government of India's Salt Board provided roughly 800 acres of land at a cheaper cost for the construction of facilities outside the ports (De, 2002).



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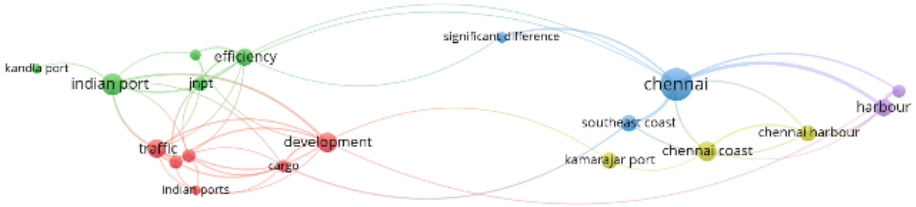

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Fig. 1a & b. Density and Network visualization of Keywords used in the case study

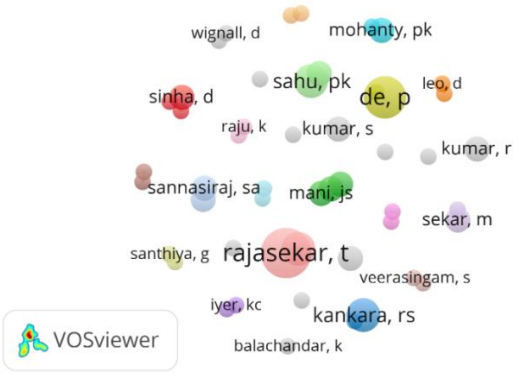

Fig. 1c. Network Visualisation of Authors

Kamarajar Port Core Competencies

Currently, the port includes 8 terminals for the handling of cars, containers, marine liquids, coal, iron ore, and natural gas. Since this paragraph focuses more on the funding than the facility, it may be moved to a more appropriate location (UNCTAD, 2019). The port of Kamarajar, which generated revenue of Rs. 587.41 crores and handled 25.89 MMT of cargo in the 2020-21 period, is building six additional berths: three for coal, two for liquid cargo, and one more for containers. When the ongoing developments are finished, there will be increase in the current capacity by another 50.58 million tonnes, bringing the total to 104.02 million tonnes. The Union Government has stated that Kamarajar is a "role model for all ports," it should be highlighted (Port Wings, 2020).

National highways, such as NH 5 connecting Chennai and Kolkata and passing through important cities like Vijayawada, Visakhapatnam, and Cuttack, NH 4 connecting Chennai and Mumbai and passing through Bangalore and Pune, and NH 45 connecting Chennai and Madurai and connecting the southern parts of Tamil Nadu, provide excellent access to other major cities from KPL (Sinha et al., 2016). Any one of these three National Highways could be used to reach all-important locations in India, whether they were located in the north, west, or east. Currently, Attipattu and Attipattu Pudunagar Stations on the Chennai-Gudur portion of the Southern Railway on the

Chennai-Delhi/Kolkata route serve as the rail links. KPL built the rail lines that connect the coal and iron ore terminal's stack yards to the already-existing NCTPS Railway line (KPL, 2022).

