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Comparative Analysis of Uttarakhand Power Corporation Limited (UPCL) with Other Northern India Distribution Companies (DISCOMs)

[1]Ms. Shruti Pasricha, [2]Dr. Varsha Gupta
[1]Student Quantum University, Roorkee, Uttarakhand
[2]Associate professor, Department of commerce & Finance, Quantum University, Roorkee, Uttarakhand

Abstract:

The power distribution sector plays a crucial role in ensuring reliable electricity supply and supporting economic development. However, electricity distribution companies (DISCOMs) in India continue to face persistent challenges related to financial sustainability, operational inefficiencies, and high technical and commercial losses. This research paper presents a comparative analysis of Uttarakhand Power Corporation Limited (UPCL) with six major electricity distribution companies operating in Northern India, namely Uttar Pradesh Poorva Vidyut Vitran Nigam Limited, Uttar Pradesh Paschim Vidyut Vitran Nigam Limited, Punjab State Power Corporation Limited, Haryana Bijli Vitran Nigam Limited, Himachal Pradesh State Electricity Board, and Jammu & Kashmir Power Distribution Corporation Limited. The study is based on secondary data collected from annual reports, regulatory filings, energy audit reports, and official publications, supplemented by limited primary insights gathered during the internship period. Key performance indicators such as revenue realization, operating costs, profitability, Aggregate Technical and Commercial (AT&C) losses, and technology adoption are analyzed. The findings indicate that UPCL demonstrates moderate performance compared to peer DISCOMs, with significant scope for improvement in loss reduction, financial efficiency, and technology integration. The study concludes with strategic recommendations aimed at enhancing UPCL's operational and financial performance.

Keywords: UPCL, DISCOMs, Comparative Analysis, Financial Performance, AT&C Losses, Power Distribution

I. INTRODUCTION

The electricity distribution sector is a vital component of the power sector, acting as the final link between power generation and end consumers. Efficient functioning of distribution companies (DISCOMs) is essential for ensuring reliable electricity supply, economic growth, and social development. In India, however, the distribution sector has remained the most financially stressed segment of the power value chain. Persistent challenges such as high Aggregate Technical and Commercial (AT&C) losses, inadequate tariff recovery, increasing power purchase costs, and operational inefficiencies have significantly weakened the financial health of DISCOMs.

Despite various reforms initiated by the Government of India, including restructuring schemes and financial support programs, many state-owned DISCOMs continue to depend heavily on government subsidies for survival. High technical losses due to outdated infrastructure and commercial losses arising from billing inefficiencies, theft, and poor collection practices remain major concerns. These issues limit the ability of DISCOMs to invest in network modernization and advanced technologies, thereby creating a cycle of inefficiency and financial stress.

Uttarakhand Power Corporation Limited (UPCL) is the sole electricity distribution utility in the state of Uttarakhand. The company operates in a geographically challenging environment characterized by hilly terrain, scattered rural settlements, and adverse weather conditions, which increase the cost of infrastructure development and maintenance. In addition to geographical constraints, UPCL faces financial and operational challenges similar to other Northern India DISCOMs.

A comparative analysis of UPCL with other Northern India DISCOMs provides a meaningful framework to evaluate its performance relative to peer organizations operating under comparable regulatory and regional conditions. Such an analysis helps distinguish performance gaps caused by internal inefficiencies from those arising due to external constraints. It also enables identification of best practices adopted by better-performing DISCOMs that can be replicated by UPCL. Therefore, this study attempts to analyse UPCL's performance in comparison with selected Northern India DISCOMs to assess financial sustainability, operational efficiency, and scope for improvement.

In recent years, increasing demand for electricity, rapid urbanization, and the push towards renewable energy integration have placed additional pressure on electricity distribution companies. DISCOMs are now required not only to ensure uninterrupted power supply but also to maintain financial discipline and adopt sustainable operational practices. Performance evaluation through financial and operational indicators has therefore become essential for understanding the efficiency of power utilities.

II. LITERATURE REVIEW

Several researchers and policy institutions have examined the performance of electricity distribution companies in India, highlighting persistent inefficiencies in the sector. Studies by the central electricity authority and the world bank indicate that AT&C losses in Indian discoms remain SIGNIFICANTLY HIGHER THAN international benchmarks, reflecting inefficiencies in network management and revenue realization. High lo

ss levels directly impact financial performance and increase dependence on government subsidies.

Existing literature emphasizes the importance of comparative and benchmarking studies in evaluating discom performance. Comparative analysis allows policymakers and utility managers to assess relative efficiency, identify best practices, and set realistic improvement targets. Research findings suggest that discoms with lower at&c losses, efficient billing systems, and strong governance frameworks exhibit better financial sustainability.

Several studies highlight the role of technology adoption in improving distribution efficiency. Smart meters, automated billing systems, and advanced monitoring tools such as scada systems have been identified as key enablers for reducing commercial losses and improving collection efficiency. Discoms that have invested in technology-driven solutions have shown measurable improvements in operational performance and customer service quality.

