Case Study Report

Data Analytics with power BI

“ELECTRICITY CONSUMPTION”

Sri Paramakalyani College, Alwarkurichi.

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Analysis of commercial electricity consumption

Abstract :

This work explains how to analyze the aggregate electricity consumption of many consumers, and extract key components such as heating, ventilation and air conditioning (HVAC), residential lighting, and street lighting consumption from the total consumption. To avoid explicit modeling of dependencies on time of day and on working versus non-working days, least-squares fitting for outside temperature and natural illumination dependency proceeds independently for each hour of the day. Cubic polynomials model dependencies on Steadman apparent temperature and on log-scale

illumination, but spline surfaces are best when considering these variables jointly. The primary focus is on residential consumption, but the same techniques can be used for studying street lighting, commercial and industrial consumption.

Introduction:

Electricity shortages constitute one of the main challenges facing the Nigeriannation. The situation is as a result of inability of the electricity supply to meet the consumers demand in the industrial, commercial and residential sectors of the nation's economy. Electricity supply in the country has been erratic and epileptic, thus resulting in frequent power outages that have impaired economic growth and development. The residential, commercial

and industrial electricity consumption accounted respectively for 51.3, 26.7 and 22 percent of total electricity consumption. These sectors have experienced serous decline in electricity consumption in the past two decades.This situation has been attributed to the inability of electricity supply to meet the estimated nation's daily demand of 5000 mega watts (mw) per hour. The nation's daily generating capacity has declined from 5000mw per hour to 1600mw per hour. This is worsened by the phenomenal growth in population and economic activities, lack of maintenance of the existing power stations as well as failure of the government to improve on the nation's generating capacity in order to meet the growing demand in the various sectors of the

economy. The impacts of this problem on the nation's economy were enormous. Industrial and commercial establishments operate below their production capacity. Some have resorted to the use of diesel generators as alternative source of power. This resulted in increased cost of production and high cost of goods and services in the country(Adenikinja 2003). Some others have relocated to neighbouring countries where there is steady supply of electricity. All the efforts aimed at addressing the power problem have been marred by corruption.The aim of this study is to compare electricity consumption among the industrial, commercial and residential sectors of the Nigerianeconomy. This is with a view to determining thepattern and extent of differentials in electricityconsumption

among the three sectors. It is hoped that the outcome of this study is capable of enhancing current measures aimed at elimination of load shedding and power outages in thecountry.

1.Literature Review:

Studies have been carried out on electricity consumption around the globe. Ubani (2009) determined the electricity consumption pattern in south-south geopolitical region of Nigeria. The results showed that there were significant differences in electricity consumption pattern amongst the six states that constitute the geopoliticalregion. River state had the highest mean consumption rate, followed in descending order by

Delta, Edo, AkwaIbom, Bayelsa and Cross River states. He recommended for strategic and systematic distribution of electricity to ensure adequate supply in south-south geopolitical region Arimah (1993) discovered that that there was spatial variation in electricity consumption in Nigeria. This, he attributed to variation in socio- physical variables among various regions. These variables are the price of electricity, urbanizationincome, population, number of residential houses, land area, commercial activities, industrial activities and distance of each state to Kanji Dam. Adenikinja (2003) discovered that the cost of electricity failures on the Nigerian manufacturing sector was quite high. Firms incurred huge costs on the provision of expensive back-up to minimize the expected outage costs. The

average costs of this back-up were on the average of 3 times the cost of public supplied electricity. This had negative impact on costs competitiveness of the manufacturing sector. The study supported the efforts to privatize and liberalize the electricity sector. This, he hoped would mitigate the burden of poor power supply as well as introduce the needed competition into the electricity market in the country. Donatos and Mergos (1991) examined the determinants of residential consumption in Greece over the period 1961 – 86. The result showed that: first, the residential demand for electricity was price inelastic but income elastic. Second, there was high substitutability between electricity and liquefied natural gas. Third, during the examined period, the number of consumers played a very important role in

the expansion of electricity consumption in Greece. Fourth, there was no regional variation in residential electricity demand. Similarly,Tserkezos (1992) studied household electricity consumption in Greece. The results showed that personal disposable income, prevailing temperature and price of electricity used by the household played an important role in the demand for electricity.

