

# A COMPARATIVE PERFORMANCE ANALYSIS OF PUNJAB STATE POWER CORPORATION LTD. (PSPCL): POST REFORMS VS. PRE REFORMS PERIOD

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## **Abstract**

This study involves a comparison of performance of Punjab State Power Corporation Ltd. (PSPCL) in post reforms period as compared to pre reforms period to ascertain the impact of power sector reforms in Punjab. The study tracks a time period of 20 years in power sector in Punjab through performance appraisal of Punjab State Power Corporation Ltd. (PSPCL) in a decade of Post Reforms period as compared to a decade of Pre Reforms period on Key Performance Indicators (KPIs) of power distribution companies. The results indicate that power sector reforms have resulted into significant improvement in the performance of Punjab State Power Corporation Ltd. (PSPCL) on Key Performance Indicators (KPIs) in post reforms period as compared to pre reforms period.

**Keywords:** Key Performance Indicators (KPIs), Post Reforms period, Pre Reforms period.

## **1. Introduction**

The power sector reforms in Punjab involved creation of Punjab State Electricity Regulatory Commission (PSERC) on 31<sup>st</sup> March, 1999 under section 17 of Electricity Regulatory Commissions Act, 1998 to formulate the policies to improve the efficiency in power sector in Punjab. The major objectives of Punjab State Electricity Regulatory Commission (PSERC) are to formulate an efficient tariff setting mechanism, economy and efficiency in pricing of transmission services, facilitate open access and promote competition in power sector in Punjab. The second phase of power sector reforms were introduced in Punjab in the year 2010 when the erstwhile Punjab State Electricity Board (PSEB) which was involved in generation, transmission and distribution of electricity was unbundled into two corporations namely Punjab State Power Corporation Ltd. (PSPCL) and Punjab State Transmission Corporation Ltd. (PSTCL) on 16.04.2010 to separate the power transmission under the provisions of the Electricity Act 2003.

## **2. Key Performance Indicators (KPIs)**

The key issue facing a power distribution company is to provide adequate and reliable supply of power to its consumers at a reasonable price (Paul 1995, Haldea 2001, Phadke et. al. 2003). It follows that primary responsibility of a power distribution company is to match its demand and supply profile, which is often found to be challenging in developing countries like India (Sarkar 2002, Ranganathan & Rao 2004). The ever increasing power bill is another major concern for consumers, the major reason for increasing cost per unit of power is high level of distribution losses which is the difference between input energy and billed energy. The high level of distribution losses lead are due to theft of power and improper metering of power which results into higher burden for power consumers (Mitra 1997, Ahluwalia 2000, Dubash & Rao 2007). The increase in wage bill of power distribution companies along with underutilization of human resources is another major reason for increasing costs of power distribution companies which leads to expensive power for the ultimate consumers

(Rao et. al. 1998, Ramana 2001, Kumar 2004). The power distribution utilities also face the issue of nonpayment of various subsidies by state government provided to agriculture and other categories of consumers, the subsidies usually account for more than 25% of revenues of these utilities. The increasing defaulter consumers especially government departments and delay in release of subsidy by government force these utilities to borrow funds from market which increase their interest cost and reduce the cost recovery ratio of power distribution companies (Ganesh 2001, Jain 2006, Mehta & Pradeep S et. al. 2009, Manju 2011). The Key Performance Indicators (KPIs) of a power distribution company on the basis of above mentioned studies are as follows: (i) Energy Deficit Ratio (ii) Transmission & Distribution (T&D) Losses (iii) Cost Recovery Ratio (iv) Number of Employees per MU sold (v) Number of Employees per Thousand Consumers.

