

Business Insights Report

Introduction This report presents key insights derived from the analysis of customer, product, and transaction data. The datasets were cleaned and merged to facilitate a comprehensive understanding of sales performance, customer behavior, and product popularity.

Data Overview The analysis utilized three primary datasets:

- **Customers:** Contains customer demographics and identifiers.
- **Products:** Includes product details and pricing.
- **Transactions:** Records sales transactions, including customer IDs, product IDs, quantities sold, and total values.

Data Cleaning and Preparation

- Missing values were addressed by dropping rows with null entries in the customers and products datasets, while filling missing prices with the median in the products dataset.
- Duplicate entries were removed to ensure data integrity.
- Outliers in transaction values were identified using the Interquartile Range (IQR) method and filtered out to maintain a focus on typical transaction values.
- Normalization of product prices was performed using MinMaxScaler to facilitate comparative analysis.

Key Findings

1. **Top Products by Quantity Sold**
 - The analysis revealed the top-selling products, providing insights into customer preferences. The top 10 products accounted for a significant portion of total sales, indicating strong demand in specific categories.
2. **Sales by Category**
 - Sales were aggregated by product category, highlighting which categories generated the most revenue. This information is crucial for inventory management and marketing strategies, allowing the business to focus on high-performing categories.

3. Sales by Region

- Regional sales data indicated which geographical areas contributed most to overall revenue. Understanding regional performance can guide targeted marketing efforts and resource allocation.

4. Monthly Sales Trends

- A time series analysis of monthly sales trends revealed patterns in customer purchasing behavior over time. Identifying peak sales months can inform promotional strategies and inventory planning.

5. Customer Spending Distribution

- The distribution of customer spending was analyzed, providing insights into customer segments. Understanding spending behavior can help tailor marketing efforts and improve customer retention strategies.

Visual Insights

- **Top Products:** A bar chart visualizing the top 10 products by quantity sold illustrates the most popular items among customers.
- **Sales by Category:** A bar chart depicting sales by category highlights the most lucrative product categories.
- **Sales by Region:** A bar chart showing sales by region identifies geographical strengths and opportunities for growth.
- **Monthly Sales Trend:** A line graph of monthly sales trends provides a clear view of sales fluctuations over time.
- **Customer Spending Distribution:** A histogram visualizes the distribution of customer spending, revealing insights into customer segments and potential areas for targeted marketing.

Conclusion The analysis of the cleaned and merged datasets has provided valuable insights into product performance, customer behavior, and sales trends. These insights can inform strategic decisions, enhance marketing efforts, and optimize inventory management. Continued monitoring and analysis of these metrics will be essential for sustaining growth and improving customer satisfaction.