Tech Saksham

Case Study Report

Data Analytics with Power BI

“Analysis of commercial Electricity Consumption Indian state ”

“A.P.C.MAHALAXMI COLLEGE FOR WOMEN”

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ABSTRACT

In India, the sources of energy availability to the human development has been advocated since independence, so much so that the adequate quantity and quality of electricity, and measured by per capita consumption, is associated in most economies as a key Human Development Index. It is expected that the nation, which is already in the forefront of urbanization and industrialization in the country, proposes to be a global hub of manufacturing. Such a vision, if continued by successive governments, will leads to a scenario where the demand for electricity is most likely to increase year after year for decades. This Paper attempts to identify the sources of electrical energy in India. The growth of agriculture, manufacturing and service sectors has been possible to modify the energy in every year and also utilization of new technologies in their production. As a result, the electrical energy is leads to greater importance for agriculture and farmers have better control over the availability of energy for productive oriented.

INDEX

CHAPTER 1

INTRODUCTION

1.1 Problem Statement

Power problems can be generated by many sources including: distribution network faults, system switching, environmental and weather conditions, faulty hardware, heavy local plant, terrorism, high power demands or accidental routing or cable cutting. The principal terms used for power problems include.

1.2 Proposed Solution

1. The authors propose "Big Data Analysis Process for Residential Housing Energy Consumption" by utilizing public open data.
2. The authors present the big data model utilizing the existing big data analysis process using CRISP-DM.
3. The authors propose four steps of big data analysis processing including Data Understanding, Data Processing, Data Analytics, and Evaluation.

1.3 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.

1.4 Advantages

- **Data-Driven Decisions**: Electricity can make informed decisions based on real-time data analysis.
- **Improved Customer Engagement**: Understanding consumer behavior and trends can help official engage with their customers more effectively.
- **Increased Revenue**: By identifying opportunities for cross-selling and up-selling, electricity can increase their revenue.

1.5 Scope

The scope of this project extends to all The demand for electricity in India is intricately linked to economic activity. Projections indicate a significant surge in demand as industrial sectors expand, urbanization accelerates, and the residential sector experiences heightened energy use. According to government projections, the electricity demand is expected to grow at an annual rate of 7% over the next decade.

CHAPTER 2

ELECTRICITY GENERATION

GENERATION - UTILITIES

The All India gross electricity generation by the Utilities during the year 2020-21 was 1373186.88 GWh as compared to 1383416.75 GWh during 2019-20. The All India generation from utilities has shown a decline of -0.74%. During the year 2020-21, the generation from Hydro, Thermal, Nuclear and Non- Conventional Energy Sources has been 150299.52 GWh, 1032610.77 GWh, 43029.08 GWh and 147247.51 GWh respectively. The respective **percentage of this generation with respect to gross generation from above sources has been 10.95%, 75.20%, 3.13% & 10.72%. The Gross Generation during 2020-21 in Central,** State and

Private Sector was 469738.08 GWh, 371263.59 GWh and 532185.20 GWh constituting 34.21%, 27.04% an 38.76 respectively.

GENERATION - NON UTILITIES (ONLY CAPTIVE)

