

Vendor Performance Analysis Report

1. Business Context and Objective

Effective inventory and sales management play a critical role in improving profitability within the retail and wholesale industry. Organizations must continuously monitor pricing strategies, inventory movement, and vendor dependency to avoid unnecessary losses and operational inefficiencies.

The objective of this analysis is to evaluate vendor and product performance by examining sales, profitability, inventory turnover, and purchasing behavior. The insights generated aim to support better decision-making around pricing, vendor management, and inventory optimization.

Specifically, this analysis focuses on:

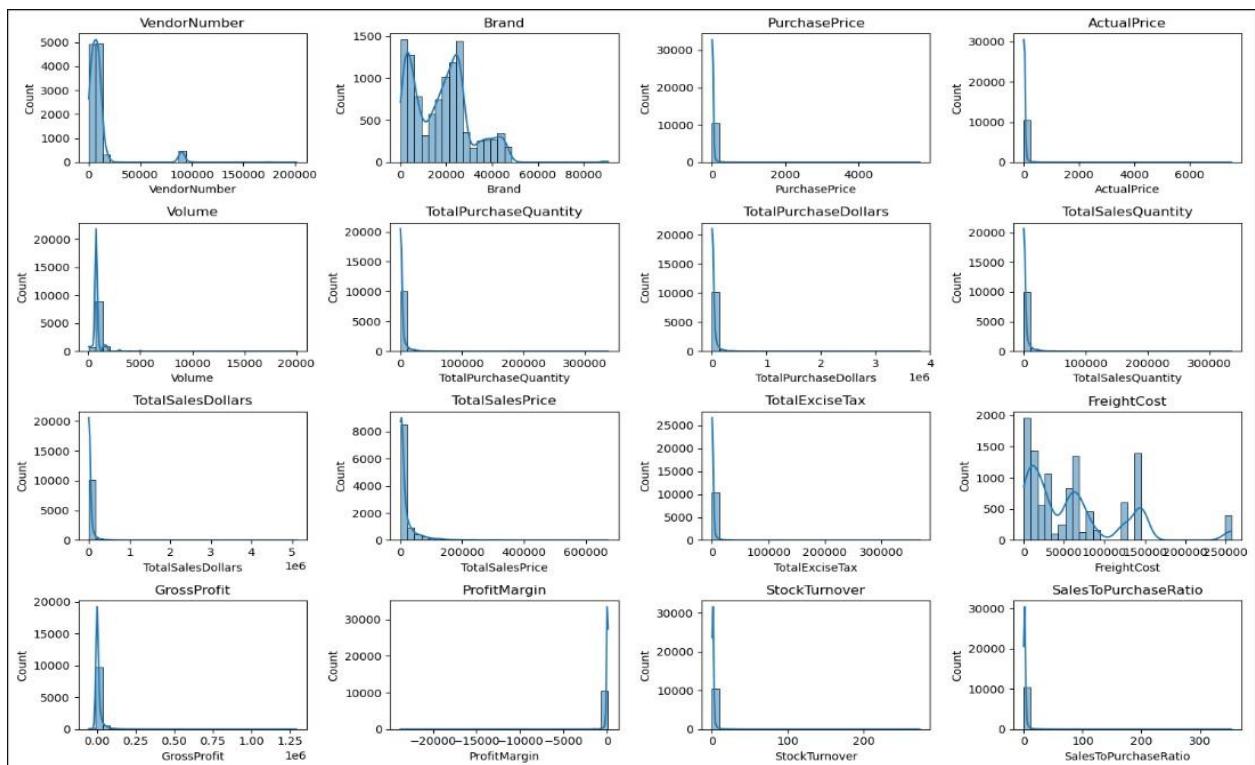
- Identifying underperforming brands that may benefit from pricing or promotional adjustments
- Determining vendors that contribute the most to overall sales and gross profit
- Evaluating the impact of bulk purchasing on unit costs
- Assessing inventory turnover to reduce holding costs and improve efficiency
- Comparing profitability patterns between high-performing and low-performing vendors

