Labour Productivity in Energy Sector Companies included in Nifty 50: An Empirical Study

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Abstract

Research Issue: In this modern environment, productivity has become synonymous for progress. It is key to prosperity. Productivity is the ratio of revalued output to revalued input; this ratio shows the actual performance of a unit. Higher the productivity means more efficient use of the resources. In the present research paper, an attempt has been made to measure, analyse and compare labour productivity of energy sector companies during the period from 2010-11 to 2017-18 i.e. for eight years.

Research Findings: Intra company comparison has been drawn with the help of chi square test and results indicate that hypothesis drawn is rejected in case of GAIL (India) Ltd. while it is accepted in all the other cases. This means that the labour productivity indices of the NTPC Ltd., Oil and Natural Gas Corporation Ltd. and Power Grid Corporation of India Ltd. for the study period are approximately same and can be represented by straight line trend or line of best fit. Intercompany comparison has been drawn with the help of Kruskal Wallis one way analysis of variance test and the results indicate that null hypothesis is rejected which means that there is significant difference in the labour productivity ratios.

Research Suggestion and Recommendation: Possible savings have been calculated for selected companies of energy sector which suggests that the total savings in labour input for a period of eight years would have been 982 crore of GAIL (India) Ltd., 2237 crore of NTPC Ltd., 7664 crore of Oil and Natural Gas Corporation Ltd. and 1743 crore of Power Grid Corporation of India if minimum input output ratio might have taken as base.

Keywords: Labour Productivity, Chi Square Test, Efficiency, Degree of Freedom, Kruskal Wallis One Way Analysis of Variance Test.

Introduction

The term productivity refers to the judicious use of the resources or the optimization of the utilization of resources, physical as well as mental, in other words it is the one's ability to produce more economically and efficiently. We should, however, note that the "Productivity" and "Efficiency" are not identical variables, for "Efficiency" connotes the competence on capacity of a given input or production unit to produce under given conditions whereas "Productivity" refers to the actual results produced by an input or production line under given condition

within a given time at given cost. It is without any improvement in its efficiency. Conversely, the efficiency of an input may increase without any simultaneous improvement in its productivity.

Productivity is concerned with efficiency and effectiveness. It is the real index of efficiency of an organisation. As efficiency should get reflected in productivity measures, productivity is considered to be a good proxy for efficiency. Productivity is the relationship between physical output and one or more of the physical inputs used in the production process. It is expressed as a ratio to reflect how efficiently resources are used in creating outputs.

Labour is considered as an important factor in production because without labour other factors of production will remain idle. Labour Productivity indicates that how much has been produced as output by the labour time expended. It measures effective utilisation of labour input i.e. the rate of degree with which the service of the existing labour are effectively utilized to increase the output.

Labour Productivity = <u>Total Output</u>

Labour Input

Review of Literature:

Many studies on productivity trends in India and abroad have been carried out over the last few decades. Few studies are being summarised below:

Islam (1990) focused on the measurement and analysis of labour productivity with distinct reference to cotton textile industry in Bangladesh. The evaluation is carried out at two-stages. The first stage explains the labour productivity at an aggregate level. The second stage analyse the differential labour productivity at inter-firm level. The present analysis attempts to grab all these aspects it measures output in physical terms and labour input in actual hours worked in approaching plant level investigation of labour productivity. This evaluation is also done with cross-section data and various hypothesis tests regarding factor affecting labour productivity has been worked out. The study is remarkable because there are certain marginal innovations in the methodology applied for measurements of variables. In this study only production worker has been considered as labour input.

Webber, Curry and Plumbridge (2009) explained the business productivity and area productivity in rural England. This paper extends a factual analysis of labour productivity differentials across the DEFRA. It is the new department for environment, food and rural affairs. Making use of plant level data, the study examines the presence and differences between rural and urban productivity. DEFRA objective is to measure differing economic performance between rural areas and enhance the performance of the weakest. Rural area productivity indicates critical significance informing rural area social welfare and polices for social involvement. The results also suggest that the labour productivity in less sparse rural as well as in urban areas depends on some similar factors although labour productivity in sparse rural areas strongly relates to a different industrial structures and ?rms in sparse rural areas gain less bene?t from larger capital stocks. As surveys examined that the skills needs (in terms of levels) are different in different rural areas and may be best secure through attracting people into rural areas rather than simply seeking to educate or retrains the local population.

Arendt and Grabowski (2017) analysed in their paper "Innovation, ICT and ICT - driven labour productivity in Poland" that the more efforts in terms of innovative sources of productivity or the introduction of new technologies is required to increase the companies productivity. In this paper author developed a two way model to establish the relationship between innovation, ICT (Information and Communication Technology) use and productivity. The data was collected through the survey of 1000 Polish companies in the first half of 2015. The relationship is analysed on the basis of CDM (Crepon Duguet Mairesse) model. This model explains the logic behind transforming innovation input into innovation output and then measuring the impact of innovation output on productivity. The study also reveals that the innovation capacity, ITC implementation and use of the companies are based on the traditional sources of innovation like R & D Department. The study also proves that the utilisation of ICT become more effective only if it is accompanied by co innovative sources of productivity.

Research Gap: As per the above review of literature and more studies studied related to the topic, there is no study on labour productivity in energy sector companies included in Nifty 50. So in this present research paper an attempt has been made to measure the labour productivity of energy sector.

Objectives of the Research

In the present research, an attempt has been made to measure, analyse and compare some concepts regarding labour productivity of energy sector companies included in Nifty 50 from 2010-11 to 2017-18i.e.for eight years. The main objectives of this paper are:

1)To measure, analyse and compare the labour productivity for the energy sector companies included in Nifty 50.

2)To measure, analyse and compare the intra company labour productivity for the study period.

3)To measure, analyse and compare the inter company labour productivity for the study period.

4)To suggest ways for the improvement in labour productivity.

Research Methodology

Collection of Data

This research paper is based on the secondary data. The data and information regarding output, labour input and all other financial variables has been obtained from the annual reports of the selected companies i.e. GAIL (India) Ltd, NTPC Ltd., Oil and Natural Gas Corporation of India Ltd. and Power Grid Corporation Ltd. The annual reports are available on the website of these companies and also the data related to index numbers has been collected from various bulletins published by Reserve Bank of India on its website.

Selection of Base Year

The year 2010-11 has been taken as the base year. The base year has been selected because the revaluation of output and input is done on the basis of this year.

Model to be used

In the present research paper Productivity Accounting Model propogated by H. S. Davis has been used for measuring labour productivity because it considers all the elements of output and input, ignoring the effect of inflation.