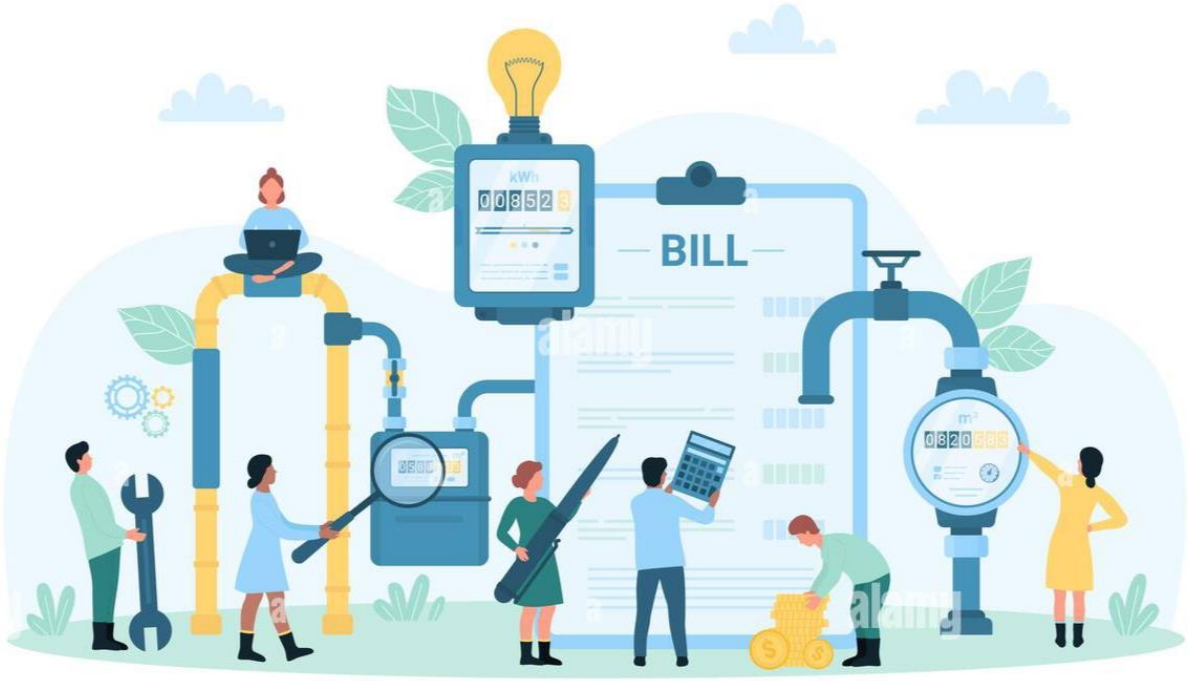
Besides electricity generation by the Public Utilities, during the year under review captive electricity generating plants of industries in the Industrial Sector having demand of 1 MW & above have produced 224827.40 GWh comprising 339.12 GWh from hydro, 193142.60 GWh from steam, 2504.19 GWh from diesel, 21683.55 GWh from gas and 7157.94 GWh from RES respectively. The captive power plant energy generation has. registered a. decline of -6.15% over previous year's generation.

TOTAL GENERATION (UTILITIES + NON-UTILITIES)

The total electricity produced in the country including that from captive plants during the year 2020-21 was 1598014.28 GWh as compared to 1622983.50 GWh during the year 2019-20. Thus the electricity generation has registered a decline of -1.54% over previous year's generation. Tables 4.1 to 4.5 give break-up details of electrical energy generation Mode-wise, State-wise, Region-w

CHAPTER 3

ELECTRICITY UTILISATION



Electrical Energy Consumption

Electricity consumption by various categories of consumers served by utilities during the year 2020-21 was 1041655.63 GWh registering a decrease of 1.02% over previous year. As in the preceding year, the major portion of electricity viz. 950531.20 GWh representing 91.25% of the total energy consumption was distributed by thePublic Sector and remaining 8.75% was distributed by the private sector. (including Cooperatives Societies).

Out of 91.25% of energy distributed by the Public Sector, the Municipalities distributed 0.47% and the Electricity Departments of the States and Union Territories and State Govt. distribution companies distributed balance 90.78%. The four major. private licensees viz. TATA Electric Companies, Calcutta Electric Supply Corporation. (CESC), Torrent Power Ltd., Adani Electricity Mumbai Limited and BSES Ltd. Distributed 2.93%, 0.86%, 0.92%, 0.69% and 1.63% adding up 7.02% only and the balance of 1.73% of total energy was distributed by Rural Co-operative Societies and other private licensees to its consumers respectively.

