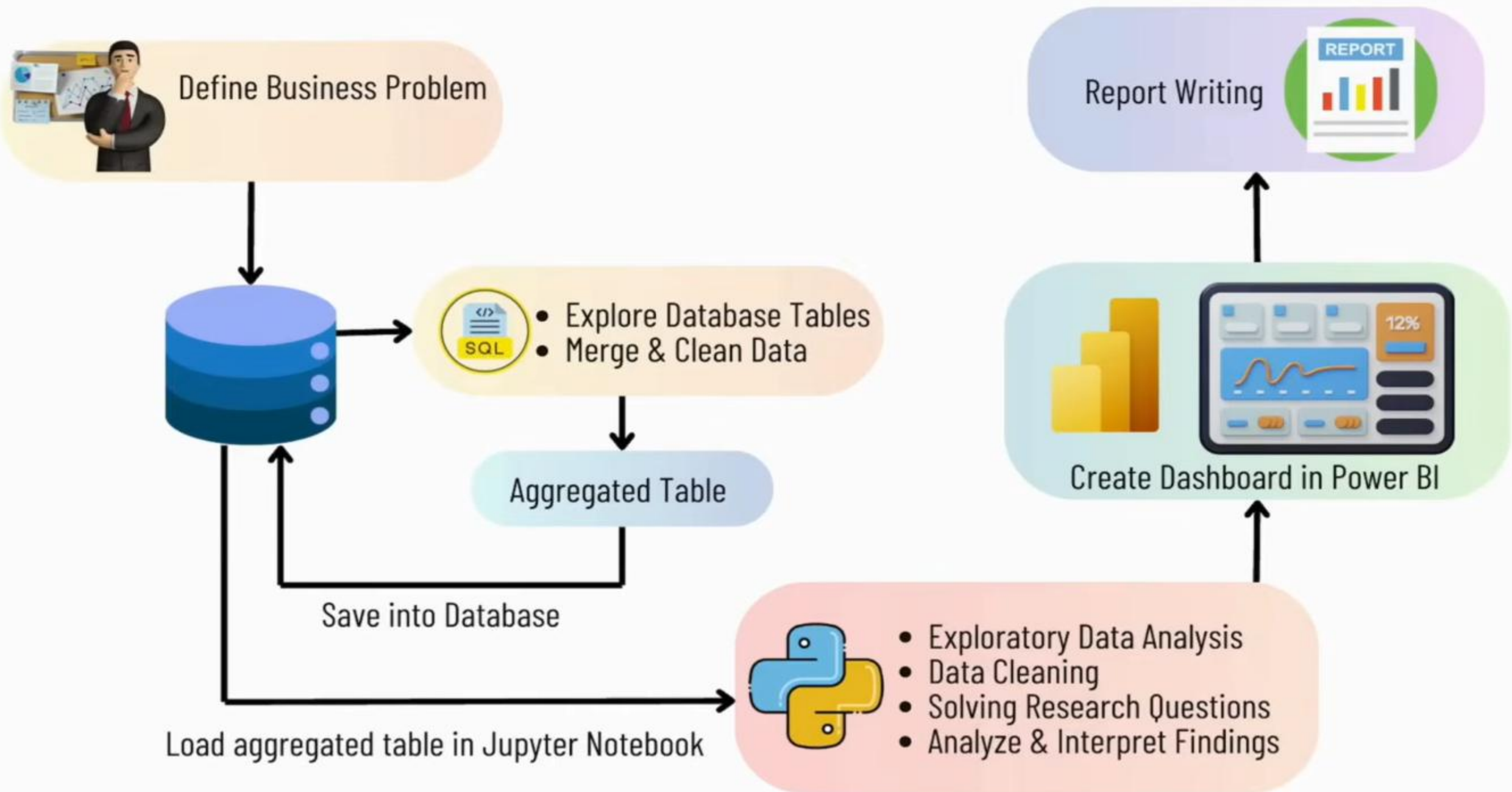


VENDOR PERFORMANCE ANALYSIS



BY Rohit Hiralal Hajare | Tool :- Python, SQL, Power BI



Business Problem

- Retail and wholesale companies often lose profits due to poor pricing, slow-moving inventory, and heavy dependency on a few vendors.
- This project analyzes vendor, sales, and inventory data to identify performance gaps and improve profitability.

Objectives :

- Identify low-performing brands for pricing or promotion changes
- Find top vendors contributing maximum sales and profit
- Analyze bulk purchasing impact on cost
- Improve inventory turnover to reduce holding cost
- Compare profit margin between high and low vendors

Dataset Overview

Tables : vendor_invoice – 5,544
sale – 12,825,363
purchases – 2,372,474
purchase_prices – 12,261
begin_inventory – 206,529
end_inventory – 224,489

Key Columns:

- 1) SalesPrice, SalesDollars
- 2) PurchasePrice, Quantity
- 3) VendorName, Brand
- 4) InventoryQty, UnsoldInventoryValue

TOOLS & TECHNOLOGIES

- Python (Pandas, NumPy, Matplotlib, Seaborn)
- SQL (Joins, Aggregations)
- Power BI (Dashboard, DAX)
- SQLite / CSV

