

VENDOR PERFORMANCE ANALYSIS

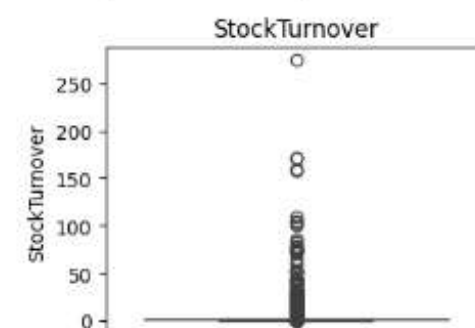
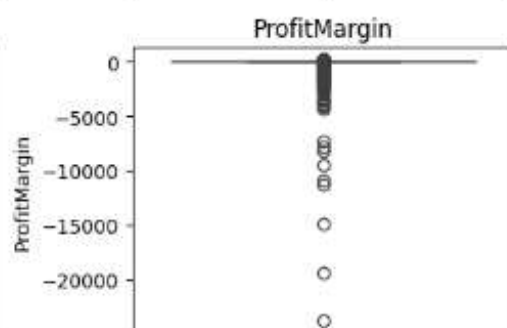
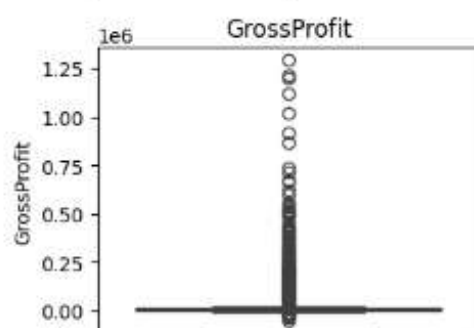
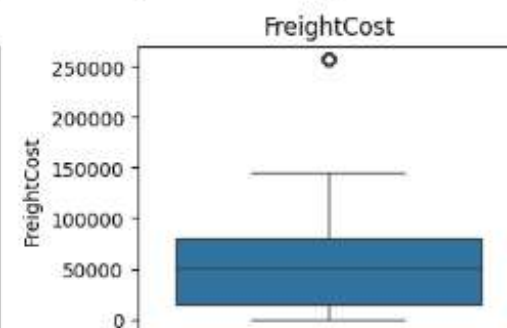
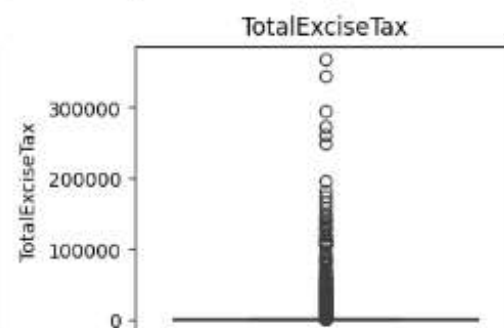
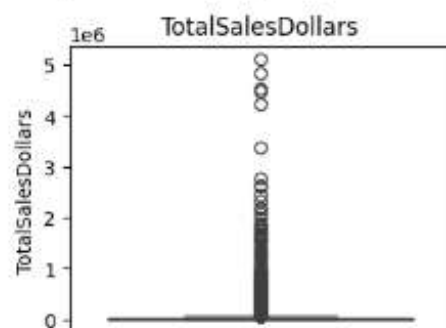
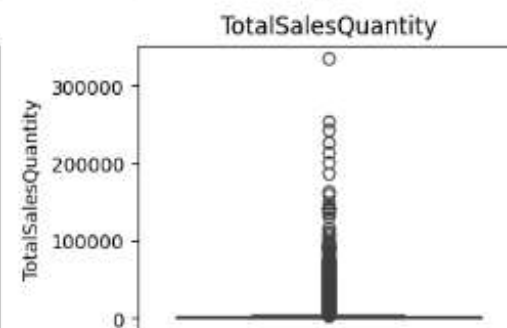
