Tech Saksham

Case Study Report

Data Analytics with Power BI

Analysis of Commercial Electricity Consumption in Indian State (Data Analytics with data from Could/Web)

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ABSTRACT

This study investigates the patterns and determinants of commercial electricity consumption in India. The commercial sector plays a pivotal role in the economic landscape, representing a significant portion of overall electricity demand. Understanding the factors influencing commercial electricity consumption is crucial for effective energy planning, resource allocation, and policy formulation.

Using a combination of statistical analysis and data visualization techniques, this research examines historical electricity consumption data from the commercial sector in India over the past decade. Various socio-economic indicators, such as GDP growth, employment rates, population density, and commercial establishments' distribution, are analyzed to discern their impact on electricity usage patterns.

Preliminary findings suggest a strong correlation between economic activity and commercial electricity consumption. Rapid urbanization and industrialization contribute to the increasing demand for electricity in commercial establishments. Furthermore, the study investigates the role of technological advancements, energy efficiency measures, and government policies in influencing electricity consumption trends.

The research aims to provide insights for policymakers, energy planners, and stakeholders to develop strategies for sustainable energy management and address challenges related to electricity supply and demand in the commercial sector. By understanding the underlying factors driving electricity consumption, policymakers can formulate targeted interventions to promote energy conservation, enhance efficiency, and ensure the reliable supply of electricity to support economic growth and development goals.

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Chapter - 1

INTRODUCTION

INTRODUCTION:

Electricity consumption is a fundamental indicator of economic activity and development within a region. In the context of India, a rapidly evolving economy, understanding the patterns and trends of commercial electricity consumption across different states is crucial for policymakers, businesses, and researchers alike. Commercial electricity usage encompasses various sectors such as retail, hospitality, offices, and other non-industrial establishments, making it a significant component of overall energy demand.

This analysis aims to delve into the consumption patterns of commercial electricity across Indian states, exploring factors that influence consumption levels, regional disparities, and potential implications for sustainable development and energy policy formulation. By examining historical data, identifying key drivers, and employing analytical tools, we seek to gain insights into the dynamics of commercial electricity consumption and its socio-economic correlates.

1. Problem Statement

In the context of a specific Indian state, the task is to conduct a comprehensive analysis of commercial electricity consumption patterns. This analysis aims to provide insights into various aspects related to commercial electricity usage within the state. The goal is to understand the trends, patterns, and factors influencing commercial electricity consumption, which can aid policymakers, energy regulators, utility providers, and other stakeholders in making informed decisions.

2. Proposed Solution

The proposed solution is to develop a PowerBI dashboard that can analyze and visualize real-time customer data. The dashboard will integrate data from various sources such as transaction history, customer feedback, and demographic data. It will provide a comprehensive view of customer behavior, preferences, and trends, enabling banks to make informed decisions. The dashboard will be interactive, user-friendly, and customizable, allowing banks to tailor it to their specific needs. The real-time analysis capability of the dashboard will enable banks to respond promptly to changes in customer behavior or preferences, identify opportunities for cross-selling and up-selling, and tailor their products and services to meet customer needs.

3. FEATURE

- **Real-Time Analysis**: The dashboard will provide real-time analysis of customer data.
- **Customer Segmentation**: It will segment customers based on various parameters like age, income, transaction behavior, etc.
- **Trend Analysis**: The dashboard will identify and display trends in customer behavior.
- **Predictive Analysis**: It will use historical data to predict future customer behavior.

4. Advantages

- **Data-Driven Decisions**: Electricity board can make informed decisions based on real-time data analysis.
- **Improved Customer Engagement**: Understanding customer behavior and trends can help Electricity board engage with their customers more effectively.
- **Increased Revenue**: By identifying opportunities Electricity Board can increase their revenue.

5. Scope

Analyzing electricity consumption across different commercial sectors such as manufacturing, services, retail, hospitality, healthcare, and IT enables a comprehensive understanding of the energy needs and consumption patterns specific to each sector. This helps in tailoring energy management strategies and policies to address the unique requirements of different industries.

