MEASURING EFFICIENCY OF VISAKHAPATNAM PORT TRUST AND JAWAHARLAL NEHRU PORT TRUST

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ABSTRACT

The role of ports in a country's international commerce is very significant, since 90% of international cargo is carried through water. So, port infrastructure development is vital for a country in order to increase international commerce, which in turn contributes significantly to the nation's economic growth. As a result, the functioning of a country's ports is crucial. This research paper analyses the efficiency of major Indian ports. It assesses efficiency in terms of Average Turnaround Time per Vessel (In Days) (TT), Average Pre-berthing Detention (in Days) (PBD), Average Output per Ship Berth Day (Tonnes) (OSBD) and Berth Occupancy (%) (BO). This paper uses 4 difference ratios to measure the efficiency of the Port trusts in India taking 2 major port trusts i.e., Visakhapatnam Port Trust (VPT) and Jawaharlal Nehru Port Trust (JNPT). The Data for the 5 years 2017 to 2021 is gathered and analysed using the independent sample t test. The analysis shows that there is a significant difference amongst the selected ports for two out of four ratios and it is for Average Turnaround Time and Average Output per Ship Berth-Day. Further the performance of JNPT is better than the VPT.

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

INTRODUCTION

A port provides access to global markets and an opportunity for developing trade with many countries. Many industrial and other development projects depend on availability of a port. The role of ports in a country's international commerce is significant, since 90% of international cargo is carried by water. As a result, port infrastructure development is vital for a country in order to increase international commerce, which in turn contributes significantly to the nation's economic growth. As a result, the functioning of a country's ports is crucial. In this paper an attempt is made to measure and compare the efficiency of Visakhapatnam Port Trust and Jawaharlal Nehru Port Trust. It assesses efficiency in terms of Average Turnaround Time per Vessel (In days) (TT), Average Pre-berthing Detention (in Days) (PBD), Average Output per Ship Berth Day (Tonnes) (OSBD) and Berth Occupancy (%) (BO). This paper uses 4 difference ratios to measure the efficiency of the Port trusts in India taking 2 major port trusts i.e., Visakhapatnam Port trust (VPT) and Jawaharlal Nehru Port Trust (JNPT). The Data for the 5 years 2017 to 2021 is gathered and analysed using the independent sample t test. The analysis shows that there is a significant difference amongst the selected ports for two out of four ratios

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REVIEW OF LITERATURE

The Chudasama and Pandya (2008)[1] research used Data Envelopment Analysis to measure Indian port efficiency (DEA). The main purpose is to reveal the genuine workings of India's port business. The study looked at cranes, berths, storage space, pre-berthing time, and turnaround time. Cargo Volume as an output variable (million tonnes). Overall, their data depict Indian port efficiency in 2005-06. The DEA-BCC model provides higher efficiency estimates (0.98 vs. 0.86). Out of 12 ports, the DEA-CCR model found 7 efficient and 5 wasteful. DEA-BCC found all ports efficient except Paradip. Large-scale production seems to be associated with high efficiency. The DEA-CCR model has a 0.84 correlation. They discovered a relationship between port output, vessel handling, and storage. Finally, empirical data show industrial waste at 5 sample ports. This port's DEA-CCR model efficiency is 0.86. It is possible to increase outputs by 1.16 (=1/0.86) times with the same inputs.

Arun T. (2012)[2] 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. Most Indian ports that have already reached maximum utilization levels are not in a position to handle large vessels. 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.

Dhingra, T. et al (2014)[3] in their paper, "The known and unknown facets of port efficiency measurement: A systematic review of literature" focusing on maritime industry, attempts to categorise and synthesise research works on different facets of port efficiency measurement. It is a systematic review of literature available on indicators, performance, efficiency, productivity, and ranking of ports. The study traced that the indicators on port performance evolve with dynamic business environment. While early researchers used performance indicators and simple statistical tools to measure port performances, researchers, of late, are using techniques like Data Envelopment Analysis (DEA), Stochastic Frontier Analysis (SFA) and others to assess their efficiency and productivity. Review of literature brought forward certain pertinent gaps like inadequate variables and limited timeframe considered by most researchers. The current anomalies hamper quality of studies and fail in depicting a holistic and true picture of port efficiency. It is noted that sound technique coupled with comprehensive list of variables can only bring a holistic and reliable picture on port efficiency.