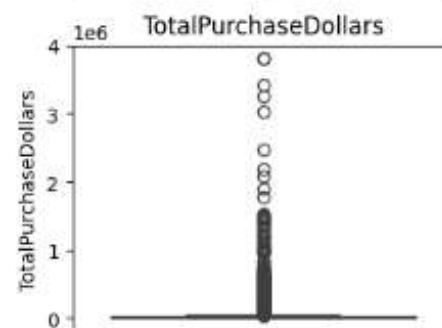
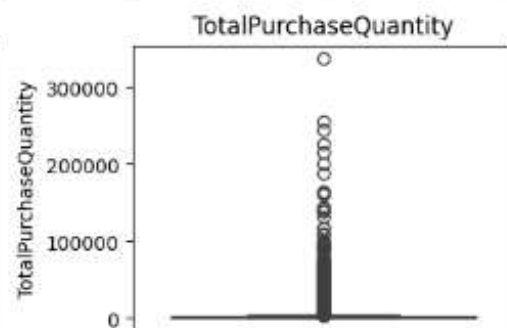
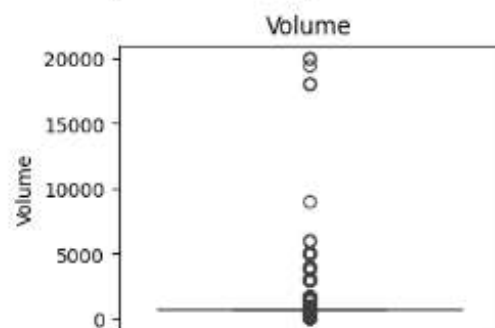
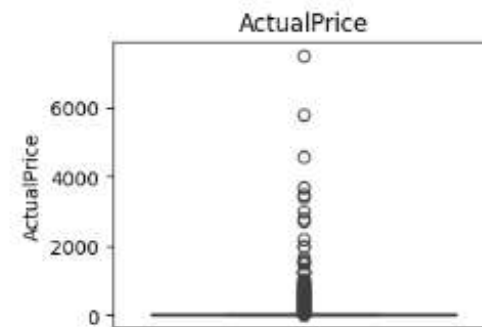
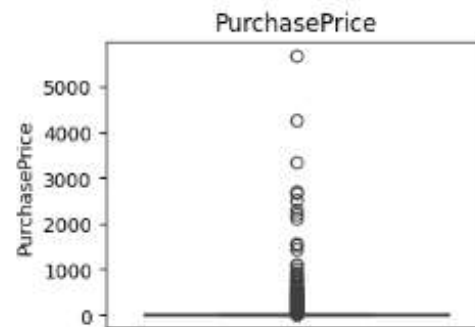
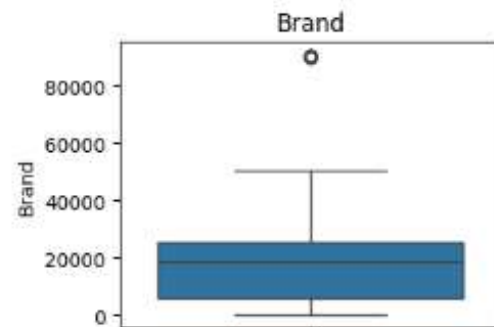
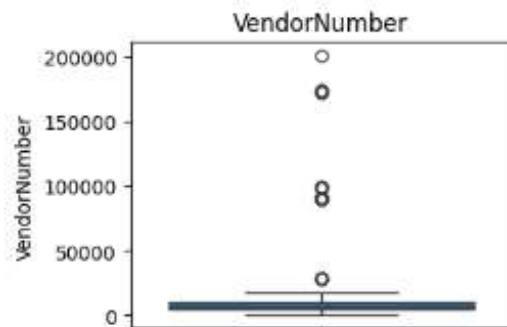
Business Problem

