

Vendor Performance Analysis Report

Executive Summary

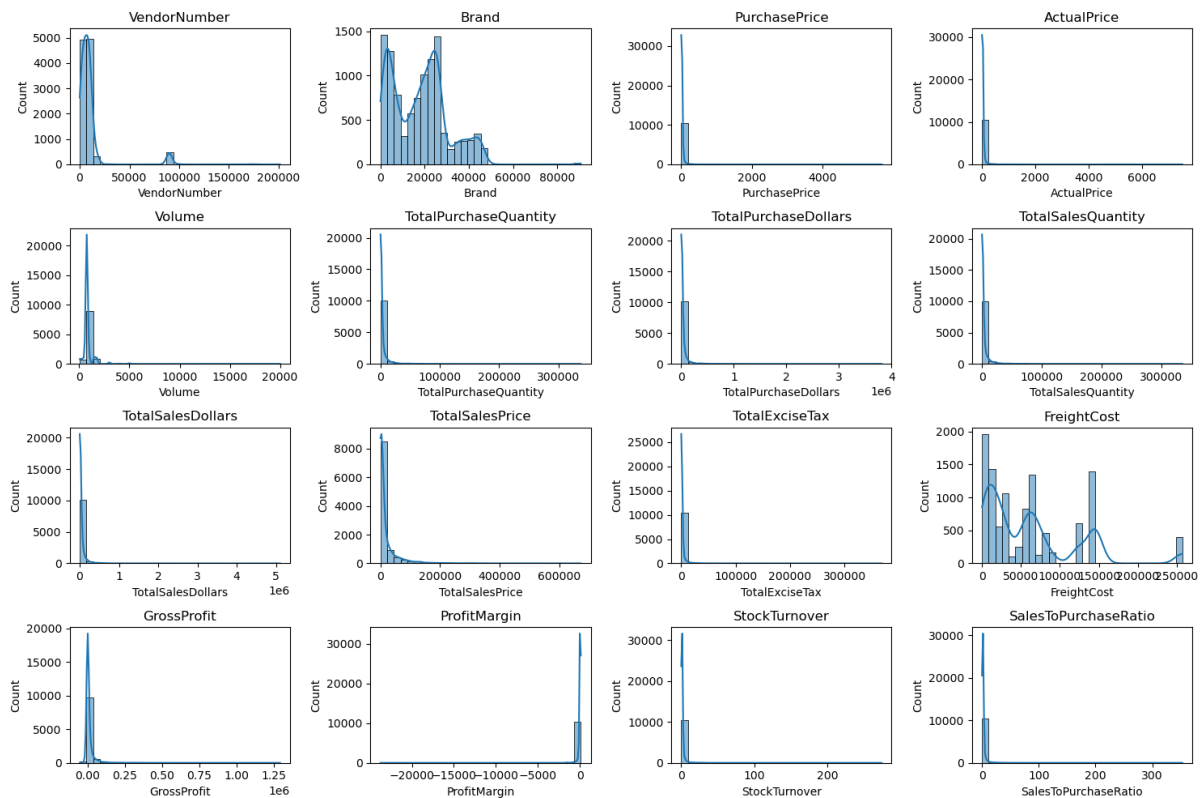
This project delivers a strategic vendor performance analysis, transforming raw operational data into clear, actionable business insights. Through rigorous data preparation, statistical validation, and targeted analysis, it identified pricing inefficiencies, supplier risks, and growth opportunities.

The findings translate directly into strategies for improving profitability, optimizing inventory, and strengthening supply chain resilience. By combining technical analytics with business impact, the project demonstrates the ability to turn complex data into decisions that drive measurable results.

Exploratory Data Analysis:

Summary Statistics:

