

Benchmarking Study for Electricity Distribution Companies of Uttar Pradesh

EXECUTIVE SUMMARY

Prepared for:

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$$Max \sum_n \left\{ \int_0^{d^a} D^a(x) dx - \int_0^{s^a} S^a(y) dy \right\}$$



INTRODUCTION

The Hon'ble UPERC has notified the Uttar Pradesh Electricity Regulatory Commission (Multi Year Distribution Tariff) Regulations, 2014 (UPERC MYDT Regulations, 2014) on 12.5.2014 which inter-alia provides the procedure and guidelines for determination of distribution and retail tariff in the State of Uttar Pradesh. It is for the first time, that the Hon'ble Commission has issued tariff regulations for Multi Year Tariff control period encompassing the financial years 2017-18 to 2019-20 as before the said period, the tariff was being framed on annual basis.

Regulation 4.2.1 of the UPERC MYDT Regulations, 2014 mandates the distribution licensees to undertake studies involving benchmarking of the performance of the Discoms with the other distribution licensees of the country, with the objective to establish the baseline norms and determine the performance standards for the distribution licensees of the State. The underlying objective is that in order to make the MYT regulations a success, it is imperative to define the improvement trajectory from the actual level up to the desired level.

In view of the above, five Electricity Distribution Companies (Discoms) of the State namely Paschimanchal Vidyut Vitran Nigam Limited (PVVNL), Purvanchal Vidyut Vitran Nigam Limited (PuVVNL), Dakshinanchal Vidyut Vitran Nigam Limited (DVVNL), Madhyanchal Vidyut Vitran Nigam Limited (MVVNL) and Kanpur Electricity Supply Company (KESCO) undertook benchmarking studies to fulfil the objectives of the UPERC MYDT Regulations, 2014.

Benchmarking

Benchmarking is a process that develops performance indices for specific entities and compares them to industry norms for the purpose of measuring entity performance and identifying areas needing improvement. It can provide useful ways to understand what drives the efficiency of a company.

This benchmarking process can reveal potential areas where a particular Discom's performance is lacking and point to directions for further detailed examination to identify any underlying contributing causes or mitigating factors to the performance gap. Having a clear assessment of its strengths and weaknesses, a Discom can formulate a better strategy to improve its competitive position in the market place.

SIGNIFICANCE OF THE PROJECT

The objective is to determine the current position of each State-owned Discom of Uttar Pradesh in terms of overall efficiency considering the factors such as operational, O&M expenses and financial parameters. The outcomes of this Benchmarking Study will help the respective Discom to: i) identify the areas for improvement, ii) develop strategy to improve upon the identified areas.

Based on the results, State owned Discoms of Uttar Pradesh may set a target for themselves and also assist the Hon'ble Commission to set the targets for each of the Discoms for the Control Period.

APPROACH AND METHODOLOGY

The approach towards this benchmarking study focuses on the identification of functional areas for performance measurement, selection of measurable and controllable parameters and benchmarking of the Discoms against these parameters in their peer group. The overall approach towards this benchmarking study can be defined as a five-stage process (Figure 1):

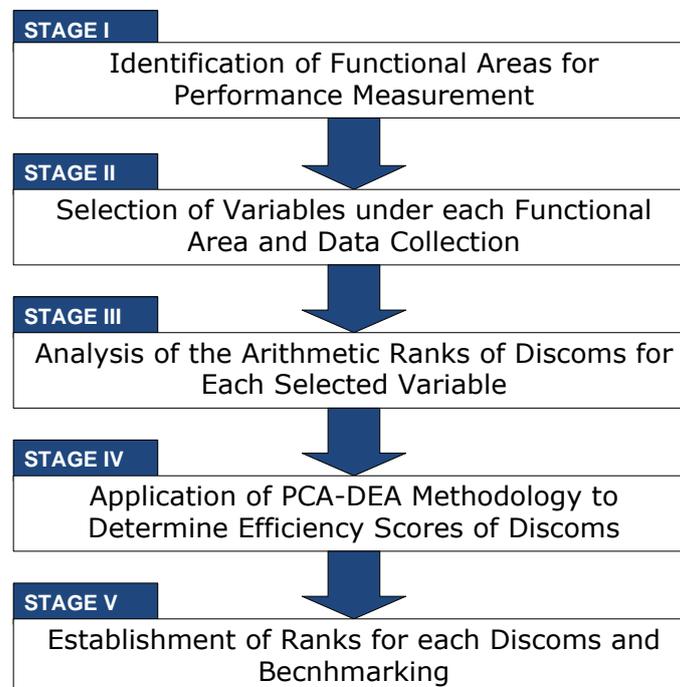


Figure 1: Overall Approach for the Study

STAGE I: Identification of the Functional Areas

In Stage I, a detailed literature survey was conducted by reviewing the current benchmarking practices in the energy and utilities domain, recent reports on the performance of the Indian utilities, and the annual reports of the Discoms. The objective was to identify broad functional areas for performance measurement of the Discoms. The following four functional areas were identified: i) Operational Performance, ii) Operational & Maintenance Expenses, iii) Financial Performance, and iv) Capital Cost.