Effective inventory and sales management are critical for optimizing profitability in the retail and wholesale industry. Companies need to ensure that they are not incurring losses due to inefficient pricing, poor inventory turnover, or vendor dependency. The goal of this analysis is to:

- Identify underperforming brands that require promotional or pricing adjustments.
- Determine top vendors contributing to sales and gross profit.
- Analyze the impact of bulk purchasing on unit costs.
- Assess inventory turnover to reduce holding costs and improve efficiency.
- Investigate the profitability variance between high-performing and low-performing vendors.

Summary Statistics:

	count	mean	std	min	25%	50%	75%	max
VendorNumber	10692.0	10651.0	18754.0	2.0	3951.0	7153.0	9552.0	201359.0
Brand	10692.0	18039.0	12662.0	58.0	5794.0	18762.0	25514.0	90631.0
PurchasePrice	10692.0	24.0	109.0	0.0	7.0	10.0	19.0	5682.0
ActualPrice	10692.0	36.0	148.0	0.0	11.0	16.0	29.0	7500.0
Volume	10692.0	847.0	664.0	50.0	750.0	750.0	750.0	20000.0
TotalPurchaseQuantity	10692.0	3141.0	11095.0	1.0	36.0	262.0	1976.0	337660.0
TotalPurchaseDollars	10692.0	30107.0	123068.0	1.0	453.0	3655.0	20738.0	3811252.0
TotalSalesQuantity	10692.0	3077.0	10953.0	0.0	33.0	261.0	1929.0	334939.0
TotalSalesDollars	10692.0	42239.0	167655.0	0.0	729.0	5298.0	28397.0	5101920.0
TotalSalesPrice	10692.0	18794.0	44953.0	0.0	290.0	2858.0	16060.0	672819.0
TotalExciseTax	10692.0	1774.0	10976.0	0.0	5.0	47.0	419.0	368243.0
FreightCost	10692.0	61434.0	60938.0	0.0	14070.0	50294.0	79529.0	257032.0
GrossProfit	10692.0	12132.0	46224.0	-52003.0	53.0	1400.0	8660.0	1290668.0
ProfitMargin	10692.0	-inf	NaN	-inf	13.0	30.0	40.0	100.0
StockTurnover	10692.0	2.0	6.0	0.0	1.0	1.0	1.0	274.0
Sales_Purchase_ratio	10692.0	3.0	8.0	0.0	1.0	1.0	2.0	353.0



Summary Statistics Insights:

Negative & Zero values:

- **Gross Profit:** Min value is \$-52002.78, 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:** Min is -infinity, which suggests cases where revenue is zero even lower than costs.
- **Total Sales Quantity & Sales Dollars:** Min values are 0, meaning some products were purchased but never sold. These could be slow-moving or absolute stock.

Outliers Indicated by High Standard Deviations:

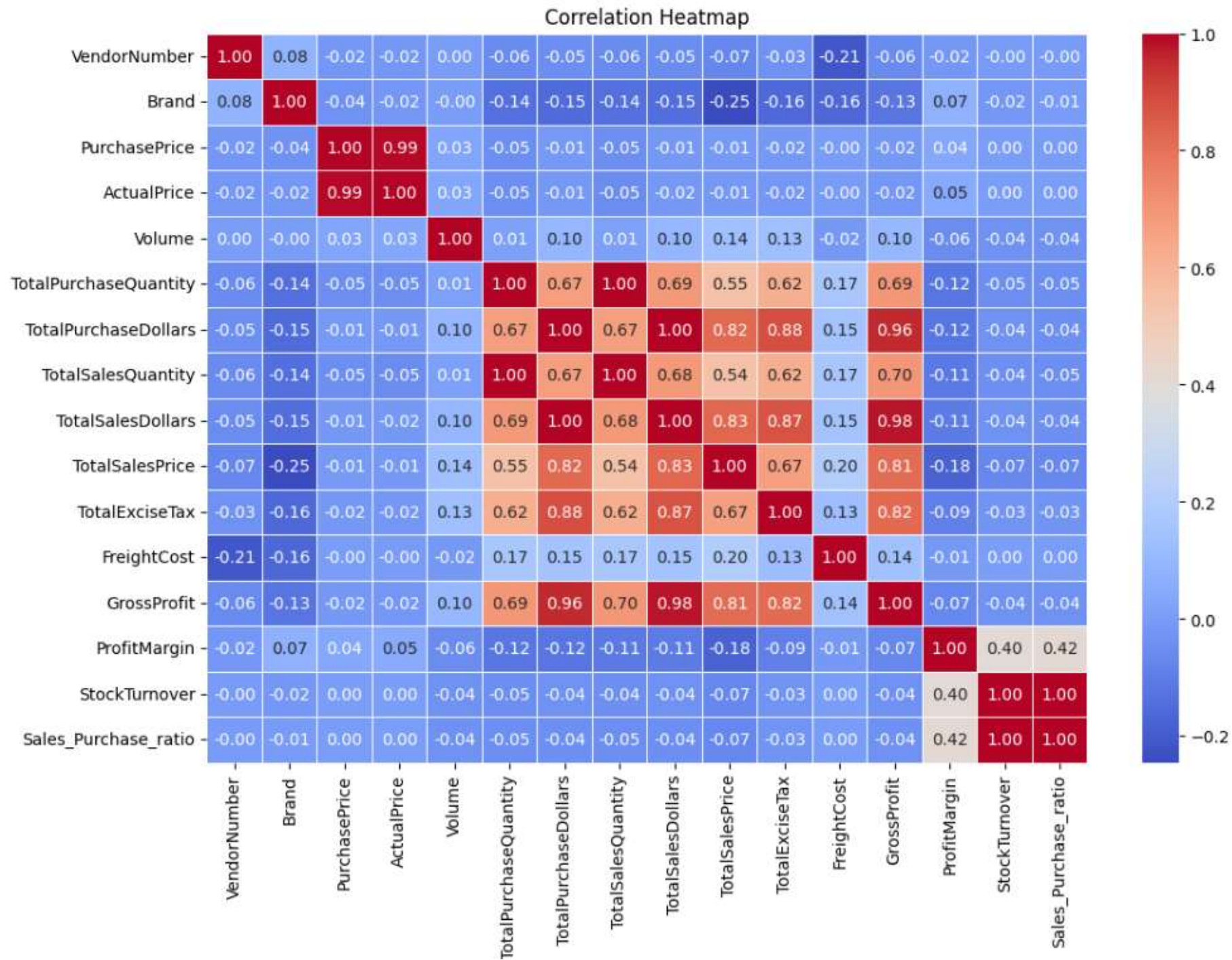
- **Purchase & Actual Prices:** The max values (5681.81 & 7499.99) are significantly higher than the mean (24.39 & 35.64), indicating potential premium products.
- **Freight Cost:** Huge variation 0.09 to 257032.07, suggests logistic inefficiencies, bulk shipments or erratic shipping costs across different products.
- **Stock Turnover:** Ranges from 0 to 274.5, implying some products sell extremely fast while others remain in stock indefinitely. Value >1 indicates that Sold quantity for that product is higher than purchased quantity due to either sales are being fulfilled from older stock leading to inventory inefficiencies.

Data Filtering

To enhance the reliability of the insights, we removed inconsistent data points where:

- Gross Profit ≤ 0 (to exclude transactions leading to losses.)
- Profit Margin ≤ 0 (to ensure analysis focuses on profitable transactions.)
- Total Sales Quantity = 0 (to eliminate inventory that was never sold.)

Correlation Insights:



Purchase Price v/s TotalSalesDollars and GrossProfit: Weak correlations (-0.012 and -0.016), indicating that price variations do not significantly impact sales revenue or profit.

