Financial Sustainability of Indian Power Sector: Curbing Losses of Distribution Companies

Review of Integrative Business & Economics Research

Namrata Bhardwaj*
Malaviya National Institute of Technology Jaipur (Rajasthan, India)

Dipti Sharma
Department of Humanities and Social Sciences, Malaviya National Institute of Technology Jaipur (Rajasthan, India)

ABSTRACT

Electricity is one of the most essential parts of a country's economic growth and development which makes for a country's power sector to be financially sustainable. Indian power sector suffers from huge annual losses in different electricity segments i.e. generation, transmission and distribution. Annual Power Finance Corporation Report states that the aggregate book losses on accrual basis of all state power utilities increased from Rs 66,022 crore in 2014-15 to Rs 89,603 crore in 2015-16. Among all the segments, distribution segment suffers from continuous losses despite of various reforms being adopted for its growth. Distribution sector is revenue generating link which makes it essential to convert loss incurring utilities into profit ones so that it can cope up with rising energy demand. Through case study analysis of profit making Utility and Financial Sustainability of Electricity Sector approach this paper throws light on the loopholes of one of the top three loss incurring utilities i.e. Rajasthan and recommendations that can be considered in order to make it profitable.

Keywords: Electricity, T&D loss, Aggregate technical & commercial losses.

1. INTRODUCTION

The power sector in India has undergone many changes in order to reduce its losses and attain financial sustainability by adopting new strategies, acts and reforms. Among many measures that were being taken in favour of the power sector by Government of India, the most comprehensive and effective was the electricity act of 2003 which laid down problem-solving measures to fight the plight of Indian power sector. The sector after the enactment of act shifted from regulated business to competitive one. However, competition in distribution segment still needs to be done at a faster pace and holds importance as it is the loss incurring segment because of which the sector is subjected to continuous bailouts and requires financial rescue schemes now and then. Variables like below-cost tariffs for different group of consumers, un-metered supply, free electricity to agriculture and ever-increasing aggregate technical and commercial losses are absolute hurdles for this segment and for the entire sector. These factors have adversely affected state power utilities due to which it fails to attract private investors and the government has to intervene for both investment and working capital.

Aggregate book losses (on accrual basis) in Rs crores are as follows:

Table 1: Aggregate book losses (on accrual basis)

Year	2013-14	2014-15	2015-16
Loss (in RsCr.)	65286	66022	89603

Source: Power Finance Corporation

Table 1 show that this sector is subjected to continuous losses in recent years. It also faced bailout in the year 2011.

1.1 Literature Review

Amit Sharma and Dipti Sharma (2018) analyses competition in the short-term power market in India. Their research emphasizes the magnitude of competition in the short-term power market in India since the initiation of power exchanges in the year 2008 by using the Hirschman Herfindahl Index (HHI) which takes the volume of electricity transacted by the traders in the market. It also uses the VAR model to check the causality of the price of electricity with the HHI and number of traders in the short-term power market. The paper concludes on a note that in the absence of adequate integration of the national grid, the spirit of the Indian Electricity Act, 2003 to increase the competition and efficiency in the Indian power sector will be defeated.

Ranajoy Bhattacharya and Amrita Ganguly(2017) discuses cross subsidy removal in electricity pricing in India. In India electricity price for agriculture is cross subsidized by the industries. The Indian government has started a process through which the extent of cross subsidization is gradually being reduced. The idea is to replace the cross subsidization by 2030 and introduce a rate structure that will increase with the amount of electricity usage. This study uses the computable general equilibrium framework to evaluate the ex-ante impact of these policy changes on the Indian economy. The paper states that removal of cross subsidies will increase inflation particularly food inflation resulting in a decline in household incomes more in rural areas. Replacing cross subsidies with a progressive rate structure will compensate for only a small part of the negative effects of the removal of cross subsidies. Four other policy options were also investigated targeting household incomes, food inflation and general inflation. Most of these options do not work as the required increase in budget deficit is unlikely to be bearable to the government. The only feasible option appears to be a direct price subsidy to agricultural sector: in this case food prices are held down, inflation is moderate and effect on household incomes is minimal.

Vibhuti Garg et al. (2016) in their report on assessment of the financial sustainability of the electricity sector in Rajasthan analyses the financial performance of power sector in Rajasthan by using Financial Sustainability Electricity sector (FSES) approach which is analytical framework developed by the Global Subsidies Initiative (Nguyen, Bridle, &Wooders, 2014). In this they have analysed performance based on four areas 1) recover operating costs; ii) reliably meet demand; iii) make investments; and iv) operate according to environmental and social norms. Increase in electricity demand in Rajasthan has been met by increasing generation capacity but the distribution segment have struggled from past to cover its costs via revenues realised from consumers and have continuously called for state government financial rescue schemes therefore causing the biggest challenge for the sector to attain the financial viability by allowing discoms to cover their cost through sales.

T. Sharma et al. (2016) emphasizes downplay of psycho-social factors compared to technological factors in electricity theft. When it comes to financial losses of the power sector electricity theft is found to be a worldwide phenomenon. India, like many other

developing countries is in the grip of electricity theft. To solve this issue the country introduced various technological solutions which failed to realize their promised potential. Therefore, it is necessary to realize the importance of psycho-social factors in controlling the theft. Though, employee theft has been explained by distinct perspectives like sociology, psychology, criminology, organizational science etc., none describes the phenomenon completely. In order to gain a holistic understanding, it is imperative to integrate the said perspectives. That's precisely what this study attempts. It proposes an integrated conceptual framework of the psycho-social factors that predispose employees to collude with consumers in electricity theft.