STAGE II: Selection of Variables and Data Collection

In the next stage, parameters linked with each of the four Functional Areas were identified. An initial list of thirty-eight (38) such parameters was prepared. Afterwards, questionnaire survey with industry experts was conducted to select most relevant parameters under each of the identified functional areas. The objective was to reduce redundancies and to select quantifiable and controllable parameters. The outcome of this exercise was a list of seventeen (17) selected parameters out of the initial list of 38.

Afterwards, a pool of thirty-three (33) State-owned Discoms was created which includes the five Discoms of UP viz. PUVNL, PuVVNL, DVVNL, MVVNL and KESCO. FY 2014-15 was selected as the base year for the study to allow maximum coverage of selected parameters data. The data pertaining to all the 33 State-owned Discoms was collected from multiple sources such as: Audited Accounts, Reports of Ministry of Power and Dash Boards maintained by Ministry of Power.

STAGE III: Analysis of the Arithmetic Ranks for Selected Variables

After the completion of data collection, analysis of the Discoms rankings as per each of the selected parameter was performed. All the 33 Discoms were ranked according to their quantitative performance against each of the selected 17 parameters. The objective was to make observations and draw inferences on the Parameter-wise ranking of each Discom of UP against other selected Discoms.

STAGE IV: Application of PCA-DEA Methodology to Estimate Efficiency Scores

A key requirement of benchmarking study is to identify the impact of each of the inputs in determining the output or performance of the entity. Among the entire set of input parameters, there could be certain input parameters, which contribute more towards the overall performance improvement (output parameters). Therefore, measurement of relationship between the input and output parameters is critical to develop high-impact actionable plans for performance improvement.

Extensive literature survey along-with interactions with academicians and industry experts on benchmarking models were conducted to identify various techniques available for performance measurement. Out of the identified techniques, a combination of

Principal Component Analysis (PCA) and Data Envelopment Analysis (DEA) was found to be most suitable technique for the study. Based on the inputs given by experts and stakeholders, out of the 17 selected parameters in Stage II, fifteen (15) parameters were identified as input parameters and two (2) parameters were selected as output parameters.

DEA is a non-parametric method in operations research and economics for the estimation of production frontiers. It is used to empirically measure productive efficiency of decision making units (or DMUs) or Discoms in this instant study. In order to assess the weight of each input variable in determining the Output Variable, Principal Component Analysis (PCA) needs to be applied before solving with DEA. PCA is a statistical procedure that uses an orthogonal transformation to convert a set of observations of possibly correlated variables into a set of values of linearly uncorrelated variables called principal components. This transformation is defined in such a way that the first principal component has the largest possible variance (that is, accounts for as much of the variability in the data as possible), and each succeeding component in turn has the highest variance possible under the constraint that it is orthogonal to the preceding components. The six-step PCA-DEA methodology conducted for the study is presented in the following figure.

