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AT&C Loss Analysis in Haryana's Power Distribution Sector under the UDAY Scheme

Ravneet Kaur*

Assistant Professor, Multani Mal Modi College, Patiala.

*Corresponding Author: official.2rka@gmail.com

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Abstract

The study analyses the trajectory of AT&C losses of the Haryana power sector's distribution utilities from 2013-14 to 2023-24 and the impact of UDAY - "Ujwal DISCOM Assurance Yojana" scheme. The statistical tools used in the paper are growth rate, compounded annual growth rate, exponential growth rate and regression applied on the secondary data obtained from the state utilities reports published by the Power Finance Corporation of India on its official website. It was concluded that the target to reduce the AT&C losses to 15 percent by the year 2018-19 of the UDAY - scheme was achieved by the year 2021-22. However, there is further scope of reduction in the losses and improve the operational efficiencies.

Keywords: *AT&C Losses, CAGR, UDAY-Scheme, Regression, Exponential Growth, Haryana, DHBVNL, UHBVNL.*

Introduction

Electricity is the foundation of growth and development in a region. Therefore, it becomes essential to study the power sector of a nation. From over 212 nations, India stands tall at the third rank in power consumption. (U.S. Energy Information Administration). Out of the total 13,82,920 MU power requirement and 13,75,571 MU of power supply of India in the year 2022-23, Haryana alone had a requirement of 57,564 MU, however, the energy supplied was 57,061 MU. (Government of India, Ministry of Power, 2023).

Without a strong and efficient distribution system it is impossible to achieve the power requirement. Wherefore, it becomes crucial to explore AT&C losses. AT&C losses, Aggregate Technical and Commercial Losses, means the energy lost during transmission owing to technical reasons, bill payment evasion by the customers, inefficient billing and collection and by power theft. (Government of India, Ministry of Power, 2016).

AT&C Losses = [1 - (Billing Efficiency x Collection Efficiency)] x 100

With the objective to reduce AT&C losses to 15 percent and achieve operational efficiency UDAY - "Ujwal DISCOM Assurance Yojana" scheme was launched by the Ministry of Power in India on 20th November 2015. It was an optional scheme introduced for all the states with a vision to reduce the pressure of cost of debt and unintentional power supply for all. (Power Finance Corporation Ltd., 2016).

W.e.f. 1st July 1999 the power sector of Haryana has following four independent bodies:

- HPGCL - Responsible for power generation in the state.
- HVPNL - Responsible for power transmission in the state.
- UHBVNL - Responsible for power distribution and retail supply in the northern circles of the state.
- DHBVNL - Responsible for power distribution and retail supply in the southern circles of the state. (Centre of Energy Regulation, IIT Kanpur)

By signing the MoU the state opted for the UDAY - "Ujwal DISCOM Assurance Yojana" scheme on 11-March-2016 and became the eighth state to undertake the UDAY scheme. (Government of India, Ministry of Power, 2016)

Literature Review

Monika & Kumar, (2016) analysed cross district variance in electricity infrastructure using secondary data from 2002-03 to 2012-13. It was an empirical comparative study conducted and found that electricity connection increased, 100 percent village electrification and improved infrastructure.

Singh & Vashishtha, (2019) analysed the financial and performance of the Haryana DISCOMs using secondary data from UDAY portal from 2016-2018. It was concluded from the study that AT&C losses remain high and ACS-ARR gap persists with weak smart metering.

Singh & Vashishtha, (2020) analysed the performance of power distribution utilities using secondary data from CEA, Economic Survey and Annual Reports from 2010-2020. They used a descriptive analysis and concluded that bills remain pending with rising electricity consumption and inefficient financial performance.

Singh et al., (2025) analysed long term operational and financial trends of Haryana from 2005-2023 using ratio analysis, CAGR etc. It was concluded that AT&C losses and collection efficiency has improved after 2017.

Gap and Significance

The gap in the literature review is that there is a lack of study on AT&C losses which is important to study so as to understand the operational efficiency and helps assess the financial sustainability in power DISCOMs.

Objectives

The objective of this study is to analyse the trajectory of aggregate and technical commercial losses and analyse the operational efficiency.

Ho: $\beta=0$, i.e. there is no change in the AT&C losses in the state DISCOMs.

