

# A STUDY OF PERFORMANCE OF SHIPS AT CHENNAI PORT

Dr. C.K. GOMATHI

## Abstract

*India has around 7720 km of natural peninsular coastline strategically located on the crucial east-east trade route, which links Europe and Far East. Maritime trade in India has been and continues to be almost synonymous with India's overseas trade accounting for over 90% of India's total cargo volumes.*

*India's coast line has 13 major ports and 200 minor and intermediate ports. Most of the major ports have been established in the last few decades of post independent economic planning, while two of the older major natural ports like Kolkata and Mumbai were established more than hundred years back during the British colonial rule. Major Ports are formed on the basis of Major Port Trust Act of 1963 and provide service to an exclusive hinterland. On the other hand Minor Ports, are under the control of State Maritime Board.*

## Introduction

In the sea borne trade of India, the Chennai port is one of the most important port in the east coast. It is growing as a hub port of handling container in the eastern India. In terms of volume of cargo handled, the Chennai port stands in third place. The port is handling all kinds of cargoes and the infrastructure available in the port is an asset to the shipping industry in the southern region<sup>[1]</sup>

Chennai port has been identified for development as a hub port on the east coast of India with a view to improving the performance and productivity levels of the container port terminal and brings it on par with the standards of the leading container ports of the neighboring countries through modernization and up-gradation to bring mainline vessels.

The East India company had well established itself and was chiefly active in the east coast during the later part of the 17<sup>th</sup> century and the early part of the 18<sup>th</sup> century.<sup>[2]</sup> There was no harbour then and company's ships had to be anchored about ¼ mile off shore. The company conducted all its commercial activities within the Walls of Fort St-George and their cargo from the ships, anchored off

shore was the first definite proposal for a harbour at Madras which emanated from the Madras Chambers of Commerce. The Chamber requested the government to take up actively the proposal for the construction of a harbour. The Government of the date accorded its warm support to this proposal. Chennai Port until the year 1875 was simply an open roadside, on open sandy coast swept by storms and periodical monsoons.

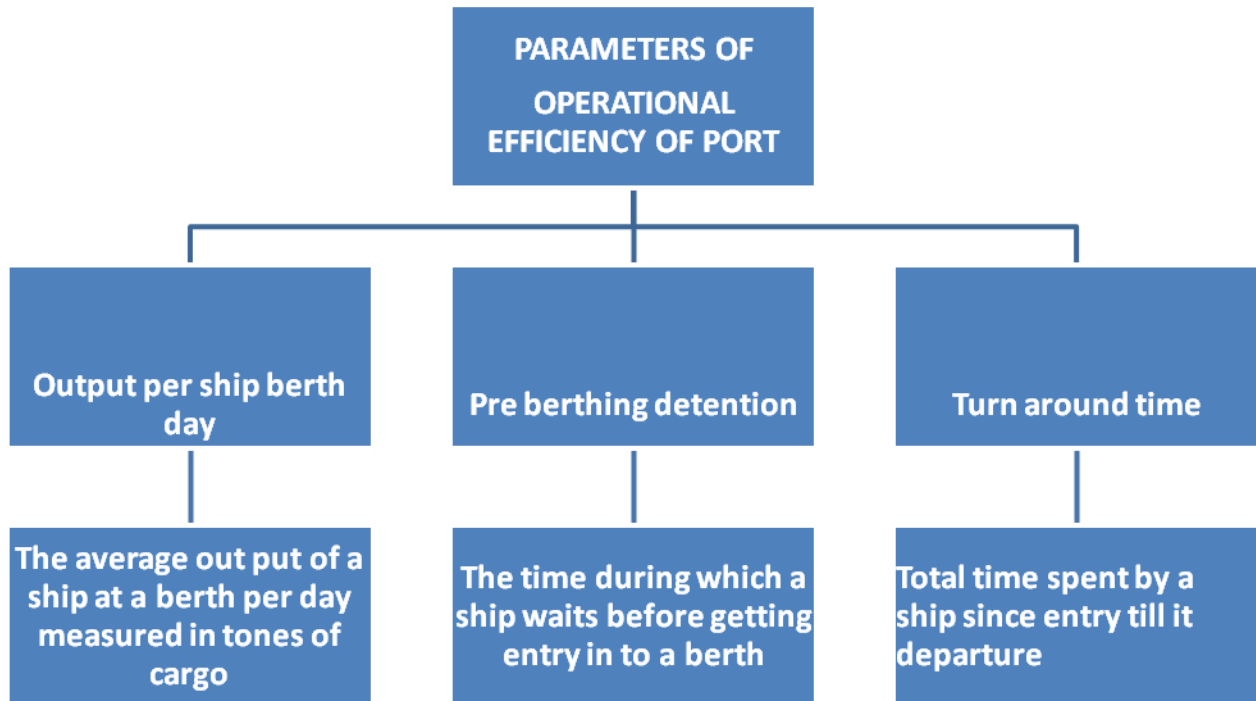
Sir Francis<sup>[3]</sup> Spring the then Chairman of Madras Port Trust in 1904, created a new north-eastern entrance to the port, after closing the original eastern entrance to control the situation of the channel in front of the basin<sup>15</sup>. Subsequently quays were constructed at different periods (ie) south quay-I in 1913 the five west quay berths in 1916 to 1920, north quay in 1931 and south quay I in 1936 in the inner harbour which was later christened as Dr. Ambedkar dock.