Hypotheses

Keeping in mind the objectives of the research paper, following hypotheses have been developed which will be tested.

Intra Company Hypothesis: Tested with the help of chi square test.

Null Hypothesis (H0): There is no significant difference in the labour productivity indices of the sampled company for the study period and can be represented by straight line trend or line of best fit.

Alternative Hypothesis (H1): There is a significant difference in the labour productivity indices of the sampled company for the study period and cannot be represented by straight line trend or line of best fit.

The acceptance of null hypothesis would reveal that the labour productivity indices of the sampled company for the study period are approximately equal.

Inter Company Hypothesis: Tested with the help of Kruskal Wallis One Way Analysis of Variance Test.

Null Hypothesis (H0): There is no significant difference in the labour productivity ratios of sampled companies.

Alternative Hypothesis (H1): There is a significant difference in the labour productivity ratios of sampled companies.

The acceptance of null hypothesis would reveal that the labour productivity ratios of sample companies are approximately equal.

Calculation of Index Numbers and Conversion Factors

The base year price index has been taken for the revaluation of data relating to study period and conversion factor has also been calculated accordingly. Here base year is 2010-11. Following formula has been used to calculate conversion factors:

Index number of the base year

Index number for the current year

Table 1

			Consumer Price Index for	
	Wholesale Price Index	Conversion	Industrial Workers	Conversion
Year	Base year 2011-12 = 100	Factors	Base Year 2001 = 100	Factors
2010-11	91.80	1.000	180.00	1.000
2011-12	100.00	0.918	195.00	0.923
2012-13	106.90	0.859	215.00	0.837
2013-14	112.50	0.816	236.00	0.763
2014-15	113.90	0.806	251.00	0.717
2015-16	109.70	0.837	265.00	0.679
2016-17	111.60	0.823	276.00	0.652
2017-18	114,90	0.799	284.00	0.634

Index Numbers and Conversion Factors for Revaluation of Data

Backward splicing technique has been used for calculating the index numbers of 2010-11.

Revaluation of Output:

The output of the companies has been revalued by multiplying the output values with the conversion factors. Here for the purpose of the study output includes revenue from operations, other income and change in the inventories of finished goods, work in progress and traded goods. Revaluation of output of the companies from 2010-11 to 2017-18 have been calculated and shown in Appendix 1 to 4 respectively.

Revaluation of Labour Input:

The labour input of the companies has been revalued by

multiplying the input values with the conversion factors. Here for the purpose of this study, the labour input includes salary, wages, bonus and benefits, contribution to provident and other funds and employees welfare expenses and others. Revaluation of labour input of the companies from 2010-11 to 2017-18 have been calculated and shown in Appendix 5 to 8 respectively.

Labour Productivity

Labour Productivity of energy sector companies has been shown from Table 2 to 5 from 2010-11 to 2017-18 taking 2010-11 as a base year for revaluation.

Table 2

Labour Productivity of GAIL (India) Ltd. from 2010-11 to 2017-18

Base	e Year 2010-11 Amount in crore								
S.No	Items	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
1	Output (in Crore)	32844.73	37024.85	41429.76	47148.15	46615.02	44514.51	40629.38	43636.95
2	Salary, Wages, Bonus and Benefits (in Crore)	546.39	372.44	445.92	457.97	450.00	481.21	493.78	625.84
3	Salary, Wages, Bonus and Benefits (Input Output Ratio)	0.0166	0.0101	0.0108	0.0097	0.0097	0.0108	0.0122	0.0143
4	Contribution to Provident and Other Funds (in Crore)	60.27	77.08	110.14	87.62	94.23	101.37	220.18	76.87
5	Contribution to Provident and Other Funds (Input Output Ratio)	0.0018	0.0021	0.0027	0.0019	0.0020	0.0023	0.0054	0.0018
6	Employees Welfare Expenses and Others (in Crore)	114.57	111.18	101.36	101.23	105.66	93.74	105.95	122.41
7	Employees Welfare Expenses and Others (Input Output Ratio)	0.0035	0.0030	0.0024	0.0021	0.0023	0.0021	0.0026	0.0028
8	Total Labour Input (in Crore)	721.23	560.70	657.42	646.82	649.89	676.32	819.91	825.13
9	Total Labour (Input Output Ratio)	0.0220	0.0151	0.0159	0.0137	0.0139	0.0152	0.0202	0.0189
10	Labour Productivity Ratio	45.5399	66.0328	63.0185	72.8924	71.7277	65.8182	49.5535	52.8852
11	Labour Productivity Indices / Observed Indices (O)	100.00	145.00	138.38	160.06	157.51	144.53	108.81	116.13
12	Computed Value/ Expected Values (E)	135.98	135.35	134.73	134.11	133.49	132.87	132.25	131.63
13	Chi-Square (O-E) ² /E	9.5180	0.6874	0.0987	5.0211	4.3195	1.0227	4.1536	1.8253

Average Labour Productivity Indices= 133.80, a= 133.80, b= -0.31, $\chi^2 = 26.6464$, S.D.= 21.19, C.V.= 15.84 %

Analysis and Interpretation:

Output: The revalued output of GAIL (India) Ltd. is the highest 47148.15 crore in 2013-14 and it is the lowest 32844.73 crore in 2010-11.

Salary, Wages, Bonus and Benefits: The most important element of labour input is salary, wages, bonus and benefits. It is the highest 625.84 crore in 2017-18 and compared to the lowest 372.44 crore in 2011-12. Its input output ratio is very important to calculate as this represent for one unit of output how much input is required. Its input output ratio is the highest 0.0166 in 2010-11 while it is the lowest 0.0097 in 2013-14 and 2014-15.

Contribution to Provident and Other Funds: Contribution to provident and other funds is the highest 220.18 crore in 2016-17 while it is the lowest 60.27 crore in 2010-11. Input output ratio of contribution to provident and other

funds is the lowest0.0018 in 2010-11 and also in 2017-18 as compared to the highest0.0054 in 2016-17.

Employees Welfare Expenses and Others: It is 114.57 crore in 2010-11, 11.18 crore in 2011-12, 101.36 crore in 2012-13, 101.23 crore in 2013-14, 105.66 crore in 2014-15, 93.74 crore in 2015-16, 105.95 crore in 2016-17 and 122.41 crore in 2017-18. Its input output ratio is the lowest0.0021 in 2013-14 and 2015-16while it is the highest 0.0035 in 2010-11.