2. Exploratory Data Analysis Overview

Summary Observations

Initial exploratory analysis revealed a wide variation across key financial and operational metrics, including purchase prices, sales volumes, freight costs, and profit margins. Several important data quality and performance patterns were identified:

	count	mean	std	min	25%	50%	75%	max
VendorNumber	10692.0	10650.649458	18753.519148	2.000000	3951.000000	7153.000000	9552.000000	2.013590e+05
Brand	10692.0	18039.228769	12662.187074	58.000000	5793.500000	18761.500000	25514.250000	9.063100e+04
PurchasePrice	10692.0	24.385303	109.269375	0.360000	6.840000	10.455000	19.482500	5.681810e+03
ActualPrice	10692.0	35.643671	148.246016	0.490000	10.990000	15.990000	28.990000	7.499990e+03
Volume	10692.0	847.360550	664.309212	50.000000	750.000000	750.000000	750.000000	2.000000e+04
TotalPurchaseQuantity	10692.0	3140.886831	11095.086769	1.000000	36.000000	262.000000	1975.750000	3.376600e+05
TotalPurchaseDollars	10692.0	30106.693372	123067.799627	0.710000	453.457500	3655.465000	20738.245000	3.811252e+06
TotalSalesQuantity	10692.0	3077.482136	10952.851391	0.000000	33.000000	261.000000	1929.250000	3.349390e+05
TotalSalesDollars	10692.0	42239.074419	167655.265984	0.000000	729.220000	5298.045000	28396.915000	5.101920e+06
TotalSalesPrice	10692.0	18793.783627	44952.773386	0.000000	289.710000	2857.800000	16059.562500	6.728193e+05
TotalExciseTax	10692.0	1774.226259	10975.582240	0.000000	4.800000	46.570000	418.650000	3.682428e+05
FreightCost	10692.0	61433.763214	60938.458032	0.090000	14069.870000	50293.620000	79528.990000	2.570321e+05
GrossProfit	10692.0	12132.381048	46224.337964	-52002.780000	52.920000	1399.640000	8660.200000	1.290668e+06
ProfitMargin	10692.0	-15.620770	443.555329	-23730.638953	13.324515	30.405457	39.956135	9.971666e+01
StockTurnover	10692.0	1.706793	6.020460	0.000000	0.807229	0.981529	1.039342	2.745000e+02
SalesToPurchaseRatio	10692.0	2.504390	8.459067	0.000000	1.153729	1.436894	1.665449	3.529286e+02



- **Negative Gross Profit Values:**
Gross profit values reached a minimum of **-52,002.78**, indicating transactions where products were sold below their purchase cost. This suggests potential issues such as heavy discounting, pricing errors, or high associated costs.
- **Extreme Profit Margin Values:**
Certain records showed extremely negative or undefined profit margins, typically occurring when revenue was zero or lower than total costs.
- **Zero Sales Records:**
Some products recorded purchase quantities but zero sales quantities, indicating unsold or obsolete inventory. These items contribute to increased holding costs and inefficient capital utilization.
- **Outliers in Pricing:**
Purchase and selling prices displayed large deviations from the mean. While average purchase prices were relatively low, maximum values exceeded **5,600**, indicating the presence of premium products within the dataset.
- **Freight Cost Variability:**
Freight costs ranged from negligible amounts to over **257,000**, highlighting inconsistencies in logistics expenses, shipment sizes, or supplier agreements.
- **Stock Turnover Variability:**
Stock turnover values ranged from **0 to 274**, suggesting that while some products sell rapidly, others remain unsold for extended periods.