The official inauguration of the west dock was done on 6<sup>th</sup> November 1964 by Sri. Lal Bahadur Shastri, the then Prime Minister of India. The dock was christened Jawahar dock in memory of Shri. Jawaharlal Nehru, India's first Prime Minister.

Consequent to the renaming of the city of Madras as Chennai with effect from 30.09.1996, the Madras Port Trust has been renamed as Chennai Port Trust. With the number of car manufacturing companies

located around Chennai potential exists for large scale car exports through pure car carries (PCC). In fact shipping of cars have already started from July, 2000 onwards.

**Determination of operational efficiency of Port is represented in Fig1.**



**Fig. – 1**

**PARAMETERS OF OPERATIONAL EFFICIENCY OF PORT**

**Analysis of Data**

For the sake of analysis of the performance of ships in Chennai port trust, extensive data was collected from Chennai port trust records, analyzed and interpreted.

To enable a realistic comparison, the period is divided in to pre-reform period (1988 – 2000) and post-reform period (2000 – 2009) Two compilation reports have also been extracted from these data and presented along side

The findings of all these are presented as inferences at end of the analysis.

**Table 1 : PREFORMANCE OF CARGO SHIP AT CHENNAI PORT DURING 1988-89 TO 2008-2009**

	Study period	No of ships	Cargo handled	Average Turn Around Time	Average Stay at berth	Average working time	Average pre Berthing detention	Average non-working time	Average out put per ship berth	Percentage of nonworking time at berth
	Year	{in No)	(in tonnes)	(in Hrs)	(in Hrs)	(in Hrs)	(in Hrs)	(in Hrs)	(in tonnes)	(in Hrs)
<b>Pre-reform period</b>	1988-89	1256	19775	121	88	49	19	39.09	4281	44
	1989-90	1392	22779	145	88	49	35	39.81	4418	44
	1990-91	1385	23843	171	100	56	54	45.32	4093	45
	1991-92	1498	23923	151	91	50	48	41.12	4229	46
	1997-98	1561	24517	171	99	55	50	44.07	3785	44
	1998-99	1403	25046	192	94	52	38	41.93	4559	45
	1999-00	1605	30720	179	95	57	81	38	4970	40
	Average	1442.86	24371.86	161.43	93.57	52.57	46.43	41.33	4333,57	44
<b>Post reform period</b>	2000-01	1765	41220	140	80	54	58	26	6977	33
	2001-02	1598	36115	126	78	52	47	26	6944	33
	2002-03	1593	33687	58	58	43	1.25	23	8660	34
	2003-04	1656	36710	54	55	47	0.91	20	9654	30
	2004-05	1669	43805	67	65	52	0.91	21	9629	28
	2005-06	1857	47248	62	58	51	0.91	22	10378	30
	2006-07	2059	53414	50.53	63.44	55.48	0.83	25	10165	29.07
	2007-08	2053	57154	54	66	57	0.96	25	10385	28
	2008-09	2078	57491	50.59	62.63	53.97	0.93	23.71	10970,	28.22
	Average	1814.22	45204.89	73.57	65.12	51.72	12.41	23.52	9306.89	30.37
	Whole period Average	1639.46	35401.11	112.01	78.51	52.27	28.42	31.9	6966.5	36.78

