Retail Business Performance & Profitability Analysis

Introduction

The objective of this project was to analyze transactional retail data to uncover profit-draining categories, optimize inventory turnover, and identify seasonal product behavior. Using real-world sales data, the goal was to generate actionable business insights to improve retail profitability and operational efficiency.

Abstract

This analysis focused on sales, profit, and customer behavior across categories, sub-categories, regions, and time periods. The data was cleaned, transformed, and explored using Python, and then visualized with Power BI. Key insights include identifying underperforming sub-categories, recognizing high-profit items, understanding monthly and seasonal sales trends, and discovering frequently bought-together product pairs. These insights can support more informed decision-making around marketing, inventory planning, and strategic product focus.

Tools Used

- Python (Pandas, Seaborn, Matplotlib, itertools, Counter)
- Power BI
- Jupyter Notebook
- Excel (for initial data inspection)

Steps Involved in Building the Project

1. Data Collection & Preparation: Loaded the dataset (retail_data.xlsx), standardized column names, and converted date fields to proper formats.
2. Data Cleaning: Removed nulls, fixed data types, and dropped irrelevant or duplicate entries.
3. Feature Engineering: Created new columns such as profit margin, profit-to-sales ratio, year-month, and simulated inventory turnover.
4. Exploratory Data Analysis:
   - Identified top/bottom performing products, categories, and cities.
   - Analyzed profit efficiency (profit per unit) and customer loyalty (repeat rate).
   - Studied trends over time: monthly sales, seasonal peaks.

- Analyzed discounts, ship mode preference, and sales by region.

5. Advanced Insights: Used combinations to identify frequently bought-together product pairs.

6. Data Export: Cleaned dataset and insight tables were exported as CSV for Power BI.

7. Dashboard Creation: Built interactive visuals in Power BI for executive overview and deep dives using filters.

Conclusion

The analysis provided a comprehensive view of retail performance. Categories like "Tables" and "Bookcases" were found to be consistent profit-drainers, while certain products and cities generated disproportionate sales. Standard Class was the most preferred shipping method, and repeat customers contributed significantly to total orders. This project demonstrates how data-driven insights can guide business strategy, from inventory optimization to customer engagement and regional sales focus.