
ANALYSIS AND DESIGN OF VISUALIZATION OF SALES DATA USING POWER BI TOOL

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Abstract:

All businesses want growth, and this can be achieved by identifying new opportunities and potential areas for growth in addition to the areas in which the business is lagging. Data analytics is the process by which the data is processed and various important insights are extracted from it that are crucial for the growth of an organization. To fulfil this requirement, Microsoft Power BI can play a vital role. It is a powerful business intelligence tool that allows its users to visualize and analyze business data that can even have multiple sources. The tool has a clean and user-friendly interface. And the final output generated is presented in the form of interactive and beautiful dashboards. At first, the raw data is to be processed through several steps of cleaning and making it compatible to be used. After that, it's processed in Power BI and finally converted into beautiful interactive and informative dashboards used for business decision-making. This paper deals with the visualization of data from a sales store in Power BI by first importing the dataset, processing and cleaning it to make it ready for visualization, establishing appropriate relationships between various tables in the dataset, and finally visualizing the information to extract meaningful insights from it. These insights can be used to forecast various future events and help the organization take control of them to the maximum possible extent.

Keywords: Data Analysis, Data Visualization, Power BI, Business Intelligence

Introduction:

In today's fast-paced business world, organisations need to have the capacity to analyse sales data and get insights into client behaviour. However, manually analysing substantial amounts of sales data can be a difficult undertaking. Companies can now use the power of data analytics to better understand their sales data thanks to sophisticated data analytics solutions like Power BI.

In this research study, we will examine the possibilities of using Power BI for sales data analytics. In this lesson, we'll look at how Power BI can be used to connect to various data sources, transform, and clean data, as well as produce interactive visualizations and reports that offer insightful data on sales success. The advantages of utilising Power BI will also be covered i.e., depth analysis, easy data integration, interactive visualizations, and cost-effectiveness.



In addition, a case study of a business that effectively used Power BI for sales data analytics will be presented in this research paper. We'll look at the difficulties the company encountered before deploying Power BI and how it overcame them. We'll also review the outcomes that the organisation saw after deploying Power BI, including enhancements to sales performance, client retention, and overall business expansion. This study paper's major goal is to show the possibilities of using Power BI for sales data analytics to offer insights for business intelligence.

What Is Data Analysis?

Data analysis entails establishing a dataset, studying it, cleaning it by removing any Na values or outliers and converting it to generate a useful result. Power BI is a cloud-based data analysis tool that extracts, visualizes, and provides real-time insight. Power BI brings together data from a range of sources to provide you with a complete picture of your company's data assets. It also takes a 'big picture' approach, using current knowledge to analyze what has happened in the past to help you make better decisions in the future.

Problem Statement :

The customer company is a sales company dealing in 47 products comprising majorly housewares, with a few general electronic appliances and sporting items. The company has 367 stores across all the states of the United States of America, which are categorized into four geographic regions with 28 sales team members who cover the different regions. The company has 50 customers who make regular purchases; these customers represent businesses that purchase from different store locations across the country. The company has multiple stores in all states of the US and sells using multiple sales channels. The data provided for analytics contains a sales orders sheet, customers data sheet, store locations sheet, products data sheet, the region data sheet and sales team data sheet.

A. Scenario :

The company's sales manager is up against several obstacles. He's having trouble keeping track of sales in a rapidly expanding market. He is having difficulties with his company's insights. He is unable to act despite knowing that sales are dropping because he lacks a clear picture of the situation. All the regional managers send him Excel files after he requests the records. However, he is unable to make modest decisions using this method. All the management wants is a picture of the company's weakest sector, where it needs to focus to boost sales and improve performance. He's looking for easy-to-understand, digestible information. As a result, he's more interested in a dashboard where he can look at real data because data speaks the truth. He only needs a simple data visualization tool that he can use regularly. As a result, by utilizing such tools and technology, one may make data-driven decisions that aid in increasing a company's sales. As a result, in this project, we will assist a corporation in creating its own sales dashboard using Power BI.



Data Cleaning :

The procedure of cleansing the data is crucial to the data analysis process. To make ensuring the data is accurate and reliable entails locating and fixing flaws, inconsistencies, and inaccuracies in the data. We will go over the data cleaning procedure we used in this section to get the data ready for Power BI analysis.

