PROJECT REPORT

ON

“Product Sales Dashboard”

SUBMITTEBY

Gend Sandesh Sharad (3313)

GUIDED BY

Mr. Shaikh Ayyaj

BACHELOR OF COMPUTER SCIENCE

VIDYA PRATISHTHAN’S.

COMMERCE & SCIENCE

COLLEGE, INDAPUR

VIDYANAGARI, INDAPUR AKLUJ LINK ROAD,

INDAPUR, DIST- PUNE 413106

A.Y. 2024-25

VPCSC

CERTIFICATE

This is to certify,

Gend Sandesh Sharad (3313)

Have successfully completed the Project Work entitled " **Product Sales Dashboard** " for T.Y.B.Sc.(Computer Science) Sem-VI of Savitribai Phule Pune University for the Academic Year 2024-25.

Date:
Place:

Project Guide **H.O.D.**

External Examiner **Internal Examiner**

ACKNOWLEDGEMENT

I acknowledge the **Product Sales Dashboard** as a comprehensive and well-structured analytical tool. It effectively presents key sales metrics, profitability insights, and retailer performance through visually engaging charts and tables. This dashboard serves as a valuable resource for data-driven decision-making in product sales analysis.

This is a well-structured Product Sales Dashboard that provides key insights into sales performance across various dimensions. Here are some highlights of your analysis:

- Key Metrics: The dashboard prominently displays Total Sales ($7.7M), Average Sales ($1.53K), Units Sold (826.8K), and Profit ($3.0M).
- Sales Breakdown: Visuals such as pie charts, bar graphs, and waterfall charts analyze sales by product, region, and retailer.
- Operating Profit Analysis: The dashboard compares profitability across products and regions, with the Midwest being the most profitable region.
- Retailer Performance: A table details sales distribution among retailers like Amazon, Foot Locker, Kohl's, Sports Direct, Walmart, and West Gear.
- Trend Insights: The Units Sold by City chart provides a city-wise breakdown, helping to identify top-performing locations.

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INTRODUCTION

Understanding sales and profits is essential for business growth. Companies track total sales for each product and monitor units sold across different cities. They analyze sales by region and record key details like sales figures, units sold, price per unit, and average retailer sales. To measure performance, they calculate average sales per product and determine operating profit. Yearly sales and profits are reviewed, while sales and profit trends are monitored by state and region. Businesses also observe monthly sales and profit patterns to identify trends and opportunities. By evaluating operating profit across regions, companies can make informed decisions to improve profitability.

CHAPTER 1

OBJECTIVES

1. Total Sales Calculation for Each Product
The total revenue generated by each product is calculated and visualized, allowing for a clear comparison of product performance. This helps identify high-revenue products and those that may need improvement in sales strategy.

2. Units Sold Tracked by City
A breakdown of units sold across different cities is displayed. This helps in identifying high-demand locations and potential areas for targeted marketing efforts or inventory adjustments.

3. Sales Totals Analyzed by Region
Total sales are segmented by different geographic regions, such as **Midwest, Northeast, West, South, and Southeast**. This analysis helps businesses understand regional sales trends and optimize distribution strategies.

4. Sales, Units Sold, Price per Unit, and Average Retailer Sales
This aspect of the dashboard provides a detailed retailer-wise breakdown, showing total sales, the number of units sold, the price per unit, and average sales per retailer. It helps in assessing retailer performance and price optimization.

5. Average Sales Measured for Each Product
The dashboard includes a **waterfall chart** displaying the average sales performance of different products. This metric is useful for identifying which products are consistently generating strong revenue.

6. Operating Profit Calculated by Product
The profitability of each product is analyzed to determine which ones contribute the most to the company's earnings. Products with higher profit margins are identified, helping businesses prioritize high-value items.

7. Yearly Product Sales and Profits Analysis
Annual sales and profits for each product are monitored to track growth trends over time. This analysis helps in understanding seasonal demand fluctuations and long-term performance patterns.

8. Sales and Profit Tracked by State
The dashboard enables tracking of total sales and profits across different states. This geographic analysis is useful for regional sales strategies, expansion planning, and market penetration efforts.

9. Monthly Sales and Profit Trends Observed
Monthly trends in sales and profits are monitored to detect patterns, such as peak sales periods or seasonal declines. Businesses can use this data to optimize marketing campaigns and inventory management.

