

## Port Environment Development: A Study of Chennai Port Performance of Ships

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### ABSTRACT

This study highlights the performance of Chennai port environment with reference to the ships. Chennai port comes under the category of development process on the east coast of India as it is considered important port. India has around 7720km of natural peninsular coastline which is strategically located on crucial east-east trade route which linked Europe, Far East and sea ports of India. 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. A comparative study of performance of ports during the pre-reform and post reform period of trade has been conducted. According to a study in Chennai port performance of ship development Chennai ranked 2nd best cargo handling next to JNPT, and its operational efficiency high it's performance indicators during the period 1988-89 to 2008-09. The secondary source of data was gathered on performance of Cargo Ship at Chennai Port from 1986-87 to 2008-2009. The analysis reveals that total traffic handled is high when compared to other ports of Tamil Nadu.

**JEL. Classification: F18; O19; Q56; P17.**

**Keywords:** Chennai port, Environment development, Performance of ships, Comprehensive ranking.

### 1. INTRODUCTION

India has around 7720km of natural peninsular coastline which is strategically located on crucial east-east trade route which linked Europe, Far East and sea ports of India. Maritime trade in India has been and continues to be almost synonymous with India's oversea trade accounting for over 90% of India's total cargo volumes (Baird 2006).

The coast line has 13 major ports and 200 minor and intermediate ports. The major ports establish in the last few decades while two older ports such as 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 the provide services to an exclusive hinterland (Goetz and Rodrigue 1999). On the other hand minor ports, under the control of state maritime boards, were in their role until a few years back and never

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The material presented by the author does not necessarily represent the viewpoint of editors and the management of the Khadim Ali Shah Bukhari Institute of Technology (KASBIT) as well as the authors' institute.

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completed fathoms of water about the major ports or amongst the selves (Haezenonck 2001). To increase performance the port development were taken into consideration and reforms were carried out in 2000. Therefore it is necessary to compare the performance of port pre and post reforms. For this purpose this study carried out and Table 01 portrays the performance of cargo ships at Chennai port during the period 1988-89 to 2008-09. The number of ships entered in to the port was 1988-89 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 (1988-89) the number of ships entered on an average was 1814 ships per annum. According to the analysis the number of ships entered into the port was more in the post reform period as compare to the pre-reform period. The secondary source of data has been used in the study and selected from the several published source like books, journals, website and electronic media.

## 1.2. Organization of Paper

Section 1 introduction Section 2 literature review, Section 3 analysis and discussion Section 4 gives concluding remarks.

## 2. LITERATURE REVIEW

In the sea borne of India the Chennai port comes under the category of most important ports in east coast. It is growing as a hub port of handling container in the east India. In terms of volume of cargo handled the Chennai stands in third place (Talley 2000). 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 (McCalla 2004). Chennai port has been identified for development as a hub port on east coast of India struggling to improve 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 (Starr 1991).

The east India company had well established itself and was chiefly active in the east coast during the later part of the 17th century and the early part of the 18th century. There was no harbor then and company's ships had to be anchored in about fathoms of water about ¼ miles off shores (McCalla 2008). 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 Harbor at Madras which emanated from the Madras Chambers of Commerce (Nottebbom 2004). The chamber requested the government to take up actively the proposals for the construction of a harbor. The government of the date accorded its warm support to this proposal. Chennai Port till the year 1875 was an open road side on sandy coast swept by storms and occasional monsoons (Robinson 2002). Madras Port Trust was created in the 1904. This conduct comes out originally after closing the eastern in accordance to control the critical situation in front of basin 15.

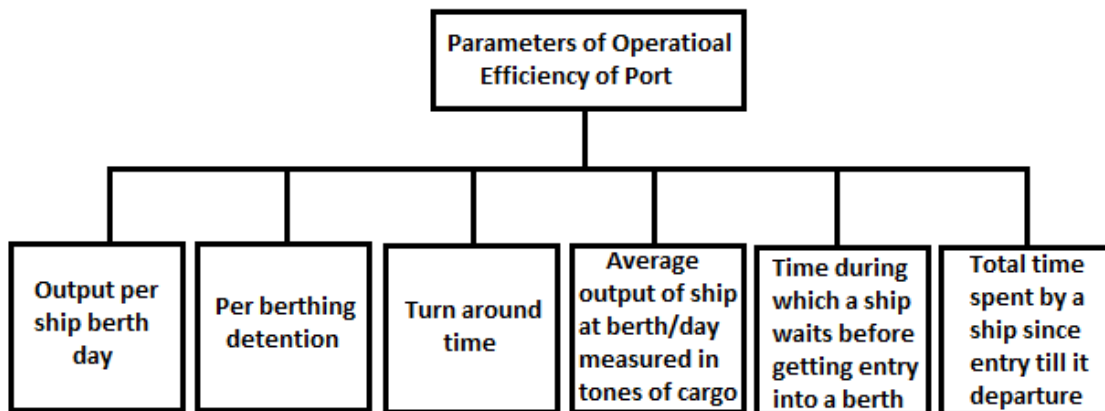
Thereby, it was constructed at different time periods that south quay-I in 1913 the five west quay berths in 1916 to 1920, north quay in 1931 and south quayII in 1936 in the inner harbour which was later christened as Dr. Ambedkar dock. The Wet Dog inauguration held on November 06, 1964 by Sri. Lal Bahadur Shastri. The dock was christened Jawahar dock in memory of Shri. Jawaharlal Nehru, India's First Prime Minister.