	count	mean	std	min	25%	50%	75%	max
VendorNumber	10692.0	1.065065e+04	18753.519148	2.00	3951.000000	7153.000000	9552.000000	2.013590e+05
Brand	10692.0	1.803923e+04	12662.187074	58.00	5793.500000	18761.500000	25514.250000	9.063100e+04
PurchasePrice	10692.0	2.438530e+01	109.269375	0.36	6.840000	10.455000	19.482500	5.681810e+03
ActualPrice	10692.0	3.564367e+01	148.246016	0.49	10.990000	15.990000	28.990000	7.499990e+03
Volume	10692.0	8.473605e+02	664.309212	50.00	750.000000	750.000000	750.000000	2.000000e+04
TotalPurchaseQuantity	10692.0	3.140887e+03	11095.086769	1.00	36.000000	262.000000	1975.750000	3.376600e+05
TotalPurchaseDollars	10692.0	3.010669e+04	123067.799627	0.71	453.457500	3655.465000	20738.245000	3.811252e+06
TotalSalesQuantity	10692.0	3.077482e+03	10952.851391	0.00	33.000000	261.000000	1929.250000	3.349390e+05
TotalSalesDollars	10692.0	4.223907e+04	167655.265984	0.00	729.220000	5298.045000	28396.915000	5.101920e+06
TotalSalesPrice	10692.0	1.879378e+04	44952.773386	0.00	289.710000	2857.800000	16059.562500	6.728193e+05
TotalExciseTax	10692.0	1.774226e+03	10975.582240	0.00	4.800000	46.570000	418.650000	3.682428e+05
FreightCost	10692.0	6.143376e+04	60938.458032	0.09	14069.870000	50293.620000	79528.990000	2.570321e+05
GrossProfit	10692.0	1.213238e+04	46224.337964	-52002.78	52.920000	1399.640000	8660.200000	1.290668e+06
ProfitMargin	10692.0	-inf	NaN	-inf	13.324515	30.405457	39.956135	9.971666e+01
StockTurnover	10692.0	1.706793e+00	6.020460	0.00	0.807229	0.981529	1.039342	2.745000e+02
SalesToPurchaseRatio	10692.0	2.504390e+00	8.459067	0.00	1.153729	1.436894	1.665449	3.529286e+02



Data Anomalies & Negative/Zero Values

Gross Profit

- Minimum value: **-52,002.78**, indicating losses likely due to high costs or heavy discounting.
- Possible cause: Selling below purchase cost.

Profit Margin

- Minimum value of $-\infty$: This occurs when revenue is zero or below total cost, leading to extreme losses.

Total Sales Quantity & Sales Dollars

- Some products have **zero sales**, meaning they were purchased but never sold.
- Implication: Potential slow-moving or obsolete stock, leading to inventory inefficiencies.

Outliers Detected (High Standard Deviations)

Purchase & Actual Prices

- Max values: **5,681.81** (purchase price) & **7,499.99** (actual price) vs. means of **24.39** & **35.64**.
- Indicates presence of premium product offerings.

Freight Cost

- Range: **0.09** to **257,032.07** — extreme variation suggests logistics inefficiencies, bulk shipments, or inconsistent shipping policies.

Stock Turnover

- Range: **0** to **274.5**.
- Interpretation: Some products sell extremely fast, others remain unsold for long periods.
- Values >1 mean sales exceed purchased quantities (older stock used to fulfill orders).