10. Operating Profit Evaluated by Region
The operating profit across different regions is analyzed to assess profitability variations. This helps in making strategic business decisions regarding resource allocation, pricing adjustments, and regional market focus.

CHAPTER 2

PROBLEM STATEMENT

1. Which product sells the most?
   - Identify which product contributes the most to total sales and profit.

2. Which retailer performs the best?
   - Find out which retailer has the highest total sales and average sales.

3. Which region is the most profitable?
   - Determine which region generates the highest operating profit.

4. How do sales vary by city?
   - Analyze which cities have the highest and lowest number of units sold.

5. Which product categories generate the most profit?
   - Compare different product categories based on their profitability.

6. Are sales increasing or decreasing for any product?
   - Identify trends in sales for different products to see if they are growing or declining.

7. What is the relationship between price per unit and sales volume?
   - Analyze whether higher or lower prices affect the number of units sold.

8. How do different sales methods impact revenue?
   - Compare different sales methods to determine their impact on total sales and profit.

CHAPTER 3

SCOPE OF PROJECT

This analysis helps businesses tailor their product offerings and marketing strategies to regional preferences. It also provides a foundation for understanding how geographic trends impact the use and effectiveness of product Sales.

1. **Regional Sales Analysis**
   - Identify top-performing products in different regions.
   - Understand customer preferences based on geographic location.
   - Compare total sales, units sold, and operating profit across regions.

2. **Retailer Performance Evaluation**
   - Analyze sales performance across different retailers.
   - Identify the most profitable retailers and their impact on total revenue.
   - Compare product sales across multiple retail chains to optimize partnerships.

3. **Product Performance Insights**
   - Determine which product categories generate the highest revenue and profit.
   - Evaluate the average sales and price per unit for better pricing strategies.
   - Identify trends in product demand over time.

4. **Strategic Decision-Making**
   - Help businesses tailor their marketing strategies based on region-specific demand.
   - Optimize inventory and supply chain to meet regional needs effectively.
   - Improve forecasting accuracy for future sales growth.

5. **Visualization and Business Intelligence**
   - Utilize Power BI dashboards to present key insights visually.
   - Enable real-time data interaction for deeper analysis and decision-making.
   - Facilitate data-driven discussions for business growth and expansion.

CHAPTER 4

METHODOLOGY

1. **Data Collection**:
    - Collect product data, including seal information and geographic sales distribution.

      Data Set contains **4,999 records** with the following **12 columns**:
    - **Retailer** – Name of the retailer selling the product.
    - **Retailer ID** – Unique identifier for each retailer.
    - **Invoice Date** – Date of transaction.
    - **Region** – Geographic region where the product was sold.
    - **State** – State within the region.
    - **City** – City where the sale occurred.
    - **Product** – Name/type of product sold.
    - **Price per Unit** – Cost of a single unit of the product.
    - **Units Sold** – Quantity of product sold.
    - **Total Sales** – Revenue generated from sales.
    - **Operating Profit** – Profit earned from sales (in currency format).
    - **Sales Method** – Sales channel (e.g., Online, Outlet).

    - **Key Observations**
        - **Geographic Sales Distribution**: The dataset includes sales data categorized by region, state, and city. This will help analyze which areas have the highest product demand.
        - **Sales Trends**: Data includes pricing, units sold, and total revenue, allowing insights into top-performing products and sales trends.

Raw product data Set:

Retailer	Retailer ID	Invoice Da	Region	State	City	Product	Price per U	Units Sold	Total Sales	Operating	Sales Meth
Walmart	1128299	########	Southeast	Florida	Orlando	Women's A	103	218	2245	1,257.00	Online
West Gear	1128299	########	South	Louisiana	New Orlea	Women's A	103	163	1679	806	Online
Sports Dire	1197831	########	South	Alabama	Birminghai	Men's Stre	10	700	7000	3,150.00	Outlet
Sports Dire	1197831	########	South	Alabama	Birminghai	Women's S	15	575	8625	3,881.00	Outlet
Sports Dire	1197831	########	South	Alabama	Birminghai	Women's S	15	475	7125	3,206.00	Outlet
West Gear	1185732	########	Midwest	Missouri	St. Louis	Women's S	15	475	7125	2,494.00	In-store
Sports Dire	1185732	########	South	Mississippi	Jackson	Men's Athl	20	450	9000	3,150.00	Online
Sports Dire	1197831	########	South	Mississippi	Jackson	Women's S	15	450	6750	2,700.00	Online
West Gear	1185732	########	Midwest	Wisconsin	Milwaukee	Men's Stre	20	450	9000	2,700.00	In-store
Foot Locke	1185732	########	Northeast	New York	New York	Men's Stre	44	434	1910	993	Outlet
Foot Locke	1185732	########	Midwest	Michigan	Detroit	Women's S	20	425	8500	2,975.00	In-store
West Gear	1185732	########	Midwest	Missouri	St. Louis	Women's S	15	425	6375	2,231.00	In-store
West Gear	1185732	########	West	Utah	Salt Lake C	Women's S	20	425	8500	2,975.00	In-store
Amazon	1185732	########	Midwest	Ohio	Columbus	Women's S	20	425	8500	3,400.00	Online
Foot Locke	1185732	########	South	Mississippi	Jackson	Women's S	15	425	6375	2,550.00	Online
Walmart	1185732	########	South	Mississippi	Jackson	Women's S	20	425	8500	3,400.00	Online
Walmart	1197831	########	South	Arkansas	Little Rock	Women's A	20	425	8500	3,400.00	Online
Walmart	1197831	########	South	Arkansas	Little Rock	Men's Athl	20	425	8500	2,975.00	Online
Walmart	1185732	########	Northeast	New York	New York	Men's Stre	48	420	2016	1,129.00	Outlet
Walmart	1185732	########	Northeast	New York	New York	Men's Stre	39	408	1591	875	Outlet
Walmart	1185732	########	Northeast	New York	New York	Men's Stre	46	403	1854	1,038.00	Outlet
West Gear	1185732	########	West	Utah	Salt Lake C	Women's S	20	400	8000	2,800.00	In-store
West Gear	1185732	########	West	Utah	Salt Lake C	Women's A	20	400	8000	3,200.00	In-store
West Gear	1185732	########	West	Utah	Salt Lake C	Men's Athl	20	400	8000	2,800.00	In-store
West Gear	1185732	########	West	Utah	Salt Lake C	Men's Athl	20	400	8000	2,800.00	In-store
Walmart	1185732	########	South	Mississippi	Jackson	Women's A	20	400	8000	3,200.00	Online
Sports Dire	1197831	########	South	Mississippi	Jackson	Women's S	15	400	6000	2,400.00	Online
Foot Locke	1185732	########	Northeast	New York	New York	Men's Stre	47	400	1880	978	Outlet

1. Data Cleaning

This process focuses on handling missing values, correcting errors, and ensuring consistency in the dataset.

a) Handling Missing Values

- Identify missing values in the dataset.
- Options to handle missing data:
  - Remove rows or columns with excessive missing values.
  - Fill missing values using mean, median, mode, or forward-fill/backward-fill techniques.
  - Use predictive models to estimate missing values.

c) Handling Duplicates

- Detect and remove duplicate records using Python's drop_duplicates() function to prevent biased analysis.

2. Data Preprocessing (Excel)

This step prepares the data for analysis and machine learning applications.

a) Feature Engineering

- Create new features from existing data, such as total revenue = price_per_unit × units_sold.

- Extract useful components from date columns (e.g., year, month, day).

c) Data Aggregation and Grouping

- Group sales data by region, state, or retailer to analyze trends.
- Summarize key metrics like total sales, average profit, and top-selling products.

3. Implementation in Python

These cleaning and preprocessing tasks can be implemented using Pandas, NumPy, and Scikit-learn in Python. Below is an example of a Python-based workflow:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import openpyxl as xls

d = pd.read_excel("C:\\Users\\sande\\OneDrive\\Desktop\\DA project.xlsx")
df = pd.DataFrame(d)

df

df.isnull().sum()

data = df.fillna(method='ffill')
data

data.isnull().sum()

data.drop_duplicates(inplace=True)

data

data.isnull().sum()