Electricity Consumption Pattern (Utilities & Non-Utilities)

The total electricity consumed including utilities and non-utilities during the year 2020-21 was 1230207.98 GWh as compared to 1248085.82 GWh during the year 2019-20 registering decrease of 1.43% over the previous year. The last two years have been difficult for the Indian economy on account of the COVID-19 pandemic, impact of which has been reflected in the power consumption pattern for 2020-21. The electricity consumption pattern for the year 2020-21 has shown improved share of Domestic and Agriculture electricity consumption. However, share of Industrial and Commercial consumption has decreased. The share of total Domestic consumption was 26.89% during the year 2020-21 as compared to24.74% during the year 2019-20 and registered a growth of 7.15% over the previous year. The share of Agriculture consumption was 17.99% during the year 2020-21 as compared to 16.93% during the year 2019-20 and registered a growth of 4.74% over the previous year. The share of Industrial consumption was 41.36% during the year 2020-21 as compared to 42.69% during the year

2019-20 and registered a decrease of 4.51% over the previous year. The share of Commercial consumption was 7.07% during the. year 2020-21 as compared to 8.50% during the year 2019-20 and registered a decrease of 18.01% over the previous year

III. Per Capita Electricity Consumption

The per capita consumption of electricity on All India basis works out to 1161 kWh for the year 2020-21 against 1208 kWh in the year 2019-20. Per Capita Electricity Consumption is worked out as the total

gross electrical energy consumed divided by Mid-Year Population during the year.