2. Methodology :

Data used in this study, namely electricity consumption in residential, commercial and industrial sectors, were collected from official records. These include time series data whichcover a period of 35 years, ranging from 1970 to 2004 obtained from Power Holding Corporation of Nigeria.

This study was limited to the year 2004 because of non-availability of data on electricity consumption beyond year 2004. Analysis of Variance technique (ANOVA) was used in testing the research hypothesis which states that: there is no significant difference in electricity consumption among the residential, commercial and industrial sectors of the Nigeria's economy. The dependent variable (y) was electricity consumption. The independent variables were represented by residential, commercial and industrial sectors which were coded in the analysis as treatment categories 1, 2 and 3 respectively. The formulae for ANOVA are given as follows:

$$SST = \sum X2\_ (\sum X)2$$

..... (1)

N

SSB = (∑X1)2

x (∑X2)2

x (∑X3)2

x (∑Xn)

2 ..... (2)

N N N N

SSW = SST - SSB ..... (3)

Where:

SST = Total variation (Total sum of squares)

SSB = Variation between groups (sum of squares

between)

SSW = Variation within groups (sum of squares

within)

3.Data Presentation Analysis:

The trend of electricity consumption in the residential, commercial and industrial sectors from 1970 to 2004. The analysis reveals a fluctuation in electricity consumption by the industrial sector.Between 1970 -1977, this sector had the highest consumption of electricity accounting for 53.6 percent of total electricity consumption. It then declined to 32.2 percent from 1978 to 1990, making it the second largestconsumer of electricity. This fall in the consumption of electricity by the industrial sector can be attributed to aheavy dependence on private generating plants as a result of frequent power outages. The contribution

of the commercial sector to national total prior to 1991 was less than 15 percent. However, due to all in electricity consumption by the industrial sector from 1992 to 2004, the commercial sector became the second largest consumer after the residential sector. This rise in consumption in commercial sector can be attributed to the increase in activities of the informal sector in Nigeria. The residential consumers of electricity became the largest electricity consumers amongst the three sectors from 1978 to 2004. It consumed about 52 percent and 52.4 percent of total electricity between 1978 – 1990 and 1991 to 2004 respectively. This increased electricity demand by residential sector could be attributed to the rising standard of living among Nigerians who

use high power consumption appliances and gadgets.

4. Discussions :

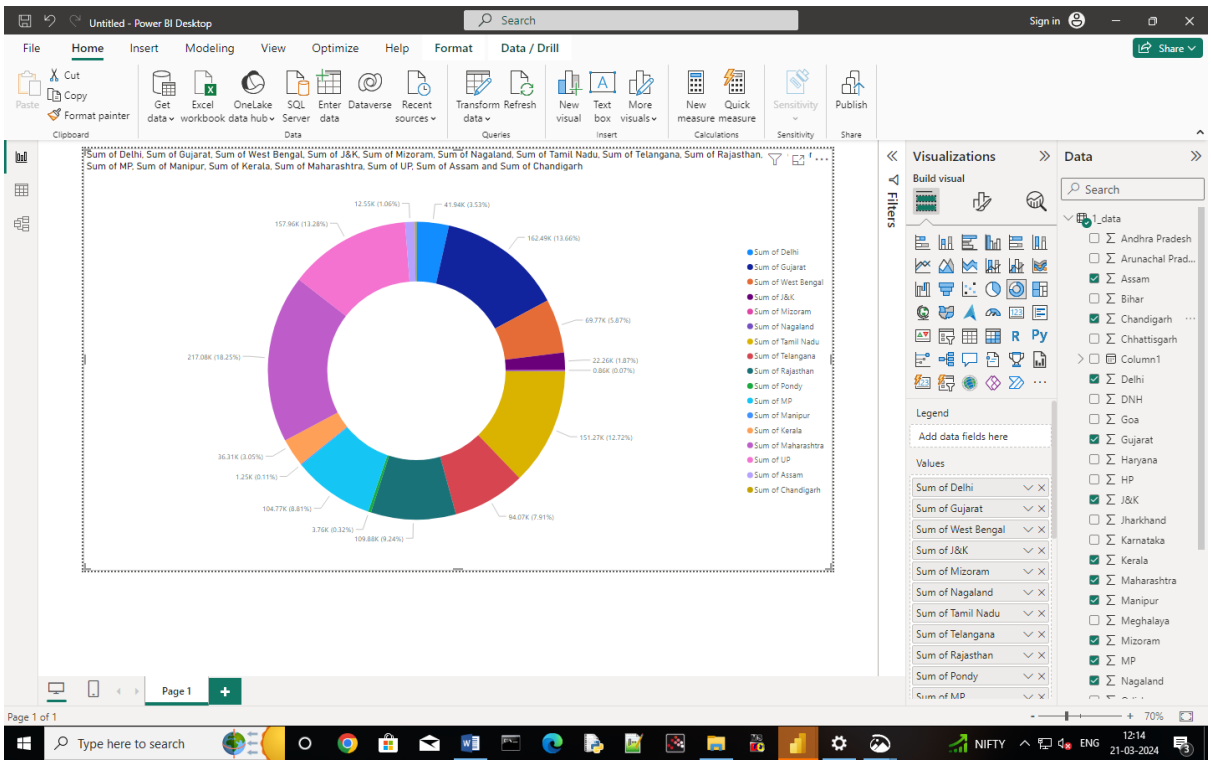
The results of the test of the hypothesis suggest that there exist significant difference in electricity consumption between the three sectors except industrial versus commercial which have lower and similar consumption trend. This implies that electricity consumption is not the same in the three sectors. The mean difference in electricity consumption between residential and commercial was highest (221.04286 mega watts per hour). It was followed by residential and industrial with 172.46286 mega watts per hour. However, industrial and commercial sectors were homogenous (48.5800 mega