DATA CLEANING & PREPARATION

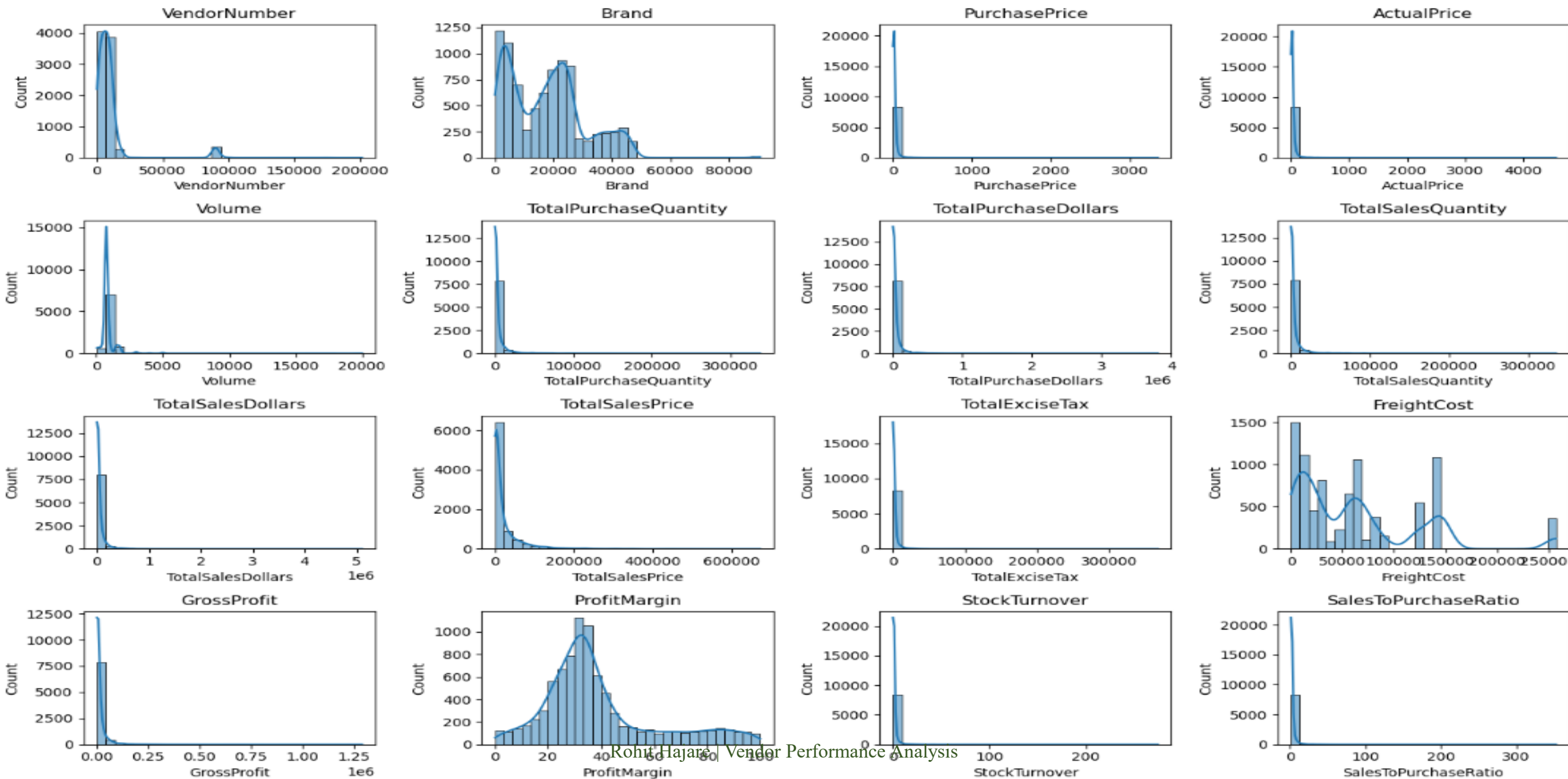
- Removed null values
- Standardized column names
- Merged sales, purchase, and inventory tables
- Created vendor_sales_summary table

Summary Statistics

	VendorNumber	VendorName	Brand	Description	PurchasePrice	ActualPrice	Volume	TotalPurchaseQuantity	TotalPurchaseDollars	TotalSalesQuantity	TotalSalesDollars
0	1128	BROWN-FORMAN CORP	1233	Jack Daniels No 7 Black	26.27	36.99	1750.0	145080	3811251.60	142049.0	369949.0
1	4425	MARTIGNETTI COMPANIES	3405	Tito's Handmade Vodka	23.19	28.99	1750.0	164038	3804041.22	160247.0	389949.0
2	17035	PERNOD RICARD USA	8068	Absolut 80 Proof	18.24	24.99	1750.0	187407	3418303.68	187140.0	459949.0
3	3960	DIAGEO NORTH AMERICA INC	4261	Capt Morgan Spiced Rum	16.17	22.99	1750.0	201682	3261197.94	200412.0	459949.0
4	3960	DIAGEO NORTH AMERICA INC	3545	Ketel One Vodka	21.89	29.99	1750.0	138109	3023206.01	135838.0	399949.0
...
8559	9815	WINE GROUP INC	8527	Concannon Glen Ellen Wh Zin	1.32	4.99	750.0	2	2.64	5.0	9.99
8560	8004	SAZERAC CO INC	5683	Dr McGillicuddy's Apple Pie	0.39	0.49	50.0	6	2.34	134.0	65.94
8561	3924	HEAVEN HILL DISTILLERIES	9123	Deep Eddy Vodka	0.74	0.99	50.0	2	1.48	2.0	1.98
8562	3960	DIAGEO NORTH AMERICA INC	6127	The Club Strawbry Margarita	1.47	1.99	200.0	1	1.47	72.0	143.97
8563	7245	PROXIMO SPIRITS INC.	3065	Three Olives Grape Vodka	0.71	0.99	50.0	1	0.71	86.0	85.29

