

## Performance analysis of Goa Electricity Department

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**Abstract:** Power being the most crucial component of infrastructure has a direct effect on the economic growth and well-being of the nation. The Indian power sector has significantly progressed to respond to the growing demand for electricity in the country. However it is subject to the challenges of providing efficient electricity at minimum cost. Thus efficiency and viability of the Indian power sector is utmost importance. Viability of any sector depends on its operational efficiency and financial health. The present study is an attempt to analyze the performance of the Goa electricity department which is the only power distribution utility in the state. The findings of the study indicates that the department is one of the better performing state power utilities as far as operational performance is concerned but the department is not financially viable.

**Key words:** Electricity, power consumption, operational performance, transmission and distribution losses.

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Date of Submission: 09-05-2018

Date of acceptance: 24-05-2018

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### I. Introduction

The economic growth and well-being of the nation largely depends on the availability of good infrastructural facilities. Power being the vital component of the country's infrastructure, the growth and development of the economy relies on adequate and efficient supply of electricity. Power sector in India is known to be the most diversified sector among all sectors (**Manpreet Singh**). Due to rapid industrial and technological development, the demand for electricity in India is constantly increasing. Moreover the increasing population and their rising standard of living add to the demand for electricity in the country posing pressure on the availability of power in the country. The Indian power sector has made significant progress to respond to the growing demand for electricity in the country. However it is subject to the challenges of providing efficient electricity at minimum cost (**Vijay Vyas, 2016**). Thus viability of the Indian power sector is utmost importance. Viability of any sector depends on its operational efficiency and financial health. India being the fifth largest power producing country, still faces the challenge to meet the growing demand for electricity. In spite of extensive enhancement in the capacities of the central and state power sectors still the per capita consumption of electricity in India is lowest among the BRICS nations and is just 1/3<sup>rd</sup> of the world average. In the era of ever increasing demand for electricity, it has become necessary for the power utilities to operate in an efficient and economic way to maintain its viability (**Vinod Kumar Yadav, N.P.Padhy and H.O.Gupta, 2011**). Most of the state government owned electricity boards and departments are facing problems in their operational capacities and financial viability. Studies on the performance evaluation of power utilities are of vital importance to recognize the strengths and weaknesses of the sector and for its continuous improvement.

### II. Literature Review

**Tripta Thakur, Deshmukh &Kaushik (2006)** found that the inefficiencies of state electric utilities were sub-optimal and have several potential for significant cost reductions especially the employee cost as most of the electric utilities were sighted o be over staffed.

**According to Rudra Rameshwar, Rajat Agarwal and Mukesh Kumar Pathak (2010)** unstable government, improper commercial execution and politicization of the sector were the reasons for the inefficiencies of the SEBs and blocks many other desirable developments. Restoration of the financial health and improvement in the operational efficiency of the SEBs is most crucial issue in the Indian power sector.

**Anoop Singh (2006)** states that improving financial state of the power sector and to attract the private investment to the power sector was the motive behind the reforms in the Indian power sector. Licensee free thermal generation, non-discriminatory access to the transmission system and open access distribution system were the major inclusions of the Electricity Act, 2003 essential for improving the performance of the Indian power sector in the long run.

**Dr.Shamshuddin Shaik, Dr.Hanifuddin Shaik and Dr.Shaik Khadar Baba** focused on T&D losses which includes grid losses, efficiency losses and power theft and suggested that these can be minimized by

proper selection of transformers, feeders, proper organization of distribution network, placing shunt capacitors. The study suggested introducing smart card metering technology, prepaid card based electric meters, use of Information technology to monitor metering at feeder and proper audit of power distribution can be adopted to reduce loss of electricity in transmission.

**Durgesh Kumer Dubey (2015)** suggest large additions to the installed generating capacity, development of associated transmission and distribution network and employing a comprehensive project management structure to meet the challenges in electricity sector in India with regard to increasing demand for electricity.

According to **Vasundhara Gaur and Eshita Gupta (2016)** in India around 20% electricity generated accounts for loss due to thefts. She associated the power theft to socio-economic governance factors. Improvements in the existing infrastructure along with smart meters would discourage the consumers from stealing electricity.

