



AN APPRAISAL OF COST PERFORMANCE IN THERMAL POWER GENERATION CORPORATIONS (A CASE STUDY OF DR.NARLA TATA RAO THERMAL POWER STATION)

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Abstract

Cost is the major determining factor in fixation of price of any product or service. There are various elements of costs involved in producing a product/service, which can be divided as fixed and variable costs. Fixed cost remains unchanged with production, but variable cost is to be changed along with the production. Hence, variable costs play a key role in cost of the product. This paper examines the nature of costs, which incurred in generation of power, and cost per million units of power generation and also percentage of change in total fixed cost, variable cost and total cost during the period of study.

Key Words: Elements of Costs, Cost Performance.

Introduction

Cost is measured in the monetary term which indicates the amount expended by the organisation to produce goods. It includes various elements of cost which involved in the cost of production and distribution of goods. According to the Oxford Dictionary, cost means the price paid for something. Some of the definitions of cost are given below. American Accounting Association: "Cost means economic sacrifice, measured in terms of monetary unit, incurred or potentially to be incurred, as a consequence of a business decision to achieve a specific objective". According to the Institute of Cost and Works Accountants of India "Cost is a measurement in monetary terms, the amount of resources used for the purpose of production of goods or rendering of services".

1. Review of Literature

Government of Andhra Pradesh (2014) "White Paper on Power Sector in Andhra Pradesh" this bulletin explicit various challenges faced by the power sector in Andhra Pradesh. Suresh K. Choudhary (2014) focused his study on the existing policy and regulatory framework and its impact on the private investment in Indian Thermal Power Sector. Rama KrishnaK (2014) in his article "Importance of Energy Savings" pointed out the importance of energy savings. Suneel.G(2010) "Power Sector Reforms in Andhra Pradesh" period of study is divided into two parts i.e., pre-reforms period (1991-92 to 1998-99) and reforms period (1999-2000 to 2005-2006) in his research he examined the compound growth rates, in total installed capacity, total power generation, transmission, distribution, number of agricultural connections, plant load factor, losses, high-tension consumers, number of low-tension consumers, expenditure and revenue. Tulasi Das. V(1998) in his research "Performance Evaluation of Thermal Power Projects - A case study of VTPS" examined the cost and operational performance and also analysed employee's perception on operational and organisational activities of the entire organisation during the pre-reforms period. VenkateswaraRao. A (1986) in his research "Global energy situations" examined the trends of past, present and future production of commercial energy sources and compared them with the likely consumption needs during 1976-1981. From the review of the above earlier studies it is observed that only a few research studies have been conducted in this area but they have also not provided sound theoretical and empirical explanation as to why the cost of power generation is on the increasing trend and what are the constituents of the total expenditure. The present study is an improvement over the earlier studies.

Objectives of the Study

- (i) To study the growth and working of the selected organization of the study.
- (ii) To analyse the structural distribution of costs of power generation in the selected organization.
- (iii) To examine the stage-wise as well as across-stages comparative analysis of cost performance in the selected unit of the study.
- (iv) To offer suggestions for the efficient working of the selected organization in specific and the power generation corporation in general.

Methodology of the Study

The study is based on secondary data, which is obtained from the annual reports of the unit of the study. The period of present study is selected from 2005-06 to 2014-15. The collected data is analysed with the financial and also relevant statistical tools, like averages, percentages, etc. and it is interpreted basing on the ideal and standards identified by the various institutions.

Profile of Dr. NTTPS

The selected unit of the study is a unique one in the country, in its layout and numerous facilities provided for easy operation and maintenance. It is the biggest power plant in the State of Andhra Pradesh with a generation capacity of 1760 MW consisting of four stages. From Stage-I to III each stage consists of 2 x 210 MW units and for Stage-IV the unit is of 500MW rating. The information on production capacity and the amount spent so far indifferent stages and units are depicting in Table-1.

