

# Retail Business Performance & Profitability Analysis - Summary Report

## Introduction

Retail companies deal with large volumes of transactional data across multiple categories, regions, and time periods. This project focuses on analyzing retail sales data to identify profit-draining categories, evaluate performance by product line, assess pricing impact, and uncover seasonal patterns. The end goal is to derive actionable business insights and create a dynamic dashboard for data-driven decision-making.

## Abstract

The dataset used in this project includes over 9000 sales records capturing order-level details such as product codes, quantities, prices, customer info, and geographic locations. Using tools like SQL, Python, and Power BI, we cleaned the data, performed profit margin analysis, correlation evaluation, and visualized seasonal and regional patterns. SQL was used to calculate category-wise and product-level profitability, Python provided insights through correlation and bar plots, and Power BI was used to build an interactive dashboard with slicers for region, product type, and season.

## Tools Used

- **SQL (SQLite)** – For data querying, profit calculations, and grouping
- **Python (Pandas, Matplotlib)** – For data cleaning, correlation analysis, visualizations
- **Power BI** – For dashboard creation, DAX measures, and interactive filtering.

## Steps Involved in Building the Project

### 1. Data Cleaning

- Removed nulls in ORDERDATE, SALES, and COUNTRY
- Fixed inconsistent date formats using Python and Power BI
- Created derived columns: Profit and Profit Margin in power bi

### 2. SQL Analysis

- Grouped data by PRODUCTLINE, PRODUCTCODE, DEALSIZE, and profit margin
- Calculated total sales, profit, and average profit margin
- Identified low-performing product lines and Stock Keeping Units.

### **3. Python Analysis**

- Correlation matrix using `.corr()` and heatmap visualization
- Bar plots to highlight top 10 SKUs by sales and profit
- Confirmed weak correlation between MSRP and sales, suggesting pricing review

### **4. Power BI Dashboard**

- Built visuals: KPIs, profit trend, product-wise& region wise bar charts
- Performed time series analysis for Sales, Profit, and Profit Margin trends over months and quarters
- Added filters for Region, Product Type, and Season (derived via DAX)
  - Enabled user-driven insights via slicers and drilldowns

## **Conclusion**

This project successfully revealed inefficiencies and opportunities across the retail product catalog. Through a combined use of SQL, Python, and Power BI, we identified low-margin categories, top-performing products, seasonal demand trends, and regional sales variations. These insights can support better pricing, inventory planning, and marketing strategies. The Power BI dashboard allows stakeholders to explore data dynamically for ongoing strategic analysis.

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