To start the data cleaning process, duplicate or unnecessary data had to be found and eliminated. To get rid of duplicate data and filter out any extraneous information, we used Power Query Editor, a data transformation and cleaning tool within Power BI. By taking this step, we made sure the information we used for analysis was correct and pertinent.

Dealing with any incomplete or missing data came as the second phase. To deal with missing data, we applied several approaches, including imputation and deletion. With imputation, missing values were filled in utilising statistical techniques like mean imputation or regression imputation. When records had too many missing pieces of information or were thought to be inconsequential, they were deleted.

The conflicting data was addressed in the third stage. By comparing data from various sources or by looking at data from a single source, we were able to spot irregularities. To handle data inconsistencies, we employed several strategies, including standardization, categorisation, and normalisation. To maintain consistency throughout the data set, for instance, we standardised date and time formats.

Verifying data integrity and accuracy was the last stage. We checked the information to see if there were any mistakes or inaccuracies, such as improper data types or values outside of the anticipated range. We found and fixed any mistakes or inaccuracies in the data using validation techniques including cross-validation and outlier detection.

In conclusion, the process of data analysis must start with data cleaning. It guarantees the accuracy, dependability, and consistency of the data used for analysis. We transformed and cleaned the data for our analysis using Power BI's data transformation and cleansing features.

Relationship Between All Tables :

Formulas Used :

1- Calender Table =

```
VAR Mindate= YEAR(MIN('Fact Table'[OrderDate]))
```

```
VAR Maxdate= YEAR(MAX('Fact Table'[OrderDate]))
```

```
return
```

```
ADDCOLUMNS(
```

```
  FILTER(
```



```
CALENDARAUTO(),
YEAR([Date])>=Mindate &&
YEAR([Date])<=Maxdate
),
"Year", YEAR([Date]),
"Month" , FORMAT([Date] , "mmm"),
"Month num" , Month([date]),
"Weekdays" , format([date] , "ddd"),
"Week num" , Weekday([date]),
"qrt" , format([date] , "\QQ")
)
2 - # cities = DISTINCTCOUNT(Dim_StoreLocations[City Name])

3 - # Customer = DISTINCTCOUNT('Fact Table'[_CustomerID])

4 - # Product = DISTINCTCOUNT('Fact Table'[_ProductID])

5 - # Sales Team = DISTINCTCOUNT('Fact Table'[_SalesTeamID])

6 - # States = DISTINCTCOUNT(Dim_Regions[State])

7 - # Store Location = DISTINCTCOUNT('Fact Table'[_StoreID])

8 - COGS = SUMX('Fact Table','Fact Table'[Order Quantity]*'Fact Table'[Unit Cost])

9 - Gross Profit = [Total Revenue]-[COGS]

10 - Total Order = SUM('Fact Table'[Order Quantity])

11 - Total Revenue = SUMX('Fact Table','Fact Table'[Unit Price]*'Fact Table'[Order
Quantity]*(1-'Fact Table'[Discount Applied]))
12 - Total Transaction = COUNTROWS('Fact Table')

13 - % Early Shipping = DIVIDE([SS- Early Shipping],[Total Order],0)

14 - % Late Delivery = DIVIDE([LD & VLD],[Total Order],0)

15 - % Late Shipping = DIVIDE([LS & VS],[Total Order],0)

16 - % Quick Delivery = DIVIDE([DS - Quick Delivery],[Total Order],0)
```



17 - DS - Late Delivery = CALCULATE([Total Order],Fact Table'[Delivery Status]="Late Delivery")

18 - DS - Quick Delivery = CALCULATE([Total Order],Fact Table'[Delivery Status 19 -]="Quick Delivery")

19 - DS - Very Late Delivery = CALCULATE([Total Order],Fact Table'[Delivery Status]="Very Late Delivery")

20 - LD & VLD = [DS - Late Delivery]+[DS - Very Late Delivery]

21 - LS & VS = [SS-late shipping]+[SS-Very late Shipping]

22 - SS- Early Shipping = CALCULATE(SUM('Fact Table'[Order Quantity]),Fact Table'[Shipping Status]="Early Shipping")

23 - SS-late shipping = CALCULATE([Total Order],Fact Table'[Shipping Status]="late shipping")