Table -1: Details of Production Capacities And Dates of Commencement of Different Stages of Dr NTTPS

Stage	Units	Production Capacity (MW)	Date of Commencement	Amount (Rs.in crore)
I	1	210	01-11-1979 to 10-10-1980	193.00
II	3	210	05-10-1989 to 23-08-1990	533.33
III	5	210	30-03-1994 to 24-02-1995	840.00
IV	7	500	06-04-2009	2100.00

Source: Records of Dr.NTTPS

2. Unit Cost: It is the contribution of various expenditures to produce one unit. This includes various fixed and variable costs. According to Chartered Institute of Management Accountants “unit of product, service or time in relation to which cost may be ascertained or expressed”. Various costs are calculated in this study. They are:

2.1 Coal Cost: Coal based thermal power generation plays a crucial role in power generation in India as well as in the World. In India more than 50 per cent of the electricity needs are satisfied by the coal based thermal power generation stations. Dr NTTPS is also one among them. Coal is the major expenditure for the coal based thermal power generation stations. In total cost, coal cost occupies lion’s share, which is affected by power generation and cost of acquisition. Calculation of coal cost is given below.

Coal cost = Total Coal Cost/No of Units generated

Table -2.1: Stage-Wise Coal Cost per MU of Power Generation during 2005-06 to 2014-15

Year	Coal Cost Rs.in Lakhs				Total
	Stage I	Stage II	Stage III	Stage IV	
2005-06	98.23	100.30	93.70	0	97.43
2006-07	98.54	98.20	94.10	0	96.89
2007-08	107.07	106.80	100.67	0	104.72
2008-09	145.20	147.63	144.63	0	145.86
2009-10	133.83	131.15	127.46	116.48	130.00
2010-11	148.90	148.13	145.77	191.10	160.91
2011-12	171.29	170.64	162.86	267.73	197.23
2012-13	226.04	217.37	215.85	271.87	234.13
2013-14	238.90	234.88	236.88	247.97	240.08
2014-15	278.48	277.51	269.61	254.94	269.41
Average Coal Cost	164.65	163.26	159.15	225.02	167.67

Source: Compiled records of Dr.NTTPS

Table-2.1 explains the stage-wise cost of coal to generate one million units of power during 2005-06 to 2014-15. Coal cost includes only the procurement of coal. During the period of study coal cost is raised by around three times. Among the four stages of Dr.NTTPS, stage IV generates more power compared to the other stages. Hence, expenditure on coal of stage IV is more than others. Total cost of coal in 2005-06 is Rs.95, 041 lakhs which is increased to Rs. 3,42,290 lakhs in 2014-15. Coal cost per unit is also raised from Rs. 97.43 to Rs. 269.41. Coal cost is raising trend except in 2009-10 due to the reduction in the price of the coal during the year. Thus, the average coal cost during the study period is Rs. 167.67.

2.2 Oil Cost: Next to the coal cost, oil plays an important role in coal based thermal power generation stations. Dr. NTTPS is consuming furnace oil and HSD oil to burn the coal for power generation. Cost of oil is a variable expenditure and it is varying based on the volume of power generation and market conditions. This ratio provides the information on how much is the amount that the organisation is spending on oil to generate one million units of power. Total cost of oil is to be calculated with the following formula.

Oil Cost = Total Oil Cost/No of Units Generated

Table-2.2: Stage-Wise Oil Cost per Million Units of Power Generation during 2005-06 to 2014-15

Year	Oil Cost Rs.in Lakhs				Generation in MU
	Stage I	Stage II	Stage III	Stage IV	Total
2005-06	0.66	0.37	0.45	0	0.49
2006-07	0.85	0.44	0.60	0	0.63
2007-08	1.01	0.48	0.53	0	0.66
2008-09	1.40	0.57	0.68	0	0.87
2009-10	1.20	0.97	0.53	6.40	1.25
2010-11	1.98	1.24	1.58	1.42	1.54
2011-12	2.63	1.58	3.05	1.03	2.01
2012-13	13.23	5.20	11.22	2.37	7.65
2013-14	3.32	4.06	9.01	1.47	4.35
2014-15	4.79	7.53	9.40	1.89	5.73
Average Oil Cost	3.11	2.24	3.71	2.43	2.52

Source: Compiled records of Dr.NTTPS

Table-2.2 shows Stage-wise oil consumption to generate power. Oil costs of four Stages are gradually increasing during the period of study. Due to shortage of coal more oil is consumed during 2012-13 more over rapid increase in the oil cost in that year, per million units cost is increased. Later this got reduced instantly in the next year. In the initial year of Stage IV commencement, oil cost to generate million units of power is more because more oil is required for the initial commencement. In the later years it is consuming less oil consumption for generating of power while compared with the remaining Stages. The average oil consumption of all Stages during the period of study is Rs. 2.52 per million units.