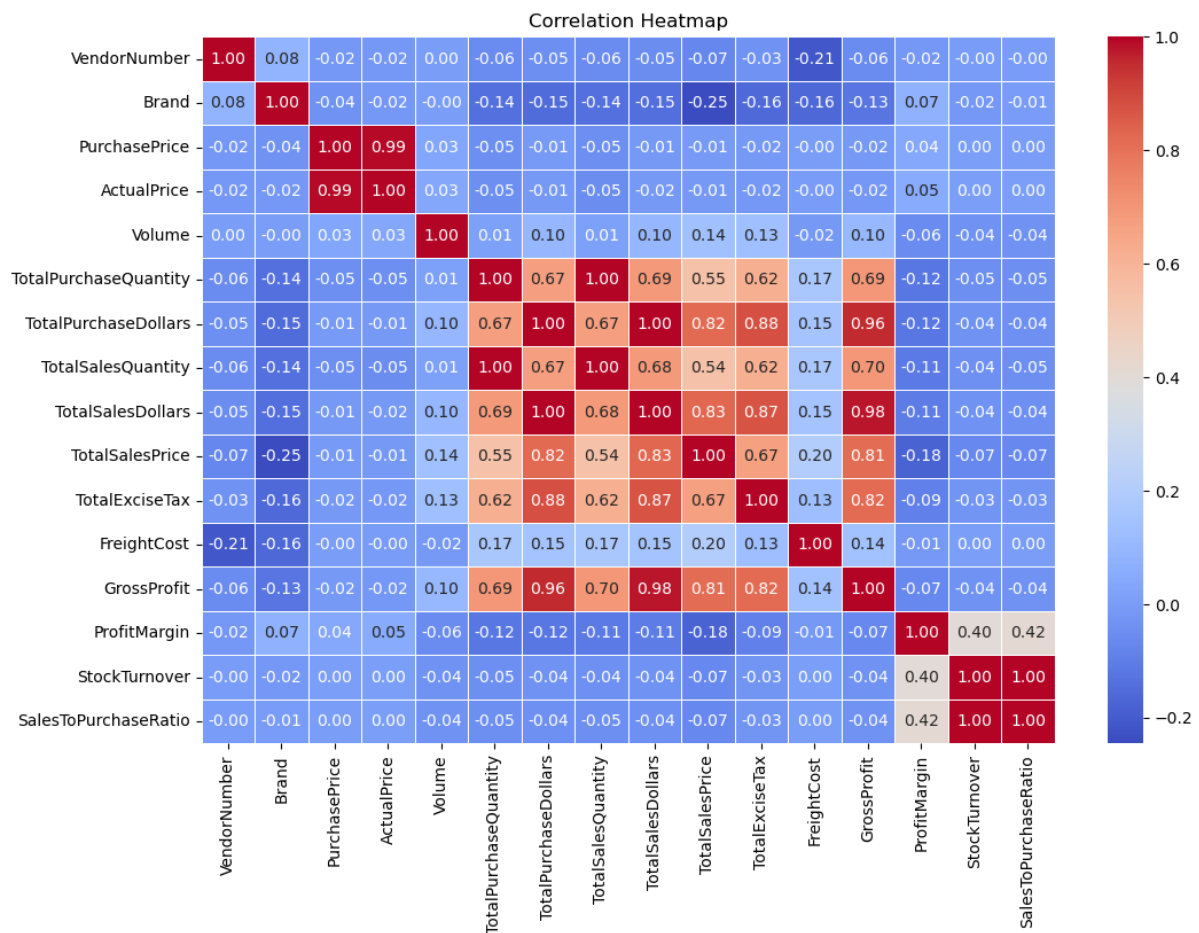
Data Filtering Criteria

To ensure reliable insights, the following data points were excluded:

- **Gross Profit ≤ 0** (loss-making transactions)
- **Profit Margin ≤ 0** (non-profitable sales)
- **Total Sales Quantity = 0** (unsold inventory)

Correlation Analysis

- **Purchase Price vs. Total Sales Dollars:** Weak correlation (**-0.012**) — price changes do not significantly affect revenue.
- **Purchase Price vs. Gross Profit:** Weak correlation (**-0.016**).
- **Total Purchase Quantity vs. Total Sales Quantity:** Strong correlation (**0.999**), indicating efficient inventory movement.



- **Profit Margin vs. Total Sales Price:** Negative correlation (**-0.179**) — higher prices may reduce margins due to competitive pressures.
- **Stock Turnover vs. Gross Profit:** Weak negative correlation (**-0.038**).
- **Stock Turnover vs. Profit Margin:** Weak negative correlation (**-0.055**).

Research Questions & Key Findings

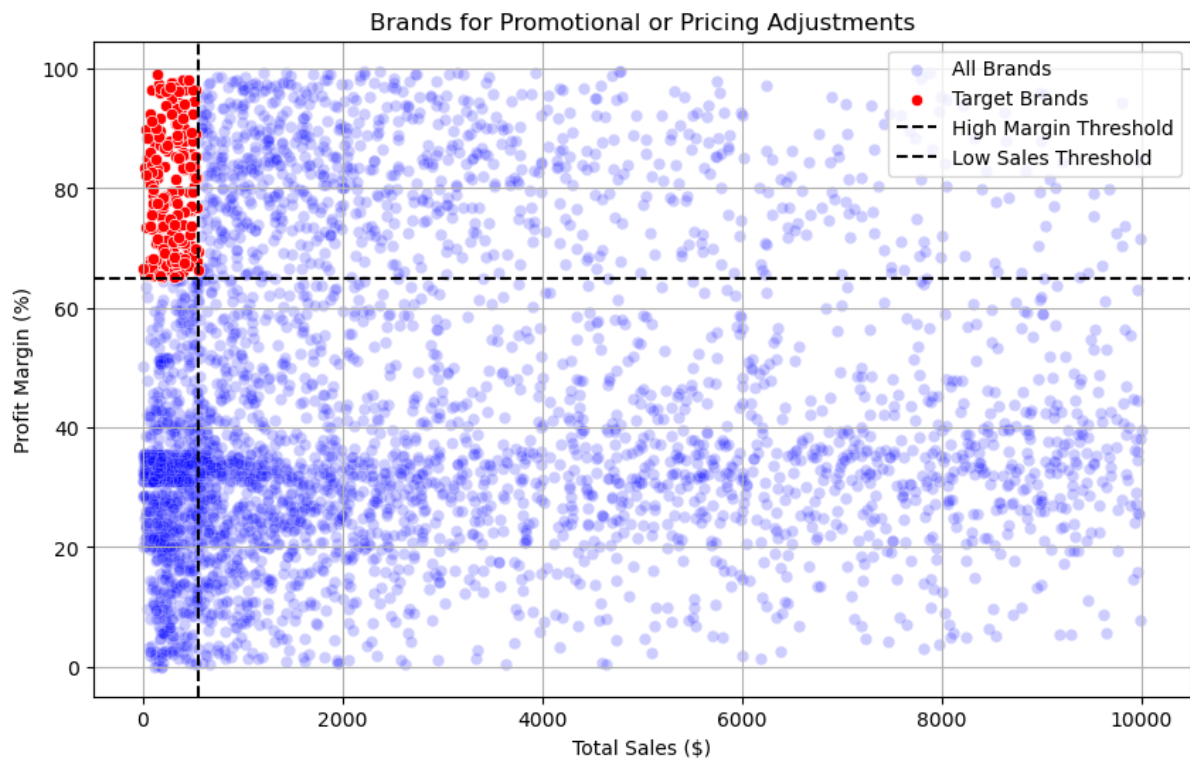
1. Brands for Promotional and Pricing Adjustments