data.to_excel("C:\\Users\\sande\\OneDrive\\Desktop\\DA_project.xlsx")
```

Summary

- Data Cleaning ensures the dataset is free from errors, missing values, and inconsistencies.
- Data Preprocessing prepares the data for analysis by transforming and structuring it efficiently.
- Python Implementation uses Pandas, NumPy, and Scikit-learn for data cleaning and transformation.

3.Analysis:

a. Identifying Products with the Highest Number of Sales in Different Regions.

The Power BI dashboard provides a comprehensive view of product sales across multiple regions. Key insights from the visualizations include:

- Top-Selling Products: The "Total Sales by Product" donut chart indicates that "Women's Street Footwear" (22%), "Men's Apparel" (20%), and "Women's Athletic Footwear" (19%) are among the highest-selling products.
- Regional Sales Performance: The "Total Sales by Region" pie chart shows that the Midwest (32%) and Northeast (26%) contribute the highest percentage of total sales, while the Southeast (10%) has the lowest sales share.
- Operating Profit by Region: The horizontal bar chart indicates that the Midwest region has the highest operating profit of $904K, followed by the Northeast with $734.4K.
- Units Sold by City: The trend line in the "Units Sold by City" chart shows that certain cities, like New York and Houston, have significantly higher sales volumes than others.

b. Use Power BI for Analysis

Power BI has been effectively utilized to analyze sales data through various visualizations:

- KPI Cards: The dashboard displays key performance indicators (KPIs) such as Total Sales ($7.7M), Units Sold ($826.8K), Avg Sales

($1.53K), and Profit ($3M) at the top for quick insights.

- Interactive Filters: Filters on the left allow users to segment data by Product, Year, Month, and State for dynamic analysis.
- Comparative Visuals:
    - Bar Charts show the distribution of Operating Profit by Product and Region.
    - Waterfall Chart provides insights into Average Sales by Product, highlighting increases and decreases.
