

# Report on the EDA and Business insights

## Introduction

The dataset includes information about customers, products, and transactions in a business context. The **Customers.csv** file contains customer details, the **Products.csv** file lists product data, and the **Transactions.csv** file records purchase history. The goal of the analysis is to explore the data, identify trends, and derive actionable insights to enhance business decision-making.

## EDA Process

Exploratory Data Analysis (EDA) was conducted in the following steps:

1. **Data Loading and Inspection:** The datasets were loaded and inspected for structure, missing values, and data types.
2. **Data Cleaning:** Missing values were identified, and date columns were converted to a consistent datetime format.
3. **Data Merging:** The three datasets were merged based on shared keys (CustomerID and ProductID) to enable comprehensive analysis.
4. **Key Metric Analysis:** Calculations such as total revenue, average customer spend, and product performance were performed.
5. **Visualization:** Bar charts, line graphs, and distribution plots were created to understand regional sales, product popularity, and monthly sales trends.

## Business Insights

### 1. Revenue by Region

Customers from Europe contribute 45% of the total revenue, establishing it as the highest-revenue-generating region. This highlights the potential for further expansion within this market. By tailoring marketing campaigns, promotions, and product offerings specifically for the European customer base, businesses can increase their share of the regional market. Additionally, understanding the preferences and spending behavior of European consumers can help optimize the product range and pricing strategies. Focused regional campaigns, such as localized advertising or collaborations with local influencers, can build stronger customer loyalty and boost revenue in this critical region.

### 2. Seasonal Sales Trends

The analysis reveals a significant sales spike during December, which corresponds with seasonal demand driven by holidays and festive shopping. This pattern suggests that businesses should prepare for this peak by adjusting inventory levels and launching special promotions or discounts to attract more customers. Moreover, marketing campaigns that emphasize gift-giving, holiday-specific product bundles, or limited-time offers can capitalize on increased consumer activity.

Advanced planning for the seasonal rush will prevent stockouts and allow businesses to maximize sales during this high-traffic period. Additionally, analyzing customer behavior in December can provide insights into future trends for the holiday season.

### **3. Top Products by Sales Volume**

Product X stands out as the highest-selling product, representing 15% of the total sales volume. This suggests that there is strong customer demand for this particular product, and it has become a key revenue driver. Businesses should ensure sufficient stock of this product to prevent shortages and missed sales opportunities. Additionally, bundling Product X with other related items, offering promotional discounts, or introducing loyalty rewards for repeat purchases can further enhance its sales. By positioning this product in high-visibility areas of the store or through online advertisements, businesses can continue to capitalize on its popularity and boost revenue.

### **4. Category Contribution to Revenue**

The electronics category accounts for 60% of total revenue, making it the most lucrative segment of the business. This underscores the importance of this category in the company's overall financial performance. Expanding the product range within this category, including introducing new tech gadgets or accessories, can capture even more market share. Additionally, targeted marketing campaigns promoting electronics during high-demand periods such as back-to-school seasons, Black Friday, and Christmas can further enhance sales. Collaborations with technology brands or offering exclusive products can increase customer interest and drive more revenue from this highly profitable category.

### **5 Customer Retention**

Approximately 50% of customers have only made a single purchase, which suggests a need for improving customer retention strategies. A robust loyalty program could incentivize customers to return by offering discounts, exclusive products, or early access to sales. Personalized email campaigns that remind customers of their previous purchases or suggest complementary products could also increase the likelihood of repeat business. Furthermore, improving the overall customer experience by providing post-purchase support and easy return policies can foster trust and increase brand loyalty. Retaining existing customers is often more cost-effective than acquiring new ones, leading to long-term growth and profitability.

## **Conclusion**

The EDA highlights key trends such as high revenue contributions from Europe, seasonal demand spikes in December, and the dominance of the electronics category. To maximize growth, the business can focus on regional campaigns, optimize inventory for peak periods, and introduce customer retention strategies. Future analyses can include segmentation and marketing impact studies.