Fabian B Lewis (2015) presents an investigation of the link between electricity theft and power disruptions simultaneously a rare and contemporary cross-country analysis of electricity theft. The study examines evolution of electricity theft internationally while estimating the direct cost of power interruptions to Jamaica and 96 other countries. The data was extracted from the Jamaica public service commission annual reports and the World Bank's (World Bank 2014) World Development Indicators database. Specific emphasis was placed on examining the extent of electricity theft suffered by JPS over the period 2003-2013, a period for which rare disaggregated electricity data were available for Jamaica. The information was complemented by cross country data on electric power transmission and distribution losses as a percentage of output extracted from World Bank (2014). Overall dataset was generated covering 100 countries. The findings suggest that electricity theft in Haiti ranked first overall and that extensive power theft has risen internationally since 1980. The direct cost of electricity disruptions ranged from US$0.43 to US$9.91 per kWh.

Mani Khurana and Sudeshna Ghosh Banerjee (2014) in their world bank report on financial performance of India's power sector stated that in September 2012, the Cabinet Committee on Economic Affairs approved a financial rescue scheme to revive the power generation sector. This bailout amounted to about Rs 1.9 trillion and came in response to banks and other financial institutions with large nonperforming loans to the power sector. This is the second time that this sector faced bailout in a decade. The first was in 2002 when the government had to convert the outstanding arrears of state electricity boards to central public sector undertakings. The first bailout of the decade required Rs 400 billion in state government bonds to restore the sector to financial solvency. The recent crisis and consequent bailout are more complicated as compared to the previous one. Recent developments inpower sector have brought new players into an environment which is prominently government-dominated sector, and these new players have also been incriminated into the crisis. The below graph and data will make the scenario of plight clearer.

C P Chandrshekhar(2013) discuss that the financial sector legislative reforms commission has exploited its ambiguous terms of reference to suggest a compete revamp of financial regulations. There are certain recommendations which if considered would shift power from parliament to "independent bodies" runby nominated experts and subject to scrutiny by a legal framework that might be capable of judging fairness of regulatory reach but not its appropriateness from the point of view of development. This is no legislative reforms commission but a commission that is serving as a vehicle to legalise a regulatory structure suited to a liberalised financial sector.

CUTS (2013) have performed a comparative analysis of the discoms of the four states i.e. Gujarat, Maharashtra, Tamil Nadu and Bihar. It reveals that adhering to the principles of competition has resulted in benefits. In Gujarat, all four discoms have been showing

consistent profitable operations, healthy cash collections and cost reflective tariffs. In Maharashtra, although a consistent profitable operation is not seen, anti-theft measures and network strengthening, besides reduction in AT&C losses have resulted in a good grade for the discom. Tamil Nadu's performance has, however, been marred by delays in servicing bank loans and free/subsidized power to certain sections. Bihar also landed with a B grade on account of high AT&C losses, high unmetered consumption and poor revenue collections.

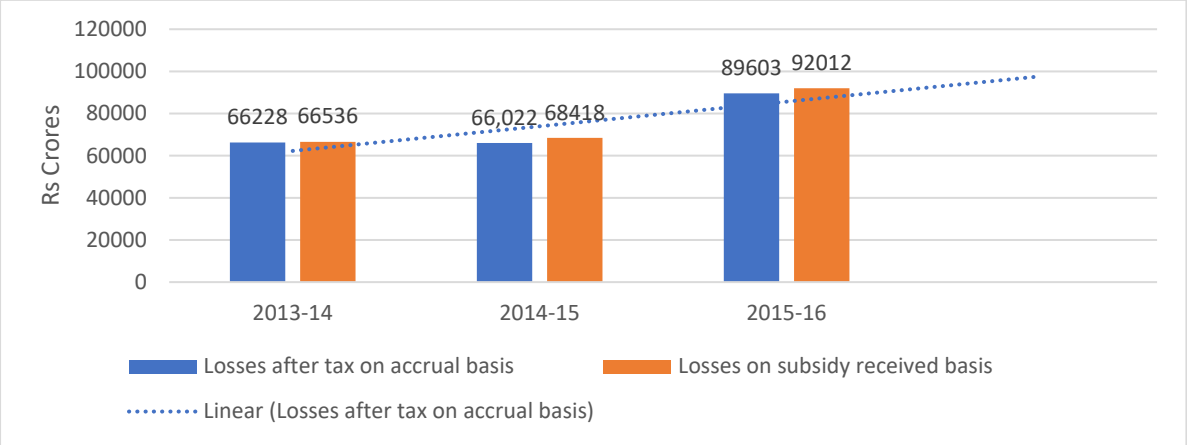
Miriam Golden (2012) studies theft and loss of electricity in to the most populous Indian state i.e. Uttar Pradesh. The research analyses data extracted from power corporation of the State from the time span of 10 years (2000-2009). The results show that the magnitude of electricity theft is substantial. The extent of theft varies with the electoral cycle of the State. During elections electricity theft increases substantially compared to the normal year. Theft increases with the intensity of tube wells, suggesting that it is linked to unmetered electricity use by farmers. Incumbent legislative members of the state assembly are more likely to be re-elected as power theft in their locality increases. Interpretation of these results is that power theft exhibits characteristics consistent with the political capture of public service delivery by local elites.

The Shunglu Committee Report (2011) highlighted the accumulated losses for the preceding five years (2006-2010) were Rs 1,79,000 crore before subsidies were included and Rs 82,000 crore after they were incorporated. For the year 2009-10 alone, the financial loss of all distribution companies was Rs 57,000crore before subsidy and about Rs 27,000 crore after subsidy. These losses are primarily due to the poor managerial and operational practices of distribution companies and compounded by unpredictability in tariffs set by regulators. The panel recommended that SERCs be made financially, as well as functionally, independent. The selection of Chairpersons and Members should be fine-tuned, and their functioning should be scrutinized by an expert group to determine to what extent the commissions have discharged their statutory duties such as the timely and regular revision of tariffs. The panel suggested that, in areas where losses are high, a loss surcharge should be imposed over and above the basic tariff. Discom losses have been substantially financed by commercial banks, with a large part of the loans guaranteed by state governments. The panel suggested that, subject to the state government and its utilities agreeing to and implementing a set of measures listed in the action plan, these loans could be suitably rescheduled. In case of failure to meet the rescheduled obligations, such assets should be taken away from the banks and placed with a special purpose vehicle (SPV) to be established. The SPV should be owned by the Reserve Bank of India and be empowered to deal appropriately with the defaulting utilities/state governments including debiting state government accounts.

