

## **The Impact of Reforms on Efficiency: A Success Story of Power Sector in Punjab**

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**Abstract:** *This study examines the journey of power sector reforms in India and explores key parameters of efficiency in power sector. It aims to assess the impact of reforms on efficiency in power sector in Punjab by comparing the performance of PSPCL in post-reforms period as compared to PSEB in pre-reforms period on key parameters of efficiency in power sector. The results show that the reforms process has brought about significant overall improvement in the level of efficiency in power sector in Punjab.*

**Keywords:** Power Sector Reforms, Efficiency, Post-reforms, Pre-reforms.

### **Introduction**

The entire gamut of activities in power sector in India like generation, transmission and distribution of electricity were being carried out by State Electricity Boards (SEBs) under the provisions of the Electricity Supply Act, 1948 (Gupta 1998, Ramana 2001). During the 1980's, the SEBs started facing major problems like imbalance in demand and supply of power, poor financial health, huge Transmission & Distribution (T&D) losses and poor billing & collection of revenue (World Bank 1991, TERI 1993, Rao et.al. 1998). The consumers of electricity also faced a lot of problems like high frequency of power cuts, low & fluctuating voltage, lack of responsiveness of service providers and inadequate grievance redressal mechanisms (Paul 1995, Report on India's Power Sector 2003).

### **Power Sector Reforms**

The power sector reforms involve changes in management, ownership, structure and regulation of the power sector (Haldea 2001, Phadke et. al 2003). The power sector reforms in India were initiated as a part of major economic reforms carried out in 1991 (Ganesh 2001, Sarkar 2002). The Electricity Act, 2003 introduced a number of policy changes in the power sector like Delicensing of power generation, Restructuring of SEBs, Electricity Regulatory Commissions (ERCs), Power trading and Open access among others (Ranganathan & Rao 2004, Dubash & Rao, 2007, Mehta & Pradeep S et.al. 2009). Power sector reforms in Punjab were initiated with the establishment of Punjab State Electricity Regulatory Commission (PSERC) on 31.03.1999 (Ahluwalia 2000, Kumar 2004). A decade later, Punjab state electricity board (PSEB) was unbundled into PSPCL and PSTCL to separate the power transmission under the provisions of the Electricity Act 2003 on 16.04.10 to take the reforms process further in power sector in the state.

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### Efficiency in Power Sector

The major concern for power sector in India has been the declining efficiency of state electricity boards as majority of SEBs face imbalance in demand and supply of power especially in summers resulting into power cuts (Mitra 1997, Jain 2006). The level of transmission and distribution (T&D) losses is an important indicator of efficiency level of a power utility (Reddy & Sumitra 1997, Rao et al., 1998). The inefficiency of the SEBs has also been attributed to overstaffing with the parameters like number of employees per MU sold and number of employees per thousand consumers much higher than developed countries. The mismatch between growing input costs like power purchase, fuel, employee, interest costs and declining revenues due to subsidized supply of power has lead to low cost recovery ratio of SEBs (Report on India's power sector 2003, Manju 2011). Keeping in view the existing studies on efficiency in power sector, the impact of reforms on the efficiency of PSPCL has been assessed on the following parameters:

(i) Power Deficiency ratio (ii) Transmission and Distribution (T&D) losses (iii) Cost recovery ratio (CRR) (iv) Number of employees per MU sold (v) Number of employees per thousand consumers.

### Methodology

The objective of this study is to assess the impact of reforms under the Electricity Act 2003 involving unbundling of erstwhile Punjab State Electricity Board (PSEB) into PSPCL and PSTCL to separate the power transmission from generation and distribution of power in the state. The impact of reforms on the level of efficiency in power sector in Punjab has been assessed by a comparison of performance of PSEB in pre-reforms period 2004-05 to 2009-10 with its successor entity Punjab State Power Corp. Ltd. (PSPCL) in the post-reforms period 2010-11 to 2014-15 on key parameters of efficiency in power sector. The data regarding these key parameters has been collected from various issues of reports on the performance of state power utilities by Power Finance Corporation (PFC) and LGBR by Central Electricity Regulatory Commission (CERC). The data collected has been analyzed by using Mean, Standard Deviation and T-Ratio to determine the significance of difference in efficiency level of PSPCL on various parameters of efficiency in post-reforms period as compared to PSEB in pre-reforms period.

### Findings

**Table 1: Power Deficiency ratio (In Percentage)**

Pre-reforms	Power Deficiency	Post-reforms	Power Deficiency
2005-06	8.7	2010-11	8.0
2006-07	9.8	2011-12	3.1
2007-08	8.4	2012-13	5.4
2008-09	10.6	2013-14	1.5
2009-10	13.8	2014-15	1.0
<b>Mean/SD</b>	<b>10.26/2.17</b>	<b>Mean/SD</b>	<b>3.8/2.91</b>
<b>T-value=3.98, Sig.=.004</b>			

**Source:** LGBR reports (various issues), CEA.

It can be seen from the table 1 that the average power deficit of PSPCL has decreased from 10.26% in pre-reforms period to 3.8% in post-reforms period. The t-value of difference in average power deficit of PSPCL in post-reforms period as compared to pre-reforms period is

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3.98 which is significant at .05 level showing that there is significant difference in performance of PSPCL on the parameter of power deficiency in post-reforms period as compared to pre-reforms period in power sector in Punjab.