CHAPTER 4

ELECTRICITY TRANSMISSION AND DISTRIBUTION SYSTEM

Electric power transmission is the bulk movement of electrical energy from a generating site such as a power plant to an electrical substation close to the location of beneficiary of the plant /consumers.

The interconnected lines which facilitate this movement are known as a transmission network. The interconnected lines which facilitate the distribution of electrical energy at lower voltages to consumers are

known as distribution network. Electric power may flow through several substations interconnecting the transmission & distribution lines at

different voltage levels. A substation may include transformers to transform voltage from low to high (Step Up Transformers), high to low (Step Down Transformers) and high to low (at distribution level) (Distribution Transformers).

I. TRANSMISSION AND DISTRIBUTION

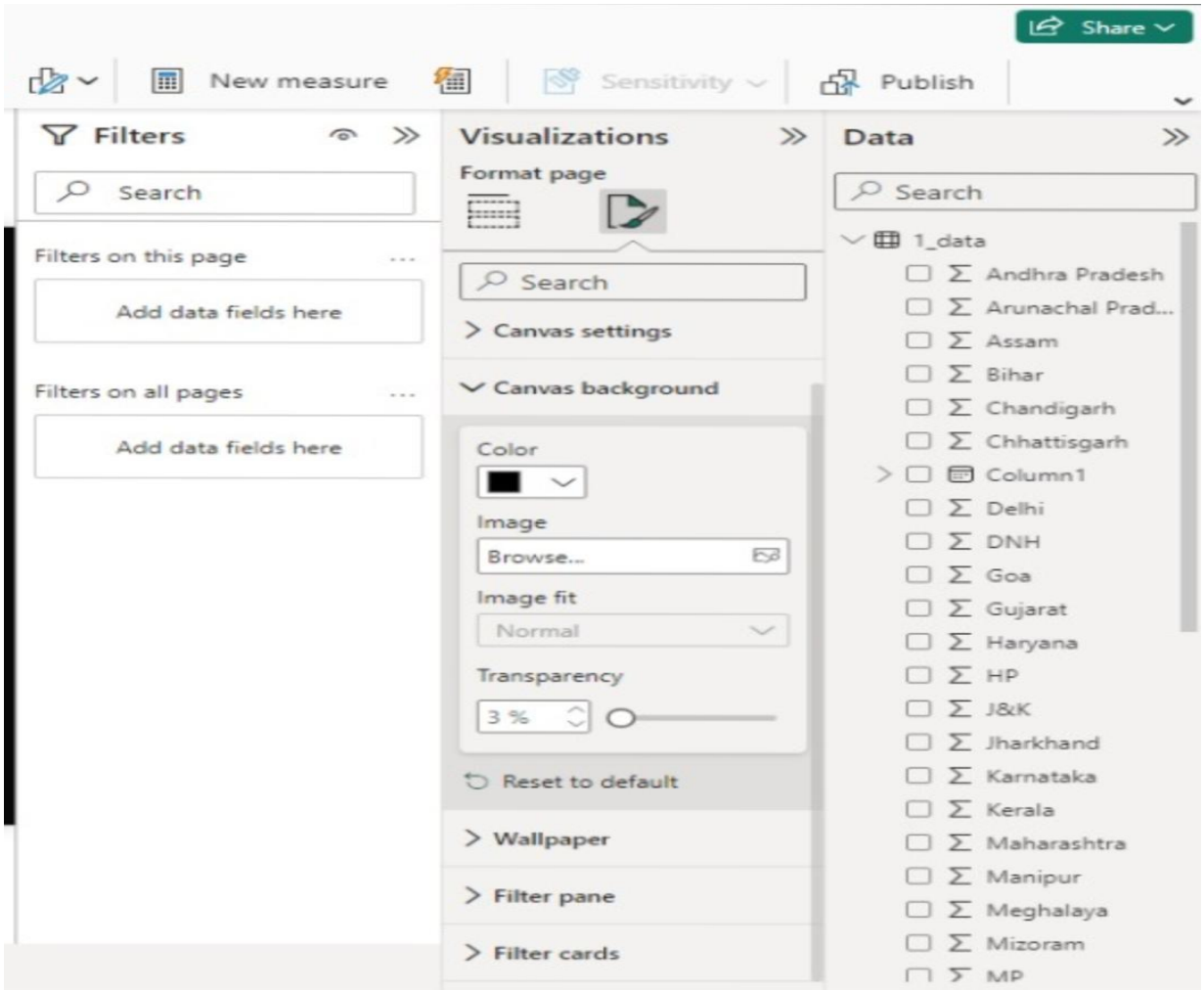
An extensive network of Transmission and Distribution lines has been developed over the years for evacuating power produced by different electricity generating stations and distributing the same to the consumers. Depending upon the quantum of power and the distance involved, lines of appropriate voltages are laid. The nominal Extra High Voltage lines in vogue are ±800 kV, ±500 kV HVDC & 765 kV, 400 kV, 230/220 kV, 132/110 kV and 66 kV AC lines. All these lines have been installed by Generation/ Transmission/ Distribution Utilities including Central Sector Organizations and State/UT Electricity Departments. The State of Uttar Pradesh has the largest Transmission and Distribution network of 1649360 Ckt .Kms in the country.