1.2 Objective of the study

Figure 1 depicts that the aggregate losses on accrual basis registered by the power utilities has shown an increasing trend from 66,022 crores in 2014-15 to Rs 89,603 crore in 2015-16 while the losses on subsidy received basis also increased from 68,418 in 2014-15 to Rs 92,012 crores in 2015-16 (Fig 1).

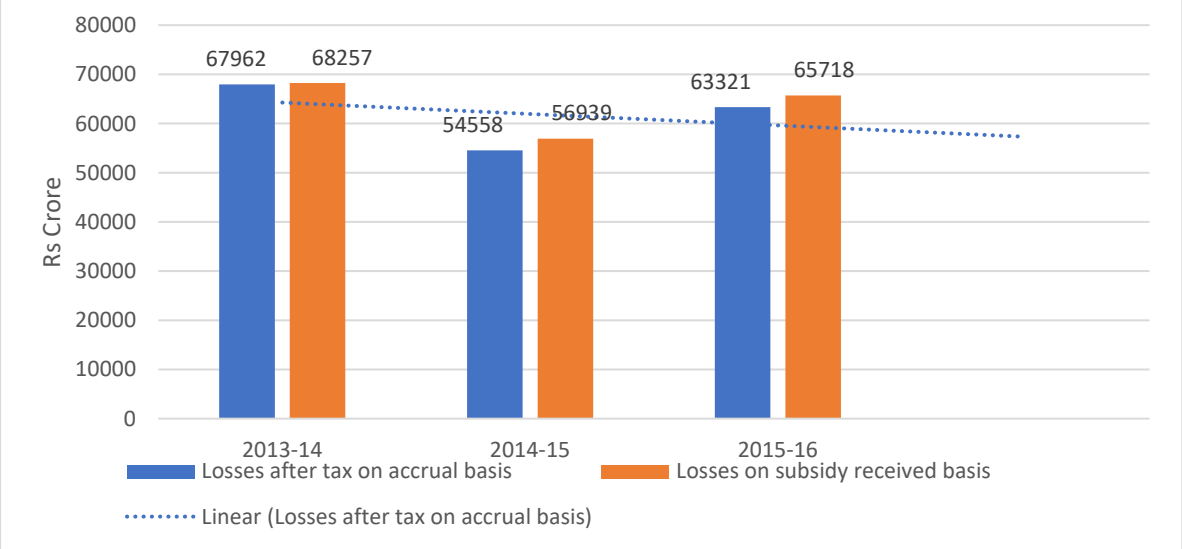
Fig.1: Aggregate losses of all utilities in India



Source: Power Finance Corporation

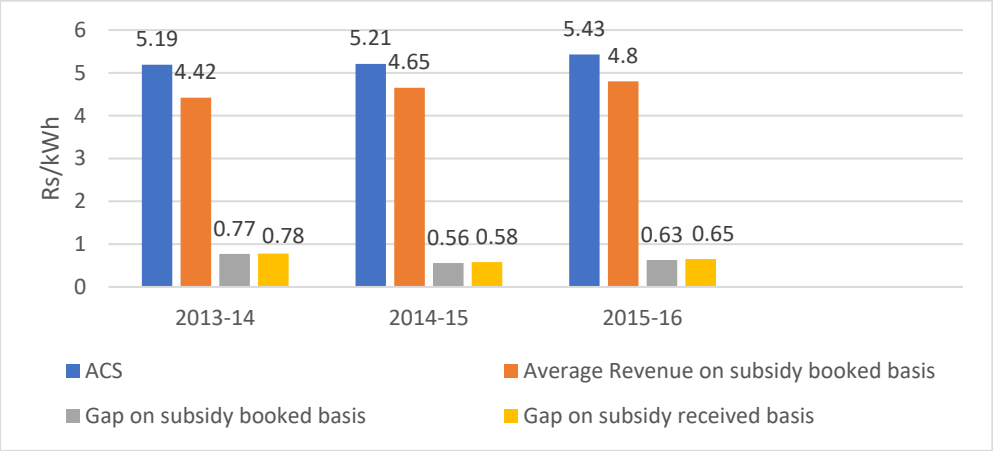
Utilities selling directly to consumers have an aggregate book loss increased from Rs 54,558 crores in 2014-15 to Rs 65,718 crores in 2015-16 while losses on subsidy received basis show an increase of Rs 65,718 crores in 2015-16 as compared to previous year which registered a loss of Rs 56,939 crores (Fig 2).

Fig.2: Aggregate Losses of Utilities Selling Directly to Consumers in India



Source: Power Finance Corporation

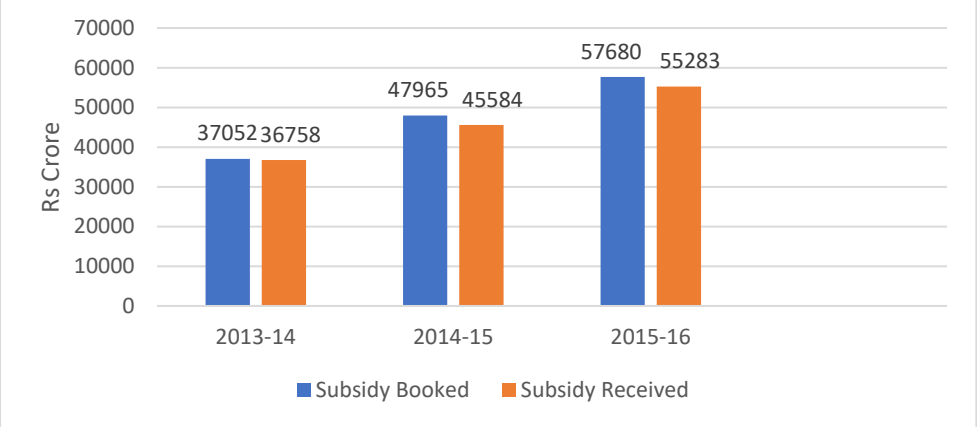
Fig.3: Revenue Gap of Utilities



Source: Power Finance Corporation

While gap on subsidy booked basis show a decreasing trend from Rs 0.77/kwh in 2013-14, Rs 0.56/kwh in 2014-15, it rises up to Rs 0.63/kwh in 2015-16. Also, the same trend is visible in case of subsidy received basis which shows decrease from Rs 0.77/kwh in 2013-14 to Rs 0.58/kwh in 2014-15 but again increases to Rs 0.65/kwh in 2015-16 (Fig 3).