8564 rows × 18 columns

Histogram Plots



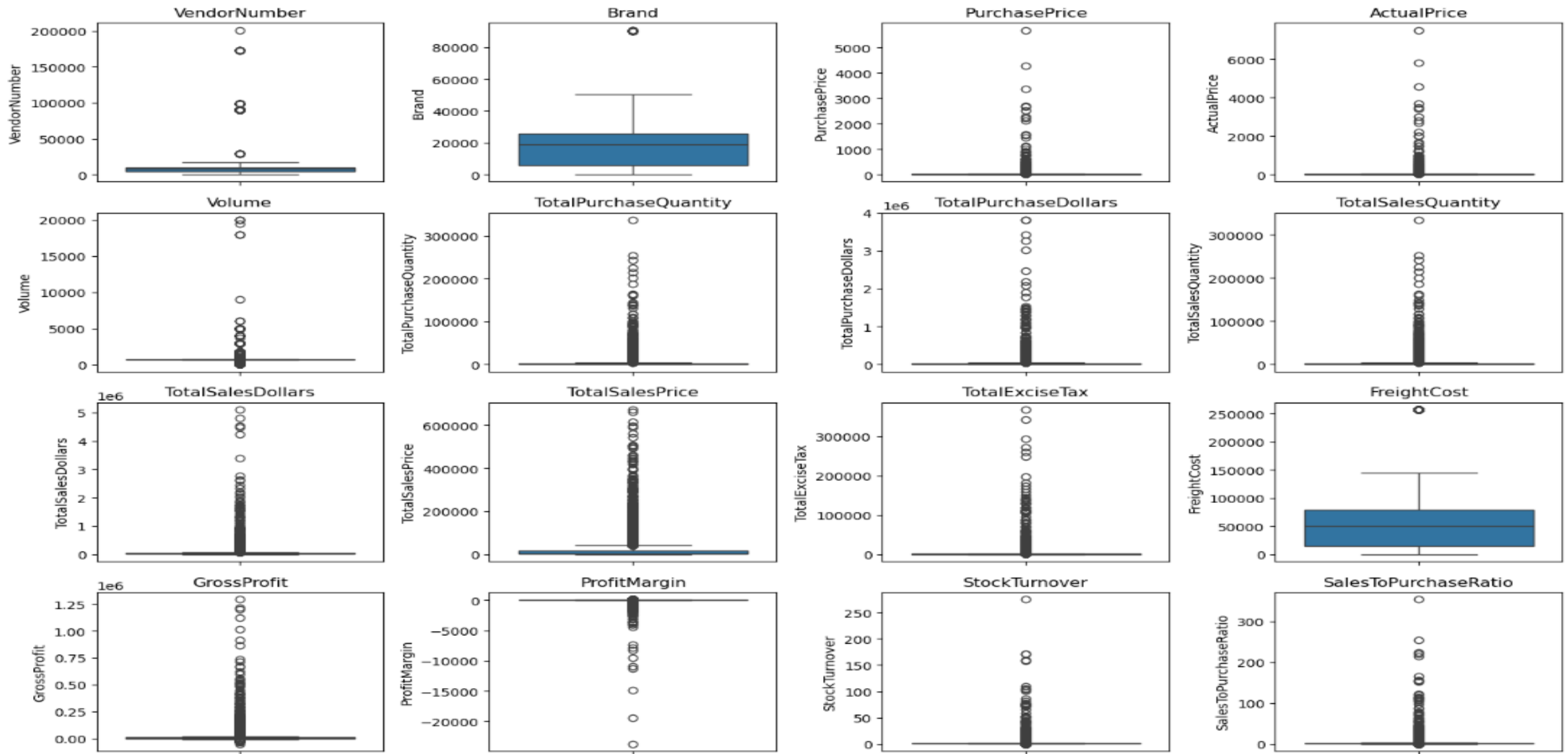
• Negative & Zero Values – Key Findings

- Gross Profit minimum of **-52,002.78** indicates heavy discounting or loss sales
- Profit margin minimum $-\infty$ occurs when revenue is zero but cost exists
- Zero sales products indicate slow-moving or obsolete inventory
- Extreme price values indicate premium product offerings

• **Outlier Detected By High Standard Deviations:**

- **Purchase & Actual Price** : The Maximum Value(**5,681.81 & 7,499.99**) are significantly higher than the mean(24.39 & 35.64) ,Indicating Premium Product Offerings.

FINDING OUTLIER'S



Summary Statistics insights:

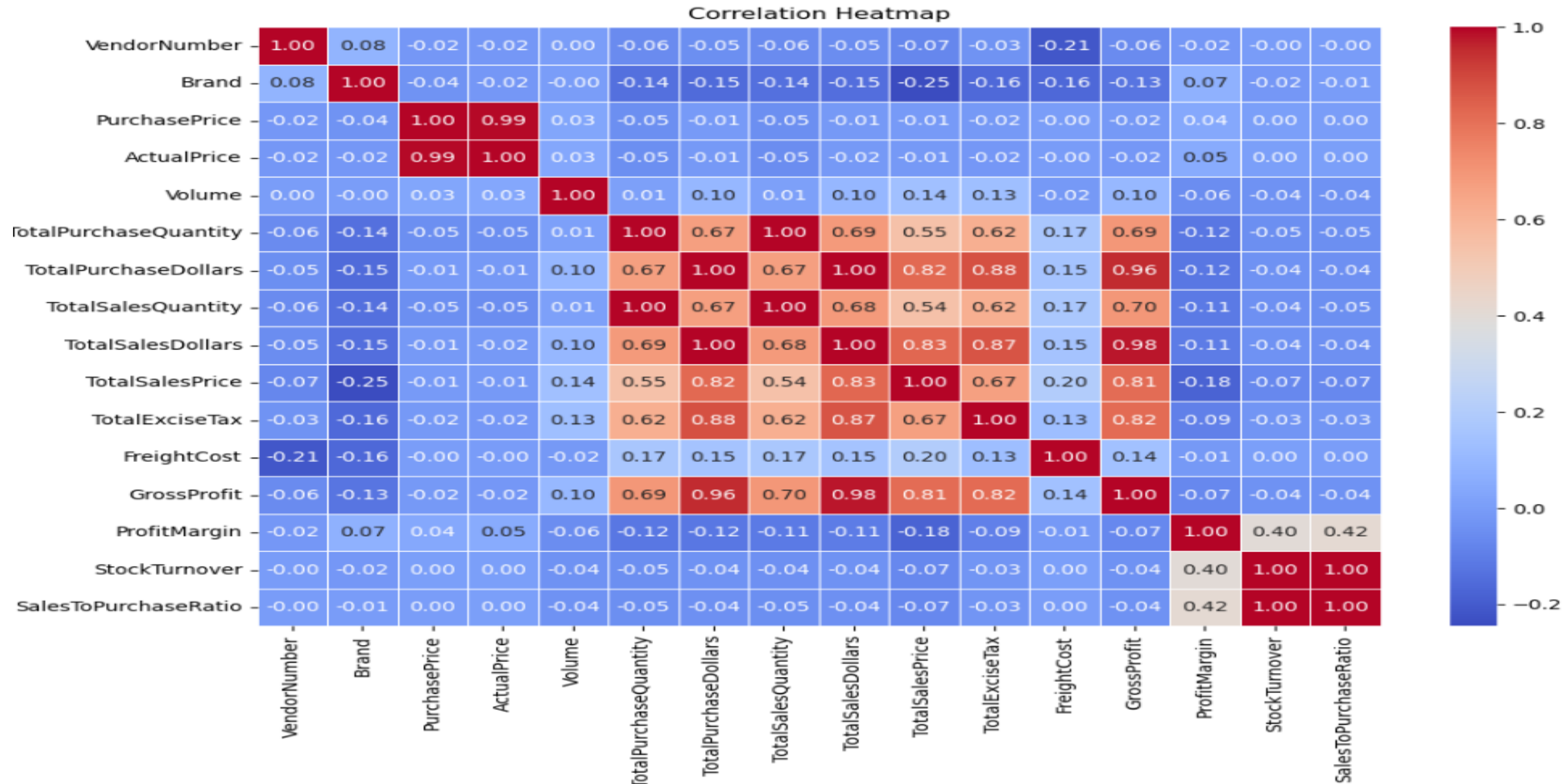
Negative & Zero Values:

- Gross Profit: Minimum value is -52,002,78, indicating losses. Some products or transactions may be selling at a loss due to high costs or selling at discounts lower than the purchase price.
- Profit Margin: Has a minimum of -Infinity, which suggests cases where revenue is zero or even lower than costs.
- Total Sales Quantity & Sales Dollars: Minimum values are 0, meaning some products were purchased but never sold. These could be slow-moving or obsolete stock.

