TGSPDCL Billing & Service Performance

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Abstract—This study presents a comprehensive analysis of service coverage and billing performance using interactive Power BI dashboards. The objective of this research is to identify gaps between total services delivered and services billed, evaluate billing efficiency across divisions and areas, and highlight low-performing units requiring managerial intervention. The dataset was processed using Power Query, where division-level and area-level summaries were generated to calculate key indicators such as Total Services, Billed Services, and Billing Percentage. Several visualizations, including bar charts, KPI cards, area charts, and low-performance tables, were developed to support decision-making through data-driven insights. The dashboard provides a comparative view of service coverage across divisions and areas, emphasizing variations in billing efficiency. Key findings indicate that certain areas have significantly lower billing percentages despite high service volume, suggesting operational inefficiencies or unbilled activities.

Keywords— Service Coverage, Billing Analysis, Data Visualization, Division Summary, Area Summary, Performance Monitoring, Units Consumed.

I. INTRODUCTION

Efficient service billing is critical for organizational sustainability, especially when large amounts of operational data are involved. Organizations often face gaps between services provided and services billed, resulting in reduced revenue and inaccurate reporting. This research focuses on developing an interactive dashboard in Power BI that analyzes service coverage, billing efficiency, and unit consumption patterns across divisions and areas.

The dashboard integrates multiple Power BI components including KPI cards, area-level and division-level summaries, funnel charts for ranking, cumulative charts using index-based progression, and drill-down matrix visuals. Power Query transformations were applied instead of DAX to compute billing percentage, create summary tables, and manage low-performing areas. This ensures simplicity, transparency, and ease of data manipulation.

The primary goal of the dashboard is to transform raw service data into actionable insights by visually representing service counts, billed services, billing percentages, and low-performing areas and units consumed by area and division

Organizations that perform routine operational services frequently face challenges such as unbilled services, inaccurate reporting, and inconsistent performance across geographic units. Monitoring service delivery and billing coverage is essential for improving financial efficiency and service accuracy. Manual reporting techniques often fail to provide real-time visibility and are prone to errors.

This research focuses on developing a Power BI dashboard that analyzes total services, billed services, billing percentages, and unit consumption across divisions and areas. Using Power Query transformations and visual analytics, the dashboard identifies low-performing regions, evaluates service-billing gaps, and assists in decision-making. The goal is to provide a data-driven understanding of operational performance.

II. LITERATURE REVIEW

Author / Year	Topic	Findings	Relevance to This Study
Kumar & Reddy (2021)	Billing Coverage Analytics	Found variations in regional billing efficiency	Supports area/division comparison used in the dashboard
Singh et al. (2020)	BI Tools in Utilities	BI dashboards improve decision clarity	Validates use of Power BI
Sharma (2019)	Consumption Data Modeling	Units consumption indicates service behavior	Used in units analysis visual
Mehta & Thomas (2022)	Visualization Techniques	Charts help identify performance trends	Influences visual selection in this dashboard

III. DATASET DESCRIPTION

The dataset contains **71,628 records** with **11 columns**, representing **power consumption, service counts, and billing details** across various administrative levels (Circle, Division, Subdivision, Section, Area).It appears to be an **operational and billing dataset** for electricity services.

1. circle (object)

- Administrative zone at the highest level.
- Example: *BANJARA HILLS*

2. division (object)

- A subdivision within a circle.
- Typically same name as circle for this dataset.

3. subdivision (object)

- Smaller administrative unit under a division.

4. section (object)

- Finer operational region responsible for field activities.

5. area (object)

- Specific locality or neighborhood.
- Ex: *KCR HOUSE NANDI NAGAR, NAGARJUNA HILLS*

6. catdesc (object)

- Customer category description.
- Examples:
  - DOMESTIC
  - NON-DOMESTIC AND COMMERCIAL
  - GENERAL PURPOSE
  - TEMPORARY SUPPLY

7. catcode (int)

- Numeric code describing the customer category.
- Example: 1 (Domestic), 2 (Commercial), etc.

