Report

Executive Summary

This report presents key insights derived from sales data analysis to support data-driven decision-making in optimizing stock levels, maximizing revenue, and improving customer targeting. Key findings include:

- **Store Segmentation:** Identified three distinct performance clusters for strategic sales optimization.
- **Stock Optimization & Demand Forecasting:** Highlighted stock risks and proposed methods for proactive inventory management.
- **Price Elasticity & Revenue Optimization:** Uncovered pricing patterns that can influence sales growth.
- **Market Basket Analysis:** Identified product pairings to improve cross-selling strategies.
- **Customer Segmentation:** Developed customer clusters for tailored marketing efforts.

1. Introduction

Project Objective

The objective of this project is to extract actionable insights from historical sales data to improve inventory management, revenue generation, and marketing strategies.

Dataset Description

The dataset includes transactional sales data, product details, and store attributes, allowing for comprehensive analysis across multiple dimensions.

2. Data Preparation

Data Cleaning

- **Handled missing values** by filling with appropriate measures.
- **Ensured consistency** in date formats and standardized column names.
- **Created new features** such as `unique_products, average_transaction_value, and sales_per_product` to enhance insights.

Exploratory Data Analysis (EDA)

- Identified trends in sales, stock patterns, and price fluctuations.

- Visualized distributions to detect outliers and assess data quality.

3. Analysis & Insights

3.1 Store Segmentation

- **Cluster Analysis:** Grouped stores into **High**, **Medium**, and **Low** performing segments using K-Means.
- **Key Insight:** High-performing stores demonstrated significantly higher average sales and product variety.
- **Recommendation:** Target marketing strategies to low-performing stores with customized promotions.

3.2 Stock Optimization & Demand Forecasting

- **Stock Heatmap:** Visualized stock levels by store and product to identify risks of overstocking and understocking.
- **Sales vs. Stock Analysis:** Identified trends where excess stock levels were not aligned with sales volume.
- **Recommendation:** Implement automated stock monitoring systems for proactive inventory control.

3.3 Price Elasticity of Demand & Revenue Optimization

- **Price vs. Sales Analysis:** Detected products with high price elasticity, indicating revenue growth opportunities.
- **Key Insight:** Lowering prices for high-elasticity products improved sales volume.
- **Recommendation:** Introduce strategic price adjustments during low-demand periods.

3.4 Market Basket Analysis (Association Rules)

- **Key Product Associations:** Identified strong product pairings based on metrics such as **Lift**, **Jaccard**, and **Zhang's Metric**.
- **Key Insight:** Cross-promoting these items can significantly boost basket sizes.
- **Recommendation:** Create product bundles and place frequently paired items together in-store and online.

3.5 Customer Segmentation (Clustering)

- **Cluster Analysis:** Identified distinct customer groups based on purchasing behavior.
- **Key Insight:** High-value customer groups contribute disproportionately to revenue.
- **Recommendation:** Develop loyalty programs targeting high-value customers while re-engaging low-activity clusters.

4. Key Visualizations

- **Interactive Tableau Dashboards** available for each project to provide comprehensive insights.

  [Cluster Identification](#)

  [Sales Insights 1](#)

- Each dashboard includes filters, interactive elements, and storytelling captions to enhance engagement.

5. Recommendations & Next Steps

Recommendations

- **Inventory Management:** Align stock levels with sales patterns to avoid overstocking.
- **Promotion Strategy:** Offer discounts on high-elasticity products to maximize revenue.
- **Cross-Selling Strategy:** Leverage market basket insights to improve product placement.
- **Customer Retention:** Implement loyalty programs for high-value customer segments.

Next Steps

- Refine models by incorporating additional data such as promotional effectiveness.
- Develop automated dashboards to provide real-time monitoring for sales trends.

6. Conclusion

This analysis provides actionable insights to support strategic decisions in sales growth, inventory optimization, and customer targeting. By implementing the suggested strategies, the organization can expect improved revenue, reduced stock wastage, and enhanced customer satisfaction.

Prepared by: Veronica Magdaleno

Contact: jobsearchvmagda@gmail.com