Surykant and Ranjit (2017)[4] in their article "Comparing and Contrasting Competitiveness of Major Indian and Select International Ports", examined the port competiveness 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.

Iyer, K. C., & Nanyam, V. N. (2021)[5] 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 transhipment 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. This research enables performance rating of various terminals. The relative efficiency of container terminals on the west coast of India is greater than the east coast, and the relative efficiency of big ports is dropping relative to lesser ports. Neither has the private involvement in all container terminals. The Tuticorin container terminal was the most constant among the seven top performing container terminals discovered via the investigation. The size of a terminal has the greatest impact on its efficiency, allowing for economies of scale.

RESEARCH METHODOLOGY

The secondary data has been gathered from the administrative report of JNPT and VPT for this study. 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

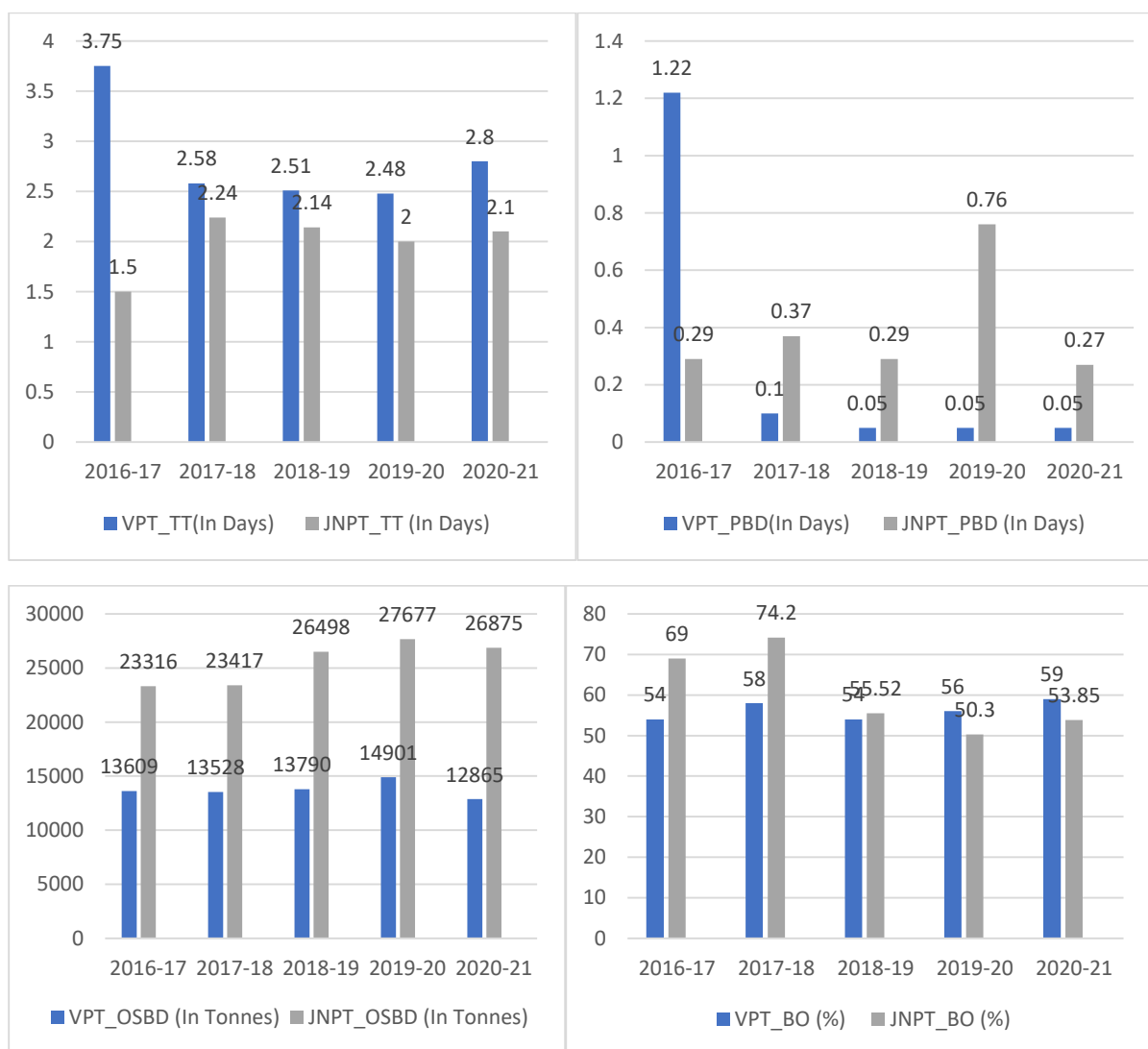| Years	VPT				JNPT			
	Average Turnaround time (In days)	Average Pre-berthing Detention (In Days)	Average Output per Ship Berth Day (Tonnes)	Berth Occupancy (%)	Average Turnaround time (In days)	Average Pre-berthing Detention (In Days)	Average Output per Ship Berth Day (Tonnes)	Berth Occupancy (%)
2016-17	3.75	1.22	13069	54	1.50	.29	23316	69
2017-18	2.58	.10	13528	58	2.24	.37	23417	74.20
2018-19	2.51	.05	13790	54	2.14	.29	26498	55.52
2019-20	2.48	.05	14901	56	2.00	.76	27677	50.3
2021-22	2.80	.05	12865	59	2.10	.27	26875	53.85