**S. Micheal and V. Mariappan (2011)** on analyzing the capacity management of electricity service center of the Goa electricity department found dissatisfaction among the customers with regard to managing of electricity service centers and this can be one of the causes of financial loss to the department.

**Raju and Rao (2004)** found that the power sector reforms had positive impact on transmission and distribution of electricity in Andhra Pradesh.

**Kumar (2014)** in his study states that rapidly increasing demand from the growing population in the country, urbanization and increasing access to technology for comfortable life poses problem of power deficit in the Indian power sector.

**Vijay Vyas (2015)** states that the Indian power sector needs to reduce excess dependence on coal and needs to generate more reliable and quality power for the growth of the economy.

### Objective Of Study

The present study aims at analyzing the operational and financial performance of the power sector in Goa, trace the problem areas in the sector and suggest measures to improve the present status of the sector.

### Scope Of The Study

The study covers the assessment of the performance of the Goa Electricity Department for the period of five years from 2010-11 to 2014-15.

## III. Research Methodology

The study is a quantitative analysis of the secondary data obtained from the records of Goa Electricity Department and from the websites of Ministry of power, JERC and Central Electricity Authority. The data is analysed using simple statistical tools.

### Data Analysis And Interpretation

Power is one major infrastructure for the progress of the region. Goa is one of the most financially attractive states of the country and a place of tourist attraction. Goa power sector acquires enormous importance to not only maintain economic growth rate but also to maintain the influx of tourist heritage in the state (**Sony Micheal and V.Mariappan, 2011**). Goa being a small state with the population of about 15 lakh does not have acute problem of shortage of electricity in the state. The power in the state is distributed by the only licensee owned by the government i.e., the Goa Electricity department. The Goa-ED was established in the year 1963 and the electrification drive in the state commenced from 1965. The department does not have its own generation of electricity thus for the power requirement of the state it has to depend on power allocated by Central Government through the power stations of NTPC via western and southern region generating stations which is wheeled through the neighboring state grids by paying heavy wheeling charges. Apart from this very little power is generated in the state by the private sector which is also procured by the department to meet the demand for electricity in the state.

**Table.1: Sector wise Installed Capacity of Electricity in Goa as on 31-01-2016 (In MW).**

Sector	Thermal				Nuclear	Hydro	RES	Total
	Coal	Gas	Diesel	Total				
State	00	00	00	00	00	00	0.05	0.05
Private	00	48	00	48	00	00	48	48
Central	331.35	00	00	331.35	25.80	00	00	357.15
Total	331.35	48	00	379.35	25.80	00	0.05	405.20

**Source: CEA reports (Central electricity authority)**

Table.1 states that major source of electricity in the state is thermal where-as the other sources of electricity include hydro, nuclear etc.

**Table.2: Growth of the Power sector in the State since the time of attaining Statehood**

Key aspects	At the time of Attaining statehood (1987-88)	2016-17
Electricity consumed	376.2 MKwh	3352.16 MKwh
Electrification	Only 15 towns and 377 villages electrified	100% electrification
Per capita consumption of electricity	368 Kwh	2000Kwh(approx.)
Domestic consumption	94.4 MKwh	880.59 MKwh
Commercial Consumption	27.8 MKwh	368.45 MKwh
Industrial consumption	170.5 MKwh	1986.92 MKwh
Agricultural Consumption	6.3 MKwh	29.94 MKwh
Other purposes	77.2 MKwh	86.26 MKwh

Source: Directorate of Planning, Statistics and Evaluation

Table.2 reflects on the growth and development of the power sector in the State since the time of attaining the statehood. There is a significant increase in the consumption of electricity, the state has achieved 100% electrification, per capita consumption of electricity is approximately 2000 Kwh which is above the national per capita consumption of 1236Kwh approx.