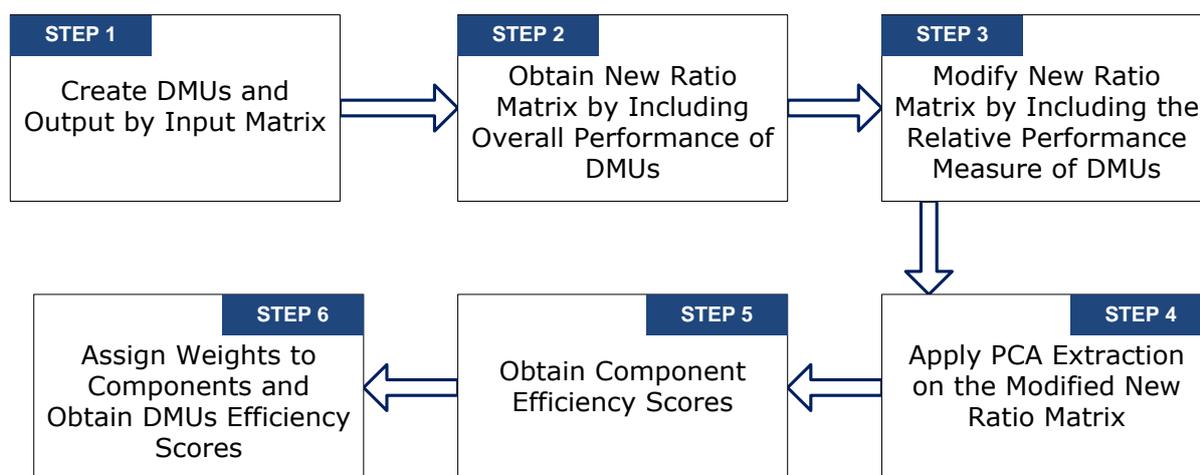


Figure 1: PCA-DEA Methodology

STAGE V: Establishment of Discom Ranks and Benchmarking

In the final stage, the Discoms were ranked as per the efficiency scores obtained through the PCA-DEA methodology. Based on the relative impact of the input parameters on the performance, areas for improvement were identified. Afterwards, meetings/presentations with the UPERC and Discoms officials were conducted to obtain feedback and establish the ranks for Discoms. After incorporating feedbacks and making necessary changes, the final recommendations were prepared including identification of critical areas for improvement.

KEY OBSERVATIONS AND FINDINGS

The ranking of each Discoms as against each of the 17 selected parameters (outcome of the exercise conducted during Stage III of the study) is presented as below:

Table 1: Summary of Parameter-wise Ranking of Discoms

S. No	Parameter Type	Parameter	Parameter-wise Discoms Ranking				
			DVVNL	MVVNL	PVVNL	PuVVNL	KESCO
1	Input	Feeders with high SAIDI (%)	27	28	33	18	1
2		Feeders with high SAIFI (%)	29	25	30	17	1
3		Feeder Monitoring (%)	27	26	22	13	32
4		HT to LT Ratio	18	32	31	33	13
5		Lead time for New Connections (%)	31	32	10	7	6
6		Lead time for Complaint Redressal (%)	10	31	22	20	1
7		R&M Expenses as % GFA	30	32	29	31	33
8		O&M Expense per unit of Energy Sales (Rs./kWh)	9	23	2	11	20
9		Average Power Purchase Cost (Rs./kWh)	31	28	30	32	29
10		ACS-ARR Gap (Rs./kWh)	31	29	19	28	21
11		Age of Debtors (Days)	30	29	21	33	31
12		Age of Creditors (Days)	26	28	16	31	12
13		Collection Efficiency (%)	31	33	9	30	29
14		E Payment (%)	23	24	12	25	26
15		AT&C Losses (%)	33	32	14	28	27
16	Output	PAT as % of expenditure	28	19	23	22	26
17		Distribution Loss (%)	32	18	15	19	25

The distribution companies of Uttar Pradesh recorded mixed positions with leading the charts in terms of Employee Cost, O&M expenses, Reliability indices, HT to LT ratio and customer service in terms of compliance redressal and granting new connections and lagging the race in terms of R&M Expenses, Average Power Purchase Cost, Age of Creditors and Age of Debtors.

Consolidated table explaining the parameters of the Uttar Pradesh Discoms is presented as below (as outcome of the process followed during Stage IV of the study):

Table 2: Final Efficiency based ranking of sample Discoms

S. No	State	Discom	Rank	S. No	State	Discom	Rank
1	Andhra Pradesh	APEPDCL	5	18	Madhya Pradesh	Central	17
2		APSPDCL	12	19		East	28
3	Bihar	NBPDCL	30	20		West	22
4		SBPDCL	26	21	Maharashtra	MSEDCL	13
5	Chhattisgarh	CSPDCL	20	22	Punjab	PSPCL	11
6	Gujarat	DGVCL	1	23	Rajasthan	AVVNL	7
7		MGVCL	3	24		JVVNL	15
8		PGVCL	4	25		JdVVNL	9
9		UGVCL	2	26	Telangana	TSSPDCL	10
10	Haryana	DHVBN	19	27		TSNPDCL	16
11		UHVBN	21	28	West Bengal	WBSEDCL	27
12	Jharkhand	JBVNL	31	29	Uttar Pradesh	DVVNL	32
13	Karnataka	BESCOM	18	30		MVVNL	33
14		GESCOM	8	31		PVVNL	23
15		HESCOM	25	32		PuVVNL	29
16		MESCOM	14	33		KESCO	6
17		CHESCOM	24				