24 - SS-Very late Shipping = CALCULATE(SUM('Fact Table'[Order Quantity]),FILTER('Fact Table','Fact Table'[Shipping Status]="Very late shipping"))

25 - Active Measure =
switch(true(),
[Selected measure info]="(\$ COGS",[COGS],
[Selected measure info]="(\$ Gross Profit",[Gross Profit],
[Selected measure info]="(\$ Total Revenue",[Total revenue],
[Selected measure info]="Order Quantity",[Quantity order],
[Selected measure info]="Transaction",[Transaction],
"Select a Measure "
)

26 - Chart selection = SELECTEDVALUE('Change Measure'[Value],"Select a measure")

27 - Change Measure =
{
"Order Quantity",
"Transaction",
"\$ Gross Profit",
"\$ Total Revenue",



"(\$ COGS" }

28 - Avg. Sales per Day = AVERAGEX(VALUES('Calendar'[Date]),[Total revenue])

29 - Best Selling days =

MAXX(TOPN(1,

SUMMARIZE('Calendar','Calendar'[Weekday],

"Best Selling days",[Avg. Sales per Day]),

[Best Selling days]),'Calendar'[Weekday])

Creating A Report Or A Dashboard :

Dashboards and reports are built based on the requirements. After that, the dashboard is designed based on what the organization genuinely wants to search for and what is more vital to the company. There are many different ways to make a dashboard. In general, the dashboard should be simple to comprehend and use.

A. Overview Of Sections In The Dashboard

B. Homepage :

The homepage of the project is a crucial entry point for users to interact with the data and glean insights. It is designed with user experience and ease of navigation in mind. The homepage provides a high-level overview of the project and the data being analyzed, while also allowing users to drill down into specific details as needed. The use of visually appealing graphics with hyperlinks on each of them is used for smooth navigation into details.

C. Customer Analysis :

The customer analysis page displays the transaction details of a company, providing insights into customer behaviour and preferences. The page typically includes visualizations such as a bar chart showing customer retargeting information. These visualizations can help identify patterns and trends in customer behaviour and purchasing potential, which can inform marketing and sales strategies, product development, and customer service initiatives. With Power BI's interactive capabilities, we can drill down into specific customer segments or periods to gain even deeper insights into customer behaviour.

D. Product Analysis :

The Power BI project's product analysis page is a critical component of business intelligence that enables organisations to learn more about the performance of their products. Analytics and visualisations about each product's sales, profit, and consumer behaviour are available on this page. This section is super beneficial for product comparisons and their future scope of sales. We can analyse trends, spot patterns, and decide how to improve product



performance by utilising interactive filters and drill-down features. Overall, this page is a crucial tool for companies looking to acquire a competitive edge through the analysis of product performance and decision-making based on data.

E. Sales Team Analysis :

This page is a crucial tool for businesses to measure and evaluate the performance of their sales team. This page is designed to display key performance indicators (KPIs) such as the revenue generated, gross profit, deals closed, and total transactions etc, among others. It provides an overview of the sales team's performance over time, enabling businesses to identify trends and make data-driven decisions to optimize sales strategies. With Power BI's powerful data visualization capabilities, the sales team analysis page can also display performance metrics by sorting sales teams based on profit generated, allowing businesses to identify areas for improvement in other teams by having a deep dive into the strategies used by top companies and make informed decisions to drive sales growth.

F. Locations Analysis :

This page offers insights into the performance of several store locations based on profits in sales done by them. Visualizations that aid in determining which store locations are performing well and which ones are underperforming are included on this page. The ability to track key performance indicators over time, including revenue, profit margin, and sales growth, enables a deeper comprehension of trends and patterns. The geographical map is added to the page to identify potential regions for additional marketing efforts and to demonstrate where sales are highest. Businesses can optimize their store placement strategy and boost their revenue and profitability by using the sales store location analysis page.

Conclusion :

Overall, the objectives of this research were met. Data analysis helps to understand concepts a lot better than just raw spreadsheet data by visualizing them. While there are several other technologies available for conducting corporate data analysis, the Power BI visualization technique is the most widely used for understanding the fundamentals of data analysis. Data representation and interpretation can be done quickly and simply with the aid of the visualization technique. This approach can be extremely beneficial for stronger conceptual design.

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