- **198 brands** have lower sales but higher margins.
- Potential opportunity: Targeted marketing or price optimization to increase sales without reducing profitability.

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'Estournel 10	558.87	69.434752

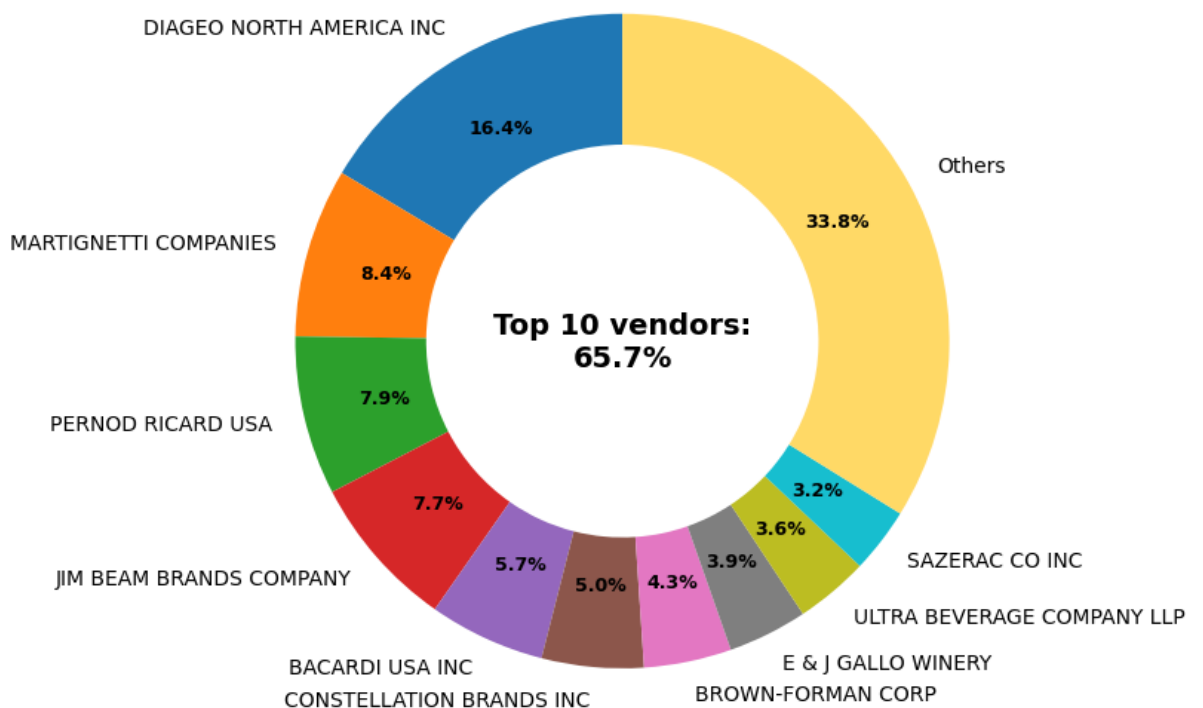
198 rows × 3 columns



2. Top Vendors by Sales & Purchase Contribution

- Top 10 vendors: **65.69%** of total purchases.
- Remaining vendors: **34.31%**.
- Risk: Over-dependence on a small group of suppliers.
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Top 10 vs Others Contribution



3. Impact of Bulk Purchasing on Cost Savings

- Large orders: **\$10.78 per unit** (72% lower unit cost).
- Suggests that bulk pricing strategies support higher sales at sustained profitability.