    - Retailer Table breaks down sales performance by retailer, listing total sales, units sold, price per unit, and average sales for companies like Amazon, Foot Locker, and Walmart.

2. Dashboard Creation:

Build an Power bi-based dashboard to display key insights, such as top-sealed products by area and trends over time.

1. KPI Cards (Top Section)

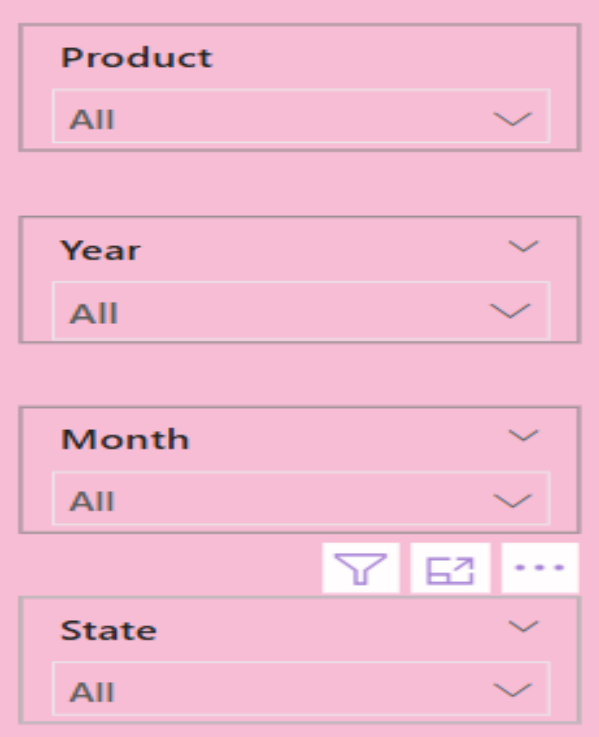
Located at the top of the dashboard, these key performance indicator (KPI) cards highlight essential business metrics:

- **Total Sales ($7.7M)** – Represents the total revenue generated.
- **Units Sold (826.8K)** – Indicates the total number of products sold.
- **Average Sales ($1.53K)** – Displays the average sales per transaction or per unit.
- **Profit ($3.0M)** – Shows the total profit earned after deductions.

2. Filters & Slicers (Left Sidebar - Pink Section)

Filters allow users to interactively refine data:

- **Product Filter** – Selects sales data for a specific product.
- **Year Filter** – Filters data based on a selected year.
- **Month Filter** – Narrows down sales trends for a particular month.
- **State Filter** – Allows region-based analysis of sales.



3. Tabs

i). Total Sales by Product (Donut Chart - Center)

- If "Product" is selected - The donut chart shows Total Sales distribution by Product.
- If "Retailer" is selected- The chart updates to show Total Sales by Retailer.
- If "Sales Method" is selected- The chart displays Total Sales by different Sales Methods (e.g., Online vs. Offline Sales).

ii). Operating Profit by Product (Bar Chart - Center Right)

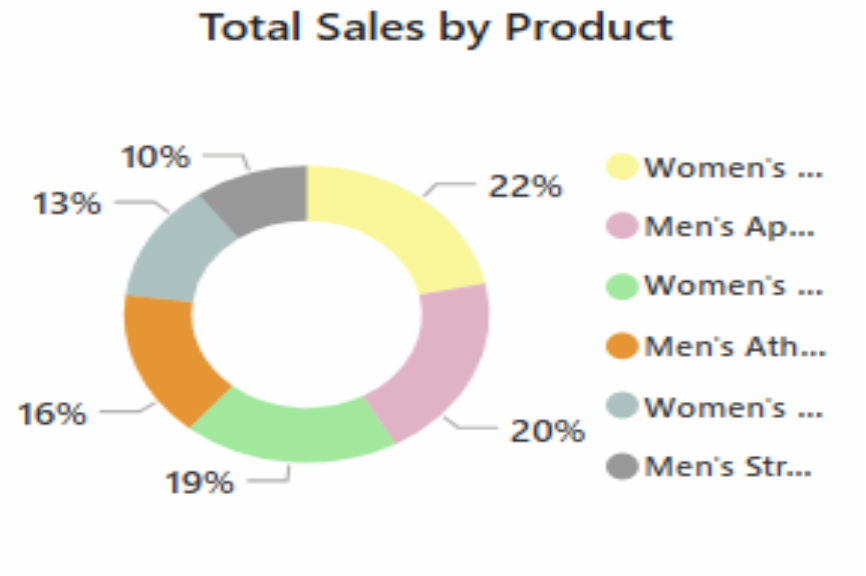
- Clicking on "Product"- The bar chart shows Operating Profit for each Product.
- Clicking on "Retailer"- The chart updates to Operating Profit per Retailer.
- Clicking on "Sales Method" → Displays Operating Profit by Sales Method.

iii). Average Sales by Product (Waterfall Chart - Bottom Left)

- Selecting "Product" → Shows Average Sales per Product.
- Selecting "Retailer" → Updates the chart to Average Sales by Retailer.
- Selecting "Sales Method" → Displays Average Sales by different Sales Methods.

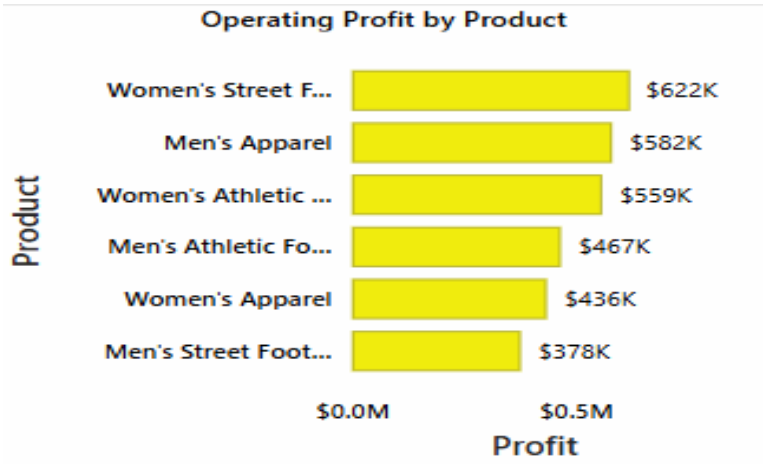