Table 1. BOT operators and terminals in KPL

S. No.	Terminal Year (Est)	Cargo	Draft	Quay Length (In mtr)	Capacity (MTPA)	BOT Operator	Revenue Share (In Rs.)	Total Cargo Handled in 2020-21 (in MMT)
1.	CB1 (2001)	T. Coal	17.5m	280	8	TANGEDCO **(Captive)**	204.45/MT	6.62
2.	CB2 (2001)	T. Coal	17.5m	280	8	TANGEDCO and NCTPS **(Captive)**	204.45/MT	3.49
3.	ECTPL (2011)	S. Coal & T. Coal	16m	320	10	JSW Infra Pvt. Ltd	52.524%	5.55
4.	MLT1 (2009)	POL and Chemicals	15m	360	5	IMC& L&T	21.68%	4.12
5.	GCB (2011)	Automobiles and Heavy Machinery	10m	278	2	KPL	SOR (KPL)	1.17
6.	AECTPL (2017)	Containers (Million TEU)	15m	400	0.8	Adani Ports Ltd	37%	0.387 TEU
7.	EBTPL (2017)	Bulk Cargo	16m	270	2	JSW Infra Pvt Ltd	36%	0.85T
8.	LNG (2019)	LNG	14.5m	300	5	IOCLNG **(Captive)**	146/MT	0.64
9.	CB3	T. Coal	17.5m	336	9	TANGEDCO (captive)	Hopper Erection	Scheduled-2022
10.	CB4	T. Coal	17.5m	336	9	TANGEDCO and NCTPS (captive)	Hopper Erection	Scheduled-2022
11	SIOTPL	Coal-Conversion	17.5m	280	12	Under Tender	Conversion	Scheduled-2022

Fig. 2. Masterplan of Kamarajar Port (Limited, 2022)

Chennai Port Authorities Core Competencies

Of India's twelve main ports, Chennai Port is the third-oldest, having been in operation for nearly 140 years. It is growing as a key port on India's east coast and has the strategic advantage of having the entirety of South India as its hinterland (Port of Chennai, 2015). The port can handle a range of cargo, including containers, liquid, and break-bulk freight, thanks to its advantageous location. The Ambedkar Dock, Jawahar Dock, and Bharathi Dock dock systems make up the port. Its overall quay length is about 5.5 kilometres and it has 26 berths in total (Chennai Port Authority, 2022). At some of these berths, a 17.4 m maximum draught is permitted. A total of 240 ha (about) of land and 170 ha (approximately) of water spread out over the Port (Ministry of Shipping, 2016).

Coal, iron ore, liquid, and dry bulk made up the majority of the total cargo mix, despite the port's history as a bulk port serving the demands of power generators, oil refineries, and steel/aluminum industries in Southern India's core hinterland (ICRA, 2021). However, with the relocation of coal and iron ore freight to Kamarajar port and the opening of the container terminals, the port has primarily been used for container handling, with liquid and other break-bulk cargo coming in second (ICRA, 2020). The port now includes two PPP-operated container terminals with a combined capacity of 2.5 million TEUs per year, each operated independently by DP World Pvt. Ltd. and Singapore's PSA International Pte Ltd (Purandare, 2016).

The "Gateway to South India," as Chennai Port Trust (ChPT) is commonly referred to, is well connected to other significant cities via national highways. It is connected to Mumbai by NH 4, Kolkata via NH 5, and Kanyakumari via NH 45. The national railroad system is well connected to Chennai Port. A 41 km internal rail network is also present in the Port (Deloitte, 2020).