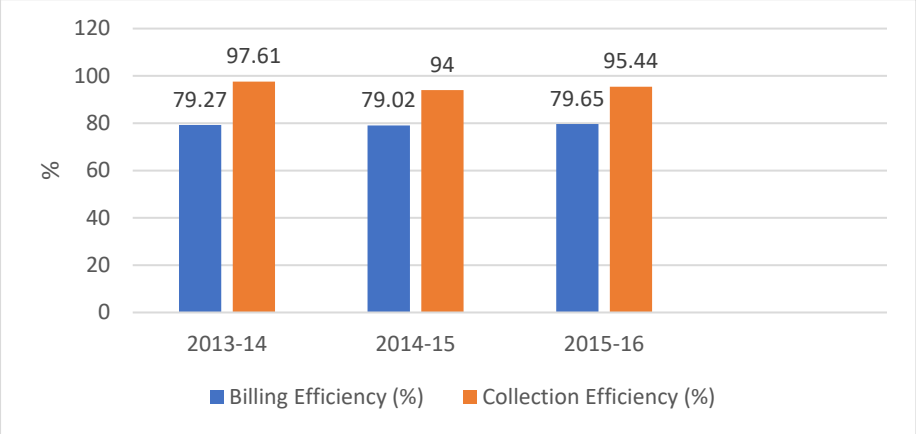
Fig.4: Gap between Subsidy Booked and Subsidy Received



Source: Power Finance Corporation

Subsidy released by the state government as percentage of subsidy booked by the state power utilities shows improvement which is though not major but a significant increase from 95.04 percent in 2014-15 to 95.84 percent (Fig 4).

Fig.5: Aggregate Technical and Commercial Losses



Source: Power Finance Corporation

The gap between billing efficiency and collection efficiency shows a significant improvement causing the overall aggregate technical and commercial losses to decrease from 25.72 percent in 2014-15 to 23.98 percent in 2015-16 (Fig 5). While some of the variables shows improvement like aggregate technical and commercial loss, decreasing gap between subsidy booked vs subsidy received, the other variables like aggregate losses of utilities selling directly to consumers and gap between average cost of supply and average revenue realised are deteriorating and need a check as soon as possible. For power sector to reduce its losses, it is necessary to pay heed towards utilities which are contributing towards losses and utilities which are showing signs of improvement so that suitable measures can be implemented for uplifting them. Table2& 3 below depicts the scaling and grading of utilities across India.

Table.2. Utility Scaling

Score	Grade	No. of Utilities	Definition of Grading
80-100	A+	7	Very high financial and operational performance
65-80	A	9	High financial and operational performance
50-65	B+	9	Moderate financial and operational performance
35-50	B	8	Below average financial and operational performance
20-35	C+	5	Low financial and operational performance
0-20	C	3	Very low financial and operational performance

On the basis of this scaling and grading pattern utilities are classified as best and worst performing ones which the following table (3) depicts.

Table.3.: Utility Trading

S.No.	Name of Utility	State	Rating Agency	7TH IR Grade (FY 2018)
1	Dakshin Gujarat Vij Company Limited	Gujarat	ICRA	A+
2	Uttar Gujarat Vij Company Limited	Gujarat	ICRA	A+
3	Madhya Gujarat Vij Company Limited	Gujarat	ICRA	A+
4	Bangalore Electricity Supply company Limited	Karnataka	ICRA	A+
5	Paschim Gujarat Vij company Limited	Gujarat	ICRA	A+
6	Mangalore Electricity Supply Company Limited	Karnataka	ICRA	A+
7	Uttarakhand Power Corporation Limited	Uttarakhand	CARE	A+
8	Chamundeshwari Electricity Supply Corporation Limited	Karnataka	ICRA	A
9	Punjab State Power Corporation Limited	Punjab	ICRA	A
10	Eastern Power Distribution company of AP Limited	Andhra Pradesh	CARE	A
11	Dakshin Haryana Bijli Vitran Nigam Limited	Haryana	CARE	A
12	Gulbarga Electricity Supply Company Limited	Karnataka	ICRA	A

13	Maharashtra State Electricity Distribution Company Ltd	Maharashtra	ICRA	A
14	Madhya Pradesh Pash. Kshetra Vidyut Vitran Co. Ltd	Madhya Pradesh	CARE	A
15	Himachal Pradesh state electricity Board Limited	Himachal Pradesh	CARE	A
16	Uttar Haryana Bijli Vitran Nigam Limited	Haryana	CARE	A
17	Assam Power Distribution Company Ltd	Assam	ICRA	B+
18	Kerala State Electricity Board Limited	Kerala	CARE	B+
19	Southern Power Distribution Company of AP Ltd	Andhra Pradesh	CARE	B+
20	Chhattisgarh State Power Distribution Company Ltd	Chhattisgarh	CARE	B+
21	West Bengal State Electricity Distribution Company Ltd	West Bengal	ICRA	B+
22	North Bihar Power Distribution Co. Ltd	Bihar	ICRA	B+
23	Southern Power Distribution Company of Telangana Limited	Telangana	CARE	B+
24	Kanpur Electricity Supply Company Ltd	Uttar Pradesh	ICRA	B+
25	South Bihar Power Distribution Co. Ltd	Bihar	ICRA	B+

