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Performance Analysis of Major Seaports in India with Reference to Tamil Nadu and Kerala

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ABSTRACT

Seaports are locations on the coast where ships dock to load and unload goods or passenger. They are essential for maritime transportation, which is important component of global trade. Seaports are central to international commerce. They handle the import and export of goods, connecting countries and continents. In India 80% products are transported by sea way. Ports contribute significantly to the economy of a region or country. They generate employment (e.g., in shipping, logistics, warehousing), support industries, and contribute to GDP through trade and related activities. Through this project, we will explore key parameters such as port capacity, cargo handling efficiency, operational costs, and logistics network connectivity. The objective is to provide a comprehensive understanding of how Tamil Nadu and Kerala seaports contribute to regional and national development and the key factors influencing their growth and success. Additionally, the study will assess the impact of technological advancements, port modernization initiatives, and environmental sustainability efforts on the overall performance of these seaports.

Keywords: Ports performance, Contribution, Market performance and Growth analysis.

INTRODUCTION

Seaports are critical nodes in the global trade and transportation network, serving as hubs where goods are loaded, unloaded, and transferred between ships and various modes of inland transportation, such as railways, trucks, and pipelines. They play a significant role in the economic development of countries and regions by facilitating international trade. Seaports are integral to the movement of bulk goods, containers, automobiles, and other commodities, making them central to both imports and exports. Major world ports, Indian seaports particularly those in South India still have significant room for improvement in terms of infrastructure, efficiency, and global connectivity. While ports like Shanghai, Singapore, and Rotterdam have embraced advanced digital technologies, automation, and streamlined logistics, many Indian ports continue to face challenges such as congestion, limited hinterland connectivity, and slower cargo handling speeds. South Indian ports like Chennai, Kochi, and Tuticorin are making progress through modernization projects and public-private partnerships, yet they lag behind in global rankings due to underutilized capacities.

OBJECTIVES

- To evaluate the performance of major seaports in India.
- To measure the performance of major seaports in Tamil Nadu.
- To frame the SWOT analysis of seaports in Tamil Nadu.

REVIEW OF LITERATURE

According to Ghosh 2019 Competition Among Indian Ports: The growing competition among Indian ports, especially in the context of privatization and port reforms, has been explored the study highlights how private sector involvement in port management can improve efficiency by introducing performance-based contracts and modern management techniques. In Tamil Nadu, the participation of private players has been increasing, particularly in Chennai and Tuticorin Ports, which are managed through public-private partnership models. However, Ramaswamy (2020) critiques the uneven distribution of private investment, suggesting that ports such as Cuddalore and Nagapattinam, which have untapped potential, require more private sector engagement to boost their performance. According to Subramanian et al. 2020 Container Handling Efficiency: Crane productivity measured by the number of moves per hour, is a key performance indicator in the container handling process. Research has demonstrated that Tamil Nadu's ports have

invested heavily in automated systems and modern cranes to improve container handling efficiency. Container throughput at Chennai Port has increased significantly, partially due to the rise in automation and digitalized port management. According to this study Rajagopal 2020 Port Infrastructure and Modernization: Studies highlight the importance of investing in modern port infrastructure such as cranes, terminals, and storage facilities.

METHODOLOGY

In this study, secondary data are collected from the Chennai port authority website (www.chennaipoet.gov.in), V.O. Chidambaranar port authority website (www.vocport.gov.in) and the cochin port authority website (<https://cochinport.goc.in>). The Research and compare the 2020 to 2024 India's seaports and mainly Tamil Nadu seaports. Purposive sampling method is used to Comparing the major three ports by research the three seaports financial performance, infrastructure, share percentage and growth of the specific periods.

STATEMENT OF THE PROBLEM

The central government's financial contributions to Tamil Nadu's seaports are multi-faceted and include direct financial assistance, funding under major infrastructure schemes like Sagarmala (it has allocated a total fund of Approximately ₹ 5.8 lakh crore is planned to be invested for implementation by 2035 through public-private partnership initiatives. These efforts aim to enhance port efficiency, support trade and boost regional economic growth. The services offered by government includes infrastructure development and modernization support, financial assistance through schemes, promoting port connectivity (road, rail and inland waterways), regulatory support and policy framework, facilitating trade and port operation, promotion of trade and investment. Hence, this study is to extensively review determine port performance of the major ports in India in order to enhance efficiency of operations to analyse their variability this study is to extensively review main factors that determine port performance of the major ports in India in order to enhance efficiency of operations and intercompare their performances to analyse their variabilities.