Total Labour: Total labour input is 721.23 crore in 2010-11, decreased to 560.70 crore in 2011-12 then it slightly increased and reached to 657.42 crore in 2012-13, it reached to 646.82 crore in 2013-14, 649.89 crore in 2014-15 then it increased and reached to 676.32 crore in 2015-16, 819.91 crore in 2016-17 and lastly it increased and ultimately reached to 825.13 crore in 2017-18. Total labour input output ratio is the highest 0.0220 in 2010-11 while it is the lowest 0.0137 in 2013-14. The lowest labour input output ratio means labour has been best utilized in the year 2013-14. This means that organisation is neither short of labour nor its labour remains idle.

Labour Productivity Ratio: Labour productivity ratio is 45.5399 in 2010-11, 66.0328 in 2011-12, 63.0185 in 2012-13, 72.8924 in 2013-14,71.7277 in 2014-15, 65.8182 in 2015-16, 49.5535in 2016-17 and 52.8852 in 2017-18. Labour productivity ratio is the lowest45.5399 in 2010-11 while it is the highest72.8924 in 2013-14. The highest ratio indicates efficiency and effectiveness while the lowest ratio indicates that the labour input has not been utilized efficiently as compared to the other year but in this case it is greater than one indicates more output from less input. Labour efficiency can also be analysed from the average of

labour indices which worked out to133.80 as compared to the base year index of 100 of 2010-11. It is concluded from the above that labour efficiency is there as compared to the base year labour.

Testing Hypothesis and Interpretation: The standard deviation and coefficient of variation of GAIL (India) Ltd. is 21.19 and 15.84 % respectively. The computed value of chi square is 26.6464. The table value of chi square at 5% level of significance with (8-1) = 7 degree of freedom is 14.07. As the calculated value of chi square is more as compared to the table value hence, null hypothesis is rejected and alternative hypothesis is accepted. This reveals that the labour productivity indices of GAIL (India) Ltd. for the study period are not equal and cannot be represented by straight line trend or line of best fit.

Table 3 Labour Productivity of NTPC Ltd. from 2010-11 to 2017-18

Base	se Year 2010-11 Amount in crore								
S.No	ltems	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
1	Output (in Crore)	57407.30	59514.54	59078.16	60961.58	60721.91	60009.61	65298.71	68081.15
2	Salary, Wages, Bonus and Benefits (in Crore)	2158.44	2307.06	2203.58	1849.63	1808.82	1711.73	1829.21	2252.13
3	Salary, Wages, Bonus and Benefits (Input Output Ratio)	0.0376	0.0388	0.0373	0.0303	0.0298	0.0285	0.0280	0.0331
4	Contribution to Provident and Other Funds (in Crore)	337.83	273.08	311.71	762.51	373.16	369.09	702.74	395.25
5	5 Contribution to Provident and Other Funds (Input Output Ratio)		0.0046	0.0053	0.0125	0.0061	0.0062	0.0108	0.0058
6	Employees Welfare Expenses and Others (in Crore)	293.44	272.38	297.14	339.13	414.07	369.91	287.69	354.40
7	Employees Welfare Expenses and Others (Input Output Ratio)	0.0051	0.0046	0.0050	0.0056	0.0068	0.0062	0.0044	0.0052
8	Total Labour Input (in Crore)	2789.71	2852.51	2812.42	2951.28	2596.05	2450.73	2819.64	3001.78
9	Total Labour (Input Output Ratio)	0.0486	0.0479	0.0476	0.0484	0.0428	0.0408	0.0432	0.0441
10	Labour Productivity Ratio	20.5782	20.8639	21.0062	20.6560	23.3901	24.4864	23.1585	22.6803
11	Labour Productivity Indices / Observed Indices (O)	100.00	101.39	102.08	100.38	113.66	118.99	112.54	110.21
12	Computed Value/ Expected Values (E)	99.44	101.71	103.99	106.27	108.55	110.82	113.10	115.38
13	Chi-Square (O-E) ² /E	0.0032	0.0010	0.0351	0.3265	0.2414	0.6022	0.0028	0.2310

Average Labour Productivity Indices = 107.41, a = 107.41, b = 1.14, χ^2 = 1.4432, S.D. = 6.86, C.V. = 6.39 %

Analysis and Interpretation:

Output: The revalued output of NTPC Ltd. is 57407.30 crore in 2010-11 and reached to 68081.15 crore in 2017-18.

Salary, Wages, Bonus and Benefits: It is showing an erratic trend. It is the highest 2307.06 crore in 2011-12 and the lowest 1711.73 crore in 2015-16. Salary, wages, bonus and benefits input output ratio is the highest 0.0388 in 2011-12 while it is the lowest 0.0280 in 2016-17.

Contribution to Provident and Other Funds: It is the highest

762.51 crore in 2013-14 while it is the lowest 273.08 crore in 2011-12. Input output ratio of contribution to provident and other funds is the lowest0.0046 in 2011-12 as compared to the highest0.0108 in 2016-17.

Employees Welfare Expenses and Others: It is the lowest 272.38 crore in 2011-12 as compared to the highest 414.07 crore in 2014-15.Input output ratio is 0.0051 in 2010-11, 0.0046in 2011-12, 0.0050 in 2012-13, 0.0056in 2013-14, 0.0068in 2014-15, 0.0062in 2015-16, 0.0044 in 2016-17 and 0.0052 in 2017-18. It is the lowest0.0044 in 2016-17.

 Total Labour: Total labour input is
 2789.71crore in 2010

 11,
 2852.51 crore in 2011-12,
 2812.42 crore in 2012-13,

2951.28 crore in 2013-14, 2596.05 crore in 2014-15, 2450.73 crore in 2015-16, 2819.64 crore in 2016-17 and 3001.78 crore in 2017-18. Total labour input output ratio is the highest 0.0486 in 2010-11 while it is the lowest 0.0408 in 2015-16.

Labour Productivity Ratio: Labour productivity ratio is 20.5782 in 2010-11 and reached to 22.6803 in 2017-18. Labour productivity ratio is the lowest20.5782 in 2010-11 while it is the highest24.4864 in 2015-16. The highest ratio indicates efficiency and effectiveness while the lowest ratio indicates that the labour input has not been utilized efficiently as compared to other years. Labour efficiency can also be observed from the average of labour indices which worked out as 107.41.

Testing Hypothesis and Interpretation: The standard

deviation is 6.86 with coefficient of variation 6.39 % indicated the variability. The computed value of chi square is 1.4432. The table value of chi square at 5% level of significance with (8-1) = 7 degree of freedom is 14.07. As the calculated value of chi square is less as compared to the table value hence null hypothesis is accepted and alternative hypothesis is rejected. This reveals that the labour productivity indices of the NTPC Ltd. for the study period are approximately same and can be represented by straight line trend or line of best fit.