**Table.3: Power supply position in the state (in MV)**

Years	Supply/ Availability	Demand/ Required Requirement	Deficit/ Surplus	GOA %Deficit/ Surplus	India % Deficit/ Surplus
2010-11	3026	3092	66	-2.10%	-9.8%
2011-12	3089	3154	65	-2.10%	-10.6 %
2012-13	2981	3024	43	-1.40%	- 9.0 %
2013-14	3107	3181	74	-2.30%	-4.5%
2014-15	3871	3890	19	-0.50%	- 4.7%

Source: CEA reports (Central electricity authority)

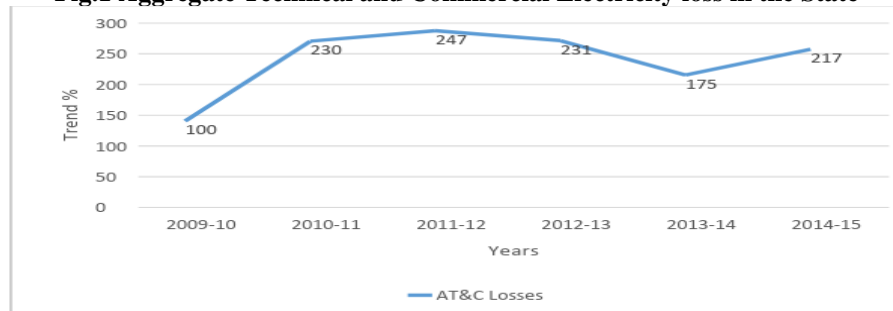
High per capita consumption of electricity, 100% electrification and 24x7 power supply across the state has put pressure on the Department to cater to the needs of the consumers. Table.3 shows that there has been deficit in supply of electricity in the state ranging from 0.5% to 2.5% during last five years. But it is lower than the national deficit of electricity. Goa-ED has been able to manage the growing requirement of electricity by adopting various strategies like pre-informed load shedding.

**Table.4: Aggregate Technical and Commercial Electricity loss in the State**

Year	AT&C losses (%)	Trend %
2009-10	6.12	100
2010-11	14.08	230
2011-12	15.12	247
2012-13	14.14	231
2013-14	10.72	175
2014-15	13.31	217

Source: CEA reports (Central electricity authority)

**Fig.1 Aggregate Technical and Commercial Electricity loss in the State**



Most of the distribution utilities suffer from high AT&C losses. Distribution losses consist of Technical and commercial losses. Technical losses occur due to inefficient transmission and commercial losses occur due unmetered consumption and inefficient billing & collection. Most of the utilities in developed countries have AT&C losses below 15%. As figured in table.4 Goa -ED also suffer from AT & C losses which ranges between 5% to 15% in the last five years which is less than the national AT&C losses which ranges between 25% - 30% (CEA). Thus Goa-ED can be considered among the better performing state utilities in terms of its AT&C losses. Controlling AT&C in the power sector is extremely important to reduce the cost, improve revenue realization and reduce the revenue gap.

**Table.5: Budget allocated to the department and the Actual Expenditure incurred.**

Year	Plan Outlay (Rs. Crores)	Expenditure (Rs. Crores)
2010-11	218.24	983
2011-12	197.24	1,168
2012-13	234.94	1,296
2013-14	177.92	1,192
2014-15	206.37	1,333

Source: Public Finance Corporation Annual report

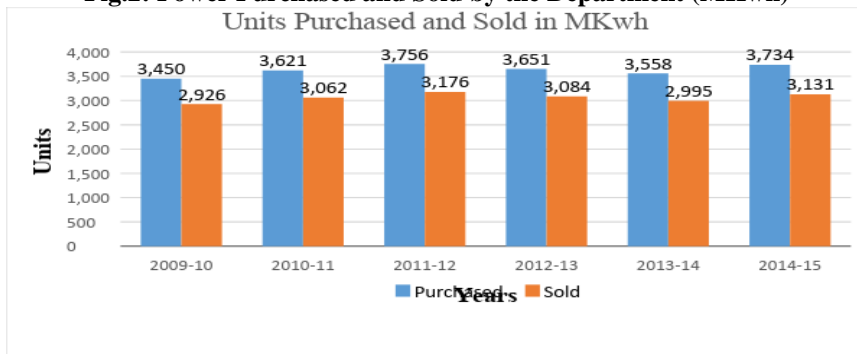
The above statistics in table.5 shows that the department tends to spend more than the budget allocation to the department. The unplanned expenditures sweep off the revenue reserves and lead the department to debt trap making it financially unviable.