Total Purchase Quantity v/s Total Sales Quantity: Strong correlation (0.999), confirming efficient inventory turnover.

Profit Margin v/s Total Sales Price: Negative correlation (-0.179) suggests that as sales price increases, margins decrease, possibly due to competitive pricing pressure.

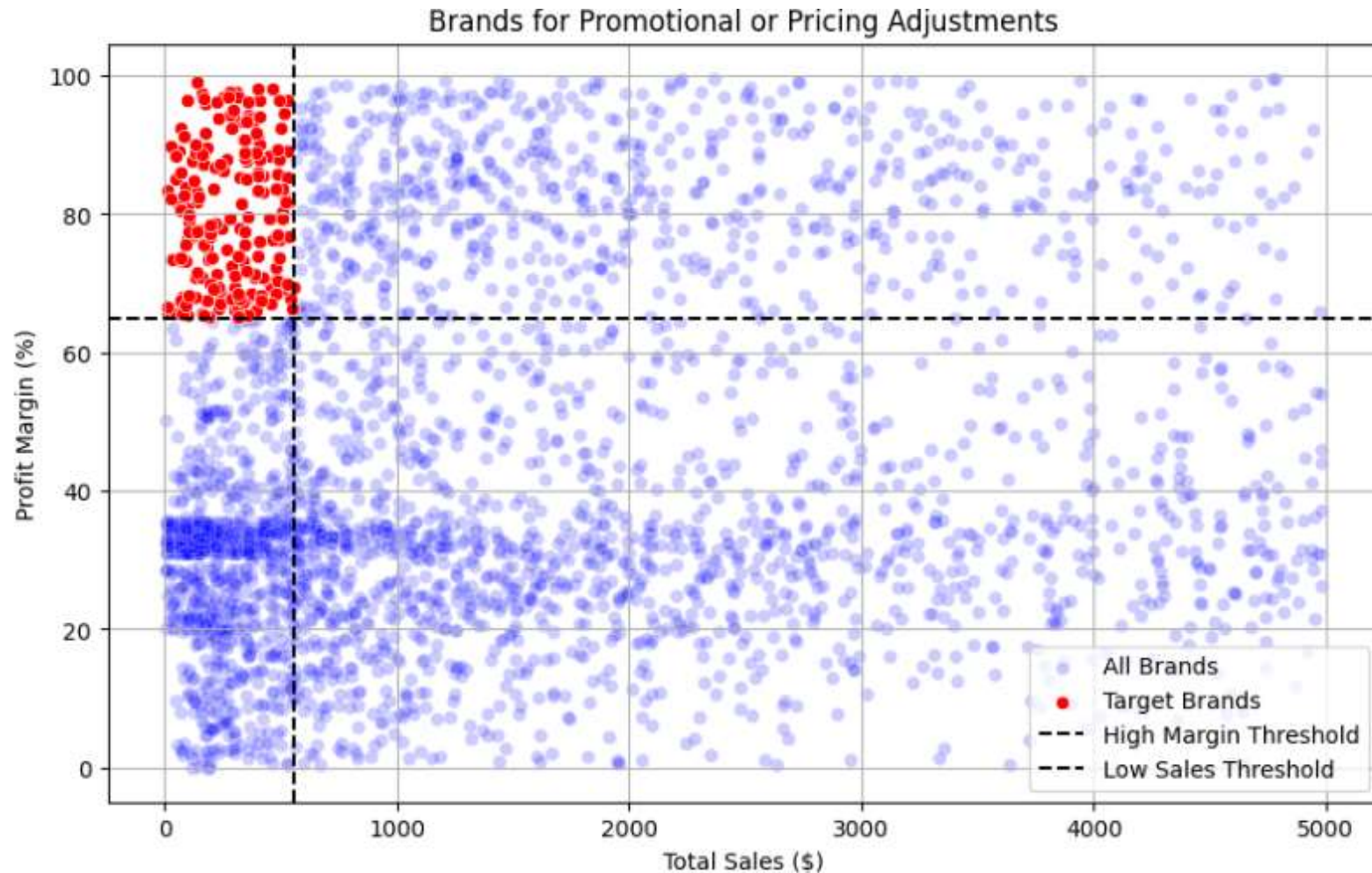
Stock Turnover v/s GrossProfit & ProfitMargin: Weak negative correlations (-0.038 & -0.055), indicating that faster turnover does not necessarily result in higher profitability.