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

Metering and Data Collection Services: Companies offering metering services provide equipment for measuring electricity consumption in commercial establishments. These meters may range from traditional analog meters to advanced smart meters that offer real-time data monitoring and remote access capabilities.

Energy Auditing and Consulting Services: Energy auditing firms offer services to assess the energy performance of commercial buildings and facilities. They conduct comprehensive audits to identify energy-saving opportunities, inefficiencies, and potential areas for improvement.

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

In the analysis of commercial electricity consumption in Indian states, the architecture involves a structured framework encompassing various components and methodologies. Here's an architectural overview:

- **Data Collection Framework**:
  - **Metering Infrastructure**: Establishing a robust metering infrastructure to capture real-time or interval-based electricity consumption data from commercial establishments.
  - **Data Acquisition Systems**: Deploying automated data acquisition systems to collect, process, and store electricity consumption data from diverse sources, including smart meters, sub-meters, and energy management systems.

Data Processing and Analysis:

- **Data Cleansing and Preprocessing**: Cleaning and preprocessing electricity consumption data to remove outliers, errors, and inconsistencies before analysis.
- **Descriptive Analytics**: Conducting descriptive statistical analysis to summarize and visualize commercial electricity consumption patterns, including mean consumption, peak demand periods, variability, and trends.

Sectoral and Geographical Analysis:

- **Sectoral Segmentation**: Segmenting commercial electricity consumers into distinct sectors such as manufacturing, services, retail, hospitality, healthcare, and IT for sector-specific analysis.
- **Regional Profiling**: Profiling electricity consumption patterns and trends in different states, cities, and urban-rural areas to understand regional variations in energy usage.

Policy and Regulatory Analysis:

- **Policy Evaluation**: Assessing the impact of energy policies, regulations, tariffs, subsidies, and incentives on commercial electricity consumption in Indian states.
- **Regulatory Compliance**: Analyzing compliance with energy efficiency standards, renewable energy targets, and other regulatory requirements among commercial consumers.

Socio-economic and Demographic Analysis:

- **Socio-economic Profiling**: Analyzing socio-economic factors such as income levels, population demographics, consumer behavior, and business dynamics influencing commercial electricity consumption.
- **Equity Analysis**: Assessing energy access, affordability, and equity issues among different segments of the population and commercial consumers

Reporting and Decision Support:

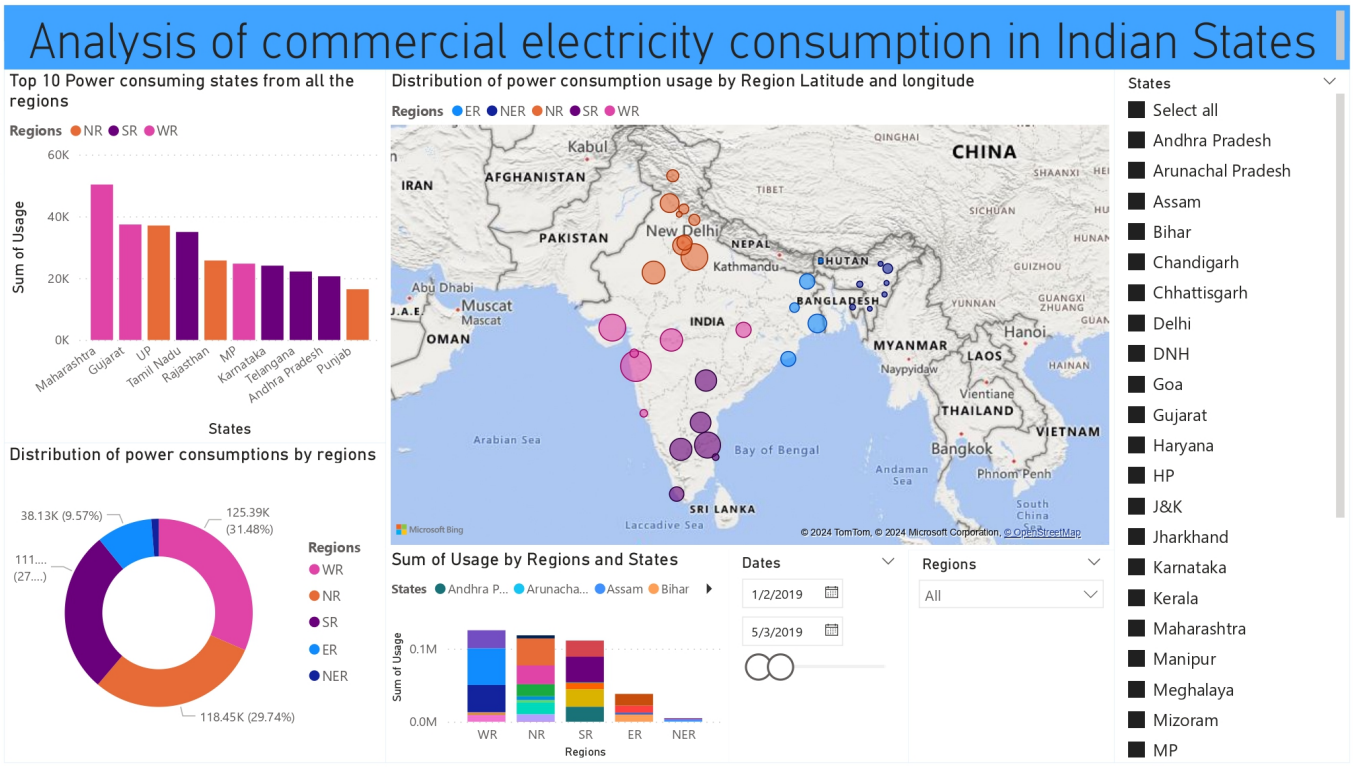
- **Visualization and Reporting**: Developing interactive dashboards, reports, and visualizations to communicate key findings, insights, and recommendations to policymakers, utilities, businesses, and other stakeholders.
- **Decision Support Systems**: Building decision support systems and tools to facilitate evidence-based decision-making and policy formulation related to commercial electricity consumption in Indian states.

By adopting a comprehensive architectural approach encompassing data collection, processing, analysis, and reporting, stakeholders can gain actionable insights into commercial electricity consumption patterns, drivers, and impacts, thereby informing policy interventions, infrastructure planning, and energy management strategies in Indian states

