



# MEASURING EFFICIENCY OF PORT TRUSTS IN INDIA: A COMPARATIVE STUDY OF JAWAHARLAL NEHRU PORT TRUST AND MUMBAI PORT TRUST

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## ABSTRACT

Analysis of port performance is an important area of study not only in India but also in the world. Ports play an important role in a country's economic growth by facilitating international trade. So, it becomes very crucial to measure the efficiency of port trusts. Through this research paper, the efficiency of two major Indian port trusts has been measured. It measures efficiency in terms of Average Turnaround Time (TT) (In days), Average Pre-berthing Detention (PBD) (in Days), Average Output per Ship Berth Day (OSBD) (Tonnes) and Berth Occupancy (BO) (%). The study is confined to 4 difference ratios to measure the efficiency of the Port trusts in India and 2 major port trusts i.e., Jawaharlal Nehru Port Trust (JNPT) and Mumbai Port Trust (MbPT). The Data for the 5 years from 2016-17 to 2020-21 are gathered and analysed using the independent sample t test. The analysis shows that there is a significant difference between the selected ports for the one out of four ratios and it is for Average Output per Ship Berth-Day. Further the performance of JNPT is better than the MbPT.

**Keywords:** Average Output per Ship Berth Day, Average Pre-berthing Detention, Average Turnaround Time, Berth Occupancy, Port Trusts.

## INTRODUCTION

The ports of India have played a significant role in the development of trade activities of country and consequently contributed in the growth of Indian economy. A port is a geographical location at the sea shore where ships load and unload their carriage. Port provides some basic facilities to sea borne vessels such as berth facility and provides protection from storms etc.

India has almost 7517 km long coastline. There are 12 major and over 200 non major ports are situated on the coastline which carry more than 70% of India's total trade in value and 90% of India's total trade in volume. India has a federal system under which maritime industry is governed both by the Central and the State governments.

The major ports are placed under the Ministry of Port, Shipping and Waterways, Government of India and are governed by the Major Port Trust Act, 1963. As per the act, each major port is administered by a Board of Trustees appointed by the Government of India. The new act called “The Major Port Authorities Act, 2021” will come into force on such date as the Central Government may, by notification, in the Official Gazette, appoint. It will apply to the Major Port Trusts of India. The Minor ports are under the jurisdiction of the respective State Governments or Maritime Boards and are governed by the Indian Ports Act 1908. The objective of this paper is to measure the performance of two major port trusts i.e. Jawaharlal Nehru Port Trust (JNPT) and Mumbai Port Trust (MbPT).

## REVIEW OF LITERATURE

Ray, A. (2005)<sup>1</sup> in their paper, “Managing port reforms in India: A case study of JNPT Mumbai” studied port performance of Jawaharlal Nehru Port Trust. JNPT was established with the goal of creating a world-class port in India. Indeed, it clearly enjoyed an edge over other Indian ports with respect to both infrastructure and performance even in the pre-reforms period. This paper discussed the key reforms at JNPT, their formulation and implementation. It was clear from the study that the reform process was well designed and optimally sequenced with active participation of a wide range of factors.

Rajyalakshmi and Sarada (2007)<sup>2</sup> in their paper, “Productivity of Major Indian Ports: A Comparative Study of Pre and Post Reform Period” focused on productivity of Indian ports in handling the exports and imports. It studied the pre and post reform labour, capital and total factor productivities and average turnaround time and berth occupation of India ports. As a result of privatization there has been increase in labour productivity. This can be done by training and transfer surplus employees to the required departments. The post reform capital productivity was very low. The optimum or maximum utilization of the existing facilities was the need of the hour was noted that poor rail and road connectivity was affecting cargo movement.

Chandrasekaran, G. (2008)<sup>3</sup> In their thesis, “Infrastructure and performance of major ports in India” concluded that in spite of immense potential, Indian ports so far have been able to exploit only 12.5 per cent of its 7516 kms long coastline. Though operational efficiency of major ports has improved over years when judged in terms of parameters like average pre-berthing time, average ship turn-around time, ship berth day output, etc., but fail to compare favourably with competing ports in the neighbourhood. The reasons like poor utilization of equipment, over-staffing, cumbersome documentation procedures, such as customs clearance, inadequate port access facilities, and lack of inter-port and intra-port competition, inability of existing ports to

handle new categories of cargo, etc. are attributed to less than satisfactory performance of Indian ports.