Key findings of this study for each State owned Discom of Uttar Pradesh are presented as below:

Paschimanchal Vidyut Vitran Nigam Limited

- i. PVVNL ranks 23rd in the league of 33 Discoms as per its overall efficiency score.
- ii. The Discom leads in terms of O&M expenses owing to its lower employee expenses.
- iii. The Discom is lagging in the parameters like feeders with high SAIDI and SAIFI, and compliant redressal indicating poor consumer service.
- iv. The HT to LT ratio ranking is low for the Discom indicating need for improvement in the network infrastructure planning.

Purvanchal Vidyut Vitran Nigam Limited

- i. PuVVNL ranks 29th in the league of 33 Discoms as per its overall efficiency score.
- ii. The Discom leads in terms of O&M expenses owing to its lower employee expenses.

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- iii. The HT to LT ratio ranking is low for the Discom indicating need for improvement in the network infrastructure planning.
 - iv. The Discom is lagging in parameters such as Collection efficiency, Age of Debtors indicating poor financial conditions and lower realisation of revenues.
 - v. The Discom is lagging in compliant redressal indicating poor consumer service.

Dakshinanchal Vidyut Vitran Nigam Limited

- i. DVVNL ranks 32nd in the league of 33 Discoms as per its overall efficiency score.
- ii. The Discom leads in terms of O&M expenses owing to its lower employee expenses.
- iii. The Discom is lagging in the parameters like Collection Efficiency, ACS-ARR Gap, indicating poor financial conditions.
- iv. The Discom is lagging HT to LT ratio indicating need for improvement in the network infrastructure planning.
- v. The Discom is lagging in the parameters such as release of new connections and compliant redressal indicating poor consumer service.

Kanpur Electricity Supply Company

- i. KESCO ranks 6th in the league of 33 Discoms as per its overall efficiency score.
- ii. KESCO lag in the parameters like R%M expenses as % of GFA and AT&C losses indicating technical and commercial inefficiencies.
- iii. The Discoms fares top in terms of compliant redressal, lead time in releasing connection requests leading to good consumer satisfaction.
- iv. The Discom also lags in terms of ACS-ARR gap which results in poor financial health of the Discom.

Madhyanchal Vidyut Vitran Nigam Limited:

- i. MVVNL ranks 33rd in the league as per its overall efficiency score.
- ii. The Discom leads in terms of O&M expenses owing to its lower employee expenses.
- iii. MVVNL is lagging HT to LT ratio indicating need for improvement in the network infrastructure planning.
- iv. MVVNL is lagging in the parameters like such as collection efficiency, ACS-ARR Gap indicating stressed financial conditions and lower realization of revenues.
- v. MVVNL scores low in lead time for release of new connections and compliant redressal indicating poor consumer service.

CONCLUSIONS

The lower Employee Cost (O&M costs) per unit of energy sales is contrasted by lower efficiency scores in respect of operational performance, commercial performance, financial performance and customer service. In view thereof, the lower Employee cost per unit of energy sales reflects under-staffing. The shortage is even more pronounced in respect of technical staff as compared to non-technical staff, which is reflected from both lower Employee cost per unit of energy sales as well as lower efficiency scores.

Discoms also need to improve upon its feeder monitoring practices in order to reduce the feeder wise losses and interruptions. Discoms should start monitoring its feeders on full scale with accurate CTs PTs and energy meters. This practice will help Discoms in address losses and improving customer satisfaction by providing reliable power supply to customers.

The high age of creditors reflects the strained financial condition of the UP Discoms. The power producers provide a rebate of 2% on timely payment of energy bills, which the UP Discoms are not able to avail. Payable management also has an impact on optimizing the power procurement cost. The UP Discoms may not be in a position to improve the age of creditors unless it attains the overall efficiency on all key parameters such as T&D losses, collection efficiency etc. Lower creditor days improves the credit rating of Discoms which has an impact on the cost of lending as well as loading of lower risk premium by various generators when bidding in power procurement tenders in UP.

For improving other important parameters such as APPC, UP Discoms may implement an Energy/Load Management and cost optimization system and build a time block wise demand-supply model to strategize on the power procurement at competitive prices. UP Discoms should also develop standard operating procedures for load management, bidding for bilateral contracts and determination of quantum and rate of bid to be filed in the power exchanges. This measure will help the UP Discoms, in improving the APPC positioning.