26	Hubli Electricity Supply Company Ltd	Karnataka	ICRA	B
27	Jaipur Vidyut Vitran Limited	Rajasthan	CARE	B
28	Ajmer Vidyut Vitran Nigam Limited	Rajasthan	CARE	B
29	Northern Power Distribution Company of Telangana Limited	Telangana	CARE	B
30	Jodhpur Vidyut Vitran Nigam Limited	Rajasthan	CARE	B
31	Paschimanchal Vidyut Vitran Nigam Limited	Uttar Pradesh	ICRA	B
32	Jharkhand Bijli Vitran Nigam Limited	Jharkhand	CARE	B
33	Tamil Nadu Generation and Distribution Corporation	Tamil Nadu	ICRA	B
34	Madhya Pradesh Madhya Kshetra Vidyut Vitran Co. Ltd	Madhya Pradesh	CARE	C+
35	Madhyanchal Vidyut Vitran Nigam Ltd	Uttar Pradesh	ICRA	C+
36	Purvanchal Vidyut Vitran Nigam Ltd	Uttar Pradesh	ICRA	C+
37	Madhya Pradesh Poorvkhetra Vidyut Vitran Co. Ltd	Madhya Pradesh	CARE	C+
38	Dakshinanchal Vidyut Vitran Nigam Ltd	Uttar Pradesh	ICRA	C+
39	Tripura State Electricity Corporation Ltd	Tripura	CARE	C
40	Manipur State Power Distribution Company Ltd	Manipur	CARE	C

41	Meghalaya Power Distribution Corporation Limited	Meghalaya	CARE	C

Source: Ministry of Power

The objective of the present research is to study the major loss making utilities of one of the three States categorised as below average, very low and low operational and financial performing units i.e. Rajasthan.Table 4 & 5 reveals top and bottom five states in terms of profit/loss (on accrual basis) for the year 2015-16.

Table.4. Top five states in terms of profit (on accrual basis) for the year 2015-16

	Rs Crore
Delhi	862
Gujarat	607
West Bengal	479
Uttarakhand	156
Mizoram	69

Source: Ministry of Power

Table.5. Bottom five states in terms of losses (on accrual basis) for the year 2015-16

	Rs Crore
Maharashtra	28,029
Uttar Pradesh	21,291
Rajasthan	12,108
Tamil Nadu	6,050
Madhya Pradesh	5,392

Source: Ministry of Power

In view of the above facts, the authors of this paper targets to study the profit earning strategies adopted by Gujrat power utilities(one of the neighbouring states of Rajasthan). Adopting case study approach,the study attempts to gain insights for measures resulting in financial sustainability of the Indian power utilities through studying the Gujrat (profit making) and Rajasthan (loss incurring) power sectors.

2. METHODOLOGY

As indicated above, a study of profit-making utilities (Gujrat)and loss incurring ones (Rajasthan) is made using secondary data sources viz, Power finance Corporation Reports, Ministry of Power (GOI) Reports and Central Electricity Authority Reports. The research paper tries to figure out the prevailing structure of distribution companies' lossesthrough extensive literature survey and examine the causes behind continuous losses. The performance of electricity sector in Gujarat and Rajasthan is studied by applying a Financial Sustainability Electricity Sector (FSES) approach based on the framework developed by Global Subsidies Initiative (Nguyen, Bridle, &Wooders, 2014). In this paper four major loss causing variables i.e. 1) T&D losses 2) Aggregate technical and

commercial losses 3) Average cost of supply and revenue realized and 4) Tariff structure were discussed.The FSES approach states that Rajasthan Discoms are facing huge losses anda large number of obstacles in recovering costs incurred. At the same time, the case study of Gujarat power sector unveils that by working on the loss causing loopholes, the State has now achieved and ranked high on operational and financial parameters. The present study tries to examine the requisite measures to be adopted for the Discoms of Rajasthan for their financial viability on the major four loss causing variables discussed above.

3. GUJARAT: FINANCIALLY SUSTAINABLE POWER SECTOR

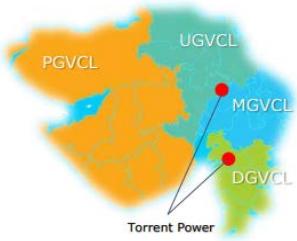
Over the past decade Gujarat has recorded significant economic growth and leads the country in respect of per capita electricity consumption.The State also has a huge untapped energy generation potential through renewable resources which needs to be exploited in order to sustain the State. During the period of 1980s, Gujarat electricity board mainly focused on electrifying rural areas, providing new connections to households and on maintenance activities instead of focusing on profitability and recovery of revenue. As a result of this the state electricity board ran into heavy losses for many years. However,year of 2001 bought hope for the State in which an initiative led by politicians, efficient administrators, acadmicians changed the picture of the State power sector. Reforms were carried out for the sector which included multifaceted strategies including unbundling of the board, renegotiation of power purchase agreements, reducing interest rates on loans, reduction of huge transmission and distribution (T&D) losses without compromising fuel quality and curbing of electricity theft.

Before discussing the reforms that fetch profit to the distribution segment of the state its important to throw light on some of the important statistics related to the generation and transmission segment which clearly states the profitability of the state.

The state currently have installed capacity of around 25,174 MW in which 19791 MW accounts for conventional and 5383 MW for renewables. The state contributes 9% of the total installed capacity of our country and had remained in the frontier in taking climate change initiatves by promoting policies and adopting strategies which are in favour of sustainable energy resources. Another striking fact which contributes to the excellent power conditions in the state is the huge particpation of private players in generation segment. Private sector contributes 48% of total power generation while state utilities holds share of 36% and Central plants have 16% contribution.

