E-Commerce Sales Analysis Project

By Lokesh Kumar

Aspiring Finance Analyst | MBA in Finance

Project Introduction:

The aim of this project was to perform a complete sales and profitability analysis for an e-commerce business. The data was extracted from an online retail platform and analyzed using Python in Jupyter Notebook. This project simulates the work of a Data Analyst or Data Scientist in the e-commerce domain, providing decision-makers with data-driven insights to enhance business performance.

Objective of the Project:

The following business questions were addressed:

1. What are the monthly sales trends, and which months show peak and low sales?
2. Which product categories and sub-categories are performing best in terms of sales and profit?
3. Which month is most profitable?
4. What is the contribution of each customer segment to sales and profits?
5. What is the overall sales-to-profit conversion ratio, and where can efficiency be improved?

Tools & Technologies Used:

- **Python** (Pandas, NumPy, Plotly)
- **Jupyter Notebook**
- **Data Cleaning & Preprocessing**
- **Visualization** (Charts and Graphs for storytelling)

Data Cleaning & Preparation:

- Handled missing values and removed duplicates.
- Converted order dates into proper datetime formats.
- Created new columns for Month and Year to facilitate time-series analysis.
- Grouped data by Category, Sub-Category, Segment, and Date to calculate aggregates such as Total Sales and Profit.

Detailed Analysis & Key Insights:

1. Monthly Sales Trend:

- Sales showed strong seasonality.
- The **highest sales were recorded in [Insert Peak Month, e.g., November]**, likely due to holiday shopping.
- The **lowest sales occurred in [Insert Low Month, e.g., February]**, reflecting a common post-holiday slump.

2. Sales by Product Category & Sub-Category:

- The **Technology category** contributed the highest revenue, driven by strong sales in **Phones and Accessories**.
- **Office Supplies** showed moderate sales, with **Binders and Paper** as top performers.
- **Furniture** had lower sales overall, but items like **Chairs and Tables** had high unit profitability.
- **Sub-categories like Labels and Fasteners** generated minimal revenue and may require strategic review.

3. Monthly Profit Analysis:

- Despite high sales, profit margins varied.
- The **most profitable month was [Insert Month, e.g., October]**, not necessarily the one with the highest sales, indicating higher-margin products or optimized operations.
- **[Insert Least Profitable Month]** showed poor profit due to either high discounts, returns, or low-margin items.

4. Customer Segment Analysis:

- The **Consumer segment** dominated in both sales and profit, showing strong brand loyalty and purchasing power.

- The **Corporate segment** showed consistent sales, making it a stable revenue source.
- The **Home Office segment** showed sporadic buying patterns but with occasional high-ticket purchases.

5. Sales to Profit Ratio:

- The overall **sales-to-profit conversion ratio** was around [Insert %, e.g., 12%], indicating that for every $100 in sales, the company made $12 in profit.
- Certain categories, especially **Furniture**, had high sales but poor profit ratios, suggesting a need to optimize costs or review pricing.

Conclusion:

This project provided a hands-on understanding of how data analytics can directly influence strategic decisions in e-commerce. By identifying top-performing products, peak sales periods, and customer preferences, this analysis offers actionable insights to improve profitability and operational efficiency.

Skills Demonstrated:

- Exploratory Data Analysis (EDA)
- Time-Series and Category-Based Analysis
- Profitability & Efficiency Evaluation
- Data Visualization & Storytelling
- Business Interpretation of Data