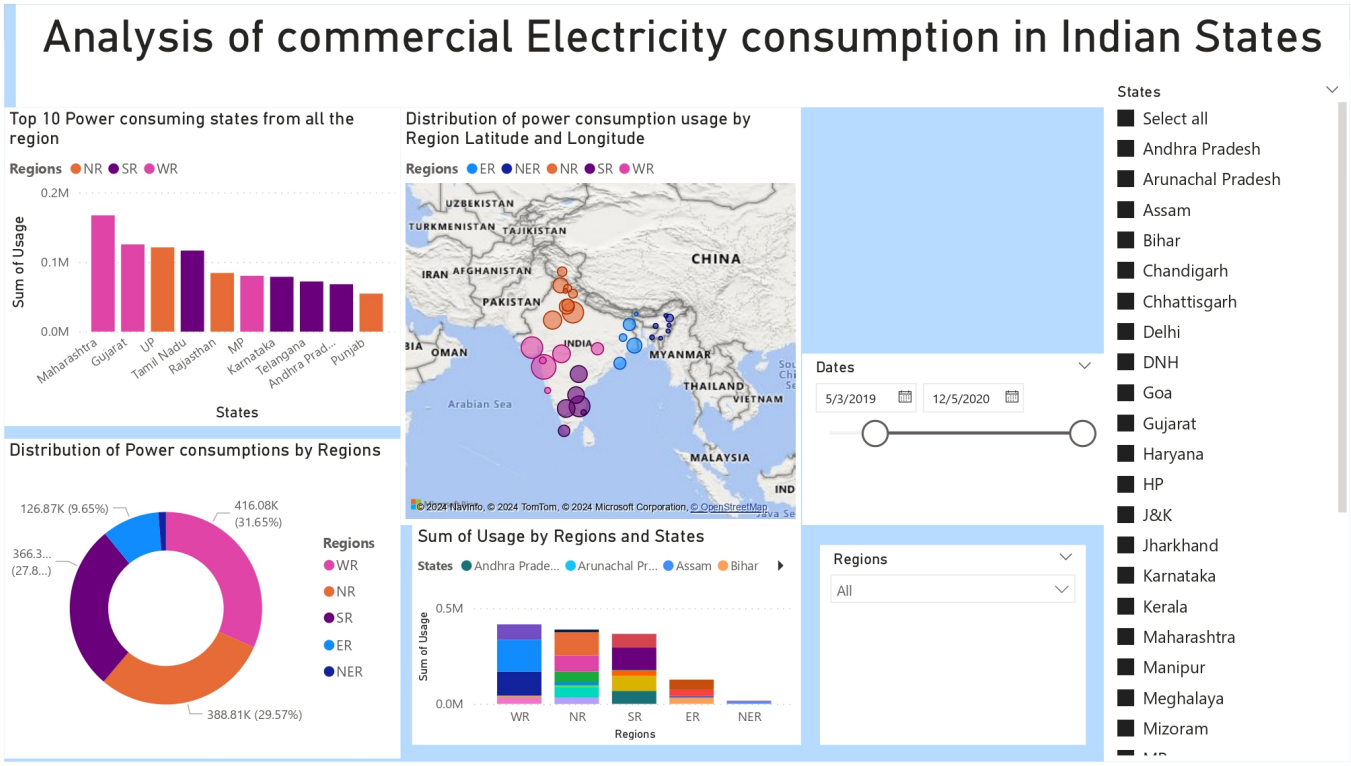
CHAPTER 4

Dashboard

BEFORE LOCKDOWN



After Lockdown



Conclusion

Drawing a conclusion on the analysis of commercial electricity consumption in Indian states would involve synthesizing the findings and identifying key trends or patterns. Here's a potential conclusion based on such an analysis:

"The analysis of commercial electricity consumption across Indian states reveals several significant insights. Firstly, there exists substantial variation in consumption levels among states, reflective of differences in economic activity, industrialization, and commercial infrastructure. States with higher levels of industrialization and urbanization tend to exhibit greater commercial electricity demand.

Secondly, while certain states show consistent growth in commercial electricity consumption over the years, others exhibit fluctuations driven by factors such as economic cycles, policy interventions, and infrastructure development.

Thirdly, the analysis underscores the importance of considering regional dynamics and sectoral compositions within states. For instance, states with a strong presence of industries such as IT and manufacturing tend to have higher commercial electricity consumption compared to those with predominantly agricultural economies.

Additionally, the analysis highlights the role of policy frameworks and regulatory mechanisms in shaping electricity consumption patterns. States with proactive policies promoting energy efficiency and renewable energy adoption tend to witness slower growth rates in commercial electricity consumption compared to those lacking such initiatives.

Overall, the analysis underscores the need for tailored strategies at both the national and state levels to manage and optimize commercial electricity consumption. This includes investments in energy-efficient technologies, infrastructure development, and the promotion of sustainable business practices to ensure reliable and affordable electricity supply while minimizing environmental impacts."

FUTURE SCOPE

The future scope of this project is vast. With the advent of advanced analytics and machine learning, PowerBI can be leveraged to predict future trends based on historical data. Integrating these predictive analytics into the project could enable the bank to anticipate customer needs and proactively offer solutions. Furthermore, PowerBI's capability to integrate with various data sources opens up the possibility of incorporating more diverse datasets for a more holistic view of customers. As data privacy and security become increasingly important, future iterations of this project should focus on implementing robust data governance strategies. This would ensure the secure handling of sensitive customer data while complying with data protection regulations. Additionally, the project could explore the integration of real-time data streams to provide even more timely and relevant insights. This could potentially transform the way banks interact with their customers, leading to improved customer satisfaction and loyalty.

REFERENCES

https://medium.com/analytics-vidhya/analysis-of-bank-customers-using-dashboard-in-power-bi-a366f2b3e563

LINK

https://github.com/Jaswin2611/Analysis-of-Commercial-Electricity-consumption-in-Indian-States

Thank you