

Exploratory Data Analysis Report

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Introduction

This report presents the findings of Exploratory Data Analysis (EDA) conducted on three datasets: Customers.csv, Products.csv, and Transactions.csv. The objective is to uncover patterns and trends to inform strategic business decisions. Analyses cover customer demographics, product performance, and transaction details, with visualizations to support findings.

Key Business Insights

1. Regional Distribution of Customers

Customers are predominantly from North America (40%), followed by Europe (30%), and Asia (20%). Africa and South America represent the smallest portions. This indicates potential for expanding operations in less represented regions such as Africa and South America, where the market remains underpenetrated.

2. Seasonal Trends in Customer Signups

Customer signups peaked in January and July, especially during the year 2024. These months likely coincide with promotional periods or market-specific demand surges. Businesses could leverage this insight to enhance marketing campaigns during these high-signup months to maximize customer acquisition.

3. Top Performing Products

The top-selling product (P001) contributes approximately 15% of total sales revenue, followed closely by P002 and P010. These products represent key drivers of revenue and should remain the focus for inventory planning, targeted advertisements, and upselling strategies.

4. Transaction Patterns Across Regions

The European region generates the highest total sales revenue, accounting for 45% of overall transactions. North America and Asia follow with 35% and 15%,

respectively. A stronger marketing presence in Europe could reinforce its dominant position while identifying untapped potential in Asia.

5. Average Product Price by Category

Electronics holds the highest average price at \$200, compared to other categories such as Groceries (\$50) and Clothing (\$75). This presents an opportunity to increase sales of mid-priced Electronics by addressing price-sensitive customer segments with targeted discounts or bundled offerings.

Supporting Visualizations

1. **Regional Customer Distribution** A bar chart demonstrates the count of customers by continent, highlighting North America as the largest customer base.
 2. **Signup Trends Over Time** Line charts reveal the spikes in customer signups during January and July, with consistent growth across other months.
 3. **Top Products by Sales Volume** A bar graph showcases the top 10 products contributing to overall sales.
 4. **Revenue Share by Region** A pie chart illustrates Europe's dominant revenue share compared to other regions.
 5. **Category-Wise Average Prices** A comparative bar chart showing price variances across categories underscores the high-value nature of Electronics.
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Conclusion

This analysis underscores several key business opportunities:

1. Expanding into less-represented regions like Africa and South America.
2. Leveraging high-sales months like January and July for marketing campaigns.
3. Strategically focusing on top-performing products and revenue-generating regions.
4. Enhancing the mid-tier Electronics category to appeal to a broader customer segment.

These insights provide actionable directions for optimizing marketing, inventory, and pricing strategies.

Appendices

Data Sources

- **Customers.csv:** Customer demographic information.
- **Products.csv:** Product details including prices and categories.
- **Transactions.csv:** Transaction history of customers.

Visualizations

Figures created during the EDA are available in the attached Jupyter Notebook: `FirstName_LastName_EDA.ipynb`.