Outliers Indicated by High Standard Deviations:

- 1) Purchase & Actual Prices: The max values(5,681.81 & 7,499.99) are significantly higher than the mean(24.39 & 35.64), indicating potential premium products
- 2) Freight Cost: High variation, from 0.09 to 257,032.07, suggests logistics inefficiencies or bulk shipments.
- 3) Stock Turnover: Ranges From 0 to 274.5, implying some products sell extremely fast while others remain in stock indefinitely. value more than 1 indicates that Sold quantity for that product is higher than purchased quantity due to either sales are being fulfilled from older stocks.

Correlation Insights



Vendor Performance Analysis

Total Sales (\$)
441.41M

Gross Profit
134.07M

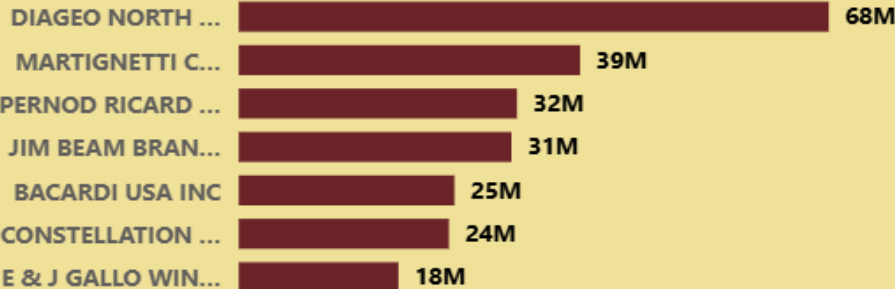
Profit Margin (%)
38.72

Unsold Capital (\$)
-275.03M

VendorName

- ☐ ADAMBA IMPOR...
- ☐ ALISA CARR BEV...
- ☐ ALTAMAR BRAN...
- ☐ AMERICAN SPIRI...
- ☐ AMERICAN VINT...
- ☐ ATLANTIC IMPO...