Sources : Chennai port Administrative report<sup>[4]</sup>

**Compilation Report – I of Cargo Handling and Number of Ships in the Chennai Port - Regression statistics:**

Multiple R	0.966999
R Square	0.935087
Adjusted R Square	0.930451
Standard Error	3366.591
Observations	16

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	2.29E+09	2.29E+09	201.6746	1.05E-09
Residual	14	1.59E+08	11333935		
Total	15	2.44E+09			

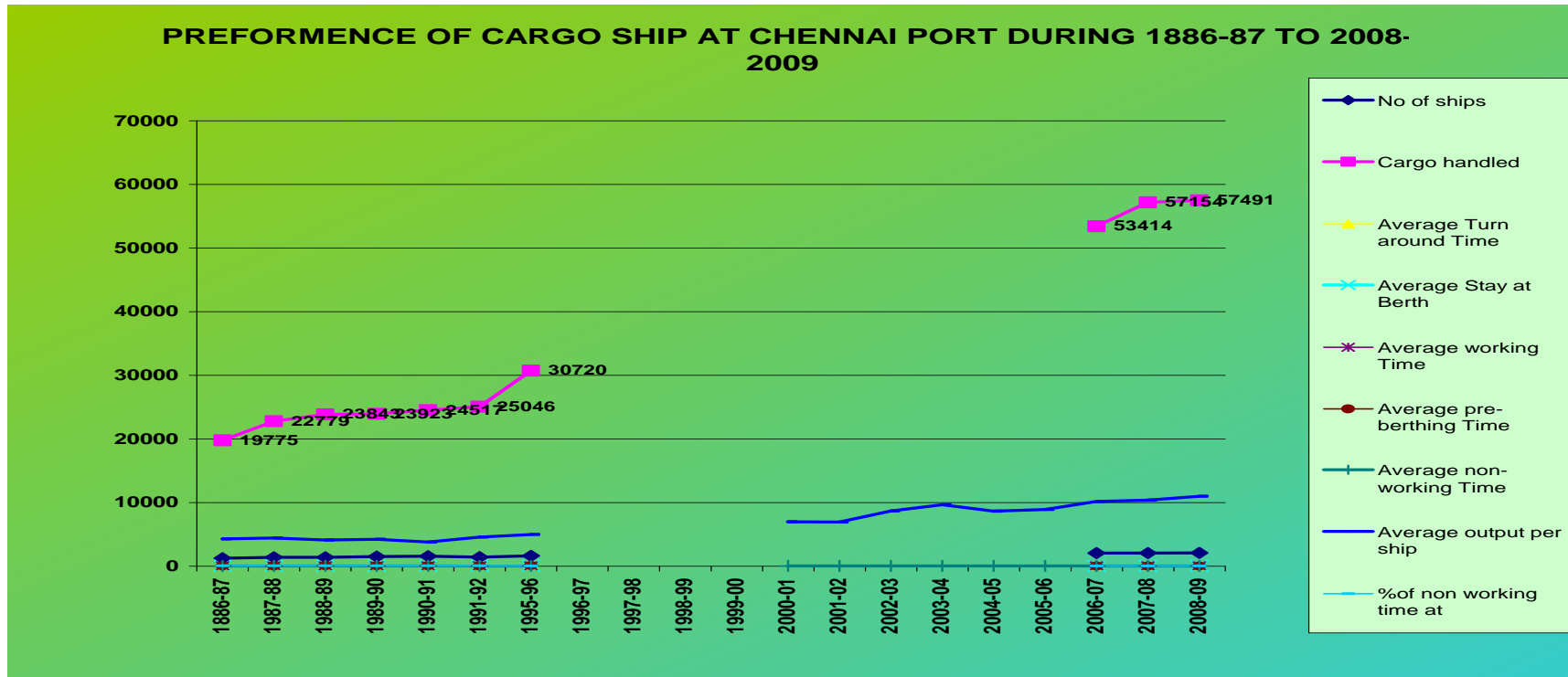
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	-44451.7	5733.608	-7.75284	1.97E-06	-56749.1	-32154.4	-56749.1	-32154.4
X Variable 1	48.76173	3.43363	14.20122	1.05E-09	41.39732	56.12613	41.39732	56.12613