2.3 Other Operating Expenditures: Operating expenditures are very much essential for any manufacturing organisation. A power generation station has to spend more amounts on this. Other operating expense of Dr. NTTPS includes coal handling charges, cost of water, expenses of dozers, lubricants, consumables and consumption of water treatment plant. This ratio explains that how much operating cost is to be incurred for one million units of power generation. The expenses for million units are to be calculated like this.

$$\text{Other Operating Expenses Cost} = \frac{\text{Total Other operating expenses}}{\text{No. of units generated}}$$

Table-2.3: Stage-Wise Operating Cost per Million Unit of Power Generation during 2005-06 to 2014-15

Year	Operating Cost Rs.in Lakhs			Generation in MU	
	Stage-I	Stage-II	Stage-III	Stage-IV	Total
2005-06	5.07	5.46	5.21	0	5.25
2006-07	4.78	5.23	4.70	0	4.90
2007-08	4.82	5.11	4.76	0	4.90
2008-09	5.35	5.62	5.43	0	5.47
2009-10	4.74	6.14	5.26	2.49	5.18
2010-11	6.03	6.86	6.51	3.26	5.50
2011-12	4.78	6.17	5.42	2.49	4.60
2012-13	4.57	5.47	5.50	2.29	4.39
2013-14	10.11	10.14	9.53	1.28	7.38
2014-15	5.38	5.90	5.24	0.71	4.14
Average Operating Cost	5.56	6.21	5.76	2.09	5.17

Source: Compiled records of Dr. NTTPS

Table-2.3 indicates stage-wise operating expenses to produce one million units of power generation during 2005-06 to 2014-15. Operating cost of four stages is fluctuating trend during the period of study, because of fluctuations in power generation. During 2013-14 these costs in I, II and III stages are more when compared to the other years, because of increase in coal handling charges. Average operating costs of I, II, III and IV stages are Rs. 5.56, Rs. 6.21, Rs. 5.76 and Rs. 2.09 respectively during the study period.

2.4 Cost of Repairs and Maintenance: It is routine and necessary to attend the repairs and maintenance of plant and machinery for the smooth running of operations. Dr. NTTPS is also maintaining its power generation plants properly. The

organisation is taking utmost care on these plants. Every year they are forcedly stop the power generation for overhauling the plants and repairs, occurred are made on regular intervals. Dr. NTTPS is allocating a noticeable portion of funds in every year for the repairs and maintenance of the plants. Calculation of repairs and maintenance cost is given below.

Cost of Repairs and Maintenance = Total Repairs & Maintenance Expenditure/No of Units Generated

Table-2.4: Stage-Wise Repairs and Maintenance Cost per Million Unit of Power Generation During 2005-06 to 2014-15

Year	Repairs & Maintenance Cost Rs.in Lakhs			Generation in MU	
	Stage-I	Stage-II	Stage-III	Stage-IV	Total
2005-06	1.78	2.07	2.19	0	2.02
2006-07	1.75	3.22	2.42	0	2.47
2007-08	2.75	2.04	2.85	0	2.54
2008-09	2.23	1.95	1.91	0	2.02
2009-10	2.38	7.16	2.74	0	3.77
2010-11	4.52	3.53	14.43	1.37	5.00
2011-12	4.86	4.78	10.00	2.87	5.46
2012-13	7.38	4.83	5.56	4.82	5.57
2013-14	9.57	7.05	8.00	5.14	7.26
2014-15	13.71	12.87	12.15	8.04	11.52
Average Repairs & Maintenance Cost	5.09	4.95	6.22	4.45	4.76

Source: Compiled records of Dr. NTTPS

Table-2.4 explicit the data related to cost of repairs and maintenance in stage-wise during the period of study. This cost is increasing steadily in the case of stage I and IV and fluctuates in II and III stages. Average repairs and maintenance cost of four stages are Rs.5.09, Rs.4.95, Rs. 6.22 and Rs.3.70 respectively during the period of study. Dr. NTTPS is spending huge expenditure on repairs and maintenance and renovation of all Stages. High quality of its maintenance gives a lot of difference. So stage I and II are running even after its life time. Total average repairs and maintenance cost during the study period is Rs. 4.76 per million units of generation.