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”



Manage relationships

Active	From: Table (Column)	To: Table (Column)
☑	card (disp_id)	disp (disp_id)
☑	client (district_id)	district (district_id)
☑	disp (account_id)	account (account_id)
☑	disp (account_id)	loan (account_id)
☑	disp (client_id)	client (client_id)
☑	order (account_id)	account (account_id)
☑	transaction (account_id)	disp (account_id)
☐	account (district_id)	district (district_id)
☐	transaction (account_id)	loan (account_id)

5841	*4268*	*981104*	*41,988 Kč*	*12*	*3499*	C	GOOD	Timely payment

Edit relationship

Select tables and columns that are related.

card

card_id	disp_id	type	issued	card issued on
1005	*9285*	classic	931107	*Sunday, 7 November 1993*
104	*588*	classic	940119	*Wednesday, 19 January 1994*
747	*4915*	classic	940205	*Saturday, 5 February 1994*

disp

disp_id	client_id	account_id	type
1	1	1	OWNER
2	2	2	OWNER
4	4	3	OWNER

Cardinality: One to one (1:1)

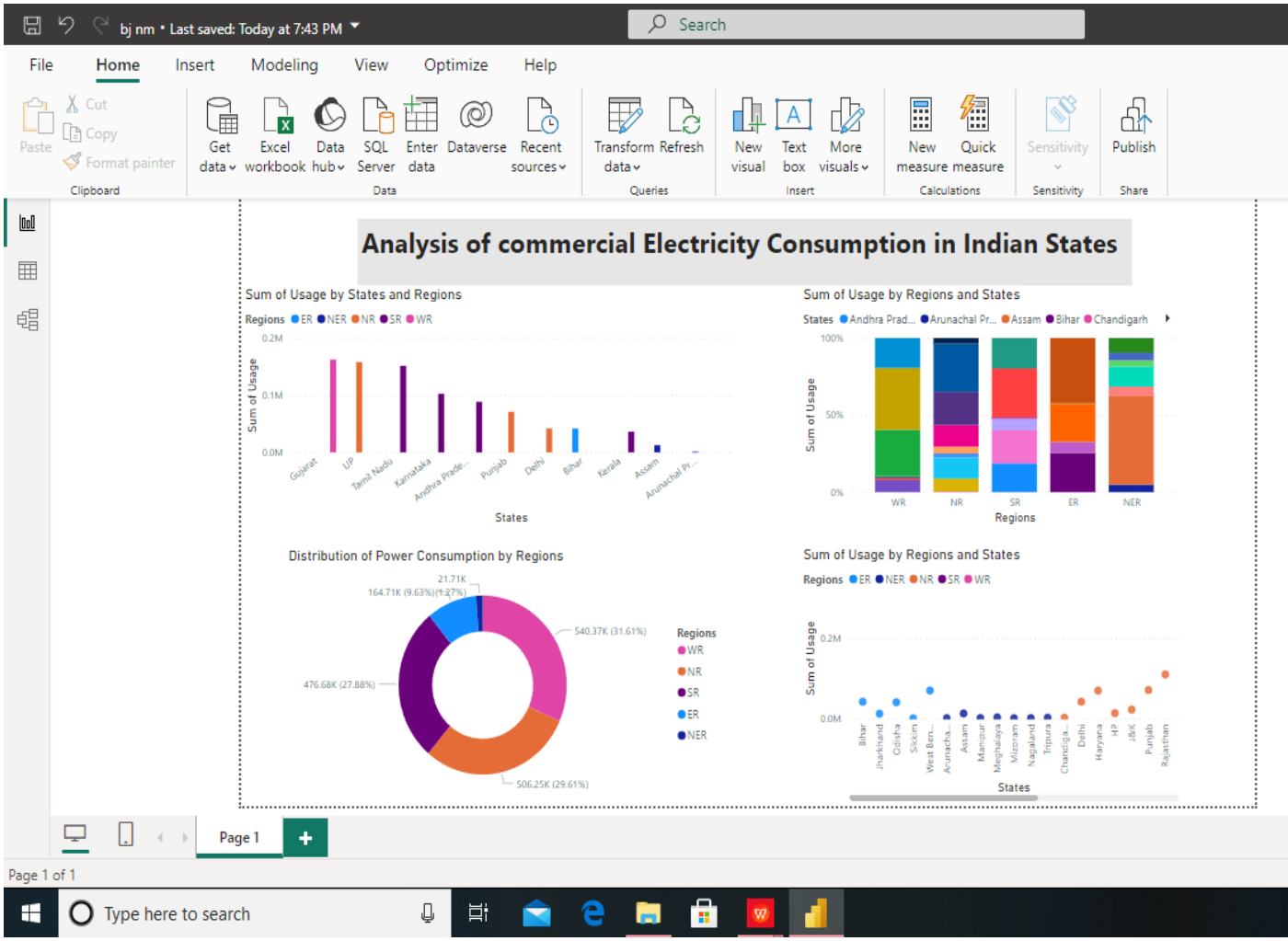
Cross filter direction: Both

☑ Make this relationship active

☐ Apply security filter in both directions

☐ Assume referential integrity

Dashboard



CONCLUSION

The project “Analysis ofCommercial electricity Consumption in Indian Sate” using PowerBI has successfully demonstrated the potential of data analytics in the banking sector. The analysis of customer data has provided valuable insights into preferences, and trends, thereby facilitating informed decision-making. The interactive dashboards and reports have offered a comprehensive view of customer data, enabling the identification of patterns and correlations. This has not only improved the efficiency of data analysis but also enhanced the bank’s ability to provide personalized services to its customers. The project has also highlighted the importance of data visualization in making complex data more understandable and accessible. The use of PowerBI has made it possible to present data in a visually appealing and easy-to-understand format, thereby aiding in better decision-making.

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.

REFERENCE

https://research.iitj.ac.in/publication/convergence-in-electricity-consumption-across-indian-states

LINK