3. Data Filtering and Preparation

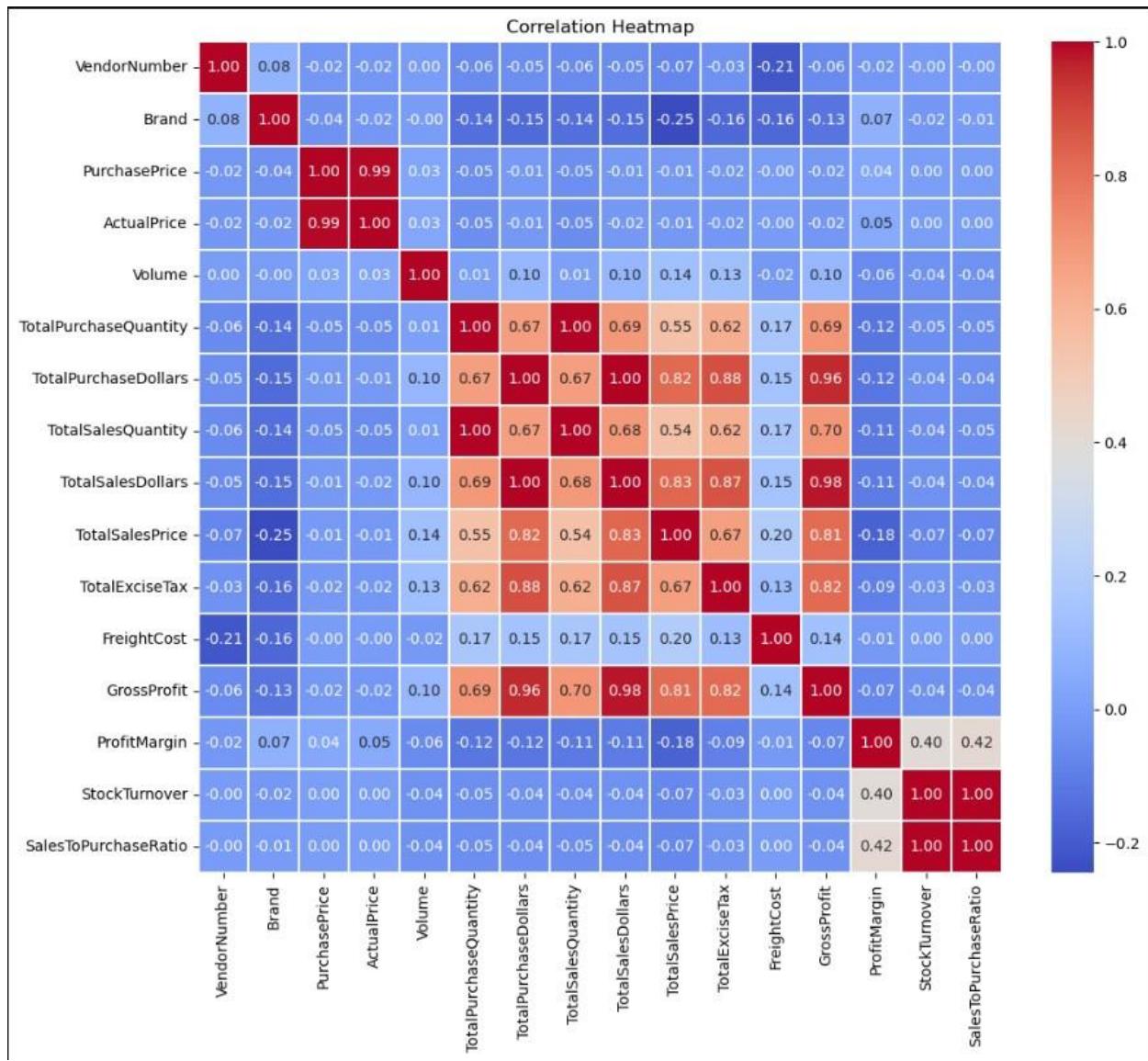
To ensure reliable and meaningful insights, the dataset was filtered to remove inconsistent or non-representative records. The following conditions were applied:

- Transactions with **gross profit less than or equal to zero** were excluded
- Records with **non-positive profit margins** were removed
- Products with **zero total sales quantity** were excluded

This filtering ensured that the analysis focused only on completed, profitable transactions.

4. Correlation Analysis Insights

Correlation analysis was conducted to understand relationships between pricing, sales, inventory, and profitability metrics. Key findings include:



- Purchase Price vs. Sales and Profit:**

Purchase price showed a very weak correlation with both total sales revenue and gross profit, indicating that price variations alone do not significantly influence revenue or profitability.

- Purchase Quantity vs. Sales Quantity:** A strong positive correlation (≈ 0.999) confirms efficient inventory movement, where purchased quantities closely align with sales quantities.

- Profit Margin vs. Sales Price:**

A weak negative correlation suggests that increasing selling prices may slightly reduce margins, possibly due to competitive pressures or discounting strategies.