Top Vendor By Sales



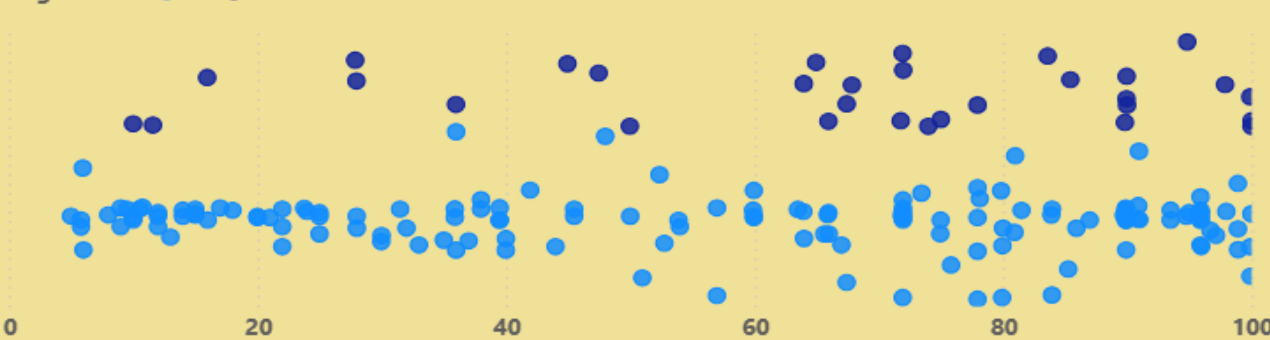
Top Brand By Sales



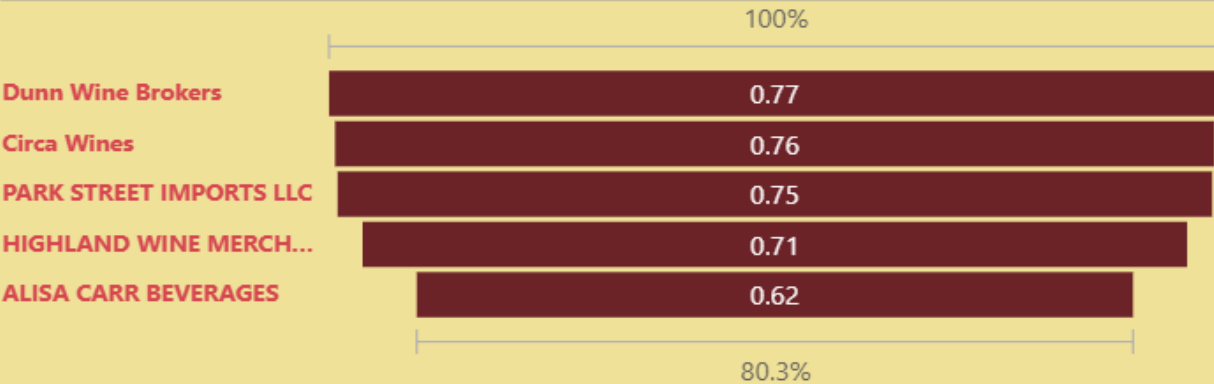
Low Performing Brand

TargetBrand

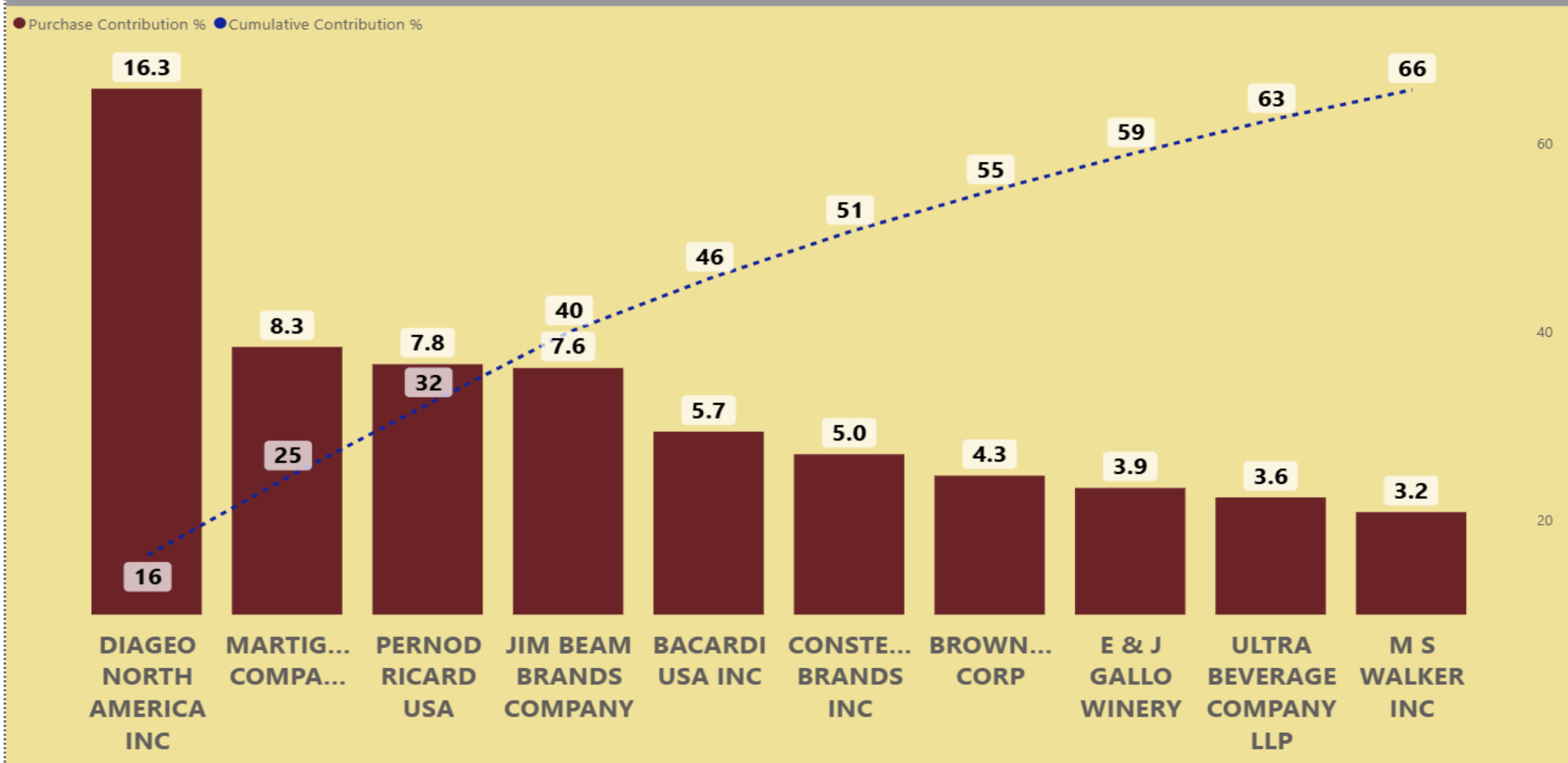
No Yes



Low Performing Vendor



Vendor Contribution To Total Purchase



board

Vendor_Contribution_To_Total_Purchase

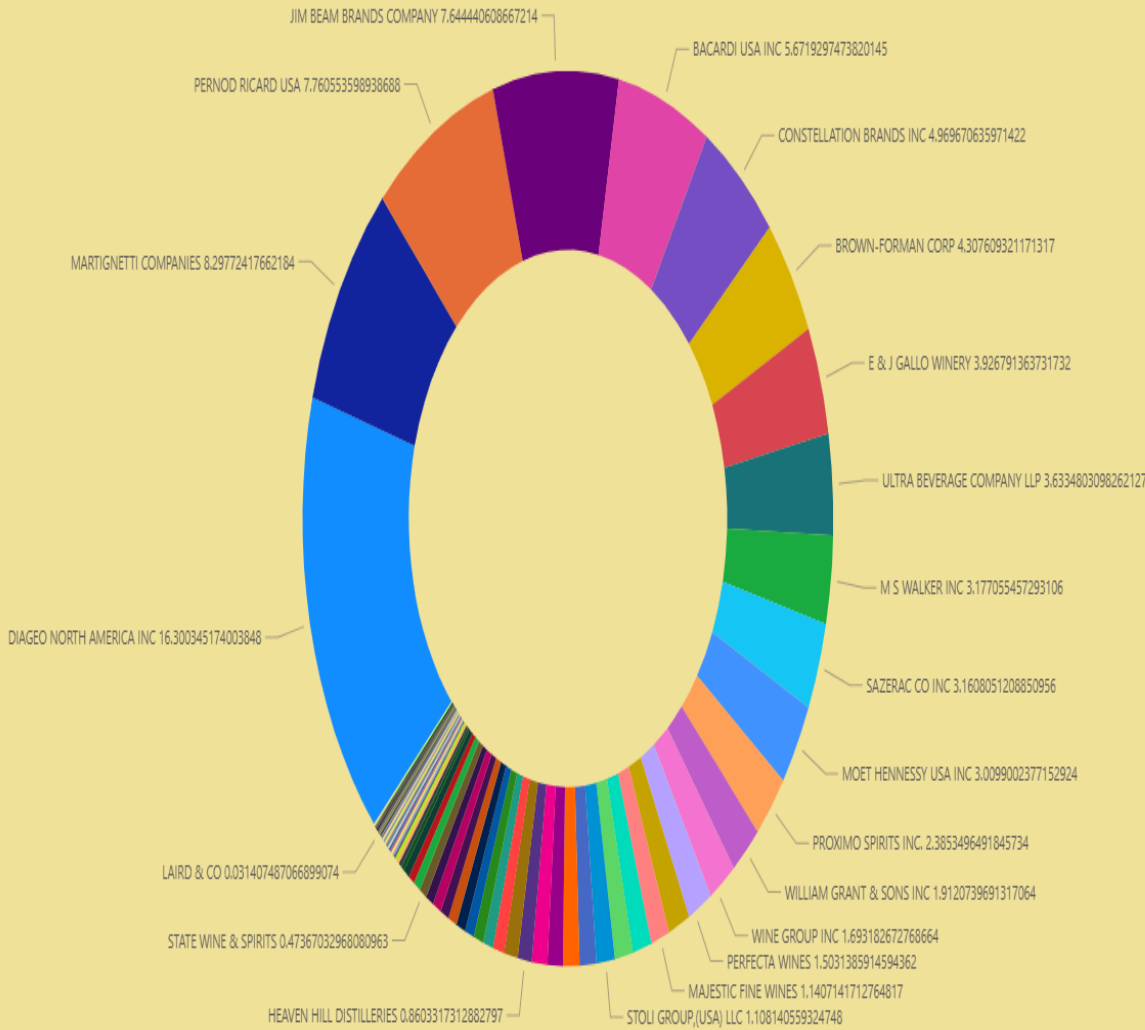
x

Profitability_By_Vendor

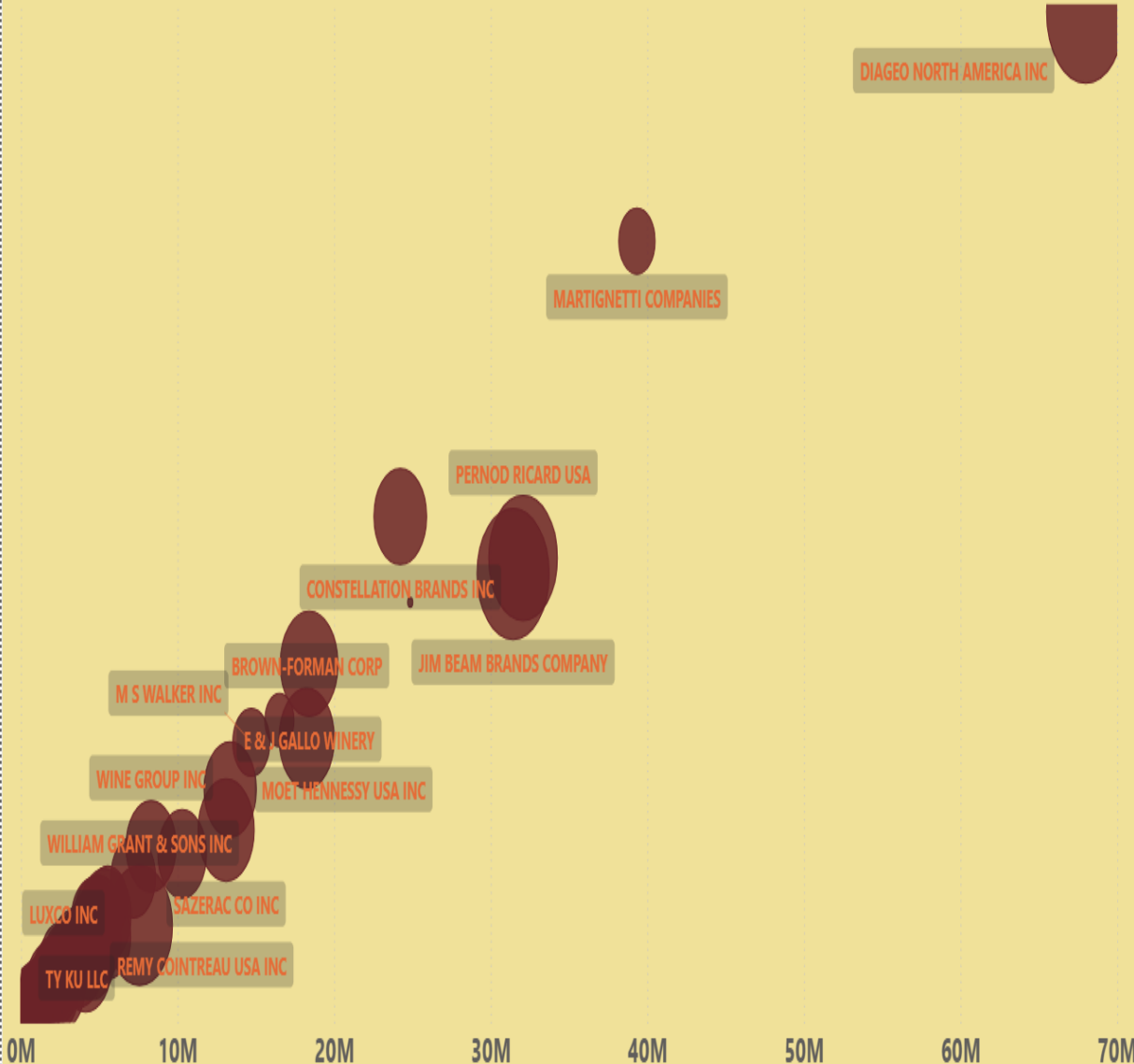
Purchase_Contribution_By_Vendor



Purchase Contribution%



PROFITABILITY BY VENDOR



Dashboard	Vendor_Contribution_To_Total_Purchase	Profitability_By_Vendor	Purchase_Contribution_By_Vendor ^x	+	Dashboard	Vendor_Contribution_To_Total_Purchase	Profitability_By_Vendor ^x	Purchase_Contribution_By_Vendor	+
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- Weak relationship between price and profit
- Strong relationship between purchase and sales quantity (0.999)
- Higher prices slightly reduce margins
- Faster turnover does not guarantee higher profit

