

Online Retail Data Analysis

Mini Project-2 Report (Team-M)

Objective -

The objective of this Power BI mini project is to leverage data visualization and analysis to enhance decision-making in the online retail sector. By developing an interactive Power BI dashboard, we aim to:

- **Analyze Sales Performance:** Track sales trends, identify top-selling products, and understand seasonal variations to optimize inventory management and sales strategies.
- **Customer Insights:** Gain insights into customer demographics, behaviour and preferences, enabling targeted marketing campaigns and personalized customer experiences.
- **Operational Efficiency:** Evaluate key operational metrics such as order completion times, return rates, and shipping costs to improve overall efficiency and customer satisfaction.
- **Financial Analysis:** Monitor key financial indicators, including revenue, profit margins, and expenses, to ensure financial health and sustainability.
- **Forecasting and Planning:** Utilize predictive analytics to forecast future sales trends and customer demand, aiding in strategic planning and resource allocation.

Methodology -

The methodology for analyzing Online Retail data involves several key steps. First, data analysis is conducted to Clean the data to remove duplicates, correct errors, and handle missing values. This step ensures the accuracy and reliability of the data. Following this, exploratory data analysis (EDA) is performed, which includes calculating summary statistics and relationships . Finally, Designed the Power BI dashboard layout, ensuring it is user-friendly and visually appealing. This layout allows for easy navigation and interpretation of data. Created visualizations that effectively communicate insights, such as bar charts, line graphs, pie charts, and heatmaps and Organized the dashboard in a way that tells a coherent data story, guiding users through the key findings and insights

Tools and Libraries —

Programming Language: Python

Libraries:

1. **Pandas:** For data manipulation and analysis.
2. **NumPy:** For numerical computations.
3. **Scikit-learn:** For machine learning algorithms and model evaluation.
4. **Matplotlib and Seaborn:** For data visualization.

IDE:

- 1.Jupyter Notebook or any other Python IDE
- 2.Power Bi.
- 3.Ms-Excel

Strategic Query Draft for CEO and CMO-

To prepare for the meeting, we have developed a set of targeted questions that address the key concerns and strategic objectives of both the CEO and CMO. These questions are designed to facilitate a productive discussion and ensure that our presentation is both relevant and insightful.

This approach ensures that the insights derived from the dataset are effectively translated into strategic actions, providing actionable intelligence for both quantitative and qualitative aspects of our analysis.

Strategic Questions for the CEO-

1. Which region is generating the highest revenue, and which region is generating the lowest?
2. What is the monthly trend of revenue, which months have faced the biggest increase/decrease?
3. Which months generated the most revenue? Is there a seasonality in sales?
4. Who are the top customers and how much do they contribute to the total revenue? Is the business dependent on these customers or is the customer base diversified?

Strategic Questions for the CMO-

1. What is the percentage of customers who are repeating their orders? Are they ordering the same products or different?
2. For the repeat customers, how long does it take for them to place the next order after being delivered the previous one?
3. What revenue is being generated from the customers who have ordered more than once?

4. Who are the customers that have repeated the most? How much are they contributing to revenue?

Result Analysis-

Data Cleaning and EDA-

Initial Cleaning: The dataset was meticulously cleaned by removing unnecessary entries, duplicates, and unspecified country names. This ensured data integrity, accuracy, and consistency, forming a reliable basis for subsequent analysis.

Exploratory Data Analysis (EDA): Our EDA revealed insights into product sales across different countries, identifying both top and bottom revenue generators. This preliminary analysis provided a clear picture of sales distribution and highlighted key areas for further investigation.

Key Findings: The analysis uncovered significant seasonal trends, high-performing countries, key customers contributing the most revenue, and product demand distribution across various regions. These findings offer actionable insights for strategic planning and decision-making.

Apart from this we also worked on four questions that were assigned to us. We have done the analysis of every question on Power Bi. The analysis are as follows:-

Question 1: Time Series of Revenue Data for 2011

- **Trends:** The monthly revenue data for 2011 shows significant fluctuations. Revenue starts high in January, drops in February, recovers in March, and then steadily increases from May, peaking in August at 3,873. The highest point is reached in October at 5,792, followed by a decrease to 3,715 in December.
- **Insights:**
 - **Seasonal Impact:** There's a clear impact of seasonality on sales, with higher revenues during the summer months and drops in February and December.
 - **Strategic Planning:** Intensifying marketing and sales efforts during the summer could maximize revenue. Special promotions or strategies in February and December may mitigate revenue drops.
 - **Forecasting:** These trends provide a basis for more accurate forecasting for the next year, aiding in better resource allocation and inventory management.

Question 2: Top 10 Countries by Revenue (Excluding the UK)

- **High-Performing Countries:**
 - **Netherlands:** Highest revenue at 285,464 from 200,361 units sold.
 - Other significant contributors include Ireland, Germany, and France.
- **Insights:**
 - **Market Focus:** Concentrating efforts on the Netherlands, Ireland, Germany, and France can capture additional market share and boost overall revenue.

- **Marketing Strategy:** Tailored marketing strategies for these high-performing countries could further enhance their revenue potential.
- **Product Demand:** The high quantity sold in the Netherlands indicates strong product demand, necessitating robust supply chain and inventory strategies.