Table 4 Labour Productivity of Oil and Natural Gas Corporation Ltd. from 2010-11 to

Base	: Year 2010-11 Amount in crore								
S.No.	Items	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
1	Output (in Crore)	71732.86	74244.84	75951.96	74017.52	70984.50	70792.55	70326.36	74166.87
2	Salary, Wages, Bonus and Benefits (in Crore)	5020.13	4767.55	5705.84	4901.62	4894.31	4385.41	4851.06	5841.37
3	Salary, Wages, Bonus and Benefits (Input Output Ratio)	0.0700	0.0642	0.0751	0.0662	0.0689	0.0619	0.0690	0.0788
4	Contribution to Provident and Other Funds (in Crore)	328.37	696.38	373.30	688.72	677.35	671.60	660.01	722.54
5	Contribution to Provident and Other Funds (Input Output Ratio)	0.0046	0.0094	0.0049	0.0093	0.0095	0.0095	0.0094	0.0097
6	Employees Welfare Expenses and Others (in Crore)	1379.71	808.82	2567.20	2348.70	615.97	878.33	2020.03	651.67
7	Employees Welfare Expenses and Others (Input Output Ratio)	0.0192	0.0109	0.0338	0.0317	0.0087	0.0124	0.0287	0.0088
8	Total Labour Input(in Crore)	6728.21	6272.75	8646.34	7939.05	6187.63	5935.34	7531.10	7215.59
9	Total Labour (Input Output Ratio)	0.0938	0.0845	0.1138	0.1073	0.0872	0.0838	0.1071	0.0973
10	Labour Productivity Ratio	10.6615	11.8361	8.7843	9.3232	11.4720	11.9273	9.3381	10.2787
11	Labour Productivity Indices / Observed Indices (O)	100.00	111.02	82.39	87.45	107.60	111.87	87.59	96.41
12	Computed Value/ Expected Values (E)	99.44	99.04	98.64	98.24	97.84	97.44	97.04	96.64
13	Chi-Square (O-E) ² /E	0.0031	1.4474	2.6770	1.1860	0.9739	2.1378	0.9205	0.0005

2017-18

Average Labour Productivity Indices = 98.04, a = 98.04, b = -0.20, $\chi^2 = 9.3463$, S.D. = 10.75, C.V. = 10.96%

Analysis and Interpretation:

Output: The output of Oil and Natural Gas Corporation Ltd. is showing a fluctuating trend. It is the highest 75951.96 crore in 2012-13 and it is the lowest 70326.36 crore in 2016-17.

Salary, Wages, Bonus and Benefits: The important part to analyse in labour input is salary, wages, bonus and benefits. It is showing a fluctuating trend with 5020.13 crore in 2010-11, 4767.55 crore in 2011-12, 5705.84 crore in 2012-13, 4901.62 crore in 2013-14, 4894.31 crore in 2014-15, 4385.41 crore in 2015-16, 4851.06 crore in 2016-17 and 5841.37 crore in 2017-18. Its input output ratio is the highest 0.0788 in 2017-18 while it is the lowest 0.0619 in 2015-16.

Contribution to Provident and Other Funds: It is the highest

722.54 crore in 2017-18 while it is the lowest 328.37 crore in 2010-11. Input output ratio of contribution to provident and other funds are the lowest 0.0046 in 2010-11

as compared to the highest 0.0097 in 2017-18.

Employees Welfare Expenses and Others: It is the highest 2567.20 crore in 2012-13 while it is the lowest 615.97 crore in 2014-15. Input output ratio is the lowest0.0087 in 2014-15 and it is the highest 0.0338 in 2012-13.

Total Labour: Total labour input of Oil and Natural Gas Corporation Ltd. is the lowest 5935.34crore in 2015-16 as compared to the highest 8646.34crore in 2012-13. Total labour input output ratio is the highest 0.1138 in 2012-13 while it is the lowest 0.0838 in 2015-16. The lowest labour input output ratio means labour is best utilized in the year 2015-16.

Labour Productivity Ratio: Labour productivity ratio of Oil and Natural Gas Corporation Ltd. is 10.6615 in 2010-11, 11.8361 in 2011-12, 8.7843 in 2012-13, 9.3232 in 2013-14,11.4720 in 2014-15, 11.9273 in 2015-16, 9.3381in 2016-17 and 10.2787 in 2017-18. It is the lowest8.7843 in 2012-13 while it is the highest11.9273 in 2015-16. The highest ratio indicates efficiency and effectiveness while the lowest ratio indicates that the labour input has not been utilized efficiently. Improvement in labour efficiency can also be observed from the average of labour indices which is98.04which is lower than the base year index of 100.

Testing Hypothesis and Interpretation: The standard deviation and coefficient of variation of Oil and Natural Gas Corporation Ltd. is 10.75 and 10.96 % respectively. The computed value of chi square is 9.35. The table value

of chi square at 5% level of significance with (8-1) = 7 degree of freedom is 14.07. As the calculated value of chi square is less as compared to the table value hence null hypothesis is accepted and alternative hypothesis is rejected. This reveals that the labour productivity ratios of the company for the study period of eight years are approximately same and can be represented by straight line trend or line of best fit.

Table 5

Labour Productivity of Power Grid Corporation of India Ltd. from 2010-11 to 2017-18

Base	Base Year 2010-11 Amount in crore								
S.No.	Items	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
1	Output (in Crore)	9098.75	9900.64	11449.39	12828.67	14330.71	17812.35	21872.62	24582.29
2	Salary, Wages, Bonus and Benefits (in Crore)	510.66	615.62	539.62	507.85	437.20	443.04	559.83	824.55
3	Salary, Wages, Bonus and Benefits (Input Output Ratio)	0.0561	0.0622	0.0471	0.0396	0.0305	0.0249	0.0256	0.0335
4	Contribution to Provident and Other Funds (in Crore)	149.22	81.60	117.50	121.64	192.39	123.18	232.78	71.16
5	Contribution to Provident and Other Funds (Input Output Ratio)	0.0164	0.0082	0.0103	0.0095	0.0134	0.0069	0.0106	0.0029
6	Employees Welfare Expenses and Others (in Crore)		80.84	84.80	89.01	104.37	99.56	105.28	122.43
7	Employees Welfare Expenses and Others (Input Output Ratio)	0.0095	0.0082	0.0074	0.0069	0.0073	0.0056	0.0048	0.0050
8	Total Labour Input (in Crore)	745.89	778.06	741.92	718.50	733.96	665.79	897.89	1018.13
9	Total Labour (Input Output Ratio)	0.0820	0.0786	0.0648	0.0560	0.0512	0.0374	0.0411	0.0414
10	0 Labour Productivity Ratio		12.7248	15.4322	17.8547	19.5253	26.7538	24.3601	24.1444
11	Labour Productivity Indices / Observed Indices (O)	100.00	104.31	126.51	146.37	160.06	219.32	199.70	197.93
12	Computed Value/ Expected Values (E)	96.17	113.48	130.80	148.12	165.43	182.75	200.07	217.38
13	Chi-Square (O-E) ² /E	0.1526	0.7411	0.1409	0.0206	0.1743	7.3186	0.0007	1.7406