The literature also points to human resource management and organizational capacity as critical factors influencing discom performance. Adequate training, skilled manpower, and performance-based accountability mechanisms contribute to improved operational efficiency. Furthermore, regulatory support and timely tariff revisions are considered essential for ensuring cost recovery and financial stability.

While numerous studies analyse the power distribution sector at the national level, limited research focuses specifically on state-level comparative analysis of northern India discoms, particularly involving UPCL. This research attempts to bridge this gap by providing a structured comparative evaluation of UPCL with peer discoms, thereby contributing to academic literature and practical policy discussions.

Recent studies also emphasize the impact of government reform schemes such as Uday and the revamped distribution sector scheme (rdss) on improving the financial condition of discoms. Researchers note that while these schemes have provided short-term relief through debt restructuring and financial assistance, sustainable improvement depends largely on internal efficiency, accountability, and technological transformation. Empirical studies reveal that states which effectively implemented reform measures and adopted smart grid technologies achieved better operational outcomes. However, literature also highlights regional disparities in reform implementation, suggesting the need for state-specific strategies rather than uniform policy application across all discoms.

III. OBJECTIVES OF THE STUDY

The objectives of this research paper are:

To compare the financial performance of UPCL with selected Northern India discoms.

To analyse operational efficiency in terms of technical and commercial losses.

To evaluate the level of technology adoption and service delivery among the selected discoms.

To identify performance gaps and best practices applicable to UPCL.

To suggest strategic recommendations for improving UPCL's overall performance.

IV. RESEARCH METHODOLOGY

The present study adopts a descriptive and comparative research design to analyse the performance of Uttarakhand Power Corporation Limited (UPCL) in comparison with selected

Northern India DISCOMs. The research is based on a combination of primary and secondary data, which enhances the reliability and practical relevance of the study.

i. Primary Data

Primary data was collected during the course of the internship undertaken at Uttarakhand Power Corporation Limited (UPCL). The data was gathered directly from UPCL employees and officials through informal discussions, structured interactions, and observation of operational processes. Information related to billing procedures, loss management practices, technology usage, and day-to-day operational challenges was obtained from employees working in different functional departments. This primary data provided practical insights into the internal working of UPCL and helped in understanding ground-level realities that are not fully reflected in published reports.

ii. Secondary Data

Secondary data was collected from annual reports of DISCOMs, publications of the Central Electricity Authority, reports of State Electricity Regulatory Commissions, energy audit reports, and official websites of the respective DISCOMs. Secondary data was primarily used to analyse financial performance, revenue trends, AT&C losses, and technology adoption across the selected Northern India DISCOMs. The study covers data for the financial years 2023–24 and 2024–25, ensuring relevance and timeliness.

V. COMPARATIVE ANALYSIS AND FINDINGS

Table I: Revenue Performance of Selected DISCOMs (2023–24)

DISCOM	Revenue (₹ Crore)	Units Sold (MU)	Avg. Tariff (₹/kWh)
UPCL	7,200	18,500	3.89
UPPCL (East & West)	35,000	92,000	4.1
PSPCL	42,000	98,500	4.25
HBVN	21,500	55,000	4.05
HPSEB	8,400	19,800	4.15
JKPDD	6,300	15,200	3.6

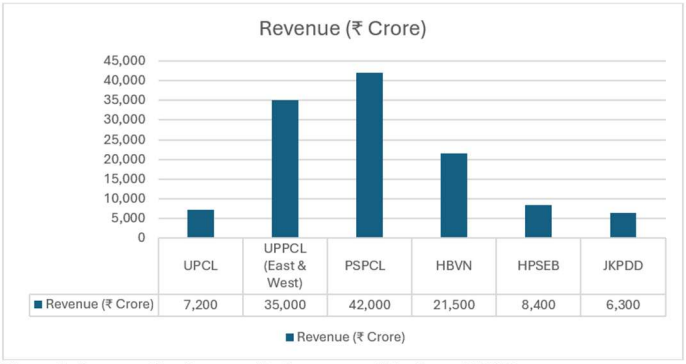

Figure 1: Comparative Revenue Performance of Northern DISCO

Above figure shows the revenue performance of selected Northern India DISCOMs. PSPCL and UPPCL generate higher revenue due to larger consumer bases. UPCL records moderate revenue compared to other DISCOMs. The figure highlights differences in scale and revenue realization capacity.