**Table.6: Power purchased and sold by the Department (MKwh)**

Year	Purchased	Trend%	Sold	Trend %
2009-10	3,450	100	2,926	100
2010-11	3,621	105	3,062	105
2011-12	3,756	109	3,176	109
2012-13	3,651	106	3,084	105
2013-14	3,558	103	2,995	102
2014-15	3,734	108	3,131	107

Source: CEA reports (Central electricity authority)

**Fig.2: Power Purchased and Sold by the Department (MKwh)**



**Fig.3: Trend Analysis of Units Purchased and Sold.**

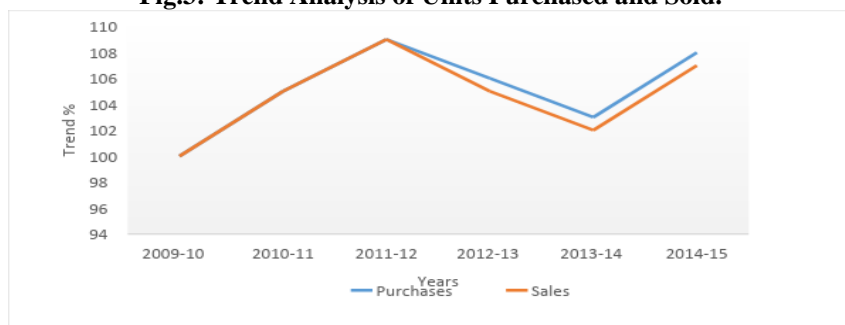


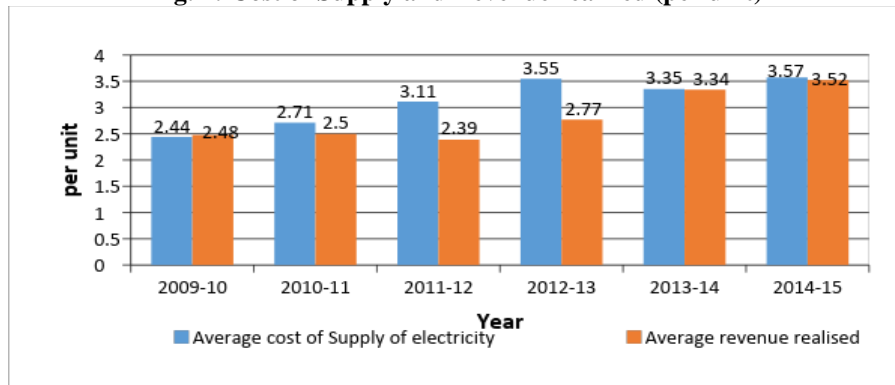
Fig.2 & 3 indicate that all the years the Power purchased is more than the Power sold and there is an increasing gap between purchase and sale of power. The difference in the power purchased and sold is due to poor infrastructure leading to transmission and distribution losses.

**Table.6: Cost of Supply, Revenue realized and gap (per unit)**

Year	Average cost of supply electricity	Trend %	Average revenue realized	Trend %	Gap (ACS-ARR)
2009-10	2.44	100	2.48	100	(0.04)
2010-11	2.71	111	2.50	101	0.21
2011-12	3.11	127	2.39	96	0.72
2012-13	3.55	145	2.77	112	0.78
2013-14	3.35	137	3.34	135	0.01
2014-15	3.57	146	3.52	142	0.05

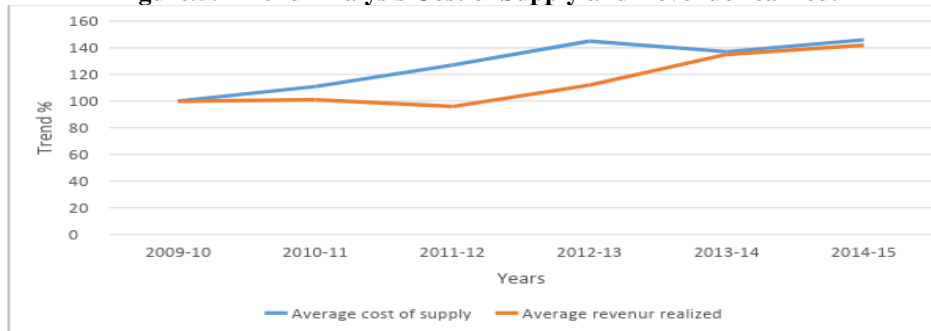
Source: CEA reports (Central electricity authority)

**Fig. 4: Cost of Supply and Revenue realized (per unit)**



Source: CEA reports (Central electricity authority)

**Figure.5: Trend Analysis Cost of Supply and Revenue realized.**



As shown in fig.4 & 5 Per capita consumption of electricity in the state is noticed to be very high, but still the Average Cost of supply is higher than Average Revenue realized thus the department is running in losses. The gap in the Average revenue realized and the cost of supply is due to unviable traffic, non-payment of bills by consumers, faults in meters, non-recording of meter readings and unmetered sale of power, power theft, transmission losses etc. These are certain areas that seek proper supervision and control.