4. Total Sales by Product (Donut Chart - Center)

- This donut chart visually represents the percentage of total sales by product category.
- Top-selling products:
  - Women's Street Footwear (22%) – Highest sales contribution.
  - Men's Apparel (20%)
  - Women's Athletic Footwear (19%)
- Men's Street Footwear (10%) has the lowest share.



5. Operating Profit by Product (Bar Chart - Center Right)

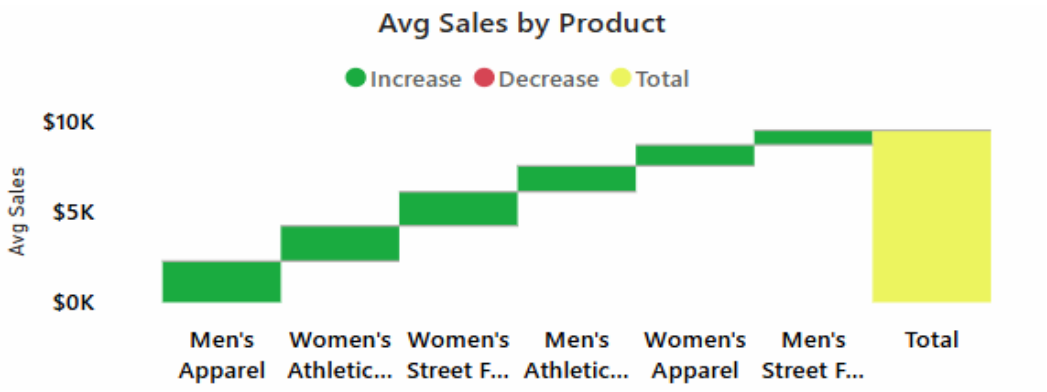
- This horizontal bar chart ranks products by their operating profit.
- Highest profit-generating products:
  - Women's Street Footwear ($622K)
  - Men's Apparel ($582K)
  - Women's Athletic Footwear ($559K)
  - Men's Athletic Footwear ($467K)
  - Women's Apparel ($436K)
  - Men's Street Footwear ($378K)
- This helps in determining which products are most profitable, guiding inventory and pricing strategies.



6. Average Sales by Product (Waterfall Chart - Bottom Left)

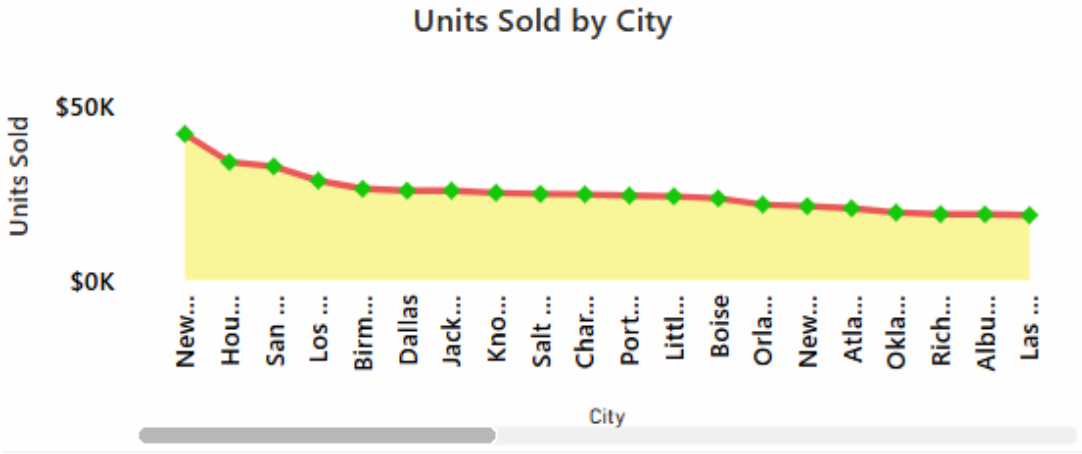
- A waterfall chart represents how each product contributes to total average sales.
- Products with increasing trends are in green, and those with declines are in red.
- The final yellow bar represents the total.

This visualization helps track product performance trends over time.



7. Units Sold by City (Line Chart - Top Right)

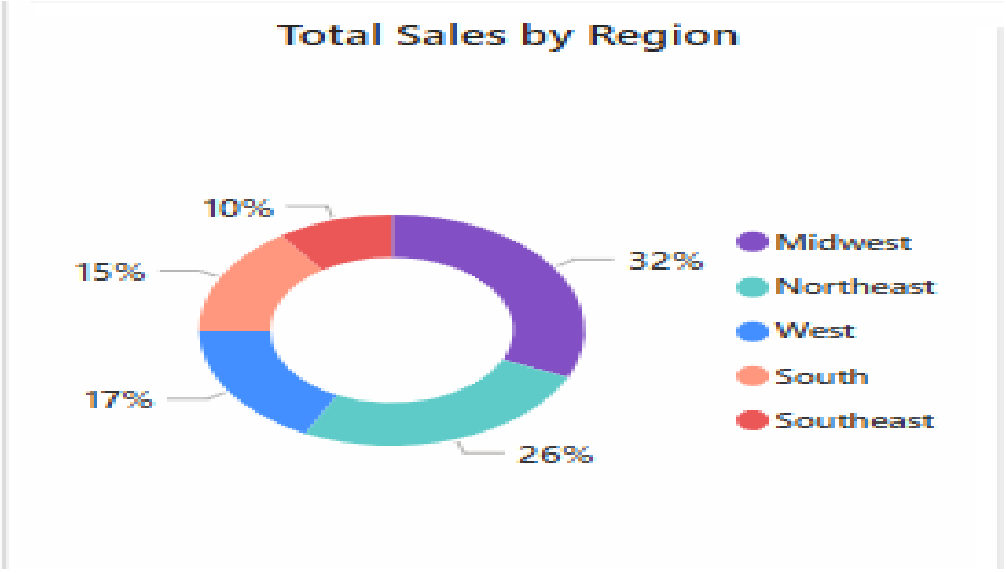
- Cities are ranked by the number of units sold.
- The leftmost cities (e.g., New York & Houston) have the highest sales.
- The trendline indicates overall sales distribution across different cities. This analysis helps in understanding regional demand variations.



8. Total Sales by Region (Donut Chart - Right Center)

- This pie chart breaks down sales by region.
- Midwest (32%) and Northeast (26%) are the highest-performing regions.
- Southeast (10%) contributes the least.

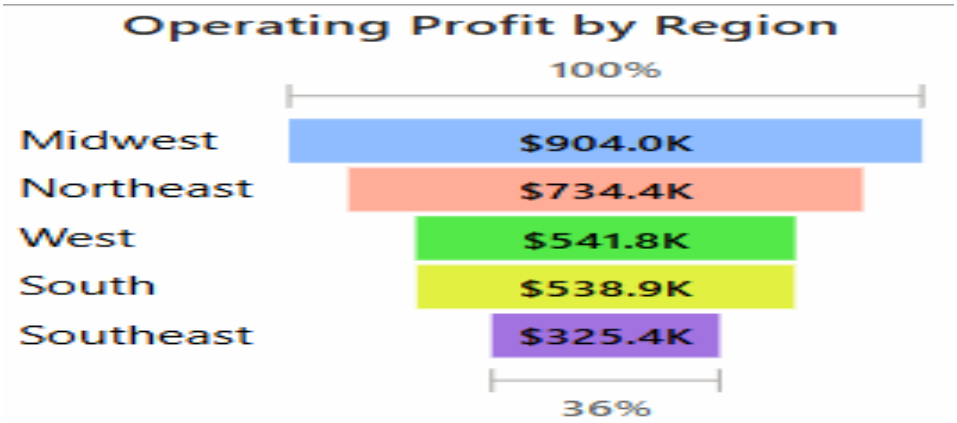
This insight helps target marketing efforts in low-performing regions.



9. Operating Profit by Region (Funnel Chart - Right)

- Shows the total profit generated per region.
- Midwest ($904K) is the most profitable region.
- Southeast ($325.4K) is the least profitable.

