Tech Saksham
Case Study Report

Data Analytics with Power BI

"Analysis of Commercial Electricity Consumption in Indian States"

"A.P.C. Mahalaxmi College for Women "

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ABSTRACT

This study aims to analyze commercial electricity consumption patterns across various states in India, offering valuable insights into the energy usage trends and potential implications for policy-making and resource allocation. Leveraging extensive data on electricity consumption and socio-economic factors, the analysis employs statistical methods and data visualization techniques to identify key factors influencing commercial electricity demand. Factors such as economic growth, industrial activity, urbanization, and climatic conditions are considered to understand their impact on electricity consumption. Additionally, the study examines the effectiveness of existing energy policies and identifies opportunities for promoting energy efficiency and sustainable practices in the commercial sector. By providing a comprehensive understanding of commercial electricity consumption dynamics, this research contributes to informed decision-making for energy planning and resource management at both regional and national levels in India.

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CHAPTER 1

INTRODUCTION

1.1 Problem Statement

In [Indian State], the commercial sector's electricity consumption is a critical component of the state's overall energy demand. Despite its importance, there is a lack of comprehensive analysis to understand consumption patterns and drivers. This study aims to fill this gap by analyzing various factors that influence commercial electricity usage. The objectives are to:

1. Assess the current state of electricity consumption in the commercial sector.
2. Identify economic, seasonal, and policy-related factors affecting consumption levels.
3. Evaluate the effectiveness of energy conservation measures and policies.
4. Forecast future consumption trends to aid in energy planning and management.

The outcome of this analysis will provide stakeholders with actionable insights to enhance energy efficiency, reduce costs, and support the state's sustainability goals.

1.2 Proposed Solution

To analyze commercial electricity consumption in an Indian state, you could consider a multi-faceted approach that includes:

1. **Data Collection**: Gather data on electricity consumption from various commercial entities over a period of time.
2. **Statistical Analysis**: Use statistical methods to identify patterns and trends in the data.
3. **Predictive Modeling**: Develop models to forecast future consumption based on historical data.
4. **Comparative Study**: Compare the consumption data with other states or similar economies to understand the position of the state in question.
5. **Policy Impact Assessment**: Evaluate how state policies are affecting electricity consumption and identify areas for improvement.

This proposed solution aims to provide a comprehensive understanding of the factors influencing commercial electricity consumption and to help in making informed decisions for energy management and policy-making.

1.3 Feature

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It seems there might be a typo in your request. If you're asking for features to analyze commercial electricity consumption in an Indian state, here are some key aspects to consider:

1. **Energy Usage Patterns**: Understanding peak demand times and seasonal variations.
2. **Sector-Wise Consumption**: Differentiating between industries, businesses, and services.
3. **Efficiency Measures**: Evaluating energy efficiency initiatives and their impact.
4. **Tariff Impact**: Analyzing the effect of electricity tariffs on consumption behavior.
5. **Sustainability Goals**: Assessing alignment with renewable energy targets and sustainability efforts.

These features can provide a comprehensive view of electricity usage and help in formulating strategies for efficient energy management.

1.4 Advantages

Analyzing commercial electricity consumption in Indian states offers several advantages:
Policy Formulation: It helps policymakers understand the energy needs and usage patterns, enabling them to create more effective energy policies.

Infrastructure Development: Insights from the analysis can guide the development of energy infrastructure to meet the growing demands efficiently.

Energy Efficiency: Identifying areas of high consumption can lead to targeted energy efficiency programs, reducing waste and saving cost.

Economic Planning: Understanding electricity consumption trends assists in economic planning and forecasting for commercial sectors.

Sustainability Goals: It supports tracking progress towards sustainability goals, such as reducing carbon emissions and promoting renewable energy source.

Such data-driven approaches are crucial for the strategic planning of energy distribution and conservation efforts across the country.

1.5 Scope

The scope of this project extends to the correlation between economic growth and electricity consumption is evident in government data. As per recent economic indicators, the Gross Domestic Product (GDP) is expected to grow at an average rate of 6%, leading to a proportional increase in electricity demand. Projections estimate that by 2030, electricity consumption could reach 2.5 trillion units annually.