The Distribution segment is important and is core to this study. Gujarat is the first state in India to attain 100% electrification of rural areas. The distribution companies of the State are one of the excellent performers. Topographically Gujrat has been divided into four regions and each has been alloted with state distribution companies.Supplying electricity to consumers is responsibility of these companies in each region. An important step taken by the State was the entry of private players in the distribution segment. For that Torrent Power was appointed by the State as a distribution licensee for supplying electricity in Ahmedabad & Gandhinagar, Surat and Dahej. State had total energy availability of around 94,025 MU's (SLDC) in the FY 2015-16 and around 78,147 MU's of electricity was being supplied by Torrent Power and State distribution companies to their consumers.

Fig.6. Division of Gujarat Power Sector



Source: GUVNL

Table.6. Key Highlights of state discoms in FY 2016

Sr No	Data	Unit	PGVCL	DGVCL	MGVCL	UGVCL
1	Divisions	Nos.	45	19	18	21
2	Sub Divisions	Nos.	240	121	113	133
3	HT/LT ratio	Nos.	1.157	0.97	0.80	1.35
4	Number of distribution transformers	Nos.	5,63,381	1,15,076	1,11,736	2,22,666
5	Number of consumers	Nos.	47,18,113	29,42,674	29,13,548	31,94,710
6	Number of Employees	Nos.	13,657	6,793	7,340	7,940
7	SAIFI (System Average Interruption Duration Index)	Nos.	86.36	94.73	53:54	35:74
8	SAIDI (System Average Interruption Duration Index)	Hr:Min	146:29	132:48	63:48	69:25
9	Reliability Index	%	98.32%	98.48%	99.96%	99.21%
10	Distribution Transformer Failure rate	%	11.97%	4.29%	3.91%	4.87%

Source: GUVNL

From the above data it is clear that all the four discoms are shining on all the positive parameters and the reliability of them are 99% alongwith a small percentage rate of distribution transformer failure.

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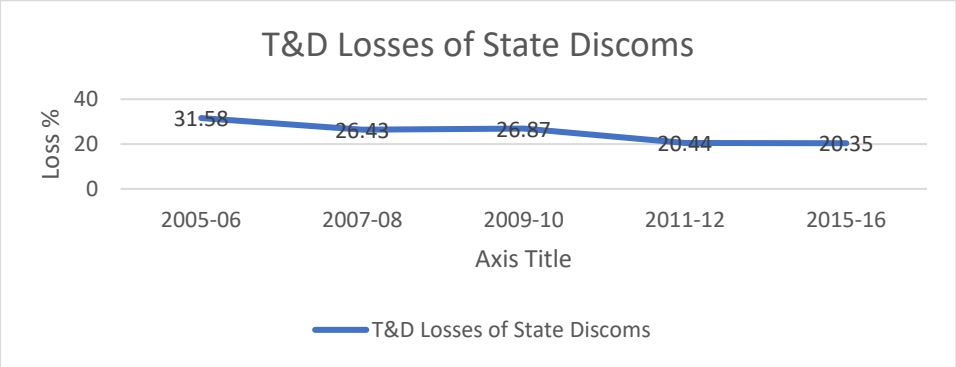
The extensive study of literature review from scholarly articles and Government Report states that the State discoms have increased their reach from 4 lac ckt km in 2005 to 6.64 lac ckt km in 2016 and increased distribution feeders from 6245 to 14503. Currently the state utilities are serving 1.37cr consumers as compared to 82 lakhs consumers in 2005. Hundred percent feeder metering and rural electrification is achieved. Agricultural connections are released at an average of more than one lakh per year alongwith 100 per cent cost reflective tarrifs and collection efficiency. Power purchase agreements and fuel framework is operational which allows each and every adjustment in cost which is to be recovered quarterly. Besides, there is a flexibility in capital structure and cost coverage ratio. There is transparency from the regulatory side and regular, timely filing of tariff petitions and tariff order issuance.Dealing with aggregate technical and commercial losses (AT&C), the State accounts for lowest AT&C losses. Measures taken for this include frequent check on electricity theft, new substation erection, laying down HT/LT arial bunch cable, improvement in voltage by installing new transformers, improved infrastructure of metering and to deal with power theft cases the State has established special police stations and special police courts which solely deal in such cases.

Fig.8. State Utilities T&D losses trend



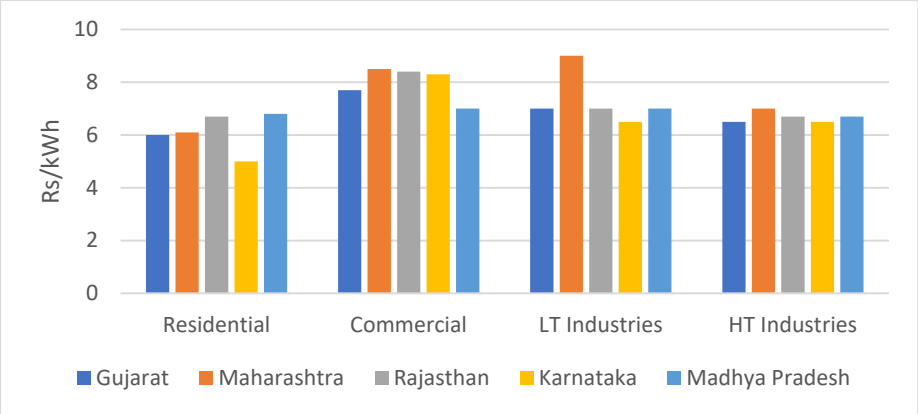
Source: GUVNL

3.1. Financial health of Discoms

From the above data we can conclude that the overall financial health of the discoms is in good condition. State utilities are fetching profit for the State by improving and enhancing their operational performance due to which operation and management expenses are below or within the approved level. The State has signed up for Ujjawal Discom Assurance Yojana which is a financial rescue scheme for discoms which are running into heavy losses. The State strives to improve operational efficiency of state discoms for a operational turnaround under this scheme. Average revenue realized of the State is Rs 6.09 per unit as against average cost of supply which is Rs 6.00 per unit in the year 2015-16. For grants of various government schemes, State government is providing subsidy to discoms for compensating tariff for categories like agricultural consumers, water works and local bodies. Government of Gujrat state has released tariff subsidy of around Rs 4155 cr for this purpose in the year 2015-16. Though hikes in tariff is a common phenomenon

across the country but the discoms of the State has ensured that there are no spikes in the retail tariff strcuture unlike other states in the recent years.This is a symbol of efficient operational, financial and managerial performance. In the recent years average compound annual growth rate of around 3.5% which is less than average inflation growth of 5-6%. The state offers to its consumers reliable power at a competitive prices across all categories.