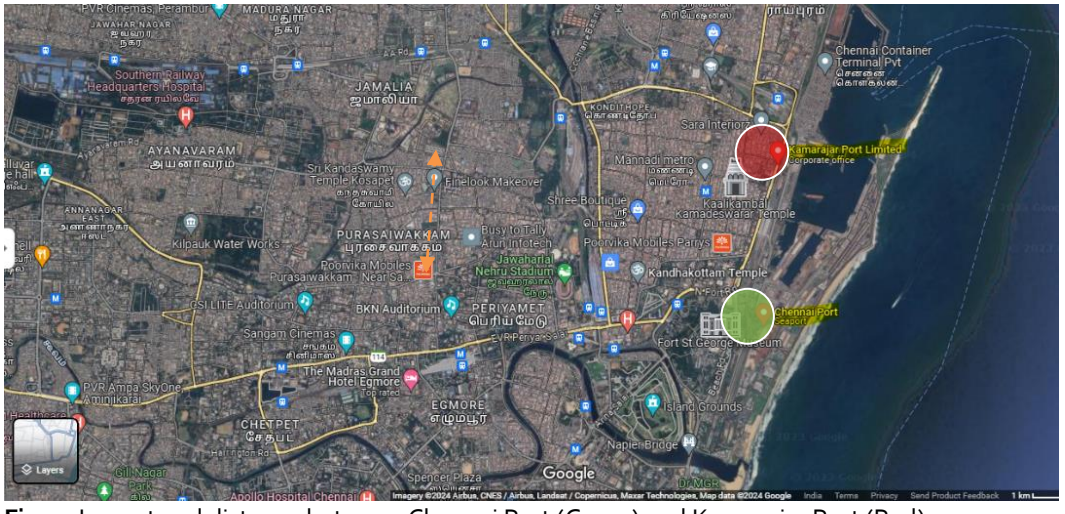

Fig. 3. Layout and distance between Chennai Port (Green) and Kamarajar Port (Red)

Acquisition of Kamarajar Port Trust by Chennai Port Trust

The Kamarajar Port was initially intended as a satellite port to the nearby Chennai Port for the purpose of handling coal to relieve congestion in Chennai Port (Project Today, 2020). This new port was intended to supply bulk raw materials to the hinterland industry as well as address the region's rising energy demand (Construction Week, 2020). The Kamarajar port project was started by Chennai Port, the project's initiator and implementing authority. The project's cost was jointly sponsored by the Chennai Port Trust (Rs. 500 crore) and the Indian government. Through a loan from the Asian Development Bank (ADB), the Indian government raised money (Rs. 460 cr). Along with the financial component, Chennai Port started the civil construction work after obtaining all necessary legal approvals, such as environmental approvals (IFLR, 2020). The Union Government approved the ADB loan in 2003 after the project was finished (ADB, 2011). The development cost for KPL during its financial restructuring was Rs. 800 Cr (AECOM, 2016). This was divided into Rs. 500 cr. of loan and Rs. 300 cr. of equity. Govt. of India and Chennai Port each contributed Rs. 200 Cr (2/3rd) and Rs. 100 Cr (1/3rd) for the equity component. The Government of India received a

piece of the debt of Rs. 120 Cr and the Chennai Port received a share worth Rs. 380 Cr, respectively. It should be mentioned that the newly established firm had to be corporatized in accordance with the Loan Covenant of ADB. As a result, KPL was corporately incorporated by the Government of India on October 11, 1999, separate from Chennai Port Trust (ChPT). The first Major port to be corporately owned thus came into being (Kamarajar Port Limited, 2022).

The Indian government sought to divest from KPL in accordance with its disinvestment strategy (Strategic Disinvestment & Privatisation, 2015). ChPT then presented the government with a proposal to buy the KPL shares. The Government hired two independent organisations to complete the asset valuation of the port and value for the potential sale as part of its due diligence process (Sundaravadivelu, 2019). In response, ChPT was requested to provide a price quote. Based on the price provided or agreed upon, ChPT then purchased Government of India's shares in KPL. KPL became a wholly-owned subsidiary of ChPT in March 2020 after ChPT bought the Government of India's entire stake (66.67%) in the company. The Chennai Port, which had a 33 percent ownership stake in the KPL from the start, purchased the remaining 67 percent from the Union government and then fully acquired the KPL as its wholly-owned subsidiary (Port to Port, 2020). Despite the transaction, KPL will continue to function as a ChPT-registered limited liability company, stay exempt from TAMP, and maintain its tariff-fixation flexibility (CAG, 2020).

Rationale

The revision in ratings considers the stress on capital structure and debt coverage indicators of the consolidated entity, arising from the Rs. 1775 Crore debt availed by ChPT for the acquisition of a stake in KPL for a total consideration of Rs. 2380 Crore. The port must raise Rs 2383 Crore (1775 Crores debt sanctioned by SBI + Rs. 608 Crore internal resource) with the help of a reserve fund in the bank (SBI) to buy these Government's shares. Because of limited cash generation from operations, the debt at ChPT will be serviced by dividend payments from KPL. However, the liquidity profile is supported by 15-year repayment tenure along with a ballooning repayment structure. The ChPT will also maintain a 3-month DSRA and Rs. 200 Crore reserve fund for debt servicing, and all dividend payments from KPL will be routed through an escrow account for debt servicing.