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

Data Collection:Obtain electricity consumption data from relevant sources and Integrate data from different sources if necessary to create a comprehensive dataset. Ensure that the data is standardized and compatible for further analysis.

Data Aggregation: Aggregate the data at different levels of granularity (e.g., state-level, sector-level) as needed for specific analysis objectives.

Sector-wise Consumption: Understanding which sectors within the state services consume the most electricity,assessing the infrastructure of state services to identify areas where upgrades or improvements is to be made

Visualization: Visualize the results of the analysis using graphs, charts, or maps to provide insights into the commercial electricity consumption patterns in Indian states

2.2 Tools and Software used

Tools:

- **PowerBI**: The main tool for this project is PowerBI, which will be used to create interactive dashboards for real-time data visualization.

- **Power Query**: This is a data connection technology that enables you to discover, connect, combine, and refine data across a wide variety of sources.

Software Requirements:

- **PowerBI Desktop**: This is a Windows application that you can use to create reports and publish them to PowerBI.

- **PowerBI Service**: This is an online SaaS (Software as a Service) service that you use to publish reports, create new dashboards, and share insights.

- **PowerBI Mobile**: This is a mobile application that you can use to access your reports and dashboards on the go.

CHAPTER 3

PROJECT ARCHITECTURE

3.1 Architecture
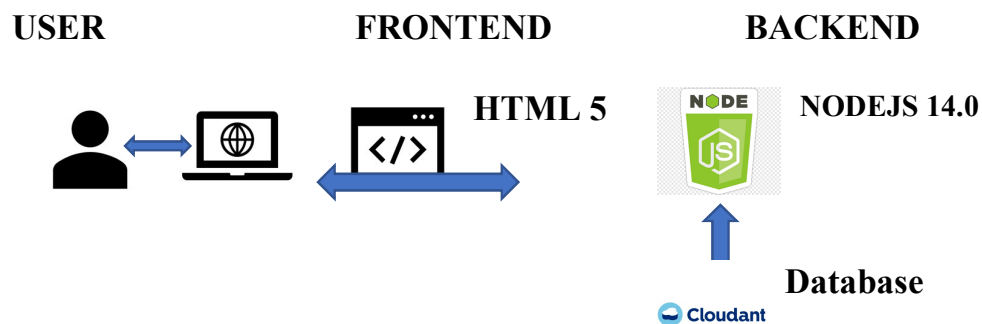
Here's a high-level architecture for the project:

.For a project focused on the analysis of commercial electricity consumption in India, the architecture could be structured as follows:

1. **Data Collection Layer**: This would involve the aggregation of electricity consumption data from commercial entities across various states in India. The data sources could include utility companies, smart meters, and energy surveys.
2. **Data Storage Layer**: A robust database system is needed to store and manage the large volumes of data collected. This could be a cloud-based solution that allows for scalability and accessibility.
3. **Data Processing Layer**: Here, the raw data would be cleaned, transformed, and prepared for analysis. This might involve normalization, handling missing values, and categorizing data points.
4. **Analysis and Modeling Layer**: At this stage, various analytical models and algorithms would be applied to the processed data to identify patterns, trends, and insights. Techniques could range from simple statistical analysis to complex machine learning models.
5. **Visualization Layer**: The insights derived from the analysis would be presented in an understandable format using dashboards and reports. This would help stakeholders make informed decisions based on the data.
    6. **Data Access**: The dashboards created in PowerBI can be accessed through PowerBI Desktop, PowerBI Service (online), and PowerBI Mobile.

This architecture provides a comprehensive solution for real-time analysis of bank customers. However, it's important to note that the specific architecture may vary depending on the bank's existing infrastructure, specific requirements, and budget. It's also important to ensure that all tools and services comply with relevant data privacy and security regulations.