Fig.9. Consumer category wise tariff comparison across some states



Source: Central Electricity Authority

Government intiatives that were taken in order to strenghten the discoms are:

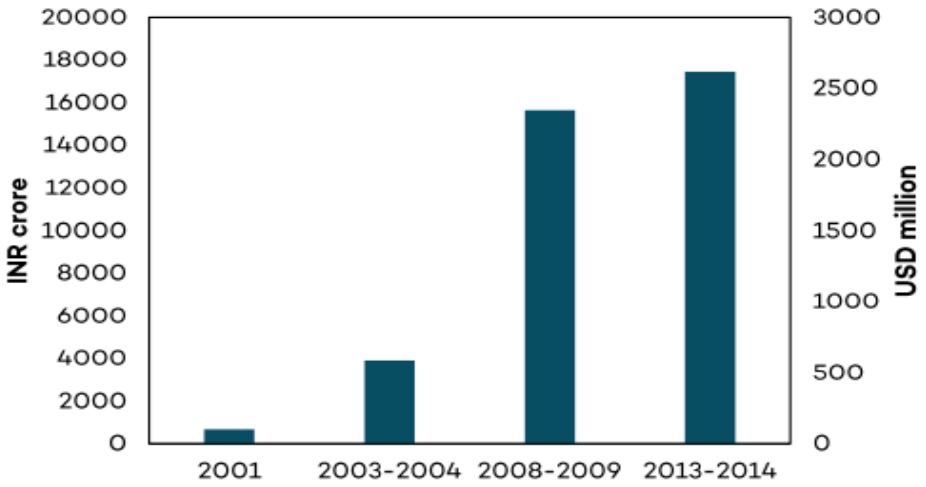
- Jyoti Gram Yojana to ensure 24*7 power supply to rural consumers.
- UDAY scheme to achieve fuel security and reduction in tariff structure.
- IPDS to strengthen sub-transmission and distribution network and improving infrastructure of metering system.
- Time of day pricing for efficient demand side management. State Utilities has implemented Time of Usage pricing which enables utilities to control demand curve and help in flattening of load curve for economic operation by imposing of Time of Usage charges for energy consumption during the peak hours.
- Improved consumer services: online portal for new connection, estimation of generation payment etc, customer care, SMS services and bill payment facility like NEFT, RTGS and payment through debit and credit cards are initiative started to facilitate consumers.

Thus, it can be concluded that efficient management of resources and operational turnaround is necessary for achieving long run goal of financial sustainability and the above-mentioned strategies can be adopted to achieve it. The implementation part of this case study lies in adopting similar strategic plans for the loss incurring utilities. The next section of this paper is focused on loss incurring Rajasthan state power discoms. Rajasthan state utilities have been ranked with grade B which is an indicator of below average operational and financial performance. The 5th annual integrated rating report of 2017 of the Ministry of Power states that Rajasthan holds second position in the country when it comes to losses which amount to Rs 12747 Cr. (FY 2015). It has been identified that apart from high T&D losses, the State is in loss because of high power purchase cost which forces the State to take loans from commercial banks that further result in interest cost and cost of power purchase to increase.

4. RAJASTHAN: A LOSS-INCURRING UTILITY

Rajasthan, as mentioned earlier holds second position in loss making utility. The state has gone through unbundling process during the year 1999 as per the Rajasthan power sector reforms act and got unbundled into generation, transmission and three distribution companies w.e.f. July 19, 2000. The three discoms namely Ajmer Vidyut VitranNigam Limited (AVVNL), Jaipur VidutVitran Nigam Limited (JVVNL) and Jodhpur Vidyut Vitran Nigam Limited (JdVVNL) were formed after unbundling and is continuously contributing to losses.

Fig.10. DISCOM losses in Rajasthan



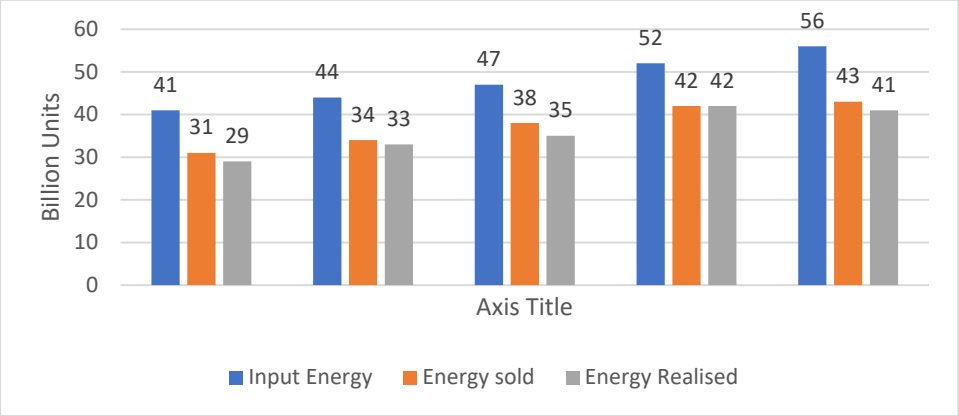
Source: Power Finance Corporation

Table.7. Cost of supply and revenue gap FY 2010 to FY 2014

Parameter	FY10	FY11	FY12	FY13	FY14
ACS (Average cost of supply) (INR/kWh)	4.91	7.13	6.90	5.80	6.54
ARR (Average Revenue Realization) (INR/kWh)	2.24	2.34	2.64	3.15	3.65
Gap (ACS-ARR) (INR/kWh)	2.68	4.79	4.26	2.66	2.89
Total Revenue Gap/Surplus (INR Crores)	12,717	22,586	21,715	14,855	17,451
Subsidy (INR Crores)	871	1204	1,763	2,345	1,525
Gap after Subsidy (INR/kWh)	2.48	4.53	3.91	2.23	2.64
Revenue Gap after Subsidy (Cr.)	11,846	21,382	19,952	12,510	15,926