8. totservices (int)

- Total number of active services in the area for that category.

9. billdservices (float)

- Number of services that were billed.
- Indicates billing coverage.
- Float because some rows may be empty/missing.

10. units (int)

- Total electricity units consumed.

11. load (float)

- Connected load in kW or kVA.
- Represents the sanctioned load of customers.

IV. METHODOLOGY

A. Data Preparation using Power Query

The dataset was imported and cleaned using Power Query. Key steps included [1]Creating Division Summary and Area Summary via *Reference*.

1. Grouping data to compute:
    - Total Services
    - Billed Services
    - Billing Percentage
2. Removing null values, standardizing area names, and ensuring data types.

B. Visualization Construction

The following visuals were created in Power BI:

- KPI Cards (Total Services, Billed Services, Billing %)
- Bar Chart (Total vs Billed Services by Division)
- Table (Low-Performing Areas)
- Units Consumption Analysis
- Cumulative Area Chart for Billing Growth
- Slicers for Division and Area

V. Results and Discussion

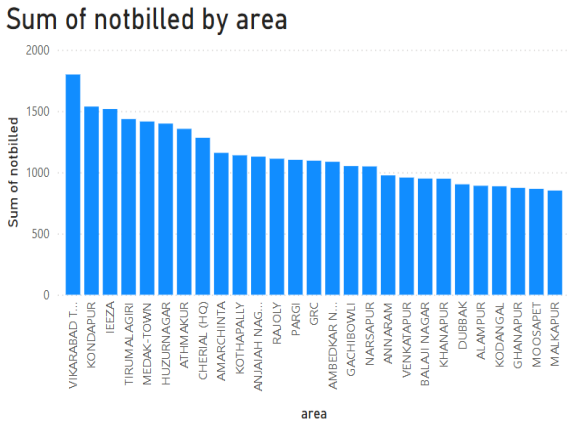
The Power BI dashboard revealed variations in billing efficiency across divisions and areas. The Division Summary table showed that while some divisions maintained high billing percentages, others exhibited discrepancies between total services and billed services. Area-level analysis identified specific locations responsible for revenue leakage. KPI cards summarized overall performance, and cumulative charts illustrated billing growth trends.

Low billed pct areas

area	Sum of TotalServices	Sum of BilledServices	billingpct	converge flag
HUZURNAGAR	1,401.00	3.00	0.21%	Low
DEVARAKONDA(HQ)	477.00	4.00	0.84%	Low
B PURA POLICE QTRS	162.00	2.00	1.23%	Low
PATANCHERU TOWN	408.00	15.00	3.68%	Low
TANEDAI PALLY	380.00	17.00	4.47%	Low
NEREDCHERLA (T)	436.00	21.00	4.82%	Low
B J R NAGAR	118.00	6.00	5.08%	Low
LUMBA THANDA	36.00	2.00	5.56%	Low
BEERAMGUDA	178.00	12.00	6.74%	Low
BHAILAMPUR	611.00	44.00	7.20%	Low
MAMIDYAL	773.00	56.00	7.24%	Low
MCH QTRS JIAGUDA	567.00	43.00	7.58%	Low
FRUIT MARKET	177.00	14.00	7.91%	Low
NR SHAILIGAR(AGL)	104.00	10.00	9.62%	Low
VEMULAGHAT	820.00	83.00	10.12%	Low

Bar and column charts revealed differences among divisions and areas, showing clusters with high and low billing efficiency. Funnel charts were used to identify the top 5 and bottom 5 areas based on billing performance. Pie and donut charts expressed the distribution of services and units across geographical regions.