CHAPTER 4

MODELING AND RESULT

Manage relationship

The "disp" file will be used as the main connector as it contains most key identifier (account id, client id and disp id) which can be use to relates the 8 data files together. The "district" file is use to link the client profile geographically with "district id"
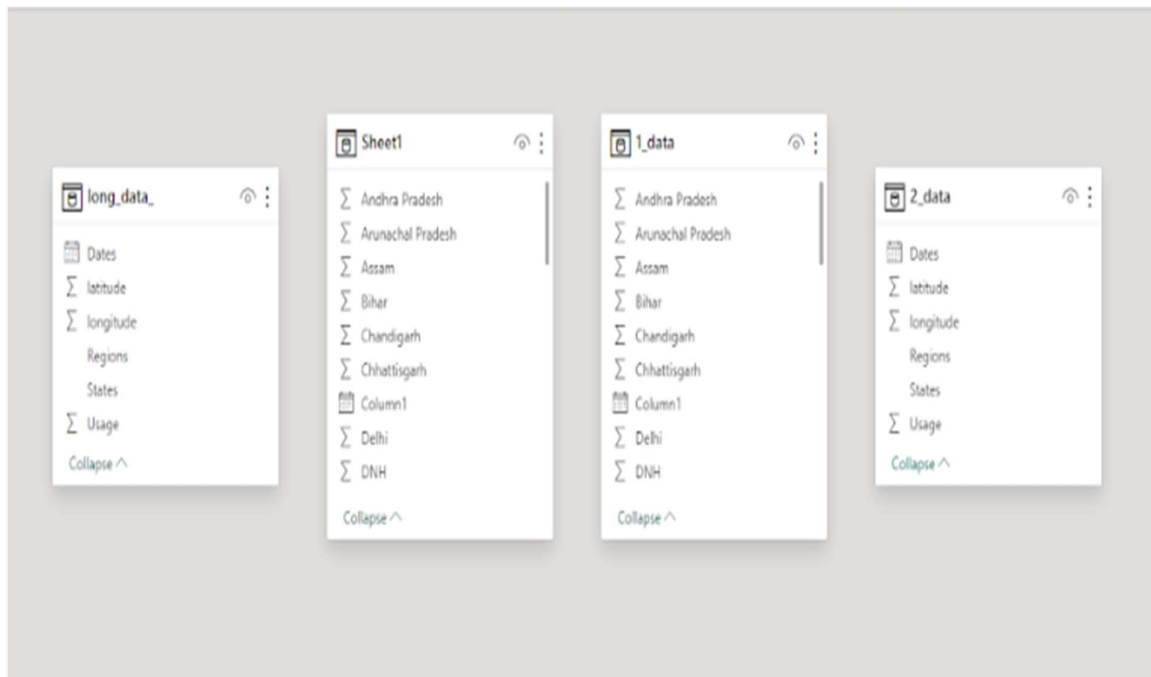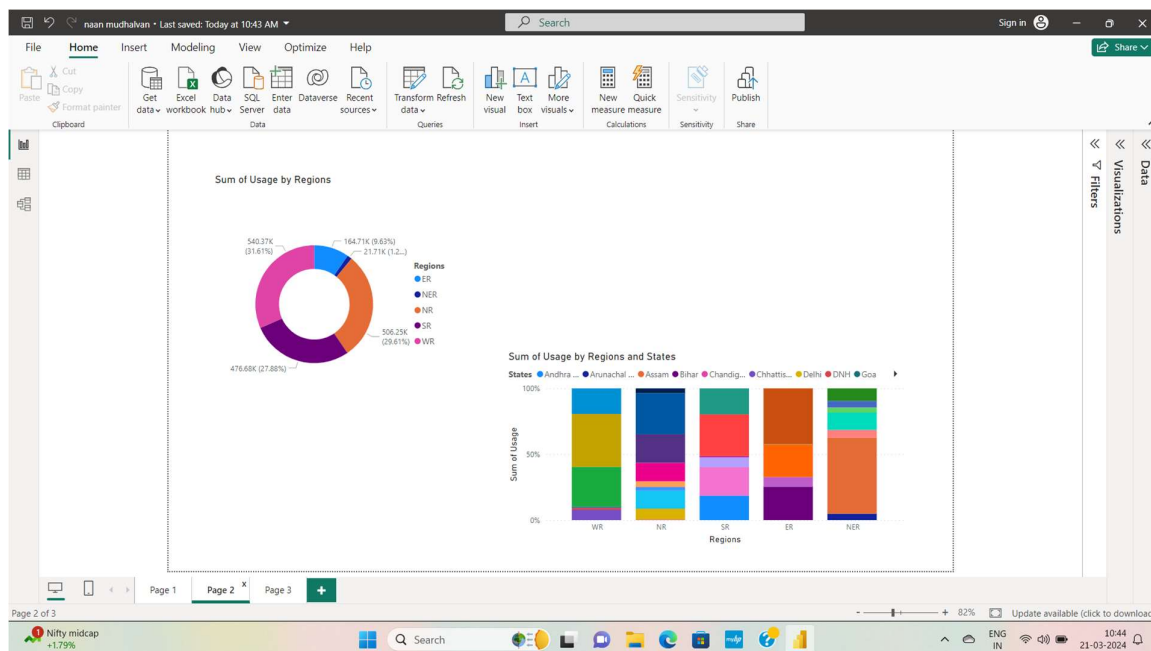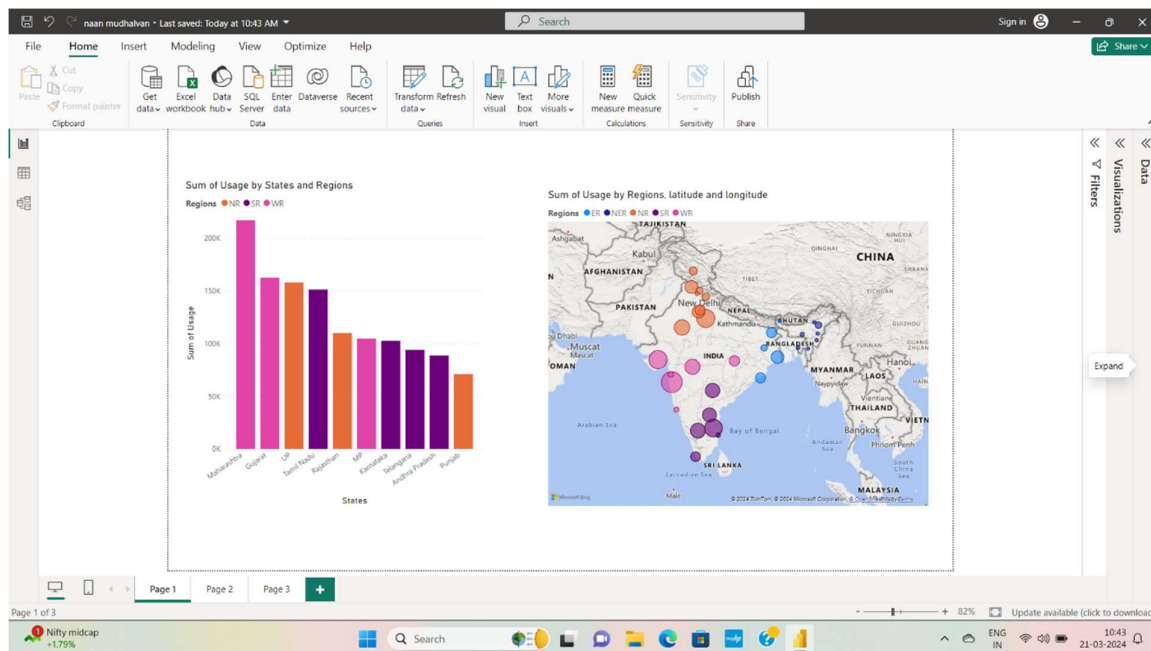
1_data