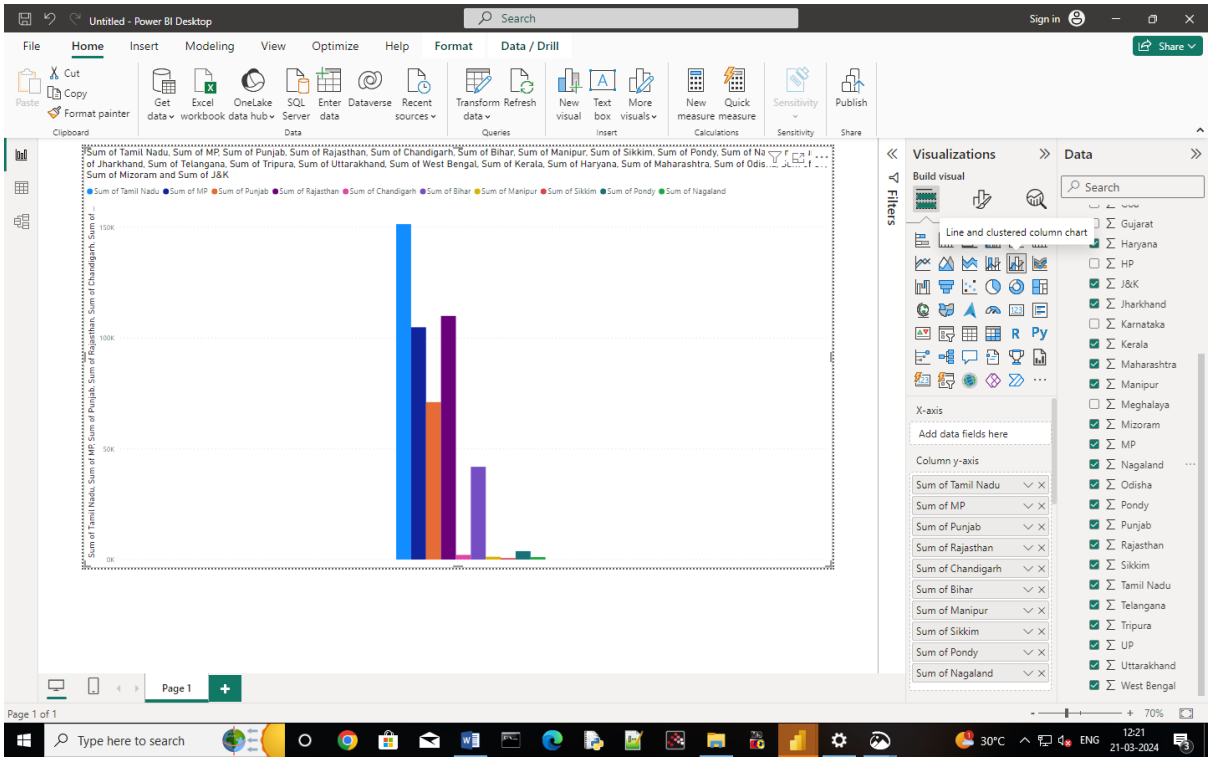
watts per hour), that is, there was no significant difference in electricity.