Further, due to the high pension obligations & salary outgo for ChPT, the profit margins of the consolidated entity are also constrained. ICRA also notes that ChPT's adjusted net worth is negative because of sizeable unfunded pension and other retirement liabilities, which weakens the consolidated entity's network. Furthermore, there is high competition and overcapacity in the container segment at the Chennai cluster, although captive customers partly mitigate the risk for certain cargo segments and minimum guaranteed volume commitment and revenue share from container terminal operators.

Despite the acquisition, KPL will continue to operate as a limited liability company under ChPT, remain outside the purview of TAMP, and have tariff-fixation flexibility. The rating considers the moderate cargo profile of ChPT and KPL, with ChPT accounting for the second-largest container handling among major ports and KPL accounting for ~15% of the container share of India in FY2020. The container terminals at KPL and ChPT are operated by reputable global and domestic port logistics companies with revenue share clauses and minimum volume guarantees.

Environmental Impact

Kamarajar port and Chennai ports are linked now after the acquisition. Because linked terminals are specialized and have efficient organization, efficient container terminals are thought to be essential to the success of third-generation ports. This is because they are more cost-effective for transportation. Because of the affordability of transportation and the specialized and effective management found at the related terminals, efficient container terminals are thought to be essential to the success of third-generation ports. Conventional port emissions studies are typically used with the current system. Several academics have created various methods to assess the environmental performance of container terminals in this regard.

Environmental Evaluations and Measures to Reduce Environmental Impact

The European Sea Ports Organization (ESPO) establishes the foundation for policies and activities as well as the top ten environmental concerns that ports are working on each year. The following are the problems: Air pollution, energy consumption, noise, community relations, ship waste, port expansion (land), water quality, dredging operations, rubbish disposal, and climate change are the top ten issues (ESPO, 2018). The majority of these environmental problems could occur in any of the procedures outlined for the container terminal. Specifically, (1), (2), (3), (4), and (7) are present in every process, but (5), (8), and (9) are more closely associated with the berth subsystem and (6), (10) with the storage subsystem. After the acquisition of Kamarajar Port, Chennai port adopted ESPO standards and working on to reduce pollutions.

Key Strengths

Linkages between the government and strategic importance

As two of the 12 major ports in India, KPL and ChPT are strategically crucial to the country's economic growth. Previously, the Government of India held 66.7% of KPL and ChPT held the rest, but ChPT acquired the Government of India's stake in KPL in March 2020, making it a wholly owned subsidiary. In addition, operational synergies are expected to result from reduced competition and streamlined capacity planning as a result of the acquisition. Moreover, the parent company- ChPT is directly controlled by the Ministry of Shipping (MoS), with representatives from the Ministry of Shipping, the Department of Customs, the Tamil Nadu government, and the Mercantile Marine department on its board, reflecting strong government ties. In addition to administrative relations, the trust has also received financial support from the MoS under the Sagarmala scheme to fund some of its capital expenditure projects partially (ICRA, 2020).

Ports with adequate draft and access to large hinterlands are located in a favourable location

Both Chennai and Kamarajar Port are all-weather ports in the southeast of India and the northeast corner of Tamil Nadu (Kumar et al, 2023). They serve as attractive ports of call on international shipping routes. In addition, the draft available at the ports is adequate in the range of 15 m-17.4 m, allowing for the handling of larger vessels and resulting in significant cost savings for the end user (De and Ghosh, 2003). The ports are connected to a vast hinterland that comprises Tamil Nadu, Karnataka, and AP and handles containers, coal, liquid, and bulk cargo (De, 2002).