Average Labour Productivity Indices= 156.78, a= 156.78, b = 8.66, χ^2 = 10.2894, S.D.= 42.51, C.V.= 27.12%

Analysis and Interpretation:

Output: The output of Power Grid Corporation of India Ltd. is showing an increasing trend with the highest 24582.29 crore in 2017-18whilethe lowest 9098.75 crore in 2010-11.

Salary, Wages, Bonus and Benefits: It is showing a fluctuating trend. It is the maximum 824.55 crore in 2017-18 as compared to the minimum 437.20 crore in 2014-15. Its input output ratio is the maximum 0.0622 in 2011-12 while it is the minimum 0.0249 in 2015-16.

Contribution to Provident and Other Funds: It is the highest

232.78 crore in 2016-17 while it is the lowest 71.16 crore in 2017-18. Input output ratio of contribution to provident and other funds is the lowest 0.0029 in 2017-18 as compared to the highest 0.0164 in 2010-11.

Employees Welfare Expenses and Others: It is the highest 122.43 crore in 2017-18 while it is the lowest 80.84 crore in 2011-12. Input output ratio is the lowest0.0048 in 2016-17 and it is the highest 0.0095 in 2010-11.

Total Labour: Total labour input of Power Grid Corporation of India Ltd. is the lowest 665.79crore in 2015-16 as compared to the highest 1018.13crore in 2017-18. Total labour input output ratio is the highest 0.0820 in 2010-11 while it is the lowest 0.0374 in 2015-16. The lowest labour input output ratio means labour is best utilized in the year 2015-16.

Labour Productivity Ratio: Labour productivity ratio of Power Grid Corporation of India Ltd. is 12.1985 in 2010-11 and after facing many fluctuations during the study period reached to 24.1444 in 2017-18. It is the lowest12.1985 in 2010-11 while it is the highest26.7538 in 2015-16. The highest ratio indicates efficiency and effectiveness. Improvement in labour efficiency can also be observed from the average of labour indices which is156.78which is lower than the base year index of 100.

Testing Hypothesis and Interpretation: The standard deviation and coefficient of variation of Power Grid Corporation of India Ltd. is 42.51 and 27.12 % respectively. The computed value of chi square is 10.2894. The table value of chi square at 5% level of significance

with (8-1) = 7 degree of freedom is 14.07. As the calculated value of chi square is less as compared to the table value hence null hypothesis is accepted and alternative hypothesis is rejected. This reveals that the labour productivity ratios of the company for the study period are approximately same and can be represented by straight line trend or line of best fit.

Kruskal Wallis One Way Analysis of Variance Test

The labour productivity of all the samples is combined and arranged in order of increasing size and given a rank number. The rank sum of each of the sample has been calculated. The detailed calculation has been done in the following table.

Table 6

Comparative Labour Productivity Ratios from 2010-11 to 2017-18 of Energy Sector and

					1				
					Oil and Natural Gas		Power Grid Corporation		
	GAIL (In	dia) Ltd.	NTPO	C Ltd.	Corpora	Corporation Ltd.		of India Ltd.	
Year	Ratio	Rank 1	Ratio	Rank 2	Ratio	Rank 3	Ratio	Rank 4	
2010-11	45.5399	25	20.5782	14	10.6615	5	12.1985	9	
2011-12	66.0328	30	20.8639	16	11.8361	7	12.7248	10	
2012-13	63.0185	28	21.0062	17	8.7843	1	15.4322	11	
2013-14	72.8924	32	20.6560	15	9.3232	2	17.8547	12	
2014-15	71.7277	31	23.3901	20	11.4720	6	19.5253	13	
2015-16	65.8182	29	24.4864	23	11.9273	8	26.7538	24	
2016-17	49.5535	26	23.1585	19	9.3381	3	24.3601	22	
2017-18	52.8852	27	22.6803	18	10.2787	4	24.1444	21	
Total		228		142		36		122	

Kruskal Wallis One Way Analysis of Variance Test

Base Year 2010-11

Value of H = 26.4659

Hypothesis Testing and Interpretation: The calculated value of H is 26.4659at 5 % level of significance with 4-1 = 3 degrees of freedom and the table value is 7.8147. As the calculated value is greater than the table value hence null hypothesis is rejected and alternative hypothesis is accepted. This means that the labour productivity ratios of the energy sector companies are not same that is there is significance difference in the labour productivity ratios.

Possible Savings

Possible savings in labour input has been calculated to analyse what would have been saved if the labour input is optimally utilized. To view the performance of the companies in respect of the labour input an attempt has been made to calculate the possible savings.

Possible Savings in Labour Input of Energy Sector

To know the performance of energy sector companies in respect of the labour an attempt has been made to calculate the possible savings.

Possible saving in labour input = Actual labour input – Standard labour input

Standard labour input = minimum requirement of Labour Input per unit of output X Actual Output revalued according to the base year

Table /

				Oil and Natural	Power Grid
Com	panies	GAIL (India)		Gas Corporation	Corporation
		Ltd.	NTPC Ltd.	Ltd.	of India Ltd.
	Standard	450	2342	6011	340
2010-11	Actual	721	2790	6728	746
	Saving	271	448	717	406
	Standard	507	2428	6222	370
2011-12	Actual	561	2853	6273	778
	Saving	54	425	51	408
	Standard	568	2410	6365	428
2012-13	Actual	657	2812	8646	742
	Saving	89	402	2281	314
2013-14	Standard	647	2487	6203	480
	Actual	647	2951	7939	719
	Saving	0	464	1736	239
	Standard	639	2477	5949	536
2014-15	Actual	650	2596	6188	734
	Saving	11	119	239	198
	Standard	610	2451	5935	666
2015-16	Actual	676	2451	5935	666
	Saving	66	0	0	0
	Standard	557	2664	5893	818
2016-17	Actual	820	2820	7531	898
	Saving	263	156	1638	80
	Standard	598	2778	6215	919
2017-18	Actual	825	3002	7216	1018
	Saving	227	224	1001	99
Total Savi	ngs	982	2237	7664	1743

Possible Savings in Labour Input of Energy Sector from 2010-11 to 2017-18 Amount in crore

Note: Amount has been rounded off to nearest

Table 7 suggests that the total savings in labour input for a period of eight years would have been 982 crore of GAIL (India) Ltd., 2237 crore of NTPC Ltd., 7664 crore of Oil and Natural Gas Corporation Ltd and 1743 crore of Power Grid Corporation of India. Possible savings have been calculated by multiplying the minimum input output ratio with the output of the respective year.