unitPurchasePrice	
OrderSize	
Small	39.057543
Medium	15.486414
Large	10.777625

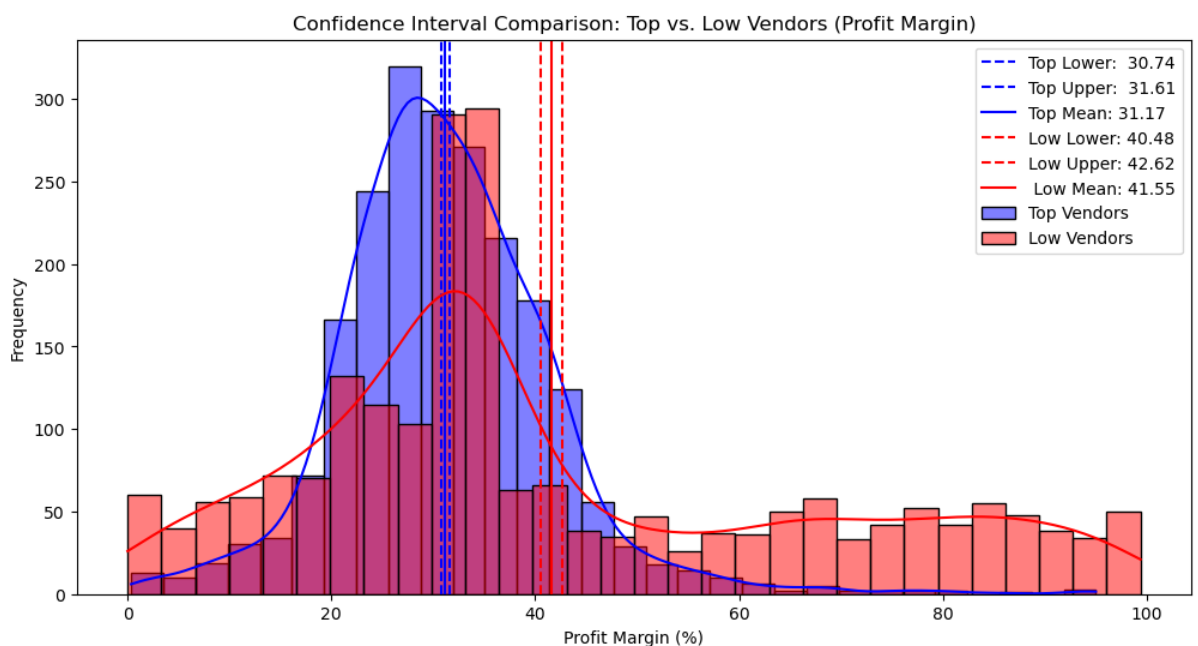
4. Low Inventory Turnover Vendors

- **Unsold inventory capital: \$2.71M.**
- Risk: Higher storage costs, reduced cash flow efficiency.
- Action: Identify and reduce slow-moving stock.

	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%.



- **Observation:** Low-performing vendors have higher margins but lower sales — possibly pricing inefficiencies or limited market reach.

6. Statistical Validation

- H_0 : No significant difference in profit margins between top and low-performing vendors.
- H_1 : Significant difference exists.
- **Result:** Reject H_0 — confirms two distinct profitability models.

Recommendations

1. Re-evaluate Pricing for Low-Sales, High-Margin Brands-

Brands that generate high margins but low sales volumes should undergo a pricing review to strike a better balance between profitability and market competitiveness. Strategic price adjustments can help capture additional demand without significantly eroding margins, ultimately boosting overall revenue.

2. Optimize Slow-Moving Inventory

For products that move slowly, it is essential to refine purchase quantities, introduce clearance promotions, and assess storage costs. These steps not only reduce holding expenses but also free up capital for faster-moving, more profitable items.

3. Enhance Marketing & Distribution for Low-Performing Vendors-

Underperforming vendors can benefit from focused marketing campaigns, expanded distribution channels, and targeted sales initiatives. This approach aims to increase sales volumes while preserving profitability, ensuring these vendors contribute more meaningfully to the bottom line.

4. Leverage Bulk Purchasing Advantages-

Bulk purchasing opportunities should be strategically used to maintain competitive pricing and improve inventory turnover. By aligning bulk orders with demand patterns, the business can reduce procurement costs without increasing excess stock risk.

5. Diversify Vendor Base-

Reducing reliance on the top 10 suppliers will strengthen supply chain resilience and mitigate risks from potential disruptions. Expanding the vendor network ensures continuity of supply and creates leverage in negotiations, further supporting long-term stability.

Conclusion

This analysis shows how data-driven insights can optimize pricing, inventory, and vendor strategy to boost profitability while reducing risk. By turning complex data into clear actions, it demonstrates the power of analytics to drive smarter business decisions and tangible results.