By comparing profit margins, businesses can adjust pricing and operational strategies accordingly.



10. Retailers Performance Table (Bottom Right)

This table provides a detailed breakdown of retailer performance:

- Retailers (Amazon, Foot Locker, Walmart, etc.).
- Total Sales ($)
- Units Sold
- Price per Unit
- Average Sales per Retailer.

It helps businesses identify high-performing retailers and optimize distribution.

Retailers

Retailer	Total Sales	Units Sold	Price per Unit	Avg Sales
Amazon	$123.9K	$5.4K	2350	$2,752.3
Foot Locker	$550.9K	$23.6K	7847	$3,508.8
Kohl's	$138.8K	$11.0K	3706	$1,780.0
Sports Direct	$270.0K	$21.7K	7108	$1,676.8
Walmart	$74.8K	$11.4K	3081	$1,100.1
West Gear	$394.0K	$25.7K	8850	$2,238.4

11. Final Product Sales Dashboard

The final Product Sales Dashboard gives a clear view of sales performance across different products, retailers, and regions. It shows important numbers like total sales, units sold, average sales, and profit. Various charts and graphs display sales data by product, region, and city. Users can filter the data by product, year, month, and state for better analysis. This dashboard helps in understanding profits and sales trends, making it easier to make smart business decisions.

CHAPTER 5

EXPECTED OUTCOMES

❖ **Identification of Top-Selling Products**

- A clear list of products that generate the highest sales in each region.
- Categorization of products based on profitability and demand.

❖ **Regional Sales Insights**

- Understanding customer preferences based on geography.
- Identification of the most and least profitable regions.
- Sales distribution trends across different cities and states.

❖ **Retailer Performance Analysis**

- Ranking of retailers based on total sales, units sold, and average sales per unit.
- Comparison of different retailers to identify the best-performing partners.

❖ **Profitability Analysis**

- Breakdown of operating profits by product category.
- Insights into which product lines contribute the most to overall profitability.

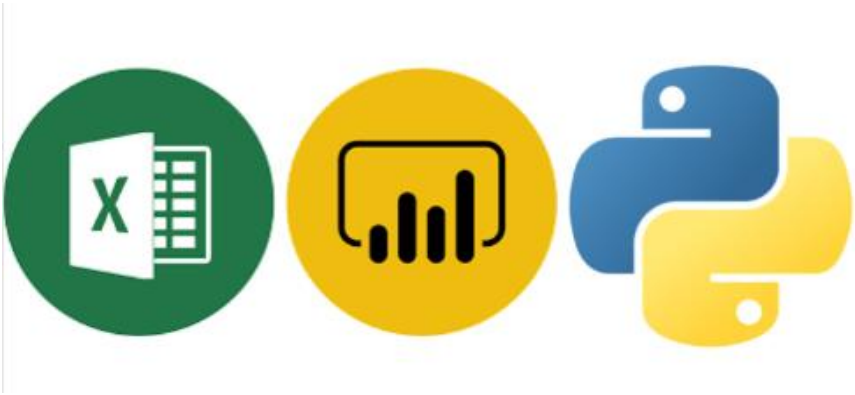