Possible Savings in Salary, Wages, Bonus and Benefits of Energy Sector

It is regarded as very important and essential aspect of labour input. For analyzing this possible savings has been calculated and results has been analysed.

Table 8
Possible Savings in Salary, Wages, Bonus and Benefits of Energy Sector from 2010-11 to 2017-18
Amount in crore

Com	panies	GAIL (India) Ltd.	NTPC Ltd.	Oil and Natural Gas Corporation Ltd.	Power Grid Corporation of India Ltd.
	Standard	319	1607	4440	227
2010-11	Actual	546	2158	5020	511
	Saving	227	551	580	284
	Standard	359	1666	4596	247
2011-12	Actual	372	2307	4768	61.6
	Saving	13	641	172	369

	Standard	458	1707	458Z	319
2013-14	Actual	458	1850	4902	508
	Saving	O	143	320	189
	Standard	450	1700	4394	357
2014-15	Actual	450	1.809	4894	437
	Saving	Ø	109	500	80
	Standard	432	1680	4385	443
2015-16	Actual	481	1712	4385	443
	Saving	49	32	D	O
	Standard	394	1829	4353	545
2016-17	Actual	494	1829	4851	560
	Saving	100	D	496	15
	Standard	423	1906	4591	612
2017-18	Actual	626	2252	5841	825
	Saving	203	346	1250	213
Fotal Savi	negs	636	2370	4325	1406

Note: Amount has been rounded off to nearest

Table 8 shows that the total savings in salary, wages, bonusand benefits for a period of eight years is636 crore ofGAIL (India) Ltd.,2370 crore of NTPC Ltd.,4325 croreof Oil and Natural Gas Corporation Ltd and1406 crore ofPower Grid Corporation of India Ltd.

Possible Savings in Contribution to Provident and Other Funds of Energy Sector

Another aspect to discuss is contribution to provident and other funds. An attempt has been made to calculate the possible savings in it.

Comp	anies	GAIL (India) Ltd.	NTPC Ltd.	Oil and Natural Gas Corporation Ltd.	Power Grid Corporation of India Ltd.
	Standard	60	264	328	26
2010-11	Actual	60	338	328	149
	Saving	0	74	0	123
	Standard	67	273	342	29
2011-12	Actual	77	273	696	82
	Saving	10	0	354	53
2012-13	Standard	75	272	349	33
	Actual	110	312	373	117
	Saving	35	40	Z4	84
	Standard	85	280	340	37
2013-14	Actual	88	763	689	122
	Saving	3	483	349	85
	Standard	84	279	327	42
2014-15	Actual	94	373	677	192
	Saving	10	94	350	150
	Standard	80	276	326	52
2015-16	Actual	101	369	672	123
	Saving	21	93	346	71
	Standard	73	300	324	63
2016-17	Actual	220	703	660	233
	Saving	147	403	336	170
	Standard	77	313	341	71
2017-18	Actual	77	395	723	71
	Saving	0	82	382	0
fotal Savir	igs	227	1268	2142	736

 Table 9

 Possible Savings in Contribution to Provident and Other Funds of Energy Sector from

Note: Amount has been rounded off to nearest

Table 9 reveals that total savings in contribution to provident and other funds element of labour input is the maximum 2142 crore of Oil and Natural Gas Corporation Ltd. while it is minimum 227 crore of GAIL (India) Ltd.

Possible savings in Employees Welfare expenses and Others of Energy Sector

Another aspect of labourinput is employees welfare expenses and others. For analyzing this possible savings has been calculated and results has been analysed.

Table: 10

Possible S avings in Employees Welfare Expenses and O thers of Energy Sector from

				Oil and Natural	Power Grid
Com	panies	GAIL (India)		Gas Corporation	Corporation
		Ltd.	NTPC Ltd.	Ltd.	of India Ltd.
	Standard	69	253	624	44
2010-11	Actual	115	293	1380	86
	Saving	46	40	756	42
	Standard	78	262	646	48
2011-12	Actual	111	272	809	81
	Saving	33	10	163	33
	Standard	87	260	661	55
2012-13	Actual	101	297	2567	85
	Saving	14	37	1906	30
	Standard	101	268	644	62
2013-14	Actual	101	339	2349	89
	Saving	0	71	1705	27
	Standard	98	267	616	69
2014-15	Actual	106	414	616	104
	Saving	8	147	0	35
	Standard	94	264	616	85
2015-16	Actual	94	370	878	100
	Saving	0	106	262	15
	Standard	85	288	612	105
2016-17	Actual	106	288	2020	105
	Saving	21	0	1408	0
	Standard	92	300	645	118
2017-18	Actual	122	354	652	122
	Saving	30	54	7	4
Total Savings		152	466	6207	187

2010-11 1	to 201	7-18 Am	ount in	crore
		,		

Note: Amount has been rounded off to nearest

Table 10 shows that 6207 crore would be possible saving of Oil and Natural Gas Corporation Ltd., R 466 crore of NTPC Ltd., 187 crore of Power Grid Corporation Ltd. and 152 crore GAIL (India) Ltd.

Comparative Average Analysis

To analyse between the companies of a particular sector it is

better to analyse its average performance of the study period. In the present study an attempt has been made to analyse and interpret the results on the basis of average performance.