### 3. Methodology

This study aims to compare the performance of Punjab State Power Corporation Ltd. (PSPCL) on Key Performance Indicators (KPIs) as mentioned above in post reforms period as compared to pre reforms period, for this purpose, post reforms period is considered as 2010-11 onwards as the unbundling of erstwhile Punjab State Electricity Board (PSEB) was unbundled into Punjab State Power Corporation Ltd. (PSPCL) and Punjab State Transmission Corporation Ltd. (PSTCL) on 16.04.2010. This study considers a time period of 20 years to examine the performance of Punjab State Power Corporation Ltd. (PSPCL) on Key Performance Indicators (KPIs) in post reforms period from the year 2010-11 to 2019-20 as compared to pre reforms period from the year 2000-01 to 2009-10. The Key Performance Indicators (KPIs) of a power distribution company as mentioned above have been calculated as follows: (i) Energy Deficit Ratio- It is calculated as the difference between demand of energy with energy supplied in MUs as a percentage of demand of energy (ii) Transmission & Distribution (T&D) Losses- It is calculated as the difference between input energy and billed energy as a percentage of input energy (iii) Cost Recovery Ratio- It is calculated by dividing Average Cost of Supply (ACS) by Average Revenue Realized (ARR) per unit (iv) Number of Employees per MU sold- It is calculated by dividing number of employees by number of units sold (in MUs) (v) Number of Employees per Thousand Consumers- It is calculated by dividing number of employees by number of consumers (in Thousands). The data regarding these Key Performance Indicators (KPIs) has been collected from Reports on State Power Utilities by Power Finance Corporation (PFC) and The Load Generation Balance Reports (LGBR) by Central Electricity Regulatory Commission (CERC). The data analysis techniques of Mean, Standard Deviation and T-ratio have been used to determine the significance of difference between performance of Punjab State Power Corporation Ltd. (PSPCL) on Key Performance Indicators (KPIs) in post reforms period as compared to pre reforms period.

### 4. Findings

**Table 1: Energy Deficit Ratio (In Percentage)**

Pre-reforms	Energy Deficit	Post-reforms	Energy Deficit
2000-01	9.50	2010-11	8.00
2001-02	10.30	2011-12	3.10
2002-03	10.70	2012-13	5.40
2003-04	9.10	2013-14	1.50
2004-05	8.30	2014-15	1.00
2005-06	8.70	2015-16	5.10
2006-07	9.80	2016-17	-7.30
2007-08	8.40	2017-18	4.00

2008-09	10.60	2018-19	12.50
2009-10	13.80	2019-20	12.90
<b>Mean/SD</b>	<b>9.92/1.61</b>	<b>Mean/SD</b>	<b>4.62/3.39</b>
<b>T-value=3.96, Sig=.005</b>			

It can be seen from the table 1 that average energy deficit of PSPCL has decreased from 9.92% in pre reforms period to 4.62% in post reforms period. The t-value of difference in average energy deficit of PSPCL in post reforms period as compared to pre reforms period is 3.96 which is significant at .05 level. It shows that there is significant difference in the performance of PSPCL on Key Performance Indicator (KPI) of Energy Deficit Ratio in post reforms period as compared to pre reforms period.

**Table 2: Cost Recovery Ratio (CRR) (In Percentage)**

<b>Pre-reforms</b>	<b>CRR</b>	<b>Post-reforms</b>	<b>CRR</b>
2000-01	95.50	2010-11	89.76
2001-02	99.92	2011-12	97.84
2002-03	93.71	2012-13	102.58
2003-04	104.40	2013-14	101.74
2004-05	91.09	2014-15	100.63
2005-06	98.19	2015-16	107.04
2006-07	83.26	2016-17	111.33
2007-08	85.02	2017-18	103.08
2008-09	91.17	2018-19	100.12
2009-10	90.26	2019-20	103.50
<b>Mean/SD</b>	<b>93.25/6.53</b>	<b>Mean/SD</b>	<b>101.76/5.66</b>
<b>T-value=2.82, Sig=.028</b>			

It can be seen from the table 2 that average Cost Recovery Ratio (CRR) of PSPCL has increased from 93.25% in pre reforms period to 101.76% in post reforms period. The t-value of difference in average Cost Recovery Ratio (CRR) of PSPCL in post reforms period as compared to pre reforms period is 2.82 which is significant at .05 level. It shows that there is significant difference in the performance of PSPCL on Key Performance Indicator (KPI) of Cost Recovery Ratio (CRR) in post reforms period as compared to pre reforms period.