**Table.7: Capital Employed.**

Years	Net worth (equity)	Debt (Loan)	Total Capital Employed	Debt/Equity ratio
2009-10	1,006	128	1,134	0.13
2010-11	927	113	1,040	0.12
2011-12	657	71	727	0.11
2012-13	372	109	481	0.29
2013-14	368	97	465	0.26
2014-15	350	54	404	0.15

Source: CEA reports (Central electricity authority)

As shown in table.7 the net worth of the department is decreasing thus decreasing the capital employed but still the debt-equity ratio is maintained in the safe limits. Thus the solvency position of the Department is still good.

#### **IV. Conclusion**

The Goa-ED is facing lot of challenges with respect to its operational and financial performance but still the department has initiated lot of measures to improve the power sector scenario in the state to achieve sustainability by provide quality and reliable power at reasonable cost and enhance commercial viability of the department. The energy efficiency measures implemented by the department to overcome the deficit like conventional street lights being replaced by smart LED lights under SLNP scheme of the central government, distribution of around 8 Lakh LED bulbs to the consumers under Pradhan Mantri UJALA Yojana which will help to save electric consumption in the state but proper monitoring is required. The transmission and distribution losses due to outdated and ageing transmission infrastructure which requires immediate up gradation is also being taken care in phased manner through underground cabling of the transmission lines. This requires huge investment but it will benefit in the long run.

#### **V. Suggestions**

Goa-ED has been able to supply quality power to the consumers keeping pace with the growing demand for electricity but still there is a need to look into the sustainability concerns of the department such as:

- Goa-ED which is only into transmission and distribution of electricity has a scope to transform itself into a self-sustained and financially sound corporate body.
- Goa being one of the famous tourist attractions for domestic and foreign tourist the state electricity department should shoulder the responsibility of providing world class basic infrastructure including the electricity supply to the tourist and thereby help in maintaining the economic growth rate of the state.
- Power being the main source for any industry to flourish it should be available in abundance and moreover there should be un-interrupted power. There should be no load shedding.
- Attempt should be made to invest in generating energy through renewable sources because Goa has a good scope for solar energy, Tidal energy, Hydro Energy etc. Generation of electricity through renewable sources will reduce the dependence of the government for electricity on the external sources and this in turn will also help in reducing the pollution in the state.
- Consumers should be educated towards energy saving and encouraged for the use of renewable energy and its benefits.
- Necessary improvement in billing and collection system, electricity transmission audit, improvement in the transmission infrastructure, improvement in service, maintenance and seasonal capabilities are needed to reduce the AT&C losses of the department.
- Financial limitation is one of the obstacles in the growth and development of the Electricity Department. If the electricity department is being provided with adequate funds, by the Centre and the State Government through proper allocation in the budget, this will help to reduce the deficit.
- Provision of Electricity is regarded as a commercial utility service. Thus in order to provide it on a sustainable basis, the cost of supply needs to be recovered from the consumers through appropriate pricing of electricity. But the tariff rates cannot be increased because of social obligations thus there is a need for cost control especially in the employee cost as that is the second largest element of cost in the cost structure.
- The department is overstaffed therefore they should work efficiently instead of opting for voluntary retirement they should provide top class services to the consumers and make its over-staffing as an advantage to the government as well as the department and the consumers.
- There is a need to employ energy management strategies, Information management system for proper maintenance of records and an Internal Control System to avoid arrears in finalization of accounts of the department.

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Mrs. Reshamkaur Bhambra "Performance analysis of Goa Electricity Department "IOSR Journal of Business and Management (IOSR-JBM) 20.5 (2018): 52-58.