5.Recommendations :

The government should ensure that the demand for electricity is met in the residential, commercial and industrial sectors of the economy. There is the need to improve the nation's electricity generating capacity to meet the daily demand. To achieve this target, the Federal Government should as a matter of urgency lay more emphasis on the expansion of the generating capacity of the existing power stations as well as the construction of new ones. Also, there should be development of alternative sources of power such as biogas, wind and solar radiation which are abundant in the country. Finally, the

Federal Government should encourage the participation of the private sector in generation and distribution of electricity by removing all impediments inimical to their participation. These efforts will in the long-run result in the generation of electricity that will meet the demands in the residential, commercial and industrial sectors of the Nigeria's economy.

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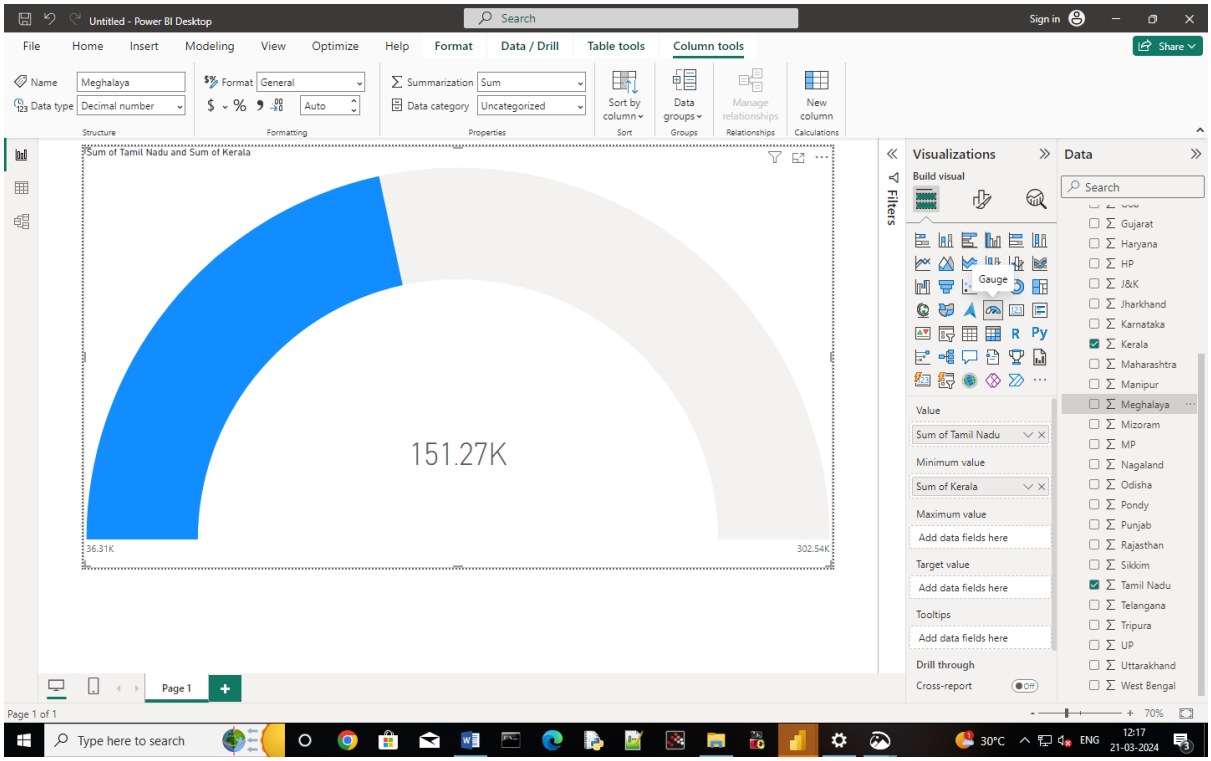
