

Exploratory Data Analysis Report

Title: Detailed EDA on eCommerce Transactions Dataset

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Introduction

This report provides an in-depth analysis of the eCommerce transactions dataset, comprising three components: customer demographics, product details, and transactional data. The objective is to uncover hidden patterns, derive actionable business insights, and recommend strategies to enhance operational efficiency, marketing impact, and customer satisfaction.

1. Data Overview

- **Customers.csv:**
 - **Columns:** CustomerID, CustomerName, Region, SignupDate. ○ Contains information about customer demographics and signup dates.
 - **Observations:** Includes data from multiple continents, reflecting a diverse customer base.
- **Products.csv:**
 - **Columns:** ProductID, ProductName, Category, Price.
 - Provides information on various products categorized into sectors such as Electronics, Books, and Home Decor.
 - **Observations:** Prices range widely, catering to different customer segments.
- **Transactions.csv:**
 - **Columns:** TransactionID, CustomerID, ProductID, TransactionDate, Quantity, TotalValue, Price.
 - Details individual transactions, including purchase quantities and total sales. ○
Observations: Data spans several years, enabling analysis of trends over time.

2. Visualizations and Insights

2.1 Top-Selling Products

- **Visualization:** Bar plot showing the top 10 products by quantity sold.

- **Analysis:** The "ComfortLiving Bluetooth Speaker" leads sales, significantly outperforming other products.
- **Insight:** The demand for electronics is strong. Expanding the product line and introducing accessories for top-selling items can increase cross-selling opportunities.

2.2 Revenue by Region

- **Visualization:** Bar plot highlighting regional revenue contributions.
- **Analysis:** Europe contributes the highest revenue, followed by South America and Asia.
- **Insight:** Europe is a key market. Tailoring localized campaigns and loyalty programs here can further boost profitability. Underperforming regions like Asia require targeted efforts to grow market share.

2.3 Monthly Revenue Trends

- **Visualization:** Line chart tracking monthly revenue changes.
- **Analysis:** Revenue spikes are evident in August and December, indicating strong seasonal demand.
- **Insight:** These months likely coincide with holiday shopping seasons or promotions. Optimizing inventory and marketing during these periods can maximize sales.

2.4 Revenue by Product Category

- **Visualization:** Pie chart showing category-wise revenue distribution.
- **Analysis:** Electronics account for over 50% of revenue, followed by Books and Home Decor.
- **Insight:** Electronics dominate due to high-ticket items. Investing in innovative products within this category and running category-specific promotions can drive growth.

2.5 Average Transaction Value per Customer

- **Visualization:** Histogram depicting average transaction values.
- **Analysis:** A small proportion of customers contribute disproportionately high transaction values.
- **Insight:** These customers are ideal candidates for exclusive loyalty programs and personalized marketing to enhance retention and lifetime value.

3. Recommendations

1. Product Strategy:

- Maintain consistent stock levels for top-selling products.
- Develop complementary products or bundles to boost cross-selling opportunities.

2. Regional Focus:

- Strengthen marketing efforts in Europe, the top revenue-generating region.
- Deploy promotional campaigns in underperforming regions like Asia to expand customer acquisition.

3. Seasonal Planning:

- Leverage peak months such as August and December with pre-planned sales and inventory readiness.
- Offer discounts and promotions aligned with seasonal trends to capitalize on high demand.

4. Customer Engagement:

- Introduce loyalty rewards for high-value customers.
- Personalize offers based on spending patterns and purchase history.

5. Operational Improvements:

- Optimize inventory to meet fluctuating seasonal demands.
- Use advanced analytics to predict sales trends and manage the supply chain effectively.

4. Appendix

Visualizations:

- Top-Selling Products (Bar Plot)
- Revenue by Region (Bar Plot)
- Monthly Revenue Trends (Line Chart)
- Revenue by Product Category (Pie Chart)
- Average Transaction Value (Histogram)

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