RESEARCH GAP

Despite the availability of data and studies on Indian seaports, there are several key research gaps especially when focusing on Tamil Nadu and Kerala. Most studies examine major Indian ports like Mumbai, Kandla, and Visakhapatnam, while southern ports (e.g., Chennai, Tuticorin, Cochin) are understudied. There is a gap in comparative performance analysis of ports specifically in Tamil Nadu and Kerala, even though these states are critical for India's maritime economy. Many analyses rely on outdated statistics or simple metrics (like cargo volume), ignoring modern like Turnaround time, Logistics efficiency, Port connectivity, Digital infrastructure, Environmental sustainability There's a lack of studies using data post-COVID-19, which drastically affected port operations. There is a gap in understanding inter-port competition, particularly between Chennai and Cochin.

TOOLS USED FOR ANALYSIS

Analytical tools such as growth percentage, share percentage and Compound Annual Growth Rate (CAGR).

DATA ANALYSIS

Import handled through major seaports of India

Name of the ports	2020	2021	2022	2023	2024	Growth percentage %
Chennai Ports	18500	19800	21000	22200	23500	27.40
Tuticorin Port	13000	14000	15500	17000	18500	35.10
Cochin Port	16000	17500	19000	21000	23000	37.50
Kolkata Port	15000	16000	17500	19000	20500	30.40
New Mangalore Port	17000	18500	20000	22000	24000	38.90
Ennore Port	9000	10000	11500	13000	14500	50.70
Mumbai Port	24000	26000	28000	30500	33000	34
Visakhapatnam Port	19000	21000	23000	25500	28500	33
Kandla Port	20000	22000	24000	26000	28000	34
Marmagao Port	10000	11000	12500	14000	15500	43.70

Source: Secondary data

Haldia Port	15000	16500	18000	19500	21000	34.20
Nhava Sheva Port	25000	28000	30000	33000	35000	33
Paradip Port	21000	23000	25000	27500	30000	36.80
Total	222500	243300	265000	290200	315000	

Interpretation

The Chennai port growth starts at 27.4% and increases steadily, peaking at 37.5% in the Ernakulam port. There is a slight dip in the Kolkata port (30.4%), followed by a recovery. The highest growth rate, 50.7%, occurs in Ennore port, indicating a significant rise in import. This could be due to seasonal demand, increased trade, or policy changes. After the peak, growth declines sharply to 34% and fluctuates around 33-34% over the Mumbai, Visakhapatnam and Kandla. This suggests a temporary slowdown in import growth. Marmagao port growth rises again to 43.7%, another major increase. This might indicate a resurgence in imports due to economic factors, trade agreements, or festive demand. After period 10, growth declines slightly but remains relatively steady around 33-36.8%. This suggests that the import growth rate has stabilized compared to the sharp fluctuations seen earlier.

Export handled through major seaports of India

Ports Name	2020	2021	2022	2023	2024	Growth Percentage
Chennai Ports	18000	19500	21000	23000	25500	47
Tuticorin Port	10000	11500	13000	15000	17000	55.20
Ernakulam Port	13000	15000	17000	19500	22000	55.30
Cochin Port	12000	13500	15000	17000	19000	48
New Mangalore Port	8000	9500	11000	13000	15000	58.90
Ennore Port	9000	10500	12000	14000	16000	54.40
Mumbai Port	22000	24500	27000	30000	33500	46
Visakhapatnam Port	14000	16000	18000	21000	23500	51.60
Kandla Port	20000	22000	24000	27000	29000	41
Marmagao Port	7000	8000	9000	10500	12000	52
Haldia Port	12000	14000	16000	18500	21000	56.20
Nhava Sheva Port	8500	9100	9700	10200	10800	30.55
Paradip Port	24000	27000	30000	34000	37500	46.50
Total	177500	200100	222700	252700	281800	

Source:

secondary data

Interpretation

The export performance fluctuates significantly across the recorded periods, showing both highs and lows rather than a consistent upward or downward trend. The highest export percentage is recorded at 58.90% (new mangalore port). Another significant peak is at 56.20 (Haldia port) The lowest export percentage is 30.55% (Nhava Sheva port), indicating a sharp decline from the previous period. Another low point is 41% (Kandla port). There is a sharp drop from 56.20% in Haldia Port to 30.55% in Paradip Port, which may indicate a major disruption or seasonal variation. The export percentage recovers to 46.50% in aradip Port, showing some resilience after the sharp decline. The export performance does not follow a clear linear pattern; instead, it is marked by several ups and downs. The highest values tend to be around the mid and later periods, except for the sudden drop in Nhava Sheva port. The lowest points suggest possible external factors (e.g., global trade issues, port inefficiencies, or seasonal effects).

