

Task 1: Exploratory Data Analysis (EDA) Report

Objective:

To analyze customer and product data to derive business insights and trends, aiding in decision-making for marketing and operations.

Dataset Overview:

1. **Customers.csv:**
 - Contains customer demographic information, including CustomerID, CustomerName, Region, and SignupDate.
 2. **Products.csv:**
 - Contains product details, including ProductID, ProductName, Category, and Price.
 3. **Transactions.csv:**
 - Contains transaction details, including TransactionID, CustomerID, ProductID, TransactionDate, Quantity, and TotalValue.
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Methodology:

1. **Data Cleaning:**
 - Converted SignupDate and TransactionDate to datetime format, handling mixed formats and invalid dates.
 - Removed rows with missing or invalid values in key columns.
2. **Customer Analysis:**
 - Analyzed customer distribution across regions.
 - Derived monthly signup trends to understand customer acquisition patterns.
3. **Product Performance Analysis:**
 - Merged transaction and product data to analyze category-level revenue and average order value.
 - Identified top-selling products by quantity.
4. **Customer Behavior Analysis:**
 - Studied average purchase value and transaction frequency by region.
 - Ranked customers based on total spending.
5. **Temporal Patterns:**
 - Analyzed sales patterns across different times of the day, days of the week, and months.

Key Insights:

1. Customer Distribution:

- The majority of customers are located in **South America (25)**, followed by **North America (20)**, **Europe (17)**, and **Asia (17)**.
- This regional distribution indicates potential for targeted campaigns in South America and North America.

2. Customer Signup Trends:

- Monthly signup trends reveal peak customer acquisition periods, which can align with specific marketing campaigns or seasonal offers.

3. Top Product Categories by Revenue:

- **Books (192,147.47 USD)**, **Electronics (180,783.50 USD)**, and **Clothing (166,170.66 USD)** are the highest revenue-generating categories.
- **Books** outperform other categories, suggesting a strong preference or demand in this segment.

4. Average Purchase Value by Region:

- Customers in **Asia** have the highest average purchase value (**771.74 USD**), indicating a preference for higher-value items.
- **Europe (681.02 USD)** and **North America (681.35 USD)** have similar average values, followed by **South America (715.33 USD)**.

5. Top-Selling Products:

- The most purchased items are:
 - **ActiveWear Smartwatch (100 units)**
 - **SoundWave Headphones (97 units)**
 - **HomeSense Desk Lamp (81 units)**
- These products should be prioritized in inventory and promotions.

6. Daily Sales Patterns:

- Sales peak on **Wednesday (119,203.15 USD)** and are lowest on **Saturday (81,399.74 USD)**.
- High weekday sales suggest stronger demand during workdays, potentially for professional or home-office products.

7. Hourly and Monthly Sales Trends:

- Sales are concentrated during specific hours, which can guide promotional timing.
- Monthly trends align with seasonal shopping behaviors, highlighting opportunities for targeted discounts.

Conclusion:

The exploratory data analysis provided insights into customer demographics, product performance, and temporal sales patterns. These findings can inform marketing strategies, inventory planning, and customer engagement initiatives.