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 during the period of study. 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 but it was lesser for VPT. This shows that VPT is better in

terms of average pre-berthing detention time. The average output per ship berth day is higher in case of JNPT during the study period. The JNPT has higher berth occupancy rate in comparison to VPT during 2016-17 to 2018-19 but in 2019-20 and 2020-21, it was higher in VPT. This shows that JNPT is better in terms of selected ratios than VPT.

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

H1= There is a significant difference between the selected ratios of VPT and JNPT.

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	VPT	5	2.8240	.53257	.23817
	JNPT	5	1.9960	.29301	.12983
PBD	VPT	5	.2940	.51810	.23170
	JNPT	5	.3960	.20707	.09261
OSBD	VPT	5	13630.60	798.65	357.167
	JNPT	5	25556.60	2044.42	914.29
BO	VPT	5	56.200	2.28035	1.01980
	JNPT	5	60.5740	10.4040	4.6528

		Levene's Test		t-test for Equality of Means							
Independent Samples Test											
		F	Sig.	t	df	Sig. (2 tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval		
									Lower	Upper	
T T	Equal variances assumed	1.005	.346	3.052	8	.016	.82800	.2712	.20247	1.453	
	Equal variances not assumed			3.052	6.184	.022	.82800	.2712	.16902	1.486	
P B D	Equal variances assumed	2.230	.174	-.409	8	.693	-.10200	.2495	-.67740	.4734	
	Equal variances not assumed			-.409	5.246	.693	-.10200	.2495	-.73447	.5304	
O S B D	Equal variances assumed	12.187	.008	-12.150	8	.000	-11926	981.58	-14189.5	-9662	
	Equal variances not assumed			-12.150	5.193	.000	-11926	981.58	-14421.2	-9430	
B O	Equal variances assumed	20.383	.002	-.918	8	.385	-4.37400	4.763	-15.3581	6.610	
	Equal variances not assumed			-.918	4.383	.406	-4.37400	4.763	-17.1550	8.407	

The results of the above test revealed that with the Levene's test of equality of variance, in average turnaround time (days) and average pre-berthing detention (days) insignificant difference was found and thus the equal

variance is assumed but for output per ship berth day (OSBD) and berth occupancy (%) significant difference was found, so equal variance is not assumed. The above test revealed that the significant value for Average turnaround time (days) and Average Output per Ship Berth Day (OSBD) is less than ($p<0.05$). So, the null hypothesis (H0) 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 turnaround time (Days) and Average Output per Ship Berth Day (OSBD). The mean value analysis revealed that the JNPT has the lower Average turnaround time in comparison to VPT and higher Average Output per Ship Berth Day (OSBD) in comparison to VPT.

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

CONCLUSION

Ratio technique is used to measure relative efficiency. All the four selected ratios are important to measure the efficiency of the port trusts. The result of independent t test revealed that there is no significant difference in average pre-berthing detention and berth occupancy between VPT and JNPT. For the two out of four ratios i.e., average turnaround time and average output per ship berth-day both the Port trusts have shown the significant differences. The mean value for the average turnaround time has shown that JNPT has lower average turnaround time than VPT. The mean value for the average output per ship berth-day has shown that JNPT has upper hand. This shows that JNPT is performing better in comparison to VPT.

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