In the past, Chennai port handled coal, iron ore, liquid and dry bulk, serving power generators, oil refineries, and steel/aluminum plants (Ghosh and De, 2001). However, following the commissioning of the container terminals in 2001 and 2009, as well as the switch of coal and iron ore cargo to Kamarajar port in 2012 as a result of high court orders citing pollution and hazardous risks for citizens living nearby the port, ChPT has primarily become a container handling port, while KPL primarily handles coal and other break bulk cargo (Kumar and Saxsena, 2023).

Hybrid operating model

It is important to note that ChPT operates under a hybrid concept, in which it operates its own berths, handling general cargoes, including liquids, dry bulks, and break bulks, in contrast to KPL, which operates mainly on a landlord port basis. As an alternative, private operators operate container terminals using a build-operate-transfer (BOT) approach (Sharma, 2020). As a result of the acquisition, ChPT is expected to reduce costs, reduce competition and streamline capacity planning in Chennai, but the substantial interest and principal obligations have put some pressure on the consolidated entity's capital structure and coverage indicators (Monie, 1995). While ChPT is only planning limited capital expenditures, KPL plans to undertake large capital expenditures on the development of a second general cargo berth, capital dredging, and connectivity projects, which will mainly be funded by internal accruals (George and Tumma, 2020).

A substantial pension liability and high employee expense of ChPT adversely affected the consolidated entity's profit margin

ChPT, one of India's oldest major ports, has 3949 employees and 15064 pensioners at the standalone level as of March 2020, making it one of the oldest in the nation. It is difficult for the consolidated entity to maintain operating profitability due to large employee and pensioner

expenses. Moreover, a significant debt position of Rs. 1105 Crore is the deficit in the ChPT pension fund as of March 2020 (compared to actuarial liabilities estimates), so regular contributions from the P&L account are required. In addition, the gearing level of the consolidated entity is under stress at 2.48 times as of March 2020, further impacting operating profitability (Rajasekar and Rengamani, 2017).

High competition and cargo volatility

ChPT and KPL compete with nearby ports, such as Kattupalli and Krishnapatnam (Rajasekar, 2011). In recent years, KPL and Kattupalli have increased container handling capacity, affecting ChPT's container segment growth. As a result of expected synergies, captive cargo (like TANGEDCO and IOC at KPL, and CPCL at ChPT) and long-term contracts with reputed domestic and global container terminal operators that guarantee a minimum volume and revenue share, the consolidated entity is mitigated from risk (Kumar and Kumar, 2020).

Congestion issues

In some cases, cargo has been diverted to competition as a result of congestion issues at Chennai port and KPL port. Once road connectivity projects currently under construction are completed, congestion is expected to decrease in the next few years (Mindur, 2019).

Financial position

In the last few years, KPL has enjoyed a healthy stream of funds generated from operations; however, CAPEX has been a significant drag on free cash flow. With CAPEX requirements of around Rs.100-150 crore per year expected in the next three years (although some CAPEX is expected to be deferred to FY2021, some CAPEX is expected to be deferred from FY2021). As of March 2020, KPL has unencumbered cash balances and liquid investments of 99.2 crore and an unutilized fund limit of Rs. 50 crores (Kumar et al, 2023).

Rating Sensitivities Positive triggers

A rating upgrade for KPL could be achieved if the consolidated entity (ChPT and KPL) can continue demonstrating stable cargo growth that drives higher revenues and cash accruals while maintaining profitability and stable working capital intensity (Rengamani, 2015).

Sustainability

Chennai Port Trust has made the port a "Green Port" by sourcing the majority of its energy needs from renewable sources. As the Chennai Port has committed to producing 500 KW of solar energy, Electrona Energy Pvt. Ltd. was given the 100 KW (Phase-I) share. The only significant port to be corporation-registered is Kamarajar Port. This port is intended to serve as Asia's energy port and is viewed as a satellite port to help the crowded Chennai Port clear up and enhance its environmental conditions (Balasubramaniam, 2018).