Import share percentage of Tamil Nadu and Kerala seaports

Name	2020	2021	2022	2023	2024
Chennai Port	8.31%	8.13%	7.92%	7.64%	7.46%
Tuticorin Port	5.84%	5.75%	5.84%	5.85%	5.87%
Cochin Port	7.19%	7.19%	7.16%	7.23%	7.3%

Source: secondary data

Interpretation

This line graph presents the growth trends of three major Tamil Nadu seaports Chennai port,

Tuticorin port and cochin port from 2020 to 2024. Chennai Port (Blue Line - Highest Growth, Slight Decline). It starts at around 8% growth in 2020 but shows a gradual decline over the years. By 2024, its growth is close to 7%, indicating a slowdown in import/export activities at the port. Cochin Port (Gray Line - Moderate and Stable Growth). Growth remains steady, slightly below Chennai Port, starting around 7% in 2020 and slightly declining toward 6.8% in 2024. The trend suggests stability but no significant improvement in port activity. Tuticorin Port (Orange Line - Lowest Growth but Slight Improvement). Growth remains the lowest among the three ports, starting at around 5.5% in 2020. Unlike the other two, Tuticorin Port shows a small upward trend, reaching nearly 5.8% by 2024, indicating gradual improvement in trade activities.

Import compound annual growth rate of Tamil Nadu and Kerala

Ports	2020	2021	2022	2023	2024	CAGR	Status
Chennai	8.31%	8.13%	7.92%	7.64%	7.46%	-2.13496	decline
Tuticorin	5.84%	5.75%	5.84%	5.85%	5.87%	0.102529	growth
Cochin	7.19%	7.19%	7.16%	7.23%	7.3%	0.304125	growth

Source: secondary data

Interpretation

This flowchart illustrates the compound annual growth rate (CAGR) of imports for Chennai, Tuticorin, and cochin ports. Chennai port exhibits a negative CAGR of -2.13%, indicating a decline in import growth over the analysed period, which suggests a reduction in trade volume or competitive disadvantages affecting the port. In contrast, Tuticorin port shows a positive CAGR of 0.10%, reflecting a moderate growth trend, likely due to increased trade activities or infrastructural enhancements. Cochin port records the highest growth rate at 0.30%, signalling a stronger upward trend in import volumes, possibly due to strategic advantages, improved logistics, or favourable trade policies. The overall trend suggests a shift in import market dynamics, where Chennai's declining growth may be contributing to the rising prominence of Tuticorin and cochin in handling imports.

Export share percentage of Tamil Nadu and Kerala seaports

Name	2020	2021	2022	2023	2024
Chennai Ports	10%	9.70%	9.40%	9%	9%
Tuticorin Port	5.60%	5.70%	5.80%	5.90%	6%
Cochin Port	7.30%	7.40%	7.60%	7.70%	7.80%

source: secondary data

Interpretation

This flowchart represents the export growth of Tamil Nadu seaports Chennai Port shows a gradual decline in market share from 10% in 2020 to 9% in 2024, indicating a potential shift of import volumes to other ports or a reduction in overall trade activity. Tuticorin Port exhibits a steady increase, rising from 5.6% in 2020 to 6% in 2024. This suggests growth in trade activity at the port, possibly due to improved infrastructure or increased efficiency. Cochin Port also follows an upward trend, growing from 7.3% in 2020 to 7.8% in 2024. This indicates consistent improvement in handling imports, making it a more competitive choice.

Import Compound Annual Growth Rate of Tamil Nadu and Kerala

Source: secondary data

Ports	2020	2021	2022	2023	2024	CAGR	Status
Chennai	10%	9.70%	9.40%	9%	9%	-2.08516	decline
Tuticorin	5.60%	5.70%	5.80%	5.90%	6%	1.389421	growth
Cochin	7.30%	7.40%	7.60%	7.70%	7.80%	1.333805	growth

Interpretation

This flowchart illustrates the compound annual growth rate (CAGR) of exports for Chennai,

Tuticorin, and Ernakulam ports. The data reveals that Chennai Port has experienced a negative CAGR of -2.08%, indicating a decline in export growth over the analysed period. On the other hand, Tuticorin Port shows the highest positive growth rate of 1.38%, followed closely by cochin Port at 1.33%. This suggests that Tuticorin and cochin are experiencing steady export growth, while Chennai is witnessing a decline, possibly due to shifting trade dynamics, increased competition, or operational challenges. The overall trend indicates that Tuticorin and cochin are emerging as stronger export hubs, whereas Chennai may need strategic interventions to reverse its downward trajectory.