- Stock Turnover vs. Profitability:**

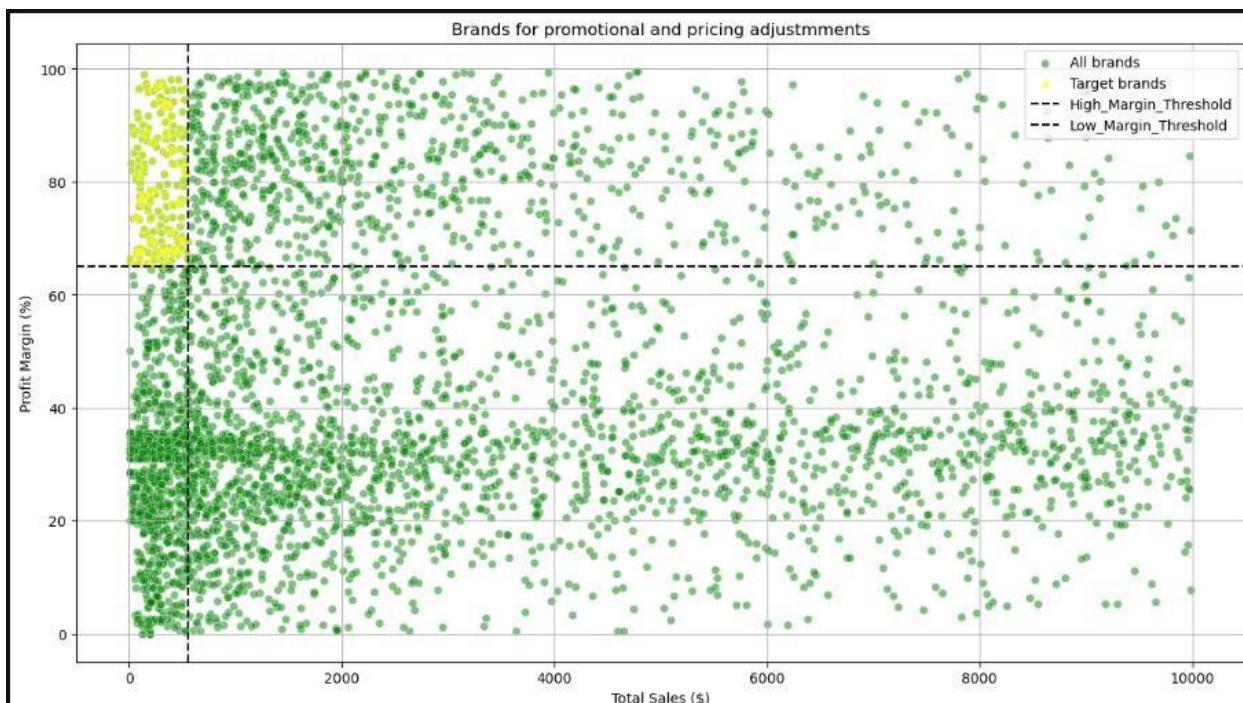
Weak negative correlations indicate that faster inventory turnover does not necessarily result in higher profit margins or gross profit.