In addition to facing the market challenges posed by a competitor, the acquisition of KPL will enable the company to handle possible diverting cargo to nearby private and non-major ports. Due to their excellent rail and road connectivity, both ports can handle more cargo at maximum capacity (Rajasekar and Rengamani, 2017). As a result of this acquisition, both ports will be able to improve their strengths, attracting investment and creating a value chain for their trade/customers (Kumar et al, 2022). More attention will be paid to clean cargo such as containers, cars, liquid cargo, cruises, and passenger traffic at Chennai Port Trust and making the best use of its existing capacity. To avoid duplication of capacity creation and ineffective utilization of existing capacity, Kamarajar Port will plan and create additional capacity for bulk and other types of cargo (Kumar, 2023).

Conclusion

In order to ensure that the environmental effect of port operations is minimised and that the processing of cargo carried by container ships is done efficiently, this paper offers a thorough decision support framework for port terminal planning by way of acquiring Kamarajar (KPL) by Chennai Port Authority (ChPT). Using the synergy created by the acquisition of Kamarajar Port

Ltd, the company can effectively combat competition and the diversion of cargo to private and non-major ports" in the area. Due to their excellent road and rail links and ability to increase the total cargo volume, both ports can face competition from nearby private ports. It is evident that the acquisition of Kamarajar Port by Chennai port to create a green port, ports should be self-committed to environmental challenges. Sustainable development necessitates expertise in a variety of fields. Maintaining a wide knowledge base and using renewable energy sources to power significant ports around the nation is difficult. efforts to cut carbon emissions and carbon footprints on policies that support green ports around the nation. The fuel consumption per TEU transported by Green Ships is a significant factor as well. lowering carbon emissions and fuel use. It would be easier for both ports to handle competition from private operators like Adani's Kattupalli Port and Krishnapatnam Port. ChPT has handled more than 50 million tonnes of freight in the past few years, compared to 35 million tonnes handled by KPL. It will take at least two to three years to reach 100 million tonnes as a result of COVID-19. It is difficult to expand ChPT because of its dense population, traffic jams, and the Madras High Court's ban on dusty cargoes, such as coal and iron ore. In addition to coal handling, KPL will expedite the Chennai Port-Madurvoyal elevated corridor project. Both ports have rail connectivity. KPL is doubling its rail lines.

References

ADB Validation Report (2013) India: Mumbai and Chennai Ports Project. ADB. Retrieved from India: Mumbai and Chennai Ports Project.

AECOM (2016) Master plan for Kamarajar Port. Ministry of Shipping /Indian Ports Association.

Balasubramaniam M (2018) Inevitability in the growth and development of green port operations in the seaports of Chennai cluster. International Journal of Mechanical Engineering and Technology 9:489-496.

CAG (2020) Report of the Controller and Auditor General of India.

Chennai Port Authority (2022) Land use plan. Chennai Port. Retrieved from https://chennaiport.gov.in/api/static/default/events/lup2022.pdf

Christiansen MA (2007) Maritime transportation. Handbooks in Operations Research and Management Science pp.189-284.

Construction Week (2020) Chennai Port Trust acquires 67% in Kamarajar Port. Retrieved from https://www.constructionweekonline.in/business/12941-chennai-port-trust-acquires-67-in-kamarajar-port.

De P (2002) Productivity, efficiency and technological change in Indian ports. International Journal of Maritime Economics 4:348-368.

De P and Ghosh B (2003) Causality between performance and traffic: an investigation with Indian ports. Maritime Policy & Management 30:5-27.

Final Report (2020) Business Plan for Chennai Port Trust. pp.185 Retrieved from https://www.chennaiport.gov.in/sites/all/themes/nexus/files/pdf/Final_Report.pdf

George SA and Tumma AC (2020) A benchmarking study of Indian seaports. Journal of Global Operations and Strategic Sourcing 13:88-102.

Ghosh B and De P (2001) Indian ports and globalisation: Grounding economics in geography. Economic and Political Weekly 36:3271-3283.

Gupta KV (2023) Assessment of environmental sustainability issues for South-Asian maritime ports. Australian Journal of Maritime & Ocean Affairs 154-176.