Table II: AT&C Loss Comparison

DISCOM	Technical Loss (%)	Commercial Loss (%)	AT&C Loss (%)
UPCL	18.5	6.8	25.3
UPPCL (East & West)	21	8.5	29.5
PSPCL	12.4	4.8	17.2
HBVN	14.6	5.2	19.8
HPSEB	13.9	5.1	19
JKPDD	24.2	11.3	35.5

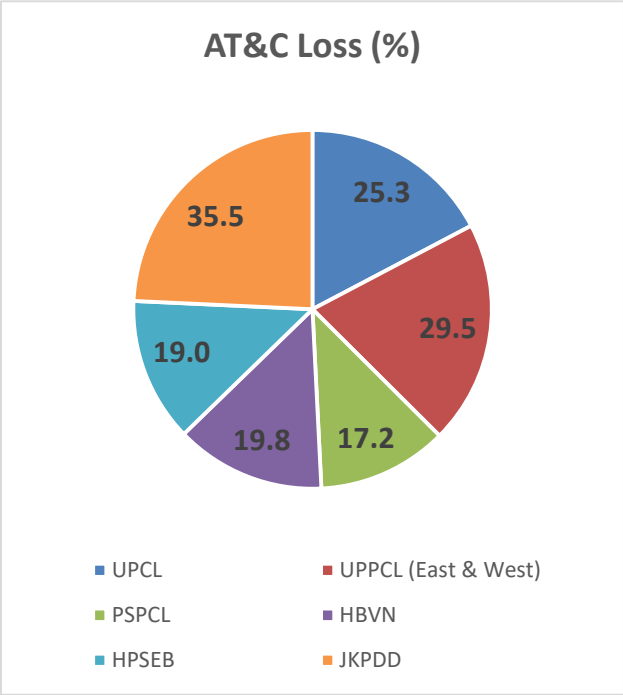

Figure 2: AT&C Loss Comparison Across Selected DISCOMs

Above figure compares AT&C losses among Northern India DISCOMs. UPCL's loss level is lower than UPPCL and JKPDD but higher than PSPCL and HBVN. Higher losses indicate inefficiencies in distribution and collection systems. Loss reduction remains a key challenge for UPCL.

Table III: Technology Adoption Status

DISCOM	Smart Meter Coverage (%)	Billing Automation Level
UPCL	35	Moderate
UPPCL (East & West)	42	Moderate
PSPCL	65	High
HBVN	58	High
HPSEB	47	Moderate
JKPDD	28	Low

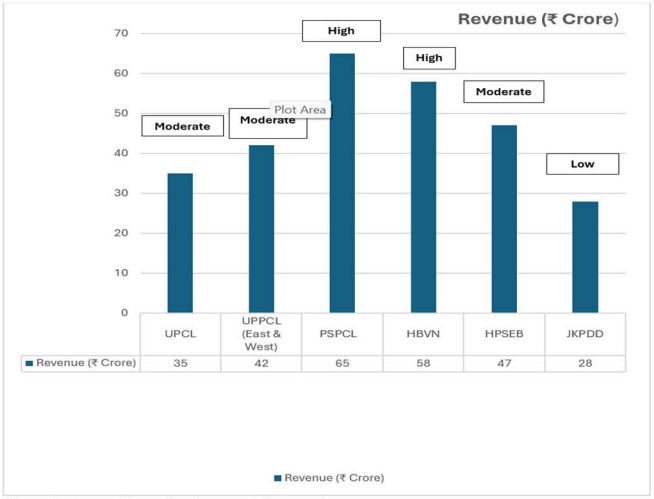

Figure 3: Smart Meter Deployment Comparison

Above figure presents the comparison of smart meter deployment across DISCOMs. DISCOMs with higher smart meter coverage show better operational control. UPCL has moderate smart meter adoption compared to peers. Increased deployment can help improve billing accuracy and reduce losses.

The comparative analysis reveals that UPCL occupies a mid-level position among the selected Northern DISCOMs. While UPCL demonstrates reasonable revenue realization and collection efficiency, its operating costs remain relatively high, resulting in continued dependence on government subsidies. AT&C losses in UPCL exceed national targets, indicating the need for focused loss reduction initiatives.

In contrast, DISCOMs such as Punjab State Power Corporation Limited and Haryana Bijli Vitran Nigam Limited exhibit better financial sustainability due to lower loss levels, improved billing efficiency, and higher adoption of smart metering systems. Technology adoption and infrastructure modernization emerge as key differentiating factors influencing DISCOM performance.

VI. RECOMMENDATIONS

Based on the findings of the study, the following recommendations are suggested for UPCL:

- Accelerate smart meter deployment to reduce commercial losses and improve billing accuracy.
- Invest in infrastructure modernization, including transformer upgrades and network strengthening.
- Enhance revenue management through improved collection mechanisms and consumer awareness programs.
- Strengthen internal monitoring and performance benchmarking practices.
- Promote capacity building and training programs for employees to improve operational efficiency.

VII. Conclusion

This research paper provides a comparative assessment of UPCL's performance against selected Northern India DISCOMs. The analysis highlights that while UPCL has made progress in certain operational areas, significant improvement is required to achieve financial sustainability and efficiency comparable to best-performing peers. The adoption of technology-driven solutions, combined with strategic management interventions, can enable UPCL to reduce losses, improve service quality, and enhance overall performance. The study also demonstrates the usefulness of comparative analysis as a tool for policy formulation and performance improvement in the power distribution sector

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