5. Key Business Findings

5.1 Brands Requiring Promotional or Pricing Adjustments

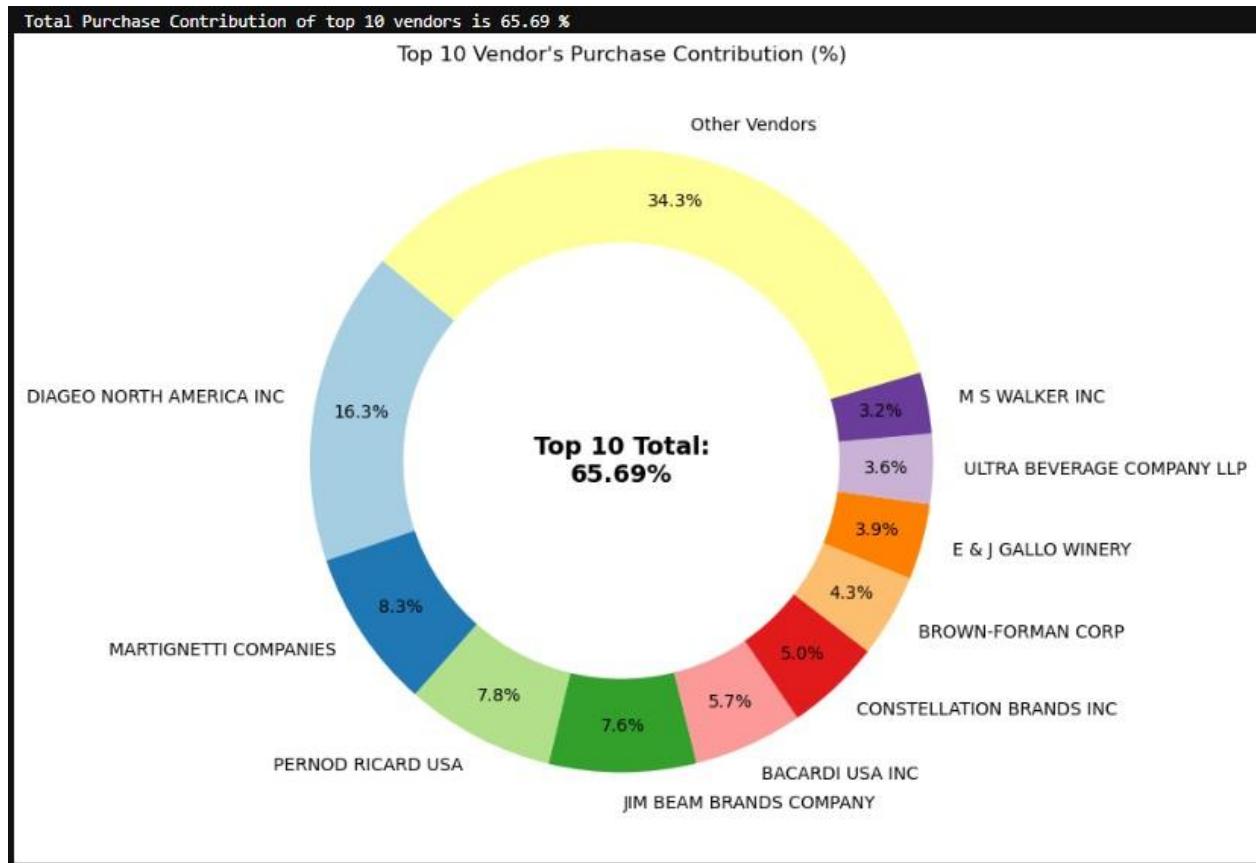
Brands with low sales but high profit margins:				
	Description	TotalSalesDollars	ProfitMargin	
6199	Santa Rita Organic Svn Bl	9.99	66.466466	
2369	Debauchery Pnt Nr	11.58	65.975820	
2070	Concannon Glen Ellen Wh Zin	15.95	83.448276	
2188	Crown Royal Apple	27.86	89.806174	
6237	Sauza Sprklg Wild Berry 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'Estournel 10	558.87	69.434752	
198 rows × 3 columns				

The analysis identified **198 brands** with relatively low sales volumes but high profit margins. These brands present an opportunity to increase revenue through targeted marketing, promotional campaigns, or optimized pricing strategies without significantly impacting profitability.



5.2 Vendor Concentration Risk

The top 10 vendors account for approximately **65.7%** of total purchases, while all remaining vendors contribute only 34.3%. This high level of dependency on a limited number of vendors increases supply chain risk and highlights the need for vendor diversification.



5.3 Impact of Bulk Purchasing on Cost Savings

Bulk purchasing was found to significantly reduce unit costs. Vendors purchasing in large quantities achieved an average **72% lower unit cost** compared to smaller orders. This demonstrates the effectiveness of bulk-pricing strategies in improving margins while supporting higher sales volumes.

OrderSize	UnitPurchasePrice	
0	Small	39.06
1	Medium	15.49
2	Large	10.78

5.4 Vendors with Low Inventory Turnover

The total value of unsold inventory was estimated at **\$2.71 million**, indicating a substantial amount of capital tied up in slow-moving stock. Low inventory turnover increases storage costs, reduces cash flow efficiency, and negatively impacts overall profitability. Identifying such vendors enables better purchase planning and inventory control.