SWOT ANALYSIS

Port	Strengths	Weaknesses	Opportunities	Threats
Chennai Port	Key hub for container traffic and industrial cargo	Congestion and limited expansion opportunities	Potential for improved logistics and hinterland connectivity	Overcrowding may lead to inefficiencies and loss of competitiveness
Tuticorin Port	Potential to become a transshipment hub	Requires better connectivity and infrastructure upgrades	Development as a major transshipment and logistics center	May fall behind without timely infrastructure development
Cochin Port	Strategic location for transshipment and LNG trade	High operational costs; faces competition from Colombo Port	Growing LNG trade and regional transshipment demand	Competitive pressure from Colombo and other regional ports

Each port has unique strengths and challenges, and future growth will depend on infrastructure modernization, policy support, and competition management.

FINDINGS

- The annual growth rate of Chennai port is consistently the highest across all years, fluctuating between **7.46% and 8.31%**. The growth rate of cochin port is relatively stable, ranging from **7.16% to 7.30%**, making it the second-best performer. Tuticorin port has the lowest annual growth rate among the three ports, staying between **5.75% and 5.87%**. Overall, there is a slight downward trend in growth across all three ports over the years.
- Chennai port consistently has the highest annual growth rate, fluctuating between **9.04% and 10.14%**. The growth rate of cochin port is stable, ranging from **7.32% to 7.80%**. Tuticorin port shows the lowest annual export growth, between **5.63% and 6.03%**, though it is gradually increasing. Chennai port's growth rate slightly declines over time but remains significantly higher than the other ports.
- Overall, while Chennai still dominates, its decreasing trend combined with the marginal gains of Tuticorin and cochin suggests a **redistribution of import market share** among these ports, possibly due to infrastructure improvements, changing trade policies, or regional economic shifts.
- The overall trend suggests a **redistribution of export market share**, with cochin and Tuticorin gradually gaining a stronger foothold while Chennai experiences a slight decline.
- Chennai Port Shows Negative Growth – Chennai port has a negative CAGR (-2.13%), indicating a decline in import growth. Tuticorin Port Shows Modest Growth – Tuticorin port has a CAGR of (0.10%), reflecting slow but positive growth. Cochin Port Leads in Growth – cochin port has the highest CAGR (0.30%), showing the strongest growth trend.
- Chennai Port Faces Decline – Chennai port has a negative CAGR (-2.08%), indicating a significant drop in export growth. Tuticorin Port Leads Growth – Tuticorin port has the highest CAGR (1.38%), showing strong export growth. Cochin Port Shows Positive Growth – cochin port follows closely with a CAGR of (1.33%), indicating steady export performance.

RECOMMENDATION

- Revitalizing Chennai port- Infrastructure Upgrades: Invest in modernizing cargo handling facilities and port logistics to improve efficiency and reduce turnaround time. Diversification of Trade Routes: Encourage new shipping lines and trade routes to counteract the declining market share. Policy Incentives: Offer tariff reductions or incentives to attract more cargo volume. Automation & Digitalization: Implement smart port technology for real-time tracking, reducing congestion and delays.
- Strengthening cochin and Tuticorin ports- Capacity Expansion: Increase container handling capacity at Cochin and Tuticorin ports to capitalize on their growth momentum. Strategic Partnerships: Collaborate with global shipping firms to enhance connectivity and trade flow. Specialized Cargo Handling: Develop niche markets (e.g., Cochin for petroleum and seafood, Tuticorin for textiles and agro-exports).

CONCLUSION

The performance analysis of south Indian seaports reveals their importance in facilitating trade, with key ports like Chennai, cochin, and Tuticorin playing a significant role, while advancement in infrastructure and technology have improved efficiency, issues such as congestion and connectivity challenges persist, strengthening port infrastructure, enhancing multimodal transport, and implementing policy reforms are vital for sustained growth and global competitiveness. The world scenario of India's seaports reveals a steadily growing maritime sector that plays a crucial role in facilitating global trade, with major ports like Mumbai, Kolkata, and Jawaharlal Nehru Port leading in cargo handling and technological advancements. When compared to the global standards, Tamil Nadu's major seaports Chennai, Ennore (Kamarajar), and Tuticorin (V.O. Chidambaranar) have shown significant regional importance by serving as vital gateways for both domestic and international trade, especially in South India. Chennai Port, with its historical significance and container handling capabilities, continues to be a key player in the east coast's maritime trade. Ennore Port stands out as India's first corporatized major port and excels in handling bulk cargo with its modern infrastructure. Tuticorin Port has emerged as a leading port for container traffic in southern Tamil Nadu, contributing to export- import activities in the hinterland. Despite their potential, these ports face challenges in terms of global competitiveness, infrastructure modernization, and connectivity. However, with ongoing developmental initiatives, policy support, and public-private partnerships, Tamil Nadu's ports are poised to align more closely with international benchmarks, enhancing their role in India's maritime growth and its positioning in the global trade network.

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