**Compilation Report – 11** of **Y= Cargo Handling** and **X1= Turn Around, X2=Stay at Birth, X3=Working Time, X4= Pre Berthing. X5= Non Working, X6=Output Per Ship Berth and X7= Percentage of Non Working Time at Birth.**

SUMMARY OUTPUT

<i>Regression Statistics</i>					
Multiple R		0.986094			
R Square		0.972382			
Adjusted R Square		0.948216			
Standard Error		2904.975			
Observations		16			
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	7	2.38E+09	3.4E+08	40.23777	1.29E-05
Residual	8	67511023	8438878		
Total	15	2.44E+09			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	-126180	84275.25	-1.49724	0.172704	-320520	68158.62	-320520	68158.62
X Variable 1	-73.8151	77.65419	-0.95056	0.369656	-252.886	105.2557	-252.886	105.2557
X Variable 2	818.5841	685.3362	1.194427	0.26652	-761.804	2398.972	-761.804	2398.972
X Variable 3	664.2385	1074.796	0.618013	0.553749	-1814.25	3142.723	-1814.25	3142.723
X Variable 4	55.60206	97.03506	0.57301	0.582381	-168.161	279.3653	-168.161	279.3653
X Variable 5	-774.231	1255.613	-0.61662	0.554625	-3669.68	2121.217	-3669.68	2121.217
X Variable 6	8.061555	3.146261	2.562265	0.033529	0.806265	15.31685	0.806265	15.31685
X Variable 7	1037.242	1718.731	0.603493	0.562897	-2926.16	5000.643	-2926.16	5000.643



## Inferences and Findings

Inferences drawn from the data in Table no 1 are presented below

Analysis of performance of Cargo ships at Chennai Port

The number of ships entered in to the port was 1256 in 1986-87 it went to 2078 in 2008-09. The total number of ships entered on an average was 1442.86 per annum during the pre reforming period whereas the number of ships entered on an average was 1814 ships per annum during the post reform period. As per the analysis the number of ships entered into the port was more in the post reform period than in the pre reform period.

**II.** Table no.1 also portrays the performance of total tonnes of cargo handled at Chennai port during the period from 1988-89 to 2008-09. The average total tonnes of cargo handled in the port was 19775 tonnes in 1988-89 and it is increased three fold times that is 57491 tonnes in 2008-09. The average cargo handled during the pre reform period was 24371 tonnes per annum. Where as the total cargo handled was 45204 tonnes per annum during the post reform period. As per the analysis the total tonnes of cargo handled in the port were more in the post reform period than in the pre reform period.

**III.** The performance of Average Turn around Time of ships at Chennai port during the period from 1988-89 to 2008-09. It is also shown in the table the number of hours taken by ship for Turn Around Time in the port was 121 hours in 1988-89 and it has decreased to 50 hours in 2008-09. The average Turn Around Time during the pre reform period was 161 hours per annum- where as the Average Turn around Time was 73 hours per annum during the post reform period. As per the analysis, the Average Turn around Time of ships in the port was less in the post reform period than in the pre reform

period. It shows that productivity of the port is increasing in the post reform period.

**IV.** Table no.1 also portrays the performance in terms of Average Stay at Berth at Chennai port during the period from 1988-89 to 2008-09. The Average Stay at Berth hours of ships in the port was 88 hours in 1988-89; it came down to 62 hours in 2008-09. The average stay at berth on an average was 93 hours per annum during the pre reform period whereas the average stay at berth on an average was 65 hours per annum during the post reform period. As per the analysis, the average stay at berth in the port was less in the post reform period than in the pre reform period. It shows increasing trend of productivity in the post reform period.