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

5.5 Profit Margin Comparison: High vs. Low-Performing Vendors

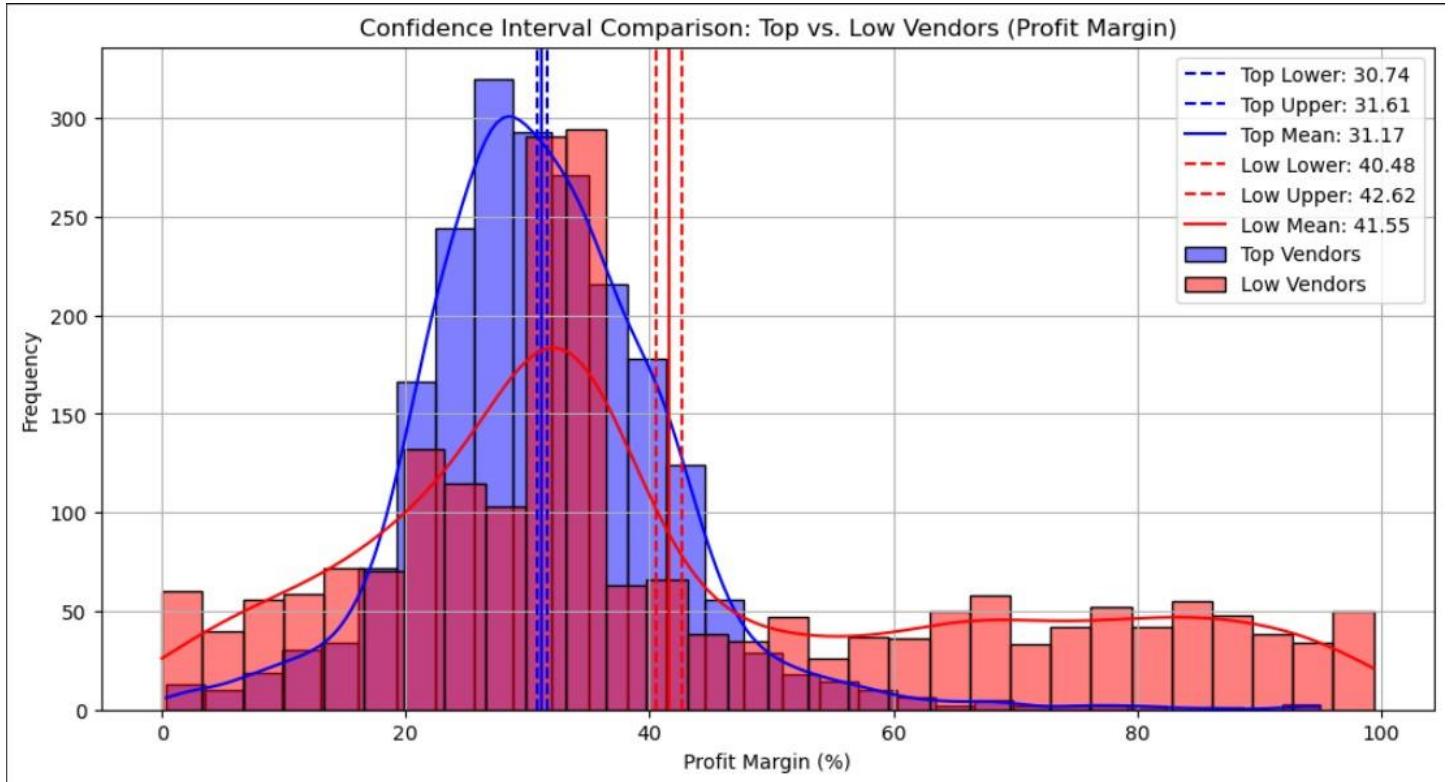
A comparative analysis of profit margins revealed:

- **Top-performing vendors:**

Mean profit margin of approximately **31.17%**.

- **Low-performing vendors:**

Mean profit margin of approximately **41.55%**.



While low-performing vendors maintain higher margins, they struggle with sales volume, indicating potential issues related to pricing, market reach, or demand generation.