Arun T. (2012)<sup>4</sup> in his thesis, “A Study on the Performance Of The Port Sector In India With Special Reference To Chennai Port”, This study has brought out the fact that the major ports in India have made considerable amount of progress in terms of number of vessels and the quantity of commodities handled. Some of the ports like Cochin, Ennore, New Mangalore, Chennai and JNPT are performing better than other ports. However, the Indian ports are still making efforts to come on a par with their international counterparts. The sector still faces problems such as inadequate capacity, dearth of infrastructure, high costs, labour inefficiency, and obsolete equipment. In fact, capacity is the major concern faced by Indian ports. Major ports in India score low on efficiency parameters

compared with their international counterparts owing to low capacity. Port capacities need to be enhanced in terms of increasing available berths, widening turning basins, acquisition of container equipment and development of value-added facilities such as warehouses.

Rajasekar et al (2013)<sup>5</sup> in their paper “Measuring the Operational Efficiency of Selected Major Ports in India”, considered the operational efficiency of select major ports in India over the period of time 1993 to 2011 through Data Envelopment Analysis (DEA). An investigation was carried out to find whether size is influencing the operational efficiency of ports in India. The concrete steps have to be undertaken to make all the ports efficient. The size is not the role critical of efficiency. Even the smaller ports could be effective in the port operations.

Surykant and Ranjit (2017)<sup>6</sup> in their article “Comparing and Contrasting Competitiveness of Major Indian and Select International Ports”, examined the port competitiveness port operators and authorities involve in opportunities in improving the trade. Many international ports perform very well in the competitiveness of global ports as compared to the Indian major ports. The study assessed various factors influencing competitiveness between Indian major ports. It found that only locations, capacity, performance, cost or infrastructure influence competitiveness, but economies in shipping, governance, competition, inter-firm networks and modernization also contribute for the effective competitiveness among ports.

Sharma, E., & Das, S. (2020)<sup>7</sup> revealed that as the Indian port industry grows due to increased foreign commerce, it is vital to assess the environmental effect on the coastal waters. The study will assess the environmental impacts of India's increasing port industry and the efficacy of measures made to reduce pollution. Researchers compared the green performance of major and small ports. Using stratified random sampling and questionnaires, researchers gathered primary data from 15 of India's busiest major and small ports from six distinct stakeholder groups. Port activities polluted water, disposed effluents, and released harmful poisons, among other things. The researcher conducted a comparative examination of the success rate of sustainable operations in big and small ports. Finally, the researchers assessed the ports based on their environmental effect and sustainability.

Iyer, K. C., & Nanyam, V. N. (2021)<sup>8</sup> revealed that Despite the quantity of research on container port efficiency, most focus on industrialised countries, with relatively few on emerging ones like India. Indian container ports are vital owing to their strategic position and transshipment capacity. It is necessary to understand their performance at the terminal level rather than the port level. This article examines the technical efficiency of 26 Indian container terminals from 2015 to 2018 and analyses it in terms of geographical advantage, administrative control, and private control of terminal operations. The study deconstructs the Malmquist index into two components: efficiency change (sometimes called catch-up) and frontier shift.

## RESEARCH METHODOLOGY

The secondary data has been gathered for this study from the administrative report of JNPT and MbPT. The period for the study is from 2016-17 to 2020-21. To measure the efficiency of both the port trusts, four different performance indicator ratios have been used i.e. Average Turnaround Time (TT) (In Days), Average Pre-Berthing Detention (PBD) (In Days), Average Output Per Ship Berth Day (OSBD) (In Tonnes), Berth Occupancy (%). For