2.5 Employees Cost: Employees are the major strength to any organisation. The credibility of the organisation is depends upon the performance of the employees. Dr. NTTPS is taking great care on its employees. They are paying adequate monetary benefits and provide many perquisites to its employees, which includes in employees cost. Calculation of employees cost per million units of power generation is given below.

Employees cost= Total Employees Expenditure/ No of Units Generated

Table-2.5: Stage-Wise Employees Cost per Million Unit of Power Generation during 2005-06 to 2014-15

Year	Employees Cost Rs.in Lakhs			Generation in MU	
	Stage-I	Stage-II	Stage-III	Stage-IV	Total
2005-06	6.36	3.90	4.47	0	4.88
2006-07	8.50	5.38	5.63	0	6.47
2007-08	9.70	5.35	5.93	0	6.86
2008-09	8.96	5.54	6.26	0	6.86
2009-10	9.48	6.55	6.69	1.80	7.28
2010-11	12.95	8.58	14.51	4.66	9.53
2011-12	16.27	8.27	9.72	5.41	9.64
2012-13	19.78	9.80	11.18	7.06	11.58
2013-14	24.46	15.62	15.99	4.82	14.42
2014-15	24.48	22.85	22.32	9.63	19.34
Average Employees cost	14.10	9.18	10.27	5.56	9.68

Source: Compiled records of Dr. NTTPS

Table-2.5 examines stage-wise employees cost to generate one million units of power. Total employees cost for one million units of generation is in increasing trend during the study period. This is Rs. 4.88 in 2005-06, which is increased to Rs. 19.34 at the end of 2014-15. It is observed that the employees cost is raised by around 4 times during these ten years' period. Total employees cost is increased significantly during 2006-07, 2010-11 and 2014-15 due to the impact of pay revision to employees. This cost is more in the case of stage I when compared to the other stages. Average employees cost during study

period is Rs. 14.10, Rs. 9.18, Rs. 10.27 and Rs. 5.56 respectively and it is Rs. 9.68 per million units for the entire organization during the study period.

2.6 Administrative and General Expenses Cost: This ratio indicates that how much amount is spent by the management to generate one million units of power in a year. Office related expenses and general expenditure comes under this head. Dr. NTTPS is promoting and allocating funds to the research and development activities, these charges are also included in this cost. This ratio is computed as:

$$\text{Administrative \& General Expenses} = \frac{\text{Total administrative \& general expenses}}{\text{No of units generated}}$$

Table-2.6: Stage-Wise Administration & General Expenses Cost per Million Unit of Power Generation during 2005-06 to 2014-15

Year	Administration Cost Rs.in Lakhs				Generation in MU
	Stage-I	Stage-II	Stage-III	Stage-IV	Total
2005-06	1.09	1.01	1.04	0	1.05
2006-07	1.12	1.09	1.04	0	1.09
2007-08	1.19	1.03	1.02	0	1.07
2008-09	1.07	0.96	1.00	0	1.01
2009-10	1.21	1.36	1.33	0.06	1.22
2010-11	1.08	1.03	1.62	0.35	0.94
2011-12	0.83	0.79	0.82	0.37	0.68
2012-13	0.88	0.76	0.79	0.39	0.69
2013-14	1.41	1.14	1.33	0.97	1.20
2014-15	2.34	2.20	2.20	0.91	1.87
Average Administration & General expenses	1.22	1.14	1.22	0.51	1.08

Source: Compiled records of Dr.NTTPS

Table-2.6 indicates the data relating to cost of administration and general expenses to generate one million units of power. These costs are fixed in nature, per million-unit cost is fluctuates based on power generation. This cost is in increasing trend in the case of I, II and III stages except during the years 2011-12 and 2012-13. During that period, it is less than Re. one for one million units of generation. In the case of stage IV, the same is less than Re.one since inception, because of consistent power generation. Average administration and general charges of stage I and III are the same during the period of study i.e., Rs. 1.22. Averages of stage II, III and total cost are Rs. 1.14, Re. 0.51 and Rs. 1.08 respectively during the period of study."