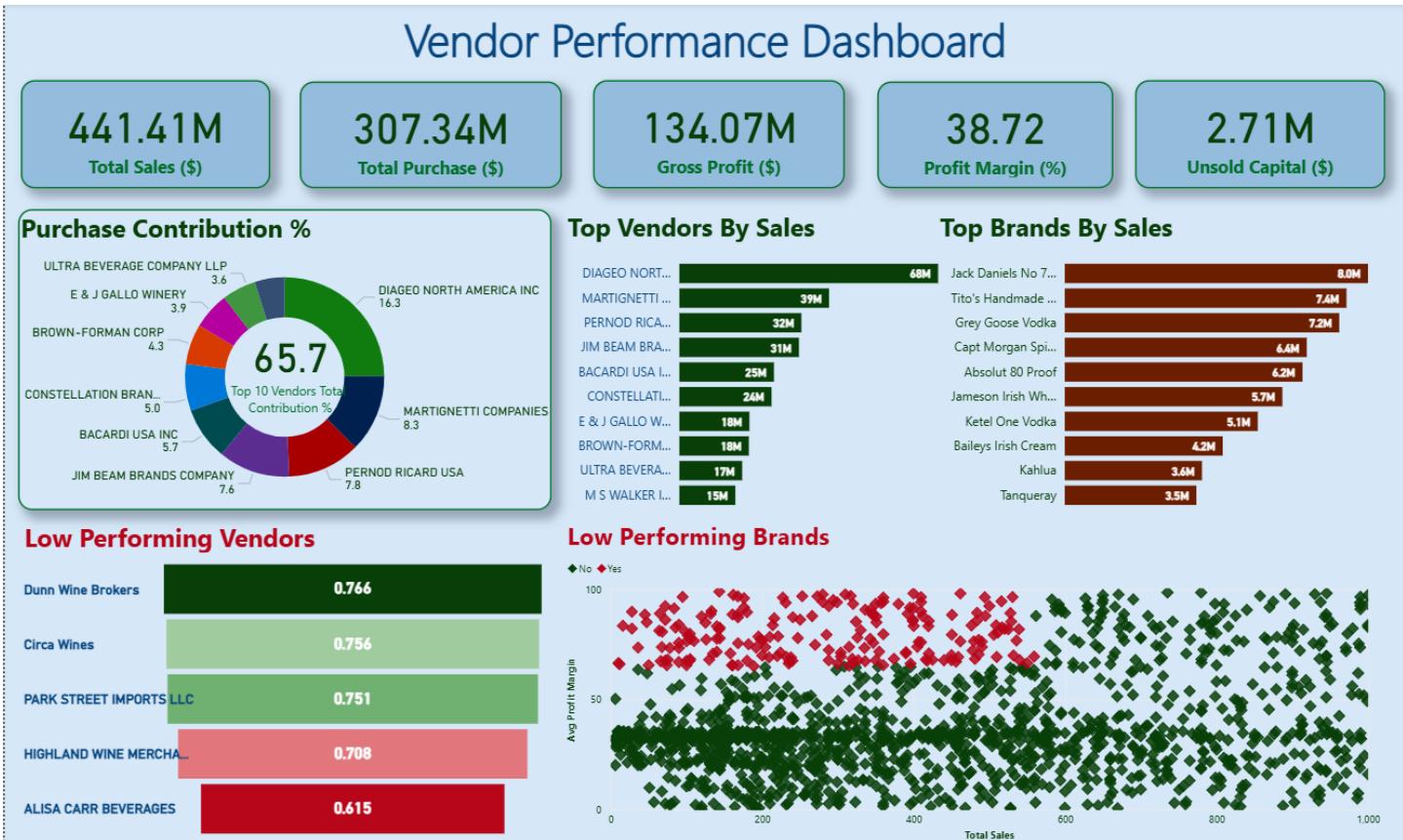
6. Statistical Validation

Hypothesis testing was conducted to assess whether the observed difference in profit margins between high-performing and low-performing vendors was statistically significant.

- **Null Hypothesis (H_0):** No significant difference in profit margins
- **Alternative Hypothesis (H_1):** A significant difference exists

The null hypothesis was rejected, confirming that the two vendor groups operate under distinct profitability models. This validates the need for differentiated strategies based on vendor performance type.

7. Dashboard



- High vendor concentration risk:** The top 10 vendors contribute 65.7% of total purchases, with **Diageo North America** and **Martignetti Companies** alone accounting for a significant share, highlighting dependency on a limited vendor base.
- Brand-level sales dominance:** A small set of brands such as **Jack Daniels No. 7**, **Tito's Handmade Vodka**, and **Grey Goose Vodka** drive the majority of sales, confirming a classic **Pareto (80/20)** pattern in brand performance.
- Operational inefficiencies identified:** The presence of **low-performing vendors and brands**, along with **\$2.71M locked in unsold inventory**, highlights opportunities to improve inventory planning, vendor optimization, and demand forecasting.

8. Final Recommendations

Based on the analysis, the following actions are recommended:

- Re-evaluate pricing strategies for low-sales, high-margin brands to increase volume without sacrificing profitability
- Diversify vendor partnerships to reduce dependency on a limited supplier base and mitigate supply chain risk
- Leverage bulk purchasing advantages to maintain competitive pricing while optimizing unit costs
- Reduce slow-moving inventory by adjusting purchase quantities, launching clearance initiatives, or revising storage strategies
- Strengthen marketing and distribution efforts for low-performing vendors to improve sales performance

9. Conclusion

Implementing these recommendations will help improve inventory efficiency, reduce operational risk, and enhance long-term profitability. A data-driven approach to vendor and inventory management enables the organization to allocate resources more effectively and build a more resilient and profitable supply chain.