Research Questions & Key Findings

1. Brands for Promotional or Pricing Adjustments

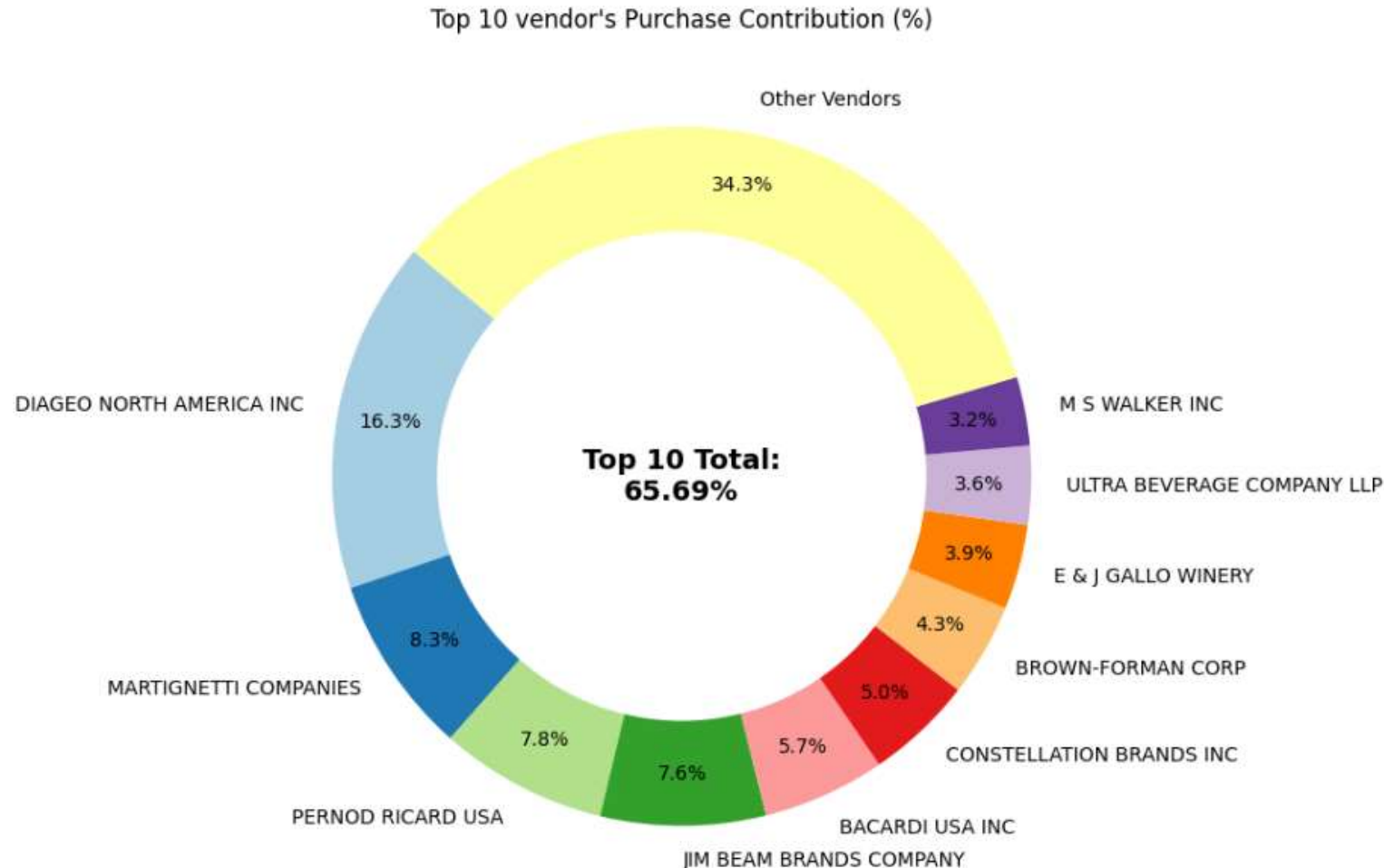
	Description	TotalSalesDollars	ProfitMargin
6199	Santa Rita Organic Svgn Bl	9.99	66.466466
2369	Debauchery Pnt Nr	11.58	65.975820
2070	Concannon Glen Ellen Wh Zin	15.95	83.448276
2188	Crown Royal Apple	27.86	89.806174
6237	Sauza Sprklg Wild Berry Marg	27.96	82.153076
...
5074	Nanbu Bijin Southern Beauty	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'Estournel 10	558.87	69.434752