2.7 Depreciation Cost: It is mandatory for any company to calculate depreciation on their fixed assets and deduct the same out of profits to acquire the same type of asset in future. This ratio indicates the amount of depreciation incurred for one million units of power generation. Dr. NTTPS is calculating the depreciation on diminishing balance method. This ratio is to be calculated in the following manner.

$$\text{Depreciation Cost} = \frac{\text{Total Depreciation}}{\text{No of Units generated}}$$

Table-2.7: Stage-Wise Depreciation Cost per Million Unit of Power Generation during 2005-06 to 2014-15

Year	Depreciation Cost Rs.in Lakhs				Generation in MU
	Stage-I	Stage-II	Stage-III	Stage-IV	Total
2005-06	2.79	14.41	25.17	0	14.31
2006-07	2.71	14.77	23.81	0	14.02
2007-08	3.24	13.27	22.74	0	13.59
2008-09	2.08	8.90	16.08	0	9.16
2009-10	1.96	10.52	17.69	0	9.19
2010-11	1.60	7.08	19.30	44.57	19.10
2011-12	1.38	5.71	10.20	41.68	16.22
2012-13	1.03	3.24	5.64	46.45	15.40
2013-14	1.11	3.51	5.87	44.87	15.76
2014-15	0.89	3.37	5.69	47.18	15.82
Average Depreciation Cost	1.88	8.48	15.22	44.95	14.26

Source: Compiled records of Dr.NTTPS

Table-2.7 examines the stage-wise depreciation cost incurred by the Dr. NTTPS to generate on million units of power. The establishment cost of stage I and II are Rs. 193, Rs. 533.33 crore respectively. From stage III and IV are Rs. 840 and Rs. 2100 crores respectively, hence cost of depreciation per million units of power generation is also in the same proportion. Depreciation of stage I and II is more than 90 per cent of its book value. Dr. NTTPS has obtained permission to run the same even after life time average cost of depreciation for I, II, III, IV stages are Rs. 1.88, Rs. 8.48, Rs. 15.22, and Rs. 44.95 respectively.

2.8 Cost of Interest and Financial Charges: Every company has to borrow funds for commencement of their business and for its expansion of its operations. Power generating organisations are needed huge amount of funds to purchase plant, other equipment and commencement and also further expansion. Moreover, it has a long gestation period. In the coal based thermal power generation stations interest and financial cost stood in second position after the coal cost. This ratio shows the cost of interest and financial charges for one million units of power generation. This ratio is calculated as:

$$\text{Cost of Interest and Financial Charges} = \text{Interest and Financial Charges/No of Units Generated}$$

Table-2.8: Stage-Wise Interest & Financial Charges per million unit of power generation during 2005-06 to 2014-15
Interest & Financial Charges Rs.in Lakhs Generation in MU

Year	Stage-I	Stage-II	Stage-III	Stage-IV	Total
2005-06	14.85	28.23	32.13	0	25.27
2006-07	14.41	28.94	30.40	0	24.76
2007-08	12.29	18.08	18.93	0	16.64
2008-09	8.15	16.50	19.01	0	14.71
2009-10	7.29	20.80	22.79	0	15.59
2010-11	9.37	24.80	44.20	54.27	33.07
2011-12	9.41	26.19	30.81	48.54	29.88
2012-13	10.68	26.43	31.37	50.45	30.86
2013-14	12.02	31.06	35.75	49.62	33.60
2014-15	12.57	38.11	44.09	51.44	37.35
Average Interest & Financial Charges	11.10	25.91	30.95	50.86	26.17

Source: Compiled records of Dr.NTTPS

Table-2.8 explicit the data on the stage-wise interest and financial charges cost per million units of power generation. After the coal cost interest and financial cost are second major element of cost in total cost of the Dr.NTTPS. Huge amount of borrowed funds is invested in stage III and IV hence the cost for these two stages are more, compared to I and II stages. Average cost of interest and financial charges per million units of generation is Rs. 11.10, Rs. 25.91, Rs. 30.95 and Rs. 50.86 respectively and in the entire organization the total average is Rs. 26.17.

