

Exploratory Data Analysis (EDA) and Business Insights Report

1. Data Preprocessing and Cleaning

- The dataset was clean, with no duplicate or missing values, minimizing preprocessing efforts.
- In the `Transactions.csv` file, the `TransactionDate` column contained both date and time values. These were converted into a datetime object using pandas, and the time component was split into a new column, `TransactionTime`, for further analysis.

2. Key EDA Findings

2.1 Customer Segmentation Analysis

- Total number of customers: **200**.
- Region with the most customers: **South America** (59 customers, 29.5%).
- Region with the least customers: **Asia** (45 customers, 22.5%).

2.2 Product Category Analysis

- **Most sold category:** Books (270 units sold).
- **Category-wise product sales:**
 - Books: 270 units
 - Electronics: 254 units
 - Home Decor: 248 units
 - Clothing: 228 units

Regional Insights by Category:

- **Books:** South America (241 items sold).
- **Clothing:** Asia (166 items sold).
- **Electronics:** South America (198 items sold).
- **Home Decor:** South America (192 items sold).

2.3 Revenue Analysis

Top Customers by Revenue:

- **Top Customer by Revenue:** Customer ID C0141, generating \$10,673.87.
- Revenue contributions by the top five customers:
 - C0141: \$10,673.87
 - C0054: \$8,040.39
 - C0065: \$7,663.70
 - C0156: \$7,634.45
 - C0082: \$7,572.91

Customer Insights:

- **Top Customer by Region and Most Purchased Category:**
 - C0028: \$6,819.57 (Asia, Electronics).
 - C0082: \$7,572.91 (South America, Books).
 - C0141: \$10,673.87 (Europe, Clothing).

Top Products by Revenue:

- **Top Product by Revenue:** ActiveWear Smartwatch (\$39,096.97).
- Other significant products:
 - SoundWave Headphones: \$25,211.64
 - SoundWave Novel: \$24,507.90
 - ActiveWear Jacket: \$22,712.56
 - ActiveWear Rug: \$22,314.43

2.4 Seasonality Trend Analysis

- **Cumulative Revenue (Monthly):** Linear growth observed throughout the year, ending with a total revenue of \$689,995.56.
- Highest cumulative revenue month: **December 2024** (\$689,995.56).
- Seasonal trends reveal consistent growth, indicating strong customer retention and product demand.

2.5 Transaction Time Analysis

Busiest time range for orders: **13:00 - 14:00**, suggesting a peak in midday transactions.

3. Business Insights and Strategies

INSIGHTS:

1. **Geographic Concentration:** South America leads in customer count and product sales across multiple categories. This highlights a strong market presence in the region.
2. **Category Performance:** Books are the most sold category, contributing significantly to revenue. Electronics and Home Decor are also strong performers.
3. **Top Customers:** High revenue concentration from a few top customers underscores the importance of personalised engagement strategies.
4. **Seasonality Trends:** Linear revenue growth throughout the year indicates consistent demand. Targeting high-demand months like December can boost sales.
5. **Peak Hours:** The 13:00 - 14:00 time window is the busiest for transactions, presenting an opportunity to offer targeted promotions or advertisements during this period.

STRATEGIES:

1. Regional Marketing Campaigns:

- Focus on South America, leveraging its high customer and sales volume.
- Expand marketing efforts in Asia to improve customer acquisition in the region.

2. Product-Specific Promotions:

- Offer discounts or bundles on trending categories like Books and Electronics.
- Use cross-selling strategies to promote related products, e.g., pairing Electronics with Accessories.

3. Customer Loyalty Programs:

- Introduce tiered loyalty rewards for high-revenue customers to retain and increase their spending.
- Use personalised offers for top customers, based on their preferred categories.

4. Seasonal Promotions:

- Launch end-of-year campaigns to capitalise on the high revenue in December.
- Run mid-year promotional events to sustain momentum during slower months.

5. Time-Based Offers:

- Schedule flash sales or exclusive deals during peak transaction hours (13:00 - 14:00).
- Enhance website/app performance to handle increased traffic during these hours.

4. Conclusion

The analysis highlights key areas of opportunity to drive growth, including regional expansion, targeted promotions, and customer loyalty initiatives. Leveraging these insights, the business can enhance revenue, improve customer satisfaction, and maintain consistent growth.