**V.** The fifth column of the table no.1 shows the average working time on the port during the period from 1988-89 to 2008-09. The average working time of cargo ships in the port was 49 hours in 1986-87. It went to 53 hours in 2008-09. In the pre reform period, the average working time of the ships was 52 hours which then slipped down to 51 in the post reform period. As per the study, the average working time in the port was less in the post reform period than in the pre reform period. It shows the improved performance of the Chennai port.

**VI.** Average pre berthing time also is declining during the period from 1988-89 and 2008-09. The average pre berthing time of the ships in the port was 19 hours in 1988-89 and came down to 12 hours in 2008-09. Taking into account the overall pre and post reform period, the Average pre berthing time reduced from 46 hrs to 12 hrs.

**VII.** Average non-working time of ships at Chennai port during the period from 1988-89 to 2008-09 is also shown the average non-working time in the port was 39 hours in 1988-89 and it decreased 23 hours in 2008-09. The average non-working time of cargo ships during the pre



reform period was 41 hours per annum - where as the average non-working time was 23 hours per annum during the post reform period

**VIII.** Table no. 1 also portrays the performance in terms of Average out put per ship berth day at Chennai port during the period from 1988-89 to 2008-09. The average out put per ship berth day in the port was 4281 tonnes in 1986-87 and it went to 10970 tonnes in 2008-09. Reckoning the whole of pre and post reform period, the average output per ship berth day was 4333 tonnes per annum during the pre reforming period whereas the average out put per ship berth day was 9306 tonnes per annum during the post reform period.

The average non- working time was decreased to 30 hours in the post reform period, as against 44 hours in the pre form period and 36 hours during the whole study period.

- Cargo handled
- Average turn-around time and
- Non working times

indicate the good performance of the port, in the post in the post-reform period compared to pre- reform period.

**Analysis of Compilation Report -I :**

To understand the existing relationship between the cargo handling and shipping services in Chennai port, regression between the cargo handling and ship services has been estimated. The regression analysis between the level of cargo handling and ship performance indicates that the level of ship performance influences the level of cargo handling by 93% of tonnes the relationship between the level of income and expenditure is statistically significant as

- $R^2$  is 0.93. As per the regression analysis,

- 't' value (14.2) tonnes is statistically significant at 5 percent level of significance.
- The analysis indicates that one rupee increase in cargo handling increases the level of ship performances by 14.2.tonnes

above the analysis of the regression function indicates that the performance of Chennai port is profitable, efficient, and highly productive. The overall model is statically significant as estimated 'F' value is greater than the table value.

**Analysis of Compilation Report - II**

Y = cargo handling

X1 = turn around time,

X2 = stay at berth,

X3 = working time

X4 = pre berthing

X5 = non working time

X6 = out put per ship berth day

X7 = percentage of non working time at birth..

The regression analysis between the level of cargo handling and other performances indicate that the level of the X1, X2, X3, X4 ,X5, X6 ,X7 influence the level of cargo handling by 97% tones, the relationship between the level of cargo handling and performance indicators is statistically significant as

- $R^2$  is 0.97 As per the regression analysis,
- 't' values like (-1.49,-0.95,1.19, 0.61, 0.57,-0.61, 2.56 and 0.60) hours is

statistically significant at 5 percent level of significance.

- The analysis indicates that one percent increase in cargo handling increases the level of (-1.49,-0.95,1.19,0.61,0.57,-0.61,2.56and 0.60).

the above analysis of the regression function indicates that the performance of Chennai port is profitable, efficient and highly productive. The overall model is statically significant as estimated 'F' value is greater than the table value.

### **Conclusion**

According to the study, Chennai ranked 2<sup>nd</sup> best in cargo handling next to JNPT, and its operational efficiency high based on its performance indicators during the period 1988-89 to 2008-09. Performance of ports during the pre-reform and post reform period of trade, Correlations Regression test, F test tools analyzing, performance of cargo shipping, Traffic handled by the port, Average Turn Around Time, ship berth day output service in port, overall idle time of birth in the port, pre-berthing detention of the berth registered significant growth and constitute positive findings of the study.

### **Reference:**

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### **About the Author**

**Dr.C.K..Gomathi**,M.A.,MBA.,MPhil.,Ph.D,  
HOD, Department of Management Science  
J.H.A. Agarsen college, Madhavaram,  
Chennai.

**srigomathibabu@gmail.com**