**Table 2: Transmission & 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>
2005-06	25.07	2010-11	17.96
2006-07	23.92	2011-12	17.42
2007-08	22.53	2012-13	16.77
2008-09	19.91	2013-14	16.95
2009-10	20.12	2014-15	15.19
<b>Mean/SD</b>	<b>22.31/2.28</b>	<b>Mean/SD</b>	<b>16.86/1.04</b>
<b>T-value = 4.87, Sig.=.001</b>			

**Source:** Power Finance Corporation reports (various issues).

It can be seen from the table 2 that the average transmission and distribution (T&D) losses of PSPCL have decreased from 22.31% in pre-reforms period to 16.86% in post-reforms period. The t-value of difference in average T&D losses of PSPCL in post-reforms period as compared to pre-reforms period is 4.87 which is significant at .05 level showing that there is significant difference in performance of PSPCL on the parameter of T&D losses in post-reforms period as compared to pre-reforms period.

**Table 3: Cost Recovery Ratio (CRR) (In Percentage)**

<b>Pre-reforms</b>	<b>CRR</b>	<b>Post-reforms</b>	<b>CRR</b>
2005-06	98.19	2010-11	89.76
2006-07	83.26	2011-12	97.84
2007-08	85.02	2012-13	102.58
2008-09	91.17	2013-14	101.74
2009-10	90.26	2014-15	100.63
<b>Mean/SD</b>	<b>89.58/5.41</b>	<b>Mean/SD</b>	<b>98.51/5.21</b>
<b>T-value = 2.75, Sig.= .025</b>			

**Source:** Power Finance Corporation reports (various issues).

It can be seen from the table 3 that the average cost recovery ratio (CRR) of PSPCL has increased from 89.58% in pre-reforms period to 98.51% in post-reforms period. The t-value of difference in average CRR of PSPCL in post-reforms period as compared to pre-reforms period is 2.75 which is significant at .05 level showing that there is significant difference in performance of PSPCL on the parameter of cost recovery ratio (CRR) of PSPCL in post-reforms period as compared to pre-reforms period.

**Table 4: Number of Employees per million units (MU) sold**

<b>Pre-reforms</b>	<b>No. of Employees</b>	<b>Post-reforms</b>	<b>No. of Employees</b>
2005-06	3.05	2010-11	1.55
2006-07	2.63	2011-12	1.47
2007-08	2.20	2012-13	1.29
2008-09	2.05	2013-14	1.17
2009-10	1.89	2014-15	1.02

<b>Mean/SD</b>	<b>2.36/.47</b>	<b>Mean/SD</b>	<b>1.30/.22</b>
<b>T-value= 4.58, Sig.=.002</b>			

**Source:** Power Finance Corporation reports (various issues).

It can be seen from the table 4 that the average number of employees per MU sold of PSPCL has decreased from 2.36 in pre-reforms period to 1.30 in post-reforms period. The t-value of difference in average number of employees per MU sold of PSPCL in post-reforms period as compared to pre-reforms period is 4.58 which is found to be significant at .05 level showing that there is significant difference in performance of PSPCL on the parameter of number of employees per MU sold in post-reforms period as compared to pre-reforms period.

**Table 5: Number of Employees per thousand consumers**

<b>Pre-reforms</b>	<b>No. of Employees</b>	<b>Post-reforms</b>	<b>No. of Employees</b>
2005-06	12.73	2010-11	7.59
2006-07	11.78	2011-12	7.04
2007-08	11.10	2012-13	6.22
2008-09	10.09	2013-14	5.71
2009-10	9.30	2014-15	5.18
<b>Mean/SD</b>	<b>11/1.35</b>	<b>Mean/SD</b>	<b>6.35/.98</b>
<b>T-value= 6.24, Sig.=.000</b>			

**Source:** Power Finance Corporation reports (various issues).

It can be seen from the table 5 that the average number of employees per thousand consumers of PSPCL has decreased from 11 in pre-reforms period to 6.35 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 6.24 which is found to be significant at .05 level showing that there is significant difference in performance of PSPCL on the parameter of number of employees per thousand consumers in post-reforms period as compared to pre-reforms period.

### **Conclusion and Recommendations**

It can be concluded that the reforms process has brought about significant improvement in the level of efficiency in power sector in Punjab as there is significant improvement in each of the key parameters of efficiency of PSPCL in post-reforms period as compared to pre-reforms period. However, the policy makers should ensure that healthy gains in efficiency achieved out of reforms process in power sector should result into increased level of consumer satisfaction in power sector in the state.

### **Future Course of Action**

The future research in this area should focus on impact assessment of reforms on the level of efficiency in power sector in other states as it has not been explored so far. The interstate comparison between model of reforms and its impact on level of efficiency in power sector in a given state can be of immense use for policymakers.

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