**Table 3: Transmission and Distribution (T&D) Losses (In Percentage)**

<b>Pre-reforms</b>	<b>T&amp;D losses</b>	<b>Post-reforms</b>	<b>T&amp;D losses</b>
2000-01	26.51	2010-11	17.96

2001-02	26.25	2011-12	17.42
2002-03	24.67	2012-13	16.77
2003-04	25.35	2013-14	16.95
2004-05	24.27	2014-15	15.19
2005-06	25.07	2015-16	14.49
2006-07	23.92	2016-17	15.25
2007-08	22.53	2017-18	13.68
2008-09	19.91	2018-19	14.11
2009-10	20.12	2019-20	14.87
Mean/SD	23.86/2.32	Mean/SD	15.67/1.50
T-value=4.92, Sig=.001			

It can be seen from the table 3 that average Transmission and Distribution (T&D) Losses of PSPCL has decreased from 23.86% in pre reforms period to 15.67% in post reforms period. The t-value of difference in average Transmission and Distribution (T&D) Losses of PSPCL in post reforms period as compared to pre reforms period is 4.92 which is significant at .05 level. It shows that there is significant difference in the performance of PSPCL on Key Performance Indicator (KPI) of Transmission and Distribution (T&D) Losses in post reforms period as compared to pre reforms period.

**Table 4: Number of Employees per Million Units (MUs) Sold**

Pre-reforms	No. of Employees	Post-reforms	No. of Employees
2000-01	4.52	2010-11	1.55
2001-02	4.38	2011-12	1.47
2002-03	4.06	2012-13	1.29
2003-04	3.80	2013-14	1.17
2004-05	3.71	2014-15	1.02
2005-06	3.05	2015-16	1.20
2006-07	2.63	2016-17	1.34
2007-08	2.20	2017-18	1.55
2008-09	2.05	2018-19	1.30
2009-10	1.89	2019-20	1.30
Mean/SD	3.23/0.99	Mean/SD	1.32/0.16
T-value=4.62, Sig=.001			

It can be seen from the table 4 that average Number of Employees per Million Units (MUs) Sold of PSPCL has decreased from 3.23 in pre reforms period to 1.32 in post reforms period. The t-value of difference in average Number of Employees per Million Units (MUs) Sold of PSPCL in post reforms period as compared to pre reforms period is 4.62 which is significant at .05 level. It shows that there is significant difference in the performance of PSPCL on Key Performance Indicator (KPI) of Number of Employees per Million Units (MUs) Sold in post reforms period as compared to pre reforms period.

**Table 5: Number of Employees per Thousand Consumers**

Pre-reforms	No. of Employees	Post-reforms	No. of Employees
2000-01	16.83	2010-11	7.59
2001-02	16.18	2011-12	7.04
2002-03	15.36	2012-13	6.22
2003-04	14.89	2013-14	5.71
2004-05	14.35	2014-15	5.18
2005-06	12.73	2015-16	2.13
2006-07	11.78	2016-17	2.30
2007-08	11.10	2017-18	2.61
2008-09	10.09	2018-19	2.23
2009-10	9.30	2019-20	2.56
Mean/SD	13.26/2.63	Mean/SD	4.36/2.20
T-value=6.28, Sig=.000			

It can be seen from the table 5 that average Number of Employees per Thousand Consumers of PSPCL has decreased from 13.26 in pre reforms period to 4.36 in post reforms period. The t-value of difference in average Number of Employees per Thousand Consumers of PSPCL in post reforms period as compared to pre reforms period is 6.28 which is significant at .05 level. It shows that there is significant difference in the performance of PSPCL on Key Performance Indicator (KPI) of Number of Employees per Thousand Consumers in post reforms period as compared to pre reforms period.

## 5. Conclusion and Recommendations

It can be concluded from findings of the study that reforms in the power sector of Punjab mainly in the form of setting up of Punjab State Electricity Regulatory Commission (PSERC) and Unbundling of erstwhile Punjab State Electricity Board (PSEB) have resulted into significant improvement in the performance of Punjab State Power Corporation Ltd. (PSPCL) on Key Performance Indicators (KPIs) in post reforms period as compared to pre reforms period. The study also depicts high level of Transmission and Distribution (T&D) Losses which have come down in post reforms period but they need to be further brought down as they contribute greatly in increasing the cost per unit for ultimate consumers.

## 6. Future Course of Action

This study has established a model for performance appraisal of power distribution companies on the basis of Key Performance Indicators (KPIs), this model can be used to conduct performance appraisal of power distribution companies in other states. This will help the policymakers to assess the state of affairs of power distribution companies in other states to undertake requisite measures under the power sector reforms process in the country.

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