Preview downloaded on Monday

Column1	Punjab	Haryana	Rajasthan	Delhi	UP
02-01-2019 00:00:00	119.9	130.3	234.1	85.8	313.5
03-01-2019 00:00:00	121.9	133.5	240.2	85.5	311.8
04-01-2019 00:00:00	118.8	128.2	239.8	83.5	320.3
05-01-2019 00:00:00	121	127.5	239.1	79.2	295
06-01-2019 00:00:00	121.4	132.6	240.4	76.6	286.8
07-01-2019 00:00:00	118	132.1	241.9	71.1	294.2
08-01-2019 00:00:00	107.5	121.4	237.2	69	289.4
09-01-2019 00:00:00	132.5	148.2	197	89.2	258.8
10-01-2019 00:00:00	131.5	157	199.9	92.8	284.2
11-01-2019 00:00:00	130.3	145.3	187.7	79.5	281.4
12-01-2019 00:00:00	137.9	151.9	189.9	92.6	298.6
13-01-2019 00:00:00	135.8	141.4	186.9	89.4	316
14-01-2019 00:00:00	139.3	143.8	195.2	82.2	319.5
15-01-2019 00:00:00	141.1	142.9	185.4	77.8	326.3

2_data
Preview downloaded on Monday

States	Regions	latitude	longitude	Dates
Punjab	NR	31.51997398	75.98000281	02-01-201:
Haryana	NR	28.45000653	77.01999101	02-01-201:
Rajasthan	NR	26.44999921	74.63998124	02-01-201:
Delhi	NR	28.6699929	77.23000403	02-01-201:
UP	NR	27.59998069	78.05000565	02-01-201:
Uttarakhand	NR	30.32040895	78.05000565	02-01-201:
HP	NR	31.10002545	77.16659704	02-01-201:
J&K	NR	33.45	76.24	02-01-201:
Chandigarh	NR	30.71999697	76.78000565	02-01-201:
Chhattisgarh	WR	22.09042035	82.15998734	02-01-201:
Gujarat	WR	22.2587	71.1924	02-01-201:
MP	WR	21.30039105	76.13001949	02-01-201:
Maharashtra	WR	19.25023195	73.16017493	02-01-201:
Goa	WR	15.491997	73.81800065	02-01-201:
DNH	WR	20.26657819	73.0166178	02-01-201:
Andhra Pradesh	SR	14.7504291	78.57002559	02-01-201:
Telangana	SR	18.1124	79.0193	02-01-201:
Karnataka	SR	12.57038129	76.91999711	02-01-201:
Kerala	SR	8.900372741	76.56999263	02-01-201:
Tamil Nadu	SR	12.92038576	79.15004187	02-01-201:
Pondy	SR	11.93499371	79.83000037	02-01-201:
Bihar	ER	25.78541445	87.4799727	02-01-201:

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Dashboard

CONCLUSION

Based on the analysis of commercial electricity consumption in Indian states, it can be concluded that there are significant variations in consumption patterns across different regions. Factors such as industrialization, urbanization, and economic development play crucial roles in determining electricity consumption levels. Understanding these regional disparities is essential for policymakers to develop targeted strategies for ensuring sustainable energy usage and infrastructure development. Additionally, promoting energy efficiency measures and renewable energy sources can help address growing energy demands while mitigating environmental impacts.

FUTURE SCOPE

The scope of analysis for commercial electricity consumption in Indian states can encompass a variety of features, including:

1. **Trend Analysis**: Examining historical data to identify consumption patterns and trends over time.
2. **Comparative Analysis**: Comparing electricity consumption across different states or regions to understand disparities and commonalities.
3. **Sector-Specific Consumption**: Analyzing electricity usage within specific commercial sectors such as retail, hospitality, or IT services.
4. **Peak Demand Analysis**: Identifying peak consumption periods to aid in demand-side management and grid optimization.
5. **Efficiency Benchmarking**: Evaluating the energy efficiency of commercial buildings against established benchmarks or standards.
6. **Policy Impact Study**: Assessing the effectiveness of energy policies and regulations on commercial electricity consumption.
7. **Forecasting**: Predicting future consumption patterns based on current data and trends.
8. **Sustainability Assessment**: Measuring the impact of commercial electricity consumption on sustainability goals and renewable energy integration.

REFERENCES

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