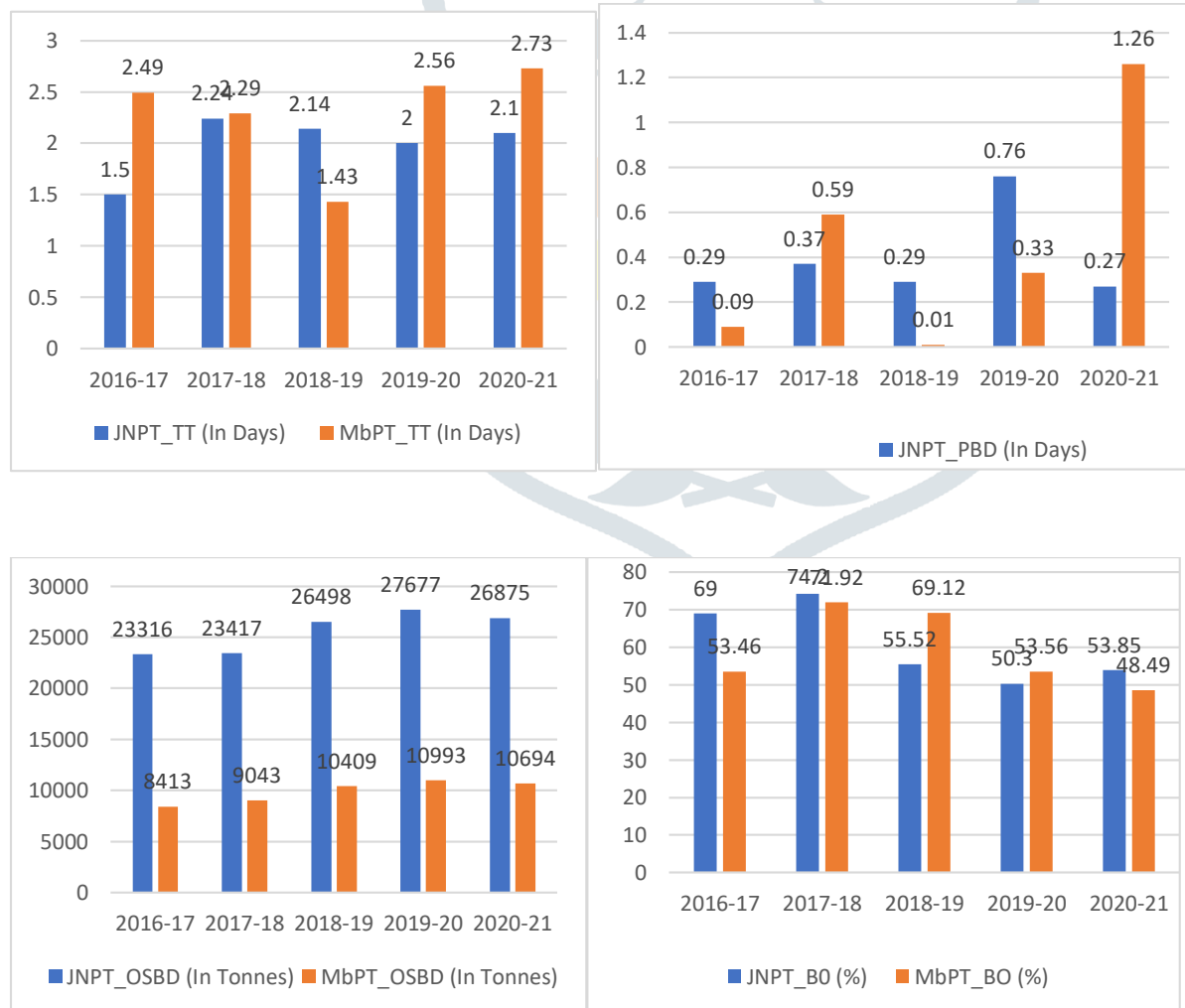
the purpose of data analysis, the Independent sample t test has been applied to compare the performance of selected port trusts.