Table 11Comparative Average Labour Productivity of Energy Sector from 2010-11 to 2017-18

Base Y	Year	201	0 -	1	1
--------	------	-----	-----	---	---

			Contribu	ution to								
	Salary, W	lages,	Provide	nt and	Employees W	/elfare	Total La	bour				
Companies	Bonus and	Benefits	Other Fun	ds (Input	Expenses and	Others	(Input O	utput	Labour Pro	oductivity		
companies	(Input Outp	ut Ratio)	Output	Ratio)	(Input Output	t Ratio)	Rati	o)	Rat	tio	Chi Squa	are Test
	Average	Rank	Average	Rank	Average	Rank	Average	Rank	Average	Rank	Value	Rank
GAIL (India) Ltd.	0.0118	1	0.0025	1	0.0026	1	0.0169	1	60.9335	1	26.6464	4
NTPC Ltd.	0.0329	2	0.0071	2	0.0054	2	0.0454	2	22.1025	2	1.4432	1
Oil and Natural Gas Corporation Ltd.	0.0693	4	0.0083	3	0.0193	4	0.0968	4	10.4527	4	9.3463	2
Power Grid Corporation Ltd.	0.0399	3	0.0098	4	0.0068	3	0.0566	3	19.1242	3	10.2894	3

Salary, Wages, Bonus and Benefits Average Input Output Ratio: The salary, wages, bonus and benefits average input output ratio of energy sector companies is the best of GAIL (India) Ltd. by 0.0118, followed by NTPC Ltd. by 0.0329, Power Grid Corporation Ltd. by 0.0399 and lastly Oil and Natural Gas Corporation Ltd. by 0.0693.

Contribution to Provident and Other Funds Average Input Output Ratio: It is the best of GAIL (India) Ltd. as compared to the others in the energy sector.

Employees Welfare Expenses and Others Average Input Output Ratio: It is 0.0026 of GAIL (India) Ltd., 0.0054 of NTPC Ltd, 0.0068 of Power Grid Corporation Ltd. and lastly 0.0193 of Oil and Natural Gas Corporation Ltd.

Total Labour Average Input Output Ratio: The total labour average input output ratio is the best of GAIL (India) Ltd. with 0.0169, followed by NTPC Ltd. with 0.0454, Power Grid Corporation Ltd. 0.0566 and lastly Oil and Natural Gas Corporation Ltd. with 0.0968.

Average Labour Productivity Ratio: Average labour productivity ratio is the best of GAIL (India) Ltd. with 60.9335 which means that for every one unit of labour input, the output produced is approximately 60 times. This is followed by NTPC Ltd. with 22.1025 then Power Grid Corporation Ltd. with 19.1242 and lastly Oil and Natural Gas Corporation Ltd. with 10.4527.

Chi Square Test: On analysing the Chi Square of the energy sector companies it has been observed that NTPC Ltd. has the least chi square value with 1.4432 then the Oil and Natural Gas Corporation Ltd. with 9.3463, followed by Power Grid Corporation Ltd. with 10.2894 and lastly it is GAIL (India) Ltd. with the highest chi square value 26.6464. The table value of chi square at 5% level of significance with (8-1)=7 degree of freedom is 14.07. This shows that the null hypothesis based on the chi square is accepted in all the above cases. This means that the

alternative hypothesis is rejected. This reveals that the labour productivity ratios of all the companies of energy sector included in Nifty 50 for the eight years period are approximately the same.

Conclusion:

It may be concluded from the above analysis that the output per rupee of labour input is satisfactory of energy sector companies but it is not optimum. Steps should be taken to stop the wastage of labour input and optimally use labour input so that its productivity ratio improves more than the present one. However, on analyzing energy sector as a whole, it may be observed that the labour productivity ratio is the best of GAIL (India) Ltd. as it has the highest output per rupee of labour input. Its average labour productivity ratio is 60.9335 which is the highest among the others. Next highest average labour productivity ratio is 22.1025 of NTPC Ltd., followed by 19.1242 of Power Grid Corporation Ltd. and lastly 10.4527 of Oil and Natural Gas Corporation Ltd.

Scope for further Research: This study is based on the labour productivity of energy sector companies included in Nifty 50 only. More study can also be made on other sectors of Nifty 50 companies and also on companies of BSE and Nifty 100 of NSE Sensex. Also productivity can also be calculated on the other factors such as material, overhead, overall, capital, etc.

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Reports:

1. Annual Reports of GAIL (India) Ltd. from 2010-11 to 2017-18.

2. Annual Reports of NTPC Ltd. from 2010-11 to 2017-18.

3. Annual Reports of Oil and Natural Gas CorporationLtd. from 2010-11 to 2017-18.

4. Annual Reports of Power Grid Corporation Ltd. from 2010-11 to 2017-18.

5. Consumer Price Index for industrial workers from the website of Reserve Bank of India.

Appendices:

Appendix 1 to 4. Revaluation of Output of Energy Sector

Appendix 1

Revaluation of Output of GAIL (India) Ltd. from 2010-11 to 2017-18.

Base year 2010 -11

		2010-11	0-11 2011-12		201	2-13	201	3-14	201	4-15	201	5-16	201	6-17	201	7-18
S.No.	Items	Actual	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued
1	Revenue from Operations	32536.52	40397.95	37085.32	47522.69	40821.99	57507.93	46926.47	56741.98	45734.04	51914.15	43452.14	48148.85	39626.50	53661.58	42875.60
2	Other Income	440.70	431.88	396.47	764.51	656.71	898.52	733.19	860.86	693.85	857.70	717.89	1176.27	968.07	987.00	788.61
	Changes in Inventories of															
	Finished Goods, Work in															
3	progress and Stock in Trade	-132.49	-497.75	-456.93	-56.98	-48.95	-626.86	-511.52	232.17	187.13	411.55	344.47	42.29	34.80	-34.12	-27.26
	Total Output	32844.73	40332.08	37024.85	48230.22	41429.76	57779.59	47148.15	57835.01	46615.02	53183.40	44514.51	49367.41	40629.38	54614.46	43636.95

Appendix 2

Revaluation of Output of NTPC Ltd. from 2010-11 to 2017-18.

Base year 2010-11

Amount in crore

		2010-11	201	2011-12		2-13	201	3-14	201	4-15	201	5-16	201	.6-17	201	.7-18
S.No.	Items	Actual	Actual	Revalued												
1	Revenue from Operations	55062.65	62052.23	56963.95	65673.93	56413.91	72018.93	58767.45	73236.94	59028.97	70506.80	59014.19	78273.44	64419.04	83452.70	66678.71
2	Other Income	2344.65	2778.42	2550.59	3101.58	2664.26	2688.89	2194.13	2100.42	1692.94	1189.27	995.42	1068.86	879.67	1755.25	1402.44
	Changes in Inventories of															
	Finished Goods, Work in															
3	progress and Traded Goods			0.00		0.00		0.00		0.00		0.00		0.00		0.00
	Total Output	57407.30	64830.65	59514.54	68775.51	59078.16	74707.82	60961.58	75337.36	60721.91	71696.07	60009.61	79342.30	65298.71	85207.95	68081.15

Appendix 3

Revaluation of Output of Oil and Natural Gas Corporation Ltd. from 2010-11 to 2017-18.