❖ **Interactive Business Dashboard**

- A dynamic **Power BI dashboard** that provides real-time insights.
- Filtering options to analyze data by **product, retailer, region, year, and month**.
- Easy visualization of sales trends through bar charts, pie charts, and line graphs.
- Better resource allocation based on real-time performance metrics.

CHAPTER 6

TOOLS REQUIRED

1. **Excel:**
    - Microsoft Excel is a widely used spreadsheet tool for data entry, analysis, and visualization.
    - It is essential for businesses, analysts, and researchers due to its flexibility and ease of use.
2. **Python:**
    - Perform data cleaning using Pandas, handling missing values.
    - Handle missing data with fillna(), dropna(), and interpolate().
    - Convert data formats (CSV, Excel, JSON, SQL) using read_csv(), to_excel(), and json.load().
3. **Power BI:**
    - Trend visualization and Create Dashboard.
    - Power BI is a Microsoft business intelligence tool used to connect, analyze, and visualize data in an interactive way.
    - It helps businesses track key performance indicators (KPIs), trends, and insights through dynamic dashboards.



CHAPTER 7

CONCLUSION

The Product Sales Dashboard provides a clear overview of sales performance, profits, and key business metrics. It highlights top-selling products, profitable regions, and key retailer contributions, helping businesses make informed decisions. The data shows that Women's Street Footwear and Men's Apparel are among the highest revenue-generating products, while the Midwest region leads in profitability. Retailers like Foot Locker and Sports Direct contribute significantly to sales. By using this dashboard, businesses can identify growth opportunities, optimize sales strategies, and improve overall profitability.

CHAPTER 8

REFERENCE

1. Book References :-

Sr.No	Book Name	Author Name
1.	Data Analytics	Dr. Mrs. Harsha Patil
2.	Power BI Essentials	Reza Rad

2. Web & Video References :-

Sr.No	Website Name	Website Links
1.	W3schools	https://www.w3schools.com/excel/excel_sort.php
2.	Youtube	https://youtu.be/9tF1IrfLflg?si=6bYX945ZZVQLobKJ