Retail Business Performance & Profitability Analysis

Project Report

Objective

This project aims to analyze transactional retail data to:

- Identify profit-draining categories & products.
- Optimize inventory turnover by evaluating the link between stock duration and profitability.
- Detect seasonal behavior of products for better inventory planning.

The analysis uses SQL, Python, and Tableau on the Global Superstore dataset.

Tools & Technologies

- **SQL:** Data cleaning & aggregation queries.
- **Python (Pandas, Seaborn):** Data preprocessing & correlation analysis.
- **Tableau**: Interactive dashboard to visualize findings and monitor KPIs.

Data Cleaning & Preparation

- Removed all records with missing/null values in key fields (Sales, Profit, Category, Sub-Category).
- Verified numerical fields for outliers.
- Converted date fields into month/quarter for seasonal trend analysis.

SQL Insights

- Calculated profit margins by category and sub-category.
- Identified categories contributing the most and least to profits.
- Computed average inventory days per category.

Python Analysis

- Cleaned the dataset and computed summary statistics.
- Examined the correlation between Inventory Days and Profitability, revealing that longer stock durations generally correspond to lower profits.
- Visualization: Scatterplot of Inventory Days vs Profit.

Key Findings

- Top-performing category: Consumer (51% of total sales and highest profit margin).
- Loss-making products: Cubify and Bevis sub-categories with negative profitability.
- Over 30% of sales are concentrated in a few high-performing products.
- Strong positive correlation between low inventory days and high profitability.
- Seasonal spikes observed (e.g., higher sales in Q4 due to holidays).

Dashboard Insights

An interactive Tableau dashboard was developed with the following features:

- **KPIs:** Total Sales, Profit, Avg Delivery Days, Return Orders.
- **Filters:** Region, Product Type (Category & Sub-Category), Season.
- **Visuals:** Profit margin by category & sub-category, Sales & profit by region (map), Top 10 customers & products, Inventory Days vs Profitability scatterplot.

Recommendations

- Discontinue or reprice products in Cubify & Bevis sub-categories to stop losses.
- Focus marketing & inventory resources on Consumer segment.
- Shorten inventory days through discounts, bundles, or promotions for slow-moving stock.
- Plan inventory according to Q4 seasonal demand spikes.

Deliverables

- SQL Queries file: retail_analysis_queries.sql
- Python Script: retail_analysis.py
- Tableau Dashboard: Visualizing all KPIs & trends interactively.
- Project Report (this document).

Next Steps

- Further refine seasonal patterns by integrating more historical data.
- Automate dashboards with real-time data pipelines.
- Implement A/B testing for pricing strategies of underperforming products