Base year 2010-11

		2010-11	201	2011-12		2-13	201	3-14	201	4-15	201	5-16	201	.6-17	201	.7-18
S.No.	Items	Actual	Actual	Revalued												
1	Revenue from Operations	65845.00	76515.09	70240.85	83005.33	71301.58	83890.27	68454.46	82870.96	66793.99	78368.07	65594.07	77907.73	64118.06	85004.10	67918.28
2	Other Income	5900.77	4452.98	4087.84	5436.74	4670.16	6713.20	5477.97	5366.57	4325.46	6192.17	5182.85	7676.34	6317.63	7883.54	6298.95
	Changes in Inventories of Finished															
3	Goods and Work in progress	-12.91	-91.34	-83.85	-23.02	-19.77	104.28	85.09	-167.43	-134.95	18.67	15.63	-132.84	-109.33	-63.02	-50.35
	Total Output	71732.86	80876.73	74244.84	88419.05	75951.96	90707.75	74017.52	88070.10	70984.50	84578.91	70792.55	85451.23	70326.36	92824.62	74166.87

Appendix 4

Revaluation of Output of Power Grid Corporation of India Ltd. from 2010-11 to 2017-18.

Base year 2010-11

		2010-11	010-11 2011-12		201	12-13	201	3-14	201	14-15	201	.5-16	201	6-17	201	.7-18
S.No	ltems	Actual	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued
1	Revenue from Operations	8388.7	10035.3	9212.43	12757.9	10958.99	15230.28	12427.91	17177.2	13844.85	20802.2	17411.46	25710.1	21159.39	29752.46	23772.22
2	Other Income	710.05	749.68	688.21	570.89	490.39	491.13	400.76	602.81	485.86	478.96	400.89	866.63	713.24	1013.86	810.07
	Total Output	9098.75	10785.01	9900.64	13328.74	11449.39	15721.41	12828.67	17780.04	14330.71	21281.18	17812.35	26576.70	21872.62	30766.32	24582.29

Appendix 5 to 8. Revaluation of Labour Input of Energy Sector

Appendix 5

Base year 2010-11 Revaluation of Labour Input of GAIL (India) Ltd. from 2010-11 to 2017-18 Amount in crore

		2010-11	201	2011-12		2-13	201	3-14	201	4-15	201	5-16	201	6-17	201	7-18
S.No.	Items	Actual	Actual	Revalued	Actual	Revalued	Actual	Revalued								
	Salary ,Wages, Bonus and															
1	Benefits	546.39	403.51	372.44	532.76	445.92	600.22	457.97	627.62	450.00	708.70	481.21	757.33	493.78	987.13	625.84
	Contribution to Provident and															
2	Other Funds	60.27	83.51	77.08	131.59	110.14	114.83	87.62	131.42	94.23	149.30	101.37	337.70	220.18	121.25	76.87
	Employees Welfare Expenses															
3	and Others	114.57	120.46	111.18	121.10	101.36	132.68	101.23	147.36	105.66	138.06	93.74	162.50	105.95	193.08	122.41
	Total Labour Input	721.23	607.48	560.70	785.45	657.42	847.73	646.82	906.40	649.89	996.06	676.32	1257.53	819.91	1301.46	825.13

Appendix 6

Revaluation of Labour Input of NTPC Ltd. from 2010-11 to 2017-18

Amount in crore

Base year 2010-11

2010-11 2011-12 2012-13 2013-14 2014-15 2015-16 2016-17 2017-18 Actual Revalued S.No Items Actual Salary, Wages, Bonus and 1 Benefits 2158.44 2499.52 2307.06 2632.71 2203.58 2424.16 1849.63 2522.76 1808.82 2520.96 1711.73 2805.54 1829.21 3552.25 2252.13 Contribution to Provident and 1077.82 Other Funds 337.83 295.86 273.08 372.42 311.71 999.36 762.51 520.45 373.1 543.58 369.09 702.7 623.43 395.25 2 Employees Welfare Expenses 441.24 and Others 293.44 272.38 297.14 444.4 339.13 414.0 544.78 369.9 287.69 558.99 295.10 355.00 577.50 354.40 Total Labour Input 2789.7 3090.48 2852.5 3360.12 2812.4 3867.9 2951.28 3620.7 2596.05 3609.32 2450.7 4324.60 2819.6 4734.67 3001.78

Appendix 7

Revaluation of Labour Input of Oil and Natural Gas Corporation Ltd. from 2010 -11 to 2017-18

Ba	ase	e year 2010-11										Amou	unt in	crore			
2010-11 2011-12 2012-13 2013-14									201	4-15	201	5-16	201	6-17	201	.7-18	
S.	No.	Items	Actual	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued
		Salary, Wages, Bonus and															
	1	Benefits	5020.13	5165.28	4767.55	6817.01	5705.84	6424.14	4901.62	6826.10	4894.31	6458.63	4385.41	7440.27	4851.06	9213.52	5841.37
		Contribution to Provident															
	2	and Other Funds	328.37	754.47	696.38	446.00	373.30	902.65	688.72	944.70	677.35	989.10	671.60	1012.29	660.01	1139.66	722.54
		Employees Welfare Expenses															
	3	and Others	1379.72	876.3	808.82	3067.15	2567.20	3078.25	2348.70	859.09	615.97	1293.57	878.33	3098.21	2020.03	1027.87	651.67
		Total Labour Input	6728.22	6796.05	6272.75	10330.16	8646.34	10405.04	7939.05	8629.89	6187.63	8741.30	5935.34	11550.77	7531.10	11381.05	7215.59

Appendix 8

Revaluation of Labour Input of Power Grid Corporation of India Ltd. from 2010-11 to 2017-18 Base year 2010-11 Amount in crore

		2010-11	20	11-12	20	12-13	201	13-14	20	14-15	20	15-16	201	16-17	20	17-18
S.No	Items	Actual	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued	Actual	Revalued
	Salary, Wages, Bonus and															
1	Benefits	510.66	666.98	615.62	644.71	539.62	665.60	507.85	609.76	437.20	652.49	443.04	858.63	559.83	1300.55	824.55
	Contribution to Provident															
2	and Other Funds	149.22	88.41	81.60	140.38	117.50	159.42	121.64	268.33	192.39	181.42	123.18	357.03	232.78	112.24	71.16
	Employees Welfare Expenses															
3	and Others	86.01	87.58	80.84	101.31	84.80	116.66	89.01	145.56	104.37	146.63	99.56	161.47	105.28	193.10	122.43
	Total Labour Input	745.89	842.97	778.06	886.40	741.92	941.68	718.50	1023.65	733.96	980.54	665.79	1377.13	897.89	1605.89	1018.13

Base year 2010-11