Research Methodology

The paper analyses AT&C losses, the secondary data of which is obtained from the reports on 'Performance of Power Utilities' published by the Power Finance Corporation of India over the study period 2013-14 to 2023-24. The study utilises various statistical tools such as:

- CAGR - It is the average annual growth rate over the study period. (Khojasteh et al., 2023)
- YoY Growth Rate - It is the growth rate compared to the previous period. (United Nations Economic and Social Commission for Western Asia)
- Exponential Growth Rate - It is the continuous compounded growth rate over the time intervals. (United Nations Economic and Social Commission for Western Asia)
- Regression - It is the model determining the relation between dependent and independent variables. (Kothari,2004). Here, the dependent variable is AT&C losses and the independent variable is year.

Key Findings

Table 1: AT&C Losses in Haryana DISCOMs

Years	AT&C Losses	
	Losses	Growth
2013-14	34.33	-
2014-15	32.52	-5.27
2015-16	32.35	-0.52
2016-17	26.42	-18.33
2017-18	21.78	-17.56
2018-19	18.08	-16.99
2019-20	18.26	1
2020-21	17.05	-6.63
2021-22	13.72	-19.53
2022-23	12.01	-12.46
2023-24	11.3	-5.91
CAGR (Value in %)	-10.52	-
Exponential Growth Rate (Value in %)	-11.12	-

Source: Power Finance Corporation Ltd. (2016, 2020, 2022, 2023, 2025)

The state has noticed a major decline in the growth of AT&C Losses in the years of 2016-17 to 2018-19 with negative 18.33 percent to about 17 percent after opting the UDAY scheme and then a steep rise in the year 2019-20 owing to COVID-19 pandemic. Eventually, reducing thereafter to 11.3 percent of the total loss in the year 2023-24. The decline is further proved by negative CAGR of 10.52 percent and negative exponential growth of 11.12 percent emphasising the decline in structural and shows improvements, as shown in Table-1.

Table 2: Regression Statistics of AT&C Losses in Haryana DISCOMs

Multiple R	0.967216
R Square	0.935506
Adjusted R Square	0.927445
Standard Error	2.099602
Observations	10

Source: Author's calculation based on secondary data

From the Table-2, Multiple R of 0.967 explains a very strong correlation between the years and AT&C losses. R Square and Adjusted R Square from the table explains 93.55 percent and 92.74 percent of the variation in AT&C Loss is explained by the change in years. Standard error measures the accuracy of predicted values and from Table-2, it is clear that mere 2 percent of the values differ from the actual value.

Table 3: ANOVA-test of AT&C Losses in Haryana DISCOMs

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	511.5581	511.5581	116.0435	0.000005
Residual	8	35.26664	4.40833		
Total	9	546.8247			

Source: Author's calculation based on secondary data

F-value explains whether the R Square value is statistically significant and Significance F value explains whether the resultant is the outcome of chance depending upon which the null hypothesis is to be accepted or rejected. From Table-3, F-value is more than 1 and Significance F is less than 0.05 which means the model is statistically significant and the result is not because of the probability of error. Hence, null hypothesis must be rejected.

Table 4: Significance of Regression Coefficients of AT&C Losses in Haryana DISCOMs

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	36.53479	1.642691	22.24082	0.00000002
1	-2.49012	0.231159	-10.7723	0.000005

Source: Author's calculation based on secondary data

The coefficients represent the variation in variables whereas the standard error denotes the variance in the values of coefficients. It is evident from Table-4 that ***AT&C LOSS = 36.53479 - 2.49012(Years)*** interpreting that the loss is deducing with approximate 2.49012 depending on the year. The t-stat represents the reliability of a dependent variable. t-stat of 22.24082 implies a robust reliance of AT&C loss on the years. Proving this dependence, null hypothesis must be rejected.

Conclusion

It is concluded from the study that AT&C loss was up to 34.33 percent in the year 2013-14 which were reduced significantly to 18.08 percent in the year 2018-19 signing the MoU for opting UDAY scheme. Due to COVID-19 pandemic the loss increased by 1 percent of growth rate. Post 2019-20 the loss reduction came on track.

The UDAY - "Ujwal DISCOM Assurance Yojana" scheme's target to reduce AT&C loss to 15 percent by 2018-19 was achieved by the year 2021-22 with 13.72 percent. However, there is further scope of improvement by focusing on smart metering, better billing and collection efficiency, feeder metering etc.

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