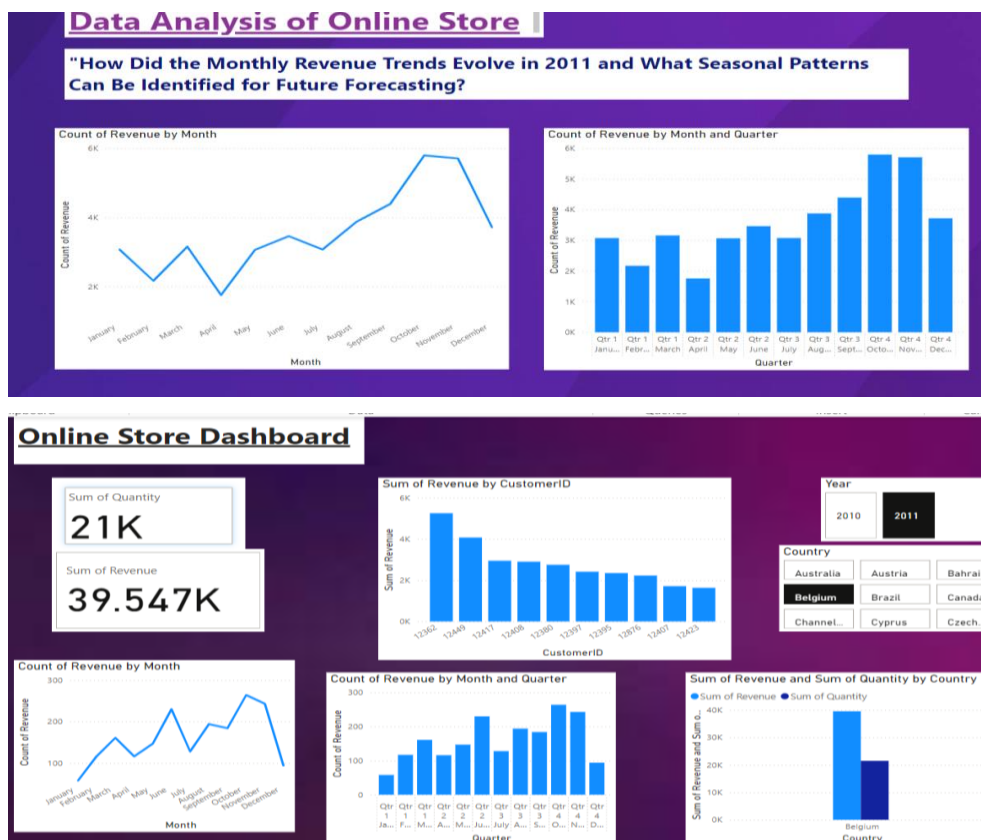
Question 3: Top 10 Customers by Revenue

- **Key Customer:**
 - **Customer ID 14646:** Contributes nearly twice the revenue of the second highest customer.
- **Insights:**
 - **Customer Retention:** Maintaining satisfaction among these top customers is crucial. Personalized offers, excellent customer service, and exclusive deals are vital to keep these top customers engaged and loyal.
 - **Revenue Stability:** Ensuring the loyalty of these customers secures a stable revenue stream and reduces the risk associated with losing key customers.
 - **Targeted Marketing:** Implementing targeted marketing campaigns for these top customers could enhance their spending and strengthen their loyalty.

Question 4: Insights on Product Demand Across Countries

- **Visual Representation:** A comprehensive map with a gradient color scheme effectively represents demand levels across various countries (excluding the UK).
- **Insights:**

- **Demand Distribution:** The map clearly highlights regions with significant demand, providing actionable insights for potential expansion opportunities.
- **Strategic Decisions:** The visual aid allows the CEO to easily interpret demand distribution, enabling informed strategic decisions regarding market expansion.
- **Market Penetration:** Identifying high-demand regions can guide efforts to penetrate new markets and enhance product availability where demand is high.



Challenges Faced-

1.Preparation of Questions for CEO and CMO:

One of the most significant challenges we faced was crafting appropriate and insightful questions for the CEO and CMO. This task required a deep

understanding of the company's strategic vision and marketing objectives. The challenge lay in formulating questions that were not only relevant but also thought-provoking, ensuring they would elicit meaningful responses. The process demanded extensive research into the company's history, current market position, and future plans. Additionally, it was essential to consider the perspectives and concerns of these high-level executives to frame the questions in a way that would resonate with them and provide valuable insights for the project.

2.Complexity and Ambiguity of the Project:

Despite the project's small scale, it presented a unique challenge due to its somewhat ambiguous nature. This ambiguity led to initial confusion and uncertainty in determining the appropriate direction for the project. We had to engage in numerous discussions with various stakeholders to clarify the project's scope and objectives. This process of clarification and alignment was crucial in overcoming the initial confusion and setting a clear path forward. It required careful planning and a flexible approach to adapt to any changes or new information that emerged during the project.

3. Presenting to the CMO and CEO:

Presenting our findings and recommendations to the CMO and CEO was another major challenge. The key issue here was the need to distill complex information into a concise and clear presentation. It was vital to ensure that the presentation was not only accurate but also engaging and easily understandable by the top executives, who may not have the time or inclination to delve into the finer details. This required careful planning and rehearsal to ensure that we could effectively communicate the most important points within a limited

timeframe. The challenge was to strike the right balance between being thorough and being succinct, ensuring that the presentation was both informative and compelling. Additionally, it was important to anticipate potential questions and prepare well-thought-out responses to demonstrate a deep understanding of the subject matter.