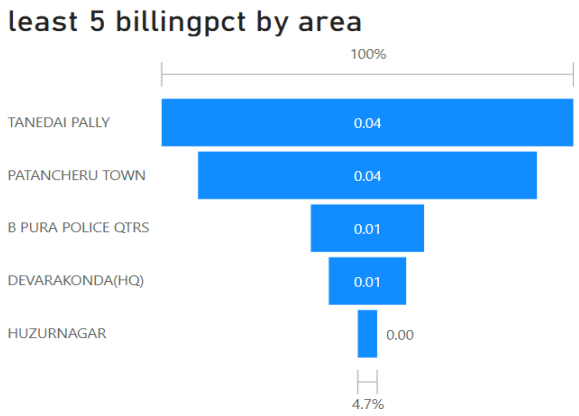
These helped decision-makers quickly understand performance levels without scanning the entire dataset. The cumulative area chart (for divisions or units) demonstrated gradual billing growth over the observed service sequence, confirming seasonal or workload-related patterns. Where revenue leakage is happening.



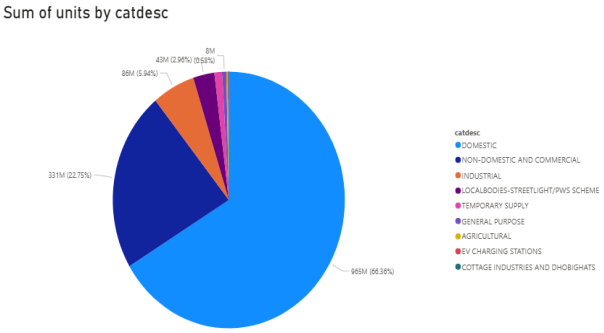
Overall, the dashboard allowed for easy comparison, faster anomaly detection, and more informed decision-making regarding resource deployment and billing verification.

The dashboard revealed significant differences in service coverage and billing performance among the divisions. Some divisions reported high service counts but low billed services, indicating inefficiencies. The billing percentage visual provided clear insight into divisions requiring operational intervention.

At the area level, several clusters were identified as low-performing, with billing percentages below the organizational average. The low-performance table helped isolate these areas quickly. The cumulative billing chart depicted gradual improvement across months or categories, reflecting billing growth patterns.



KPI indicators summarized organizational performance concisely and enabled leadership to evaluate overall health at a glance. The interactivity in Power BI (filters and drill-down) supported deep-dive analysis.



VI. Conclusion and Future Scope

This research demonstrated the effectiveness of Power BI in analyzing service coverage and billing performance. By using simple transformations in Power Query and avoiding complex DAX, the solution remains easy to audit and scalable for future expansion. The dashboard successfully identifies high and low-performing divisions and areas, highlights discrepancies in billing, and presents essential KPIs for management review.

Future enhancements may include integrating predictive analytics for forecasting billing trends, implementing automated alerts for low-billing thresholds, incorporating machine learning models for anomaly detection, and connecting the dashboard to real-time data sources for continuous monitoring. The methodology can also be extended to other domains such as logistics, utilities, and public service systems.

This study demonstrates the strength of Power BI as a business intelligence tool for analyzing service delivery and billing performance. Through automated Power Query transformations and effective visualizations, billing inefficiencies and low-performing regions were identified. The approach allows organizations to reduce unbilled services, improve revenue accuracy, and gain operational clarity.

Future research and development in this domain can be expanded through the integration of advanced analytical and automation capabilities. Predictive analytics can be incorporated to forecast billing efficiency trends based on historical service patterns, allowing organizations to anticipate potential gaps before they occur. Machine-learning–based anomaly detection models may also be implemented to automatically identify irregularities in service coverage, consumption units, or billing behavior, enabling faster intervention.

Additionally, automated alert systems can be developed within Power BI or external workflow tools to notify administrators when billing percentages fall below predefined thresholds, thereby improving operational responsiveness. Integrating real-time data streams would further enhance the dashboard's utility by ensuring continuous monitoring of service performance and immediate visibility into fluctuations. Finally, the inclusion of advanced KPI forecasting dashboards could provide decision-makers with forward-looking insights, helping them plan resources, improve service delivery, and optimize billing strategies more effectively.

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