2.9 Consolidated Total Fixed Cost: Fixed cost is mainly based on time. This cost remains fixed in total amount though increase or decrease in the volume of output for a given period of time. Fixed cost per unit decreases as production increases and increases as production declines. Consolidated total fixed cost of Dr. NTTPS includes repairs and maintenance cost, employees cost, administrative expenses, depreciation and interest & financial charges. This cost examines per unit fixed cost to generate one million units of power generation. This ratio is calculated as below.

$$\text{Consolidated Total Fixed Cost} = \text{Total Fixed Expenses/No of Units generated}$$

Table-2.9: Stage-Wise Consolidated Fixed Cost per Million Units of Power Generation during 2005-06 to 2014-15
Fixed Cost Rs.in Lakhs Generation in MU

Year	Stage-I	Stage-II	Stage-III	Stage-IV	Total	% of Change
2005-06	27.65	50.32	65.74	0	48.25	-
2006-07	29.53	54.33	64.18	0	49.76	3.12
2007-08	30.53	40.91	52.60	0	41.91	-15.78
2008-09	23.82	35.07	45.53	0	35.03	-16.41
2009-10	23.96	47.68	52.53	2.17	38.39	9.59
2010-11	31.76	46.48	96.53	105.97	69.26	80.40
2011-12	35.40	47.09	63.13	99.75	63.46	-8.37
2012-13	42.82	46.53	56.27	110.14	65.85	3.76
2013-14	50.74	59.49	67.85	107.67	73.86	12.17
2014-15	52.47	78.56	84.94	116.68	84.83	14.86
Average Fixed cost	34.87	50.65	64.93	90.40	57.06	9.26

Source: Compiled records of Dr.NTTPS

Table-2.9 reveals the consolidated fixed cost of Dr. NTPPS and also the percentage of change during the period of study. Total fixed cost per million units of generation fluctuating because of changes in production. Total fixed cost stage IV is more i.e. Rs. 90.40 followed by stage III and II. Stage I is having low total fixed cost i.e. Rs. 34.87 per million units because of lesser investment when compared to the other stages. Average total fixed cost of the entire station during the study period is Rs. 57.06.

During the years 2007-08, 2008-09 and 2011-12 percentage of fixed cost compared to the previous year is reduced due to the reduction in depreciation, interest and financial charges and also increase in the power generation. During 2010-11 employees cost, repairs and maintenance, depreciation and also interest and financial charges are increased hence percentage of change over previous year is also increased abnormally. Average change in total fixed cost during the period of study is 9.26 per cent.

2.10 Consolidated Total Variable Cost: These costs are varying in total in direct proportion to the volume of output. The variable costs per unit remain constant with changes in production. These costs fluctuate in total amount but tend to remain constant per unit as production activities changes. The coal cost, oil cost and other operating costs are included in the consolidated total variable costs of Dr. NTPPS. This ratio explains that the total amount of variable cost spent to generate one million units of power generation. This ratio is calculated as given below.

$$\text{Consolidated Total Variable Cost} = \frac{\text{Total Variable Cost}}{\text{No of Units generated}}$$

Table2.10: Stage-Wise Consolidated Variable Cost per Million Unit of Power Generation during 2005-06 to 2014-15
Total Variable Cost Rs.in Lakhs Generation in MU

Year	Stage-I	Stage-II	Stage-III	Stage-IV	Total	% of Change
2005-06	103.97	106.13	99.36	0	103.17	-
2006-07	104.17	103.87	99.41	0	102.42	-0.73
2007-08	112.90	112.38	105.96	0	110.28	7.67
2008-09	151.96	153.83	150.74	0	152.20	38.02
2009-10	139.77	138.26	133.25	125.37	136.43	-10.36
2010-11	156.91	156.22	153.86	195.77	167.95	23.10
2011-12	178.70	178.38	171.33	271.25	203.83	21.37
2012-13	237.78	222.86	227.45	271.99	241.00	18.23
2013-14	252.26	249.07	255.42	250.79	251.81	4.49
2014-15	285.30	287.80	281.85	266.37	279.68	11.07
Average Variable Cost	172.37	170.88	167.86	230.93	174.88	12.54

Source: Compiled records of Dr.NTPPS

Table-2.10 shows the data on stage-wise and total variable cost and also percentage of change during the period 2005-06 to 2014-15. Total variable cost during the period of study is registered an increasing trend except during the years 2006-07 and 2009-10, but the coal cost is reduced. Total variable cost of stage IV is more, i.e., Rs. 230.93 per million units when compared to the remaining stages. Average variable cost during the period of study is Rs. 174.88.