198 brands exhibit lower sales but higher profit margins, which could benefit from targeted marketing, promotions, or price optimizations to increase volume without compromising profitability.



2. Top Vendors by Sales & Purchase Contribution

The top 10 Vendors contribute 65.69% of total purchases, while 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 v/s higher unit costs in small orders.)

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

OrderSize	UnitPurchasePrice
Small	39.068186
Medium	15.486414
Large	10.777625

4. Identifying Vendors with Low Inventory Turnover

	VendorName	UnsoldInventoryValue	UnsolInventoryValue
25	DIAGEO NORTH AMERICA INC	722209.05	722.21K
46	JIM BEAM BRANDS COMPANY	554665.63	554.67K
68	PERNOD RICARD USA	470625.61	470.63K
116	WILLIAM GRANT & SONS INC	401960.83	401.96K
30	E & J GALLO WINERY	228282.61	228.28K
79	SAZERAC CO INC	198436.41	198.44K
11	BROWN-FORMAN CORP	177733.74	177.73K
20	CONSTELLATION BRANDS INC	133617.62	133.62K
61	MOET HENNESSY USA INC	126477.70	126.48K
77	REMY COINTREAU USA INC	118598.15	118.60K

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.

5. Profit Margin Comparison: High vs low-Performing vendors

Top Vendors Profit Margin (95% CI): (28.99%, 33.36%), Mean: 31.18%

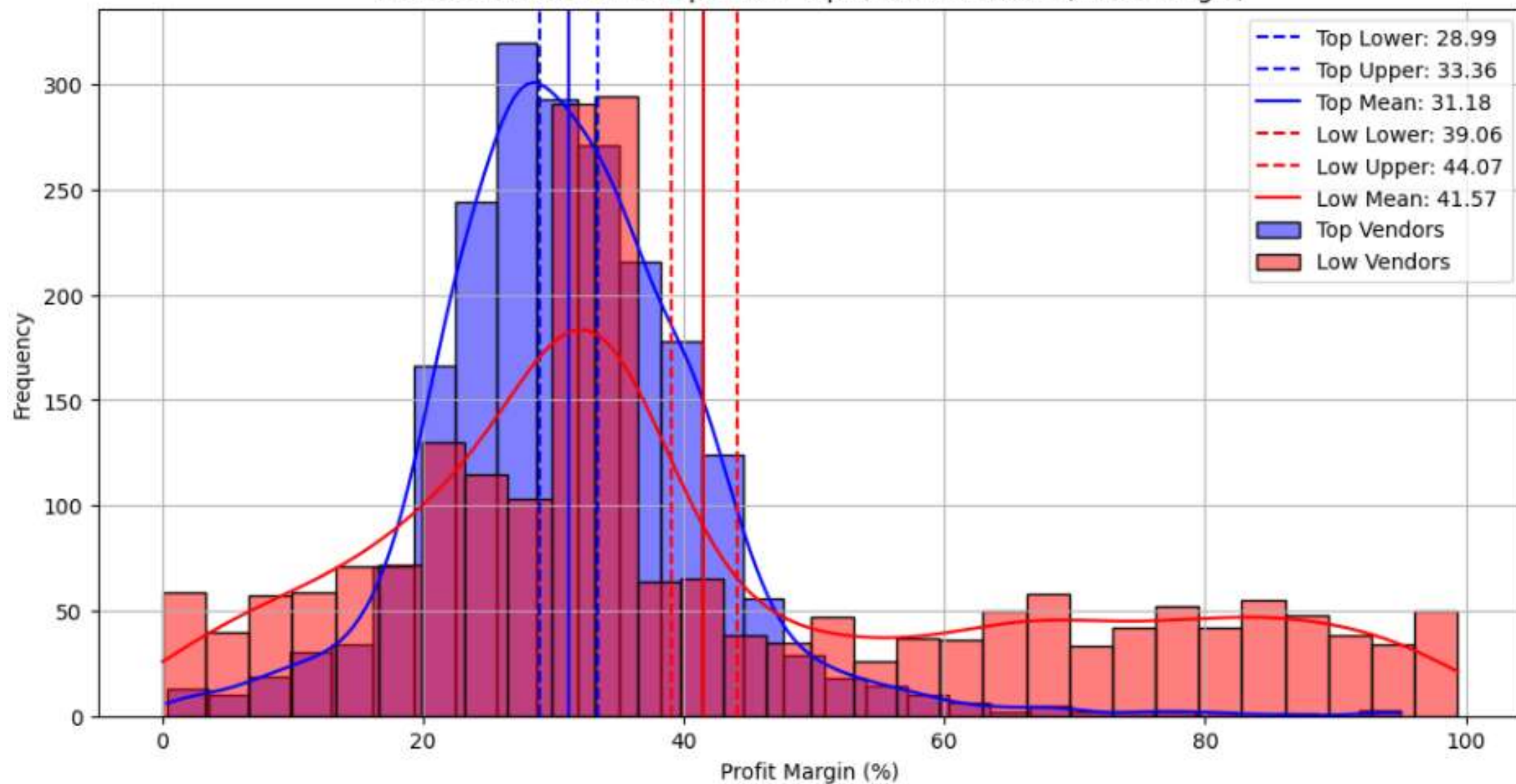
Low Vendors Profit Margin (95% CI): (39.06%, 44.07%), Mean: 41.57%

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

Actionable Insights:

- Top-performing vendors: Optimize profitability by adjusting pricing, reducing operational costs, or offering bundled promotions.
- Low-performing vendors: Improve marketing efforts, optimize pricing strategies and enhance distribution networks.

Confidence Interval Comparison: Top v/s Low Vendors (Profit Margin)



6. Statistical validation of Profit Margin Differences

Hypothesis Testing:

H_0 (Null Hypothesis): There is no significant difference in the mean profit margins of top and low performing vendors.

H_1 (Alternate Hypothesis): The mean profit margins of top-performing and low-performing vendors are significantly different.

Result: The null hypothesis 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 Recommendations:

- Re-evaluate pricing for low-sales, high-margin brands to boost sales volume without sacrificing profitability.
- Diversify vendor partnerships to reduce dependency on a few suppliers and mitigate supply chain risks.
- Leverage bulk purchasing advantages to maintain competitive pricing while optimizing inventory management.
- Optimize slow-moving inventory by adjusting purchase quantities, launching clearance sales, or revising storage strategies.
- Enhance marketing and distribution strategies for low-performing vendors to drive higher sales volumes without compromising profit margins.
- By implementing these recommendations, the company can achieve sustainable profitability, mitigate risks, and enhance overall operational efficiency.