Research Questions & Key Findings

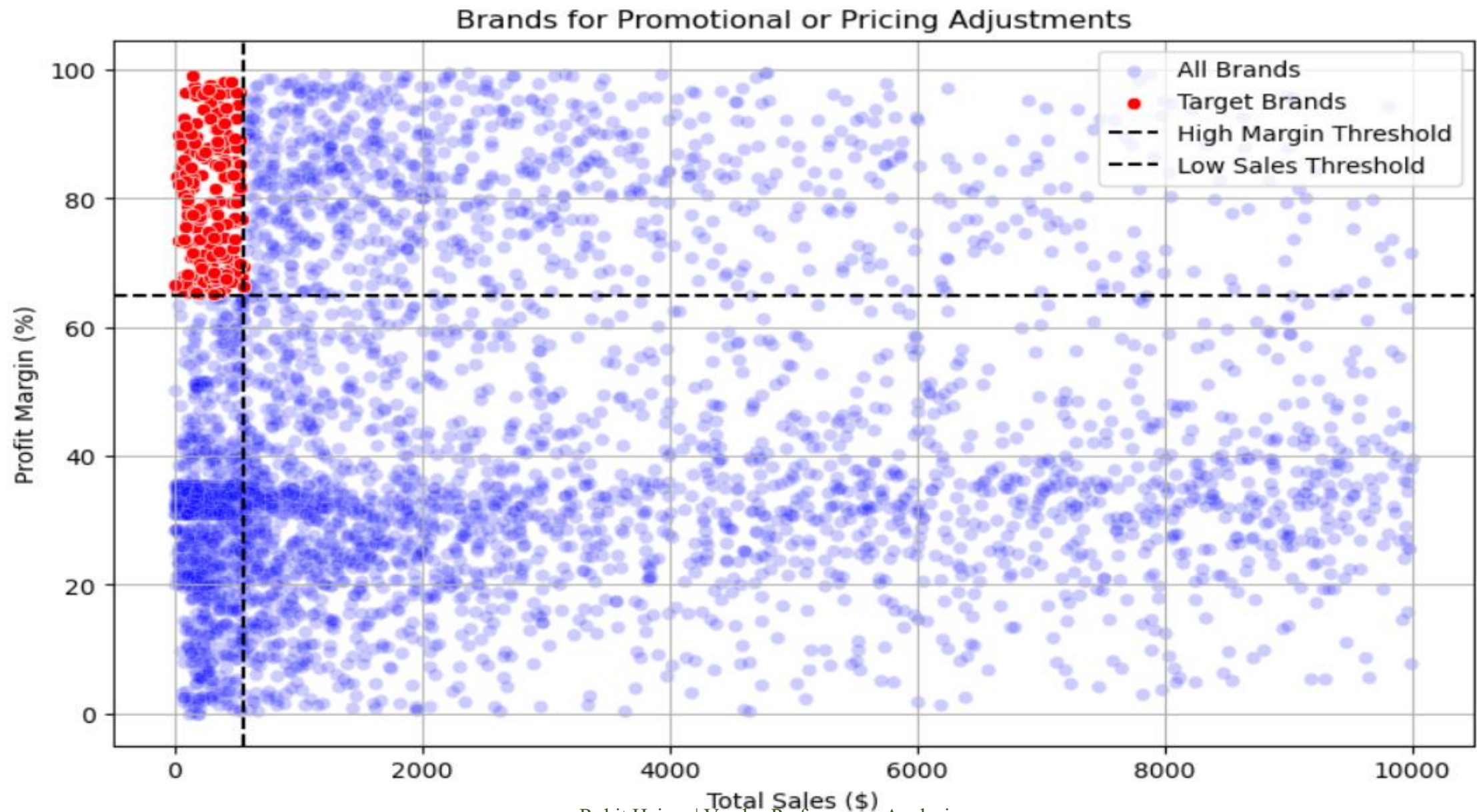
1) Brand For Promotional or Principle Adjustment

Brands with Low Sales but High Profit Margins:

	Description	TotalSalesDollars	ProfitMargin
6199	Santa Rita Organic Svgn Bl	9.99	66.466466
2369	Debauchery Pnt Nr	11.58	65.975820
2070	Concannon Glen Ellen Wh Zin	15.95	83.448276
2188	Crown Royal Apple	27.86	89.806174
6237	Sauza Sprklg Wild Berry Marg	27.96	82.153076
...
5074	Nanbu Bijin Southern Beauty	535.68	76.747312
2271	Dad's Hat Rye Whiskey	538.89	81.851584
57	A Bichot Clos Marechaudes	539.94	67.740860
6245	Sbragia Home Ranch Merlot	549.75	66.444748
3326	Goulee Cos d'Estournal 10	558.87	69.434752

198 rows × 3 columns

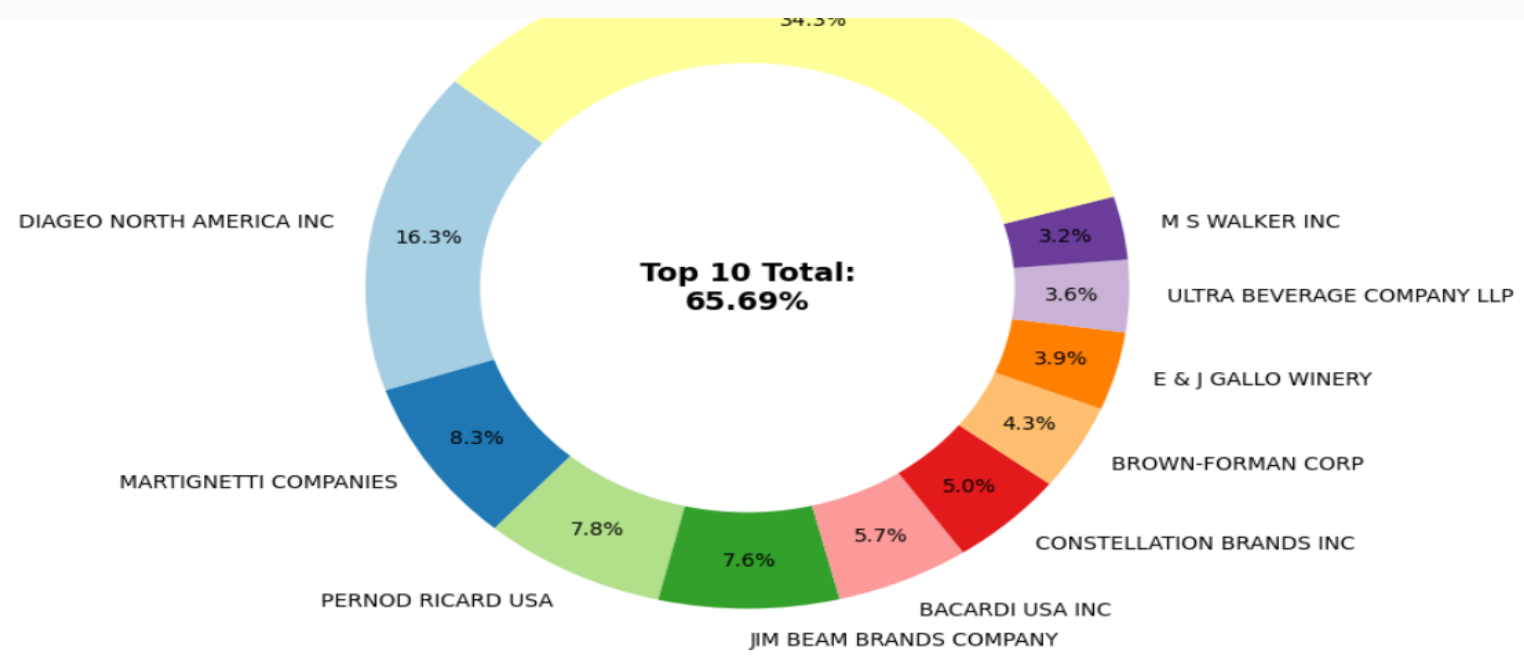
Brands for promotional Or Pricing Adjustments



- 198 brands exhibit lower sales but higher profit margin, which could be benefit for target marketing, Promotion or price optimazations to increase volume without compromising profitability

2. Top Vendors by Sales & Purchase Contribution

The top 10 vendors contribute 65.69% of total purchases, while the remaining vendors contribute only 34.31%. This over-reliance on a few vendors may introduce risks such as supply chain disruptions, indicating a need for diversification.