During 2008-09 cost of coal is increased compared to the previous years. Hence percentage of total variable cost is also increased. In the year 2009-10 coal cost and other operating expenses are reduced. So the percentage of total cost is also reduced when compared to the previous year. Average change in total variable cost during the period of study is 12.54%.

2.11 Consolidated Total Cost: Total cost is the amount which is incurred by the organisation to produce the products/service. Consolidated total cost is the combination of total fixed costs and total variable costs of the unit. This cost examines the total amount spent by the organisation to generate one million unit of power generation. Total cost per million units of power generation is calculated as:

$$\text{Consolidated Total Cost} = \frac{\text{Consolidated Total Cost}}{\text{No of Units Generated}}$$

Table-2.11: Stage-Wise Consolidated Total Cost per Million Unit of Power Generating during 2005-06 -2014-15
Total Cost Rs.in Lakhs Generation in MU

Year	Stage-I	Stage-II	Stage-III	Stage-IV	Total	% of Change
2005-06	131.62	156.45	165.10	0	151.42	
2006-07	133.61	158.21	163.59	0	152.15	0.48
2007-08	143.43	153.29	158.56	0	152.19	0.02
2008-09	175.78	188.89	196.26	0	187.23	23.03
2009-10	163.73	185.94	185.78	127.53	174.82	-6.63
2010-11	188.68	202.70	250.39	301.74	237.21	35.68

2011-12	214.10	225.48	234.46	371.00	267.30	12.68
2012-13	280.60	269.39	283.72	382.13	306.84	14.79
2013-14	303.00	308.55	323.27	358.46	325.67	6.14
2014-15	337.77	366.36	366.79	383.05	364.51	11.93
Average Total Cost	207.23	221.53	232.79	320.65	231.93	10.90

Source: Compiled records of Dr. NTTPS

Table-2.11 reveals the stage-wise consolidated total cost of the entire organization and also percentage of change from 2005-06 to 2014-15. During 2008-09 variable cost of power generation is increased and in 2009-10 the same was declined, so per million units' total cost is varied during these years. During 2010-11 fixed costs been increased, with the impact of the same total cost per million unit of generation is also raised. Among four stages, the total cost per million units of stage I is less followed by stage II. The average total cost of the entire organization during the period is Rs. 231.93 per million units of generation. The average percentage of change during the study period is 10.90.

3.0 Findings

- (i) For thermal power stations, coal is the main consuming material hence, it is the major cost. Since the selected units of the study, imported coal from other countries; the coal cost per million units of power generation is in increasing trend during the period of study.
- (ii) Among the four stages of the unit, stages II and IV are consuming less oil to generate power. Further, it is also incurring more operating expenditure on stage II, and less on stage IV, during the period of study.
- (iii) Among the four stages of the selected organization, the organisation is spending more repairs and maintenance cost in stage III, because of frequent breakdowns. Hence, it is suggested that the repairs and maintenance cost is to be reduced to the possible extent.
- (iv) It is also observed from the analysis that stage IV is consuming less administration and general charges compared to the remaining stages of the organization in this context it is suggested that the management has to allocate more funds on research and development activities.
- (v) Cost of depreciation in stage IV is much more when compared with other stages of the unit because huge amount is spent for erection of stage IV. Investment on stage I is lesser compared to the other stages.
- (vi) Total variable cost during the study period is increasing except during 2006-07 and 2009-10 because of reduction of coal cost in those years. Stage IV has incurred more variable expenses compared to other stages.

4.0 Conclusion

Among the four stages of the selected organization, the stage IV is generating more power consistently compared to the other stages. There is a further chance to enhance its productivity because this is designed with new technology and efficient operating system. Total variable cost of the entire organisation is rising significantly because of increase in the cost of material and other operating expenditure. Total fixed cost during the period of study is also increased due to huge investment and other fixed charges. Fixed cost per unit is to be reduced, by increasing more power generation and it is suggested to the organisation to reduce to the possible extent in future by purchasing indigenous.

5.0 References

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