### DATA ANALYSIS

The data gathered from the two ports for the period of 5 years are presented in the following table:

**Table-1: Ratios of the Selected Port Trusts**

Years	JNPT				MbPT			
	Average Turnaround time (In days)	Average Pre-berthing Detention (In Days)	Average Output per Ship Berth (Tonnes)	Berth Occupancy (%)	Average Turnaround time (In days)	Average Pre-berthing Detention (In Days)	Average Output per Ship Berth (Tonnes)	Berth Occupancy (%)
2016-17	1.50	.29	23316	69	2.49	.09	8413	53.46
2017-18	2.24	.37	23417	74.20	2.29	.59	9043	71.92
2018-19	2.14	.29	26498	55.52	1.43	.01	10409	69.12
2019-20	2.00	.76	27677	50.3	2.56	.33	10993	53.56
2021-22	2.10	.27	26875	53.85	2.73	1.26	10694	48.49



**Figure1: Various ratios of selected ports**

The different ratios of the selected port trusts are presented in the above table and it can be concluded that the average turnaround time for both the ports is fluctuating, but it is lesser in case of JNPT. This shows that JNPT is better in terms of average turnaround time. The average pre-berthing detention is also fluctuating continuously in

both the ports. The average output per ship berth day is higher in case of JNPT. The JNPT has higher berth occupancy rate in comparison to MbPT. This shows that JNPT is better in terms of selected ratios than MbPT.

To conduct a comparative study between JNPT and MbPT, the following hypothesis is formulated:

H1= there is a significant difference between the selected ratios of JNPT and MbPT.

For the purpose of analysing the above data and conducting a comparative study between the selected port trusts, the independent sample t test with SPSS Software is applied and the results are as under:

**Table-2: Independent sample t test**

Group Statistics					
	Port Trust	N	Mean	Std. Deviation	Std. Error Mean
TT	JNPT	5	1.9960	.29031	.12983
	MbPT	5	2.3000	.51127	.22865
PBD	JNPT	5	.3960	.20707	.09261
	MbPT	5	.4560	.50327	.22507
OSBD	JNPT	5	25556.60	2044.42	914.29
	MbPT	5	9910.40	1121.30	501.46
BO	JNPT	5	60.5740	10.4040	4.6528
	MbPT	5	59.3100	10.4833	4.6883

Independent Samples Test										
		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2 tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
								Lower		Upper
T	Equal variances assumed	.833	.388	-1.156	8	.281	-.304	.262	-.910	.302
	Equal variances not assumed			-1.156	6.336	.289	-.304	.262	-.939	.331
P	Equal variances assumed	2.813	.132	-.247	8	.811	-.060	.243	-.621	.501
	Equal variances not assumed			-.247	5.317	.815	-.060	.243	-.674	.554
O	Equal variances assumed	6.752	.032	15.004	8	.000	15646.20	1042.78302	13241.53	18050.86
	Equal variances not assumed			15.004	6.207	.000	15646.20	1042.78302	13115.07	18177.32

	not assumed									
B O	Equal variances assumed	.005	.944	.191	8	.853	1.2640	6.60523	-13.967	16.495
	Equal variances not assumed			.191	8	.853	1.2640	6.60523	-13.967	16.495

The results of the above test revealed that with the Levene's test of equality of variance, in all the ratios except output per ship berth day (OSBD), insignificant difference was found and thus the equal variance is assumed but for output per ship berth day (OSBD) significant difference was found, so equal variance is not assumed. The above test revealed that the significant value for Average Output per Ship Berth Day (OSBD) is less than ( $p < 0.05$ ). So, the null hypothesis ( $H_0$ ) is rejected here and alternate hypothesis is accepted. We can say that there is a significant difference between both the ports in terms of Average Output per Ship Berth Day (OSBD). The mean value analysis revealed that JNPT has the higher mean value than MbPT. So JNPT has the higher Average Output per Ship Berth Day (OSBD) in comparison to MbPT.

For the rest of the ratios, the significant value is greater than 0.05 ( $p > 0.05$ ). Null hypothesis is accepted and there is no significant difference between JNPT and MbPT in terms of Average turnaround time, Average pre-berthing time and Berth Occupancy.

## CONCLUSION

Ratio technique is widely used to measure relative efficiency. All the four selected ratios have their own role in measuring the efficiency of the port trusts. There is no significant difference in average turnaround time and average pre berthing detention and berth occupancy. For the one out of four ratios i.e. average output per ship berth-day both the Port trusts have shown the significant differences. The mean value for the average output per ship berth-day has shown that JNPT has upper hand and MbPT has to work to improve its performance.

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