Retail Business Performance & Profitability Analysis

INTRODUCTION

Retail businesses generate large volumes of transactional data, but deriving actionable insights from this data is critical for improving profitability and inventory efficiency. This project aims on analysing retail sales transactions to evaluate business performance, identify profit-draining categories, understand seasonal trends, and provide strategic recommendations for better inventory optimization.

ABSTRACT

This project analyses retail transaction and product-level data to uncover insights related to sales performance, profitability, and inventory movement. Using MySQL for data preparation and KPI computation, Python (Pandas) for correlation analysis, and Tableau for visualization, the study identifies key profit drivers, slow-moving products, and seasonal demand patterns. The analysis supports data-driven decision-making for pricing, inventory planning, and category-level optimization.

Tools Used

- MySQL Workbench – Data cleaning, joins, KPI calculations, and creation of SQL view.
- Python (Pandas) – Profitability calculation and correlation analysis.
- Tableau – Interactive dashboard creation and data visualization.

Steps Involved in Building the Project

1. Data Preparation & SQL Analysis

- Imported retail dataset from Kaggle into MySQL Workbench.
- Cleaned data by handling null and missing values, calculated profit margins by category and sub-category.
- Calculated key metrics like:
    - Total Sales
    - Total Profit
    - Profit Margin (%)
- Created SQL view to expose curated, analysis-ready data for visualization.

2. Python Correlation Analysis

- Loaded cleaned data into Pandas.
- Calculated profit margin at the product level.
- Due to the absence of explicit inventory holding days, total quantity sold was used as a proxy for inventory movement.
- Performed correlation analysis between inventory movement and profitability.
- Result: Correlation value of –0.03, indicating a very weak negative relationship. The near-zero correlation suggests that inventory duration does not have a strong linear impact on profitability while other factors such as pricing strategy, discounting, and product category may play a more significant role in determining profit margins.

3. Tableau Dashboard Development

An interactive Tableau dashboard was built using the SQL view with the following features:

- Key KPIs
    - Total Sales
    - Total Profit
    - Profit Margin (%)
    - Total Quantity Sold
    - Average Discount
- Visualizations
    - Profit Margin by Category (Bar Chart).
    - Sales vs Profit by Sub-Category (Dual-axis Line Chart).
    - Monthly Sales Trend to analyse seasonality (Line Chart).
    - Scatter plot to identify slow-moving and low-profit products.
- Filters
    - Region
    - Product Category
    - Season (derived from transaction date)

These filters allow dynamic analysis across different business segments.

Conclusion

The retail business generated **₹3,054.8K in total sales** and **₹985.5K in total profit**. An overall **profit margin of 32.26%** indicates **healthy operational efficiency**. The business sold **2,996 units**, with an **average discount of 7.7%**, suggesting controlled discounting practices.

The insights reveal that while the retail business is overall profitable, profitability varies significantly across categories and sub-categories. Fashion emerges as the strongest profit driver, whereas Electronics and Groceries require cost and pricing optimization. Several slow-moving products present inventory risks and should be strategically reviewed. Seasonal trends play a crucial role in demand, highlighting the importance of season-aligned inventory planning and targeted discount strategies.