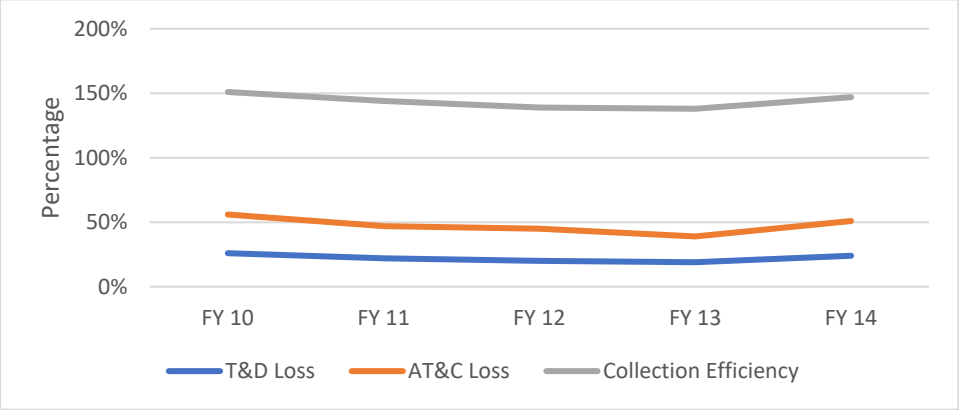
Source: Power Finance Corporation (2010-2014)

Fig.11. T&D, AT&C losses and collection efficiency for the year 2010-2014



Source: Central Electricity Authority

Fig.12. T&D, AT&C losses and collection efficiency for the year 2010-2014



Source: Central Electricity Authority

Discussing these segments separately will help to gain better understanding of the causes which are leading towards losses.

4.1. Ajmer Vidyut Vitran Nigam Limited

AVVNL covers eleven districts of Rajasthan namely Ajmer, Bhilwara, Nagaur, Sikar, Jhunjhunu, Udaipur, Banswara, Chittorgarh, Rajsamand, Doongarpur and Pratapgarh. Statistics show that variables which are causing losses to the sector are:

- Low ratio of cost coverage i.e. 0.80x in FY 2018 (PY: 0.88x)
- Billing efficiency is low79.85% in FY 2018 (PY: 77.90%)
- Collection efficiency is lowat 96.30% in FY 2018 though improved from 96.03% in FY 2017.
- High power purchase costat Rs 4.76 per unit in FY 2018 (PY: Rs 4.59 per unit).

4.2. Jodhpur Vidyut Vitran Nigam Limited

It covers ten districtsJodhpur, Jaisalmer, Bikaner, Sirohi, Jalore, Barmer, Pali, Churu, Hanumangarh and Shriganganagar. Loss causing factors for this discom are:

- Low billing efficiency of around 80.67% in FY 2018 (PY 78.31%)
- Low collection efficiency of around 94.92% in FY 2018 and is improved from 94.29% in FY 2017.

- Power purchase cost is very high at Rs 4.69 per unit in FY 2018 (PY Rs 4.56 per unit)
- Cost coverage ratio is again very low at 0.76x in FY 2018 (PY 0.87X)
- Revenue gap in ARR remains untreated for FY 2019.

4.3. Jaipur Vidyut Vitran Nigam Limited

It covers 12 districts of Rajasthan namely Jaipur, Dausa, Alwar, Bharatpur, Dholpur, Kota, Bundi, Baran, Jhalawar, Sawaimadhopur, Tonk and Karoli. Loss causing variablesare:

- High power purchase cost at Rs 4.68 per unit in FY 2018 as compared to Rs 4.52 per unit in FY 2017.
- Cost coverage ratio is low at 0.82x in FY 2018 as compared to 0.87x in FY 2017.
- Low billing efficiency of 78.94% in FY 2018 as compared to that of 74.52% in the FY 2017.
- Collection efficiency is again low at 94.80% in FY 2018 and shows only a little improvement when compared to that of 94.21% in FY 2017.

Case study analysis of Gujarat state and review of literature states that actions can be taken in the direction of reducing AT&C loss by focusing on the loopholes that are causing such losses. Improvement in the billing efficiency via technical and administrative measures, improvement in the collection efficiency and through appropriate tariff increase cost coverage ratio can be improved and losses can be decreased. Issuance of tariff order by Regulatory Commission as well as on time receipt of tariff subsidies can further improve cost coverage ratio.Policies must be focussed on providing a healthy and competitive environment for private players.

5. CONCLUSION

The challenge before the Rajasthan state power sector and country's power sector as a whole is to attain financial viability especially for the distribution companies as currently this segment is incurring heavy losses. The case study of Gujarat shows that the distribution companies of the State have shown a considerable improvement by working on the major loopholes which are as follows:

- Consistency in case of being profitable facilitated by tariffs which is cost reflective
- Achieving balance between billing and collection efficiency
- Receiving adequate subsidy support from government
- Minimising AT&C losses and keeping it up to 8.95% (FY 2018)
- Balanced cost coverage ratio due to regular tariff revisions
- Timely submitting audited accounts reflecting efficient staff and management.

Applying these measures to the loss incurring utilities can help them cover their deficiencies which can in near future make them profitable and can help them to attain the final objective which financial sustainability.

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