3. Impact of Bulk Purchasing on Cost Savings

Vendors buying in large quantities receive a 72% lower unit cost (\$10.78 per unit vs. higher unit costs in smaller orders).

Bulk pricing strategies encourage larger orders, increasing total sales while maintaining profitability.

OrderSize	UnitPurchasePrice
Small	39.057543
Medium	15.486414
Large	10.777625

4. Identifying Vendors with Low Inventory Turnover

Total Unsold Inventory Capital: \$2.71M

Slow-moving inventory increases storage costs, reduces cash flow efficiency, and affects overall profitability.

Identifying vendors with low inventory turnover enables better stock management, minimizing financial strain.

VendorName	StockTurnover
ALISA CARR BEVERAGES	0.615385
HIGHLAND WINE MERCHANTS LLC	0.708333
PARK STREET IMPORTS LLC	0.751306
Circa Wines	0.755676
Dunn Wine Brokers	0.766022
CENTEUR IMPORTS LLC	0.773953
SMOKY QUARTZ DISTILLERY LLC	0.783835
TAMWORTH DISTILLING	0.797078
THE IMPORTED GRAPE LLC	0.807569
WALPOLE MTN VIEW WINERY	0.820548

	VendorName	UnsoldInventoryValue
25	DIAGEO NORTH AMERICA INC	722.21K
46	JIM BEAM BRANDS COMPANY	554.67K
68	PERNOD RICARD USA	470.63K
116	WILLIAM GRANT & SONS INC	401.96K
30	E & J GALLO WINERY	228.28K
79	SAZERAC CO INC	198.44K
11	BROWN-FORMAN CORP	177.73K
20	CONSTELLATION BRANDS INC	133.62K
61	MOET HENNESSY USA INC	126.48K
77	REMY COINTREAU USA INC	118.60K

5) Profit Margin Comparison: High vs. Low-Performing Vendors

Top Vendors' Profit Margin (95% CI): (30.74%, 31.61%), Mean: 31.17%

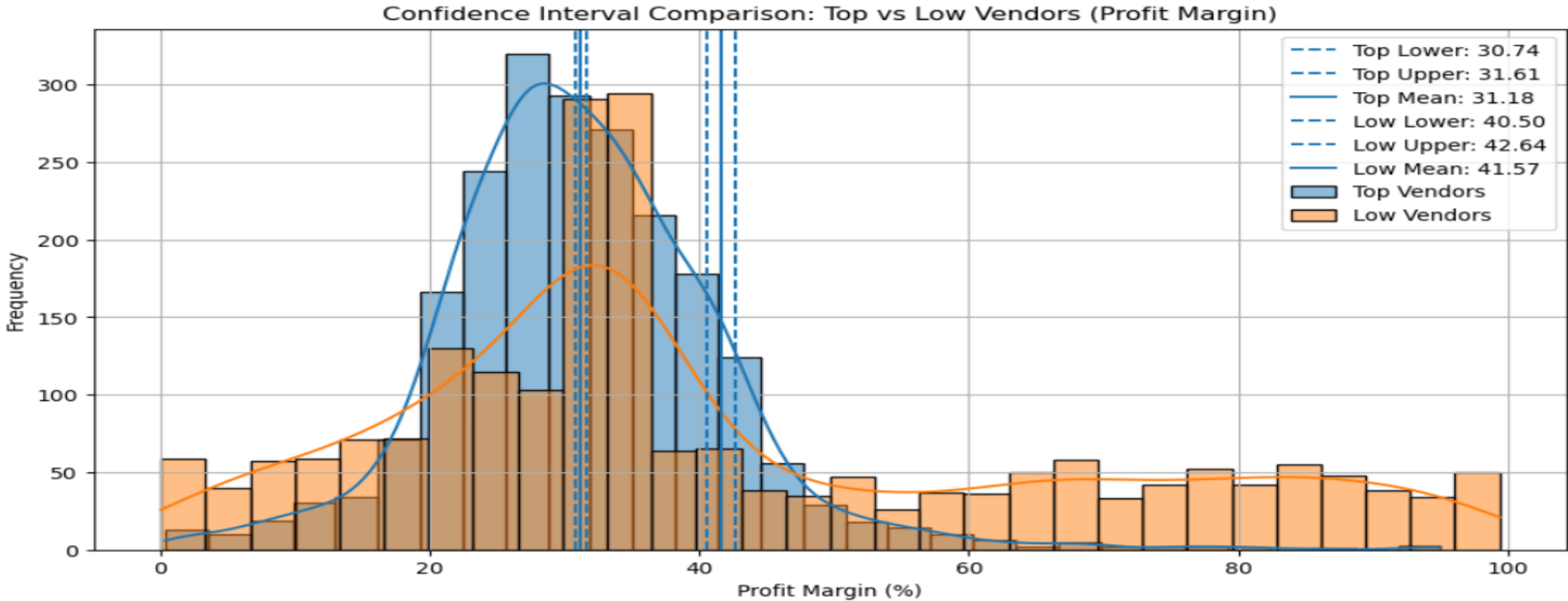
Low Vendors' Profit Margin (95% CI): (40.48%, 42.62%), Mean: 41.55%

Low-performing vendors maintain higher margins but struggle with sales volumes, indicating potential pricing inefficiencies or market reach issues.

Actionable Insights:

PROFIT MARGIN COMPARISON

Top Vendors 95% CI: (30.74, 31.61), Mean: 31.18
Low Vendors 95% CI: (40.50, 42.64), Mean: 41.57



Low-performing vendors have **higher margins but low volume**
→ Indicates pricing inefficiency or poor market reach.

6. Statistical Validation of Profit Margin Differences

Hypothesis Testing:

H_0 (Null Hypothesis): No significant difference in profit margins between top and low-performing vendors.

H_1 (Alternative Hypothesis): A significant difference exists in profit margins between the two vendor groups.

Result: The null hypothesis is rejected, confirming that the two groups operate under distinctly different profitability models.

Implication: High-margin vendors may benefit from better pricing strategies, while top-selling vendors could focus on cost efficiency.

FINAL RECOMMENDATION

- Adjust pricing for low-volume, high-margin brands
- Reduce dependency on few vendors
- Use bulk purchasing strategically
- Clear slow-moving inventory
- Improve marketing for low-performing vendors