Alternatively, Madras city as Chennai was renamed with effect from September 30, 1996. The Madras Port Trust comes out with the revised name Chennai Port Trust (Slack 1989). The shipping started from July 2000 and onwards. This initiate occur from the car manufacturers those who start the car export through Pure Car Carries (PCC) (Fleming and Hayuth 1994).

Table: 01 Performance of Cargo Ship at Chennai Port during 1986-87 to 2008-2009

	Study period	No of ships	Cargo handled	Average Turn around Time	Average Stay at berth	Average working time	Average pre-berth in time	Average non-working time	Average output per ship berth day	% of non working time at berth
	Year	{in No}	(in tons)	(in Hrs)	(in Hrs)	(in Hrs)	(in Hrs)	(in Hrs)	(in tons)	(in Hrs)
Pre-reform period	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
Post-reform period	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



Operational efficiency of port is determined primarily by the following three efficiency parameters

Table also portrays the performance of total tones of cargo handled at Chennai port during the period 1988-89 to 2008-09. The total tone of cargo handled in the port was 19775 tons in 1988-89 and it is increased three fold times that was 57491 tons in 2008-09. The average cargo handled during the pre reform period was 24371 tons per annum. Whereas the total cargo handled was 45204 tons per annum

during the post reform period. As per the analysis the total tons of cargo handled in the port were more post reform period as compare to the pre-reform period.

### **2.1. The Performance of Average Turnaround Time of Ships at Chennai Port during the Period 1988-89 to 2008-09**

The number of hours taken by ship for Turnaround Time in the port was 121 hours in 1988-89 and it has been decreased to 50 hours in 2008-09. The average Turnaround Time during the pre reform period was 161 hours per annum. Whereas the Average Turnaround Time was 73 hours per annum during the post reform period. As per the analysis, the Average Turnaround Time of ships in the port was less in post reform period as compare to the pre-reform period. It shows that productivity of the port is increasing in the post reform period (Position paper 2009).

Table portrays the performance of ships Average stay at berth at Chennai port during the period 1988-89 to 2008-09. The number of Average stay at berth hours of ships in the port was 88 hours in 1988-89 it went to 62 hours in 2008-09. The average stay at berth on an average was 93 hours per annum during the pre reforming period whereas the average stay at berth on an average was 65 hours per annum post reform period as compare to the pre-reform period. According to analysis the average stay at berth in the port was less post reform period as compared to the pre-reform period. It shows increasing trend of productivity post reform period as compare to the pre-reform period..

### **2.2. The Average Working Time At The Port During The Period 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. During 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 analysis, the average working time in the port was less in post reform period as compare to the pre-reform period. It shows good performance of the Chennai port. Average pre berthing time also is declining during the period 1988-89 and 2008-09. The average pre berthing time of the ships in the port was 19 hours in 1988-89 and it went to 12 hours in 2008-09. The average pre berthing time was 12 hours as against 46 hours in post-reform period. As per analysis the average pre berthing time in the port was declined in post reform period as compared to the pre-reform period. Average non-working time of ships at Chennai port during the period 1988-89 to 2008-09 is also shown in Table 01. The average non-working time in the port was 39 hours in 1988-89 and it is decreased 23 hours in 2008-09. The average non-working time of cargo ships during the pre reform period was 41 hours per annum. Whereas the average non-working time was 23 hours per annum during post-reform period. As per the analysis the Average non-working time of the cargo ships in to the port was less post reform period as compare to the pre-reform period. Table also portrays the performance Average output per ship birth day at Chennai port during the period 1988-89 to 2008-09 (Position paper 2009). The average output per ship birth day in the port was 4418 tons in 1989-90 and it went to 10970 tons in 2008-09. The average output per ship birth day was 4333 tons per annum during the pre reforming period whereas the average output per ship birth day was 9306 tons per annum during the post reform period (Position paper 2009). As per the analysis the average output per ship birth day in the port was more in post reform period as compare to the pre-reform period.

### 3. ANALYSIS AND DISCUSSION

#### A- Summery Report of Cargo Handling and Number of Ships in the Chennai Port

##### Regression Analysis

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

#### B-Summary of cargo handling with respect to multiple variables

Y= Cargo Handling

X1= Turn around, X2=Stay at birth, X3=Working time, X4= Pre-berthing, X5= Non-work in, X6=Output per ship berth, X7= Percentage of non-working time at birth.