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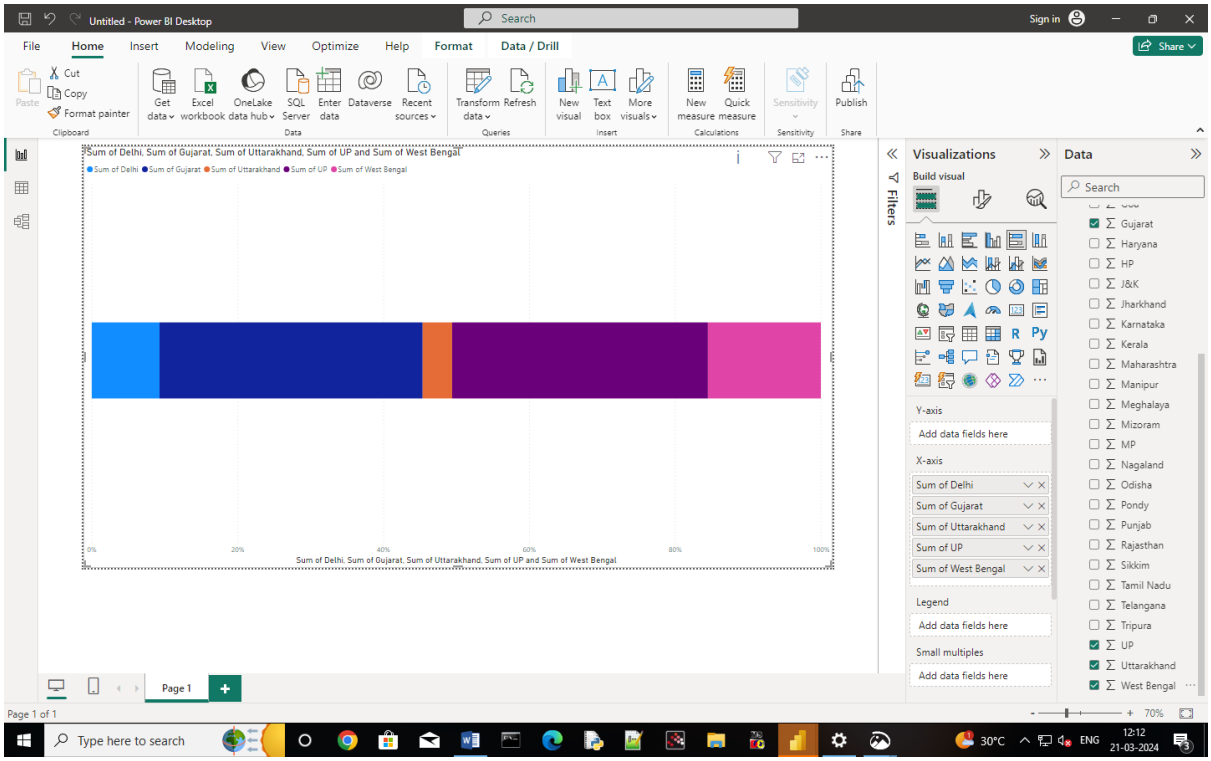

Conclusion :

This study compared electricity consumption among the residential, commercial and industrial sectors of Nigeria's economy. The results of the hypothesis suggest that there exist significant differences in electricity consumption among the three aforementioned sectors with exception of

industrial versus commercial sectors. The residential sector has the highest mean consumption of electricity. It is followed in descending order by industrial and commercial sectors.A comparison of mean electricit consumption in each of the three sectors with daily demand shows that the three sectors are grossly under supplied with electricity. There is the need for adequate supply of electricity to meet the consumers' demand in the residential, commercial and industrial sectors of Nigeria.

Reference:

https://core.ac.uk/upload234667852/

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