ICRA (2020) Kamarajar Port Limited: Ratings downgraded to ICRA Ltd.

ICRA (2021) Chennai Port Trust: Ratings reaffirmed. ICRA Ltd.

IFLR (2020) Retrieved from https://www.iflr1000.com/Deal/Profile/23811?SEOtitle= Chennai-Port-Trust-314-million-acquisition-of-74-49-stake-in-Kamarajar-Port#undefined

Kamaraj Port (2023) Retrieved from Kamaraj Port Ltd: https://www.ennoreport.gov.in/content/

Kamarajar Port Limited (2022) 22nd Annual Report. Kamarajar Port Limited

Kumar M and Kumar S (2020) Maritime and Inland Trade in India: A Perspective Study. IRE Journal of Maritime Research and Development 4:10.

Kumar S and Saxsena P (2023) A Data Envelopment Analysis (DEA) based study of major sea ports of India. International Journal of Emerging Trends in Engineering Research 11:168-173.

Kumar ST, Kanungo S and Sekar M (2023) Digital Disruption in Major Ports with Special Reference to Chennai Port Kamarajar Port and Tuticorin Port. In Third Congress on Intelligent Systems: Proceedings of CIS (2022) 2:89-101.

Limited KP (2022) Masterplan Retrieved from https://wwwennoreportgovin/content/innerpage/master-planphp

Mindur L (2019) The impact of India's economy on the development of seaports Scientific Journal of Silesian University of Technology. Series Transport 105:169-182.

Ministry of Shipping Indian Ports Association (2016) Final Report for Sagarmala MoPSW.

Model YU (2021) Kamarajar Port Limited. Pp.113.

Monie GD (1995) Restructuring the Indian ports system. Maritime Policy and Management 22:255-260.

Monie GD (1995) The problems faced by Indian ports today. Maritime Policy and Management 22:235-238.

Port of Chennai (2015) Concession For Operating Container Shuttle Chennai Port Trust.

Port to Port (2020) Chennai and Kamarajar Ports merge to create Behemoth in the East Coast Retrieved from: http://porttoportin/headernewsdetphp?newstitle=12763

Port Wings (2020) Chennai Port acquires 100 percent stake in Kamarajar Port. Retrieved from https://portwingsin/chennai-port-acquires-100-percent-stake-in-kamarajar-port/

Project Today (2020) Chennai Port Trust acquires 67 percent in Kamarajar Port. Retrieved from https://wwwprojectstodaycom/News/Chennai-Port-Trust-acquires-67-percent-in-Kamarajar-Port

Purandare AA (2016) SWOT Analysis of Chennai Port (An ISO 14001: 2004 Certified Port). Pacific Business Review International 8(9): 122-129.

Rajasekar T and Deo M (2011) Major Port Trusts of India: Growth and Performance. IUP Journal of Infrastructure 9:7-23.

Rajasekar T and Rengamani J (2017) A study on the port congestion of the seaports in Chennai cluster. International Journal of Research in Management Economics and Commerce 13-19.

Rengamani J (2015) A study on the performance of major ports in India. International Journal of Management 6:48-55.

Sharma EA (2020) Measuring impact of Indian ports on environment and effectiveness of remedial measures towards environmental pollution. International Journal of Environment and Waste Management 25:356-380.

Sinha S, Hussain A, Chakraborty S, et al. (2016) Bridging infrastructural deficit at select trade ports in India.

Strategic Disinvestment & Privatisation (2015) Retrieved from Department of Investment and Public Asset Management, Ministry of Finance, Government of India. https://dipamgovin/strategic-disinvestment

Sundaravadivelu R (2019) Modernization of Port. Proceedings of the Fourth International Conference in Ocean Engineering (ICOE2018) pp.25-40.

UNCTAD (2019) Review of Maritime Transport, Geneva.

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SB and TSA conceived the concept, wrote and approved the manuscript.

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