##### Regression Statistics

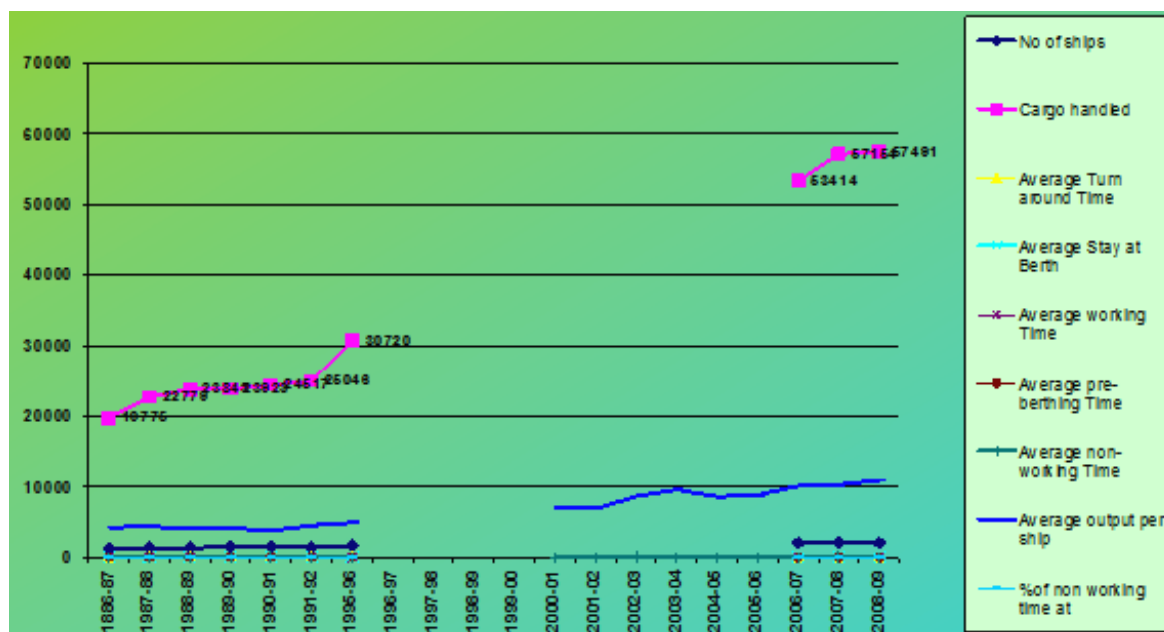
Multiple R	0.986094
R Square	0.972382
Adjusted R Square	0.948216
Standard Error	2904.975
Observations	16

##### ANOVA

	<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			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
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

**Figure 01: Performance of cargo ship at Chennai Port during 1886-87 to 2008-09**



The average output per ship birth day increased over the period of time. The average output per ship birth day increased from 4333 tons in the pre reform period to 9306 tones in the post reform period. Similarly the percentage of non working time at berth varies from 44 hours in 1886-87 to 28 hours in 2008-09.

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 post reform period as compare to the pre-reform period.

The foregoing analysis of various parameters like number of ships sailed, cargo handled, average turn-around time, non-working times indicate the state of higher performance of the port post reform period as compare to the pre-reform period. To understand the existing relationship between the 1st summery report of 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 percent of tones the relationship between the level of income and expenditure is statistically significant as the  $R^2$  is 0.93. As per the regression analysis, 't' value (14.2) tons 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.tons. 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.

In summery 2nd report of  $Y =$  cargo handling and  $X1 =$  turn-around time,  $X2 =$  stay at birth,  $X3 =$  working time  $X4 =$  pre berthing  $X5 =$  non-working time,  $X6 =$  output per ship birth day  $X7 =$  percentage of non working time at birth.

The regression analysis between the level of cargo handling and other performances indicates that the level of the  $x1, x2, x3, x4, x5, x6, x7$  influences the level of cargo handling by 97 percent tones. The relationship between the level of cargo handling and performance indicators is statistically significant as the  $R^2$  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  $x1, x2, x3, x4, x5, x6$  and  $x7$ . 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.

#### 4. CONCLUSION

It is concluded that the Chennai port performance of ship development comes on the 2<sup>nd</sup> best cargo handling next to JNPT. The efficiency of the port indicates the high performance level during the period of 1988-89 to 2008-09. 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 percent of tones the relationship between the level of income and expenditure is statistically significant as the  $R^2$  is 0.93 whilst cargo handling and performances indicates that influences the level of cargo handling by 97 percent tones is statistically significant as the  $R^2$  is 0.97. The comparative study of pre and post reform shows that the performance of Chennai port is profitable, efficient and highly productive.

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