

# Vendor Performance Analysis

A complete end-to-end data analysis pipeline to evaluate and optimize vendor and inventory performance in a retail environment using Python, SQL, Power BI, and statistical methods.

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## Key Highlights :

- **Automated Data Ingestion** into SQLite using Python
  - **SQL-based Summary Metrics** for vendor performance
  - **Exploratory Data Analysis** with outlier detection & insights
  - **Profitability Analysis** using Gross Profit, Margins, Turnover, etc.
  - **Power BI Dashboard** for executive-level visibility
  - **PDF Report** summarizing business recommendations
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## Business Objectives :

- Identify underperforming brands for strategic action
  - Pinpoint vendors with low stock turnover or losses
  - Leverage bulk purchasing insights to reduce unit cost
  - Validate profitability differences statistically between vendor tiers
  - Reduce risk from vendor over-dependence
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## Key Features :

- **Business Problem:**  
The company lacked insights into vendor and brand-level performance, leading to poor inventory decisions, pricing inefficiencies, and supply chain risk.
- **Core Business Questions Solved:**
  - i. Which brands need promotional or pricing adjustments due to low sales but high margins?
  - ii. Who are the top-performing vendors and brands in terms of sales?

- iii. Which vendors account for the largest portion of purchase dollars?
- iv. How dependent is the business on its top vendors?
- v. Does bulk purchasing reduce unit price, and what is the optimal volume?
- vi. Which vendors have low inventory turnover (slow-moving stock)?
- vii. How much capital is locked in unsold inventory per vendor?
- viii. What are the 95% confidence intervals of profit margins across vendor groups?
- ix. Is there a statistically significant difference in profitability between top and low-performing vendors?

- **Visual Walkthroughs:**

The project includes scatter plots, bar graphs, statistical tables, and correlation heatmaps to support every insight visually.

- **Business Impact & Insights:**

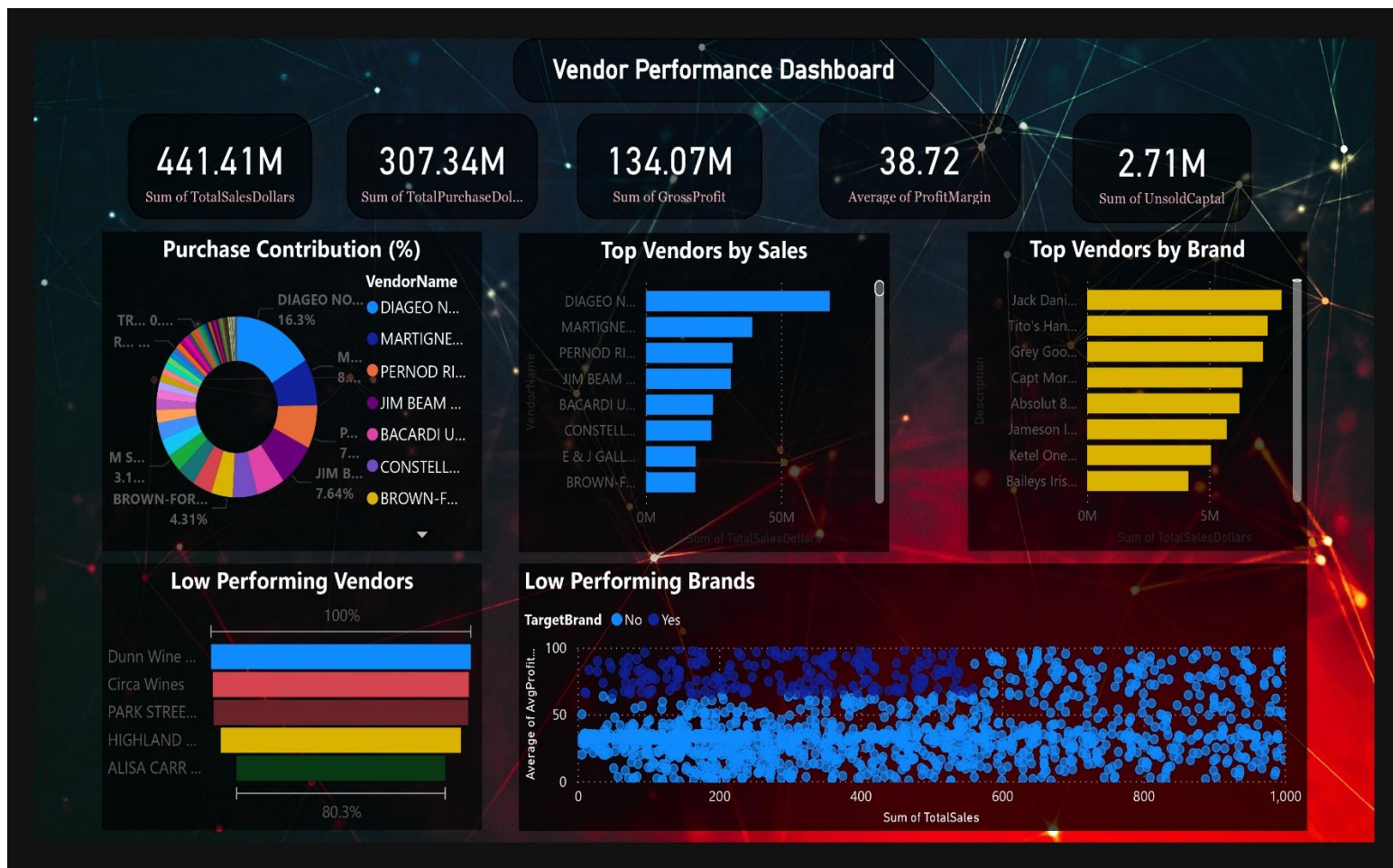
- Identified \$2.71M in locked inventory capital
- Found top 10 vendors account for ~66% of total purchase value
- Vendors purchasing in bulk save ~72% in unit cost
- Confirmed statistical difference in profit margins across vendor segments
- Delivered data-backed recommendations to reduce risk, improve pricing, and drive sales growth

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## Power BI Dashboard :

Vendor\_Performance Analysis.pbix provides interactive insights including:

- Top vendors by sales and margin
- Inventory turnover heatmap
- Sales vs. Purchase ratios
- High-margin but low-volume brands



## Report Summary :

- Summary statistics
- Outlier & correlation analysis
- Strategic findings
- Statistical validation (hypothesis testing)
- Final recommendations for operational improvements

## Tools & Tech Stack :

- **Python** – Pandas, SQLite, SQLAlchemy
- **SQL** – CTEs, joins, aggregations
- **Power BI** – Dashboarding & visual storytelling
- **Jupyter Notebooks** – EDA & analysis
- **PDF** – Final stakeholder-ready documentation