

Vendor Performance Report

Business Problem

In the retail and wholesale industry, it is important to maintain effective inventory and sales management practices to optimize profit. This goal is achieved by companies through checking and ensuring they are not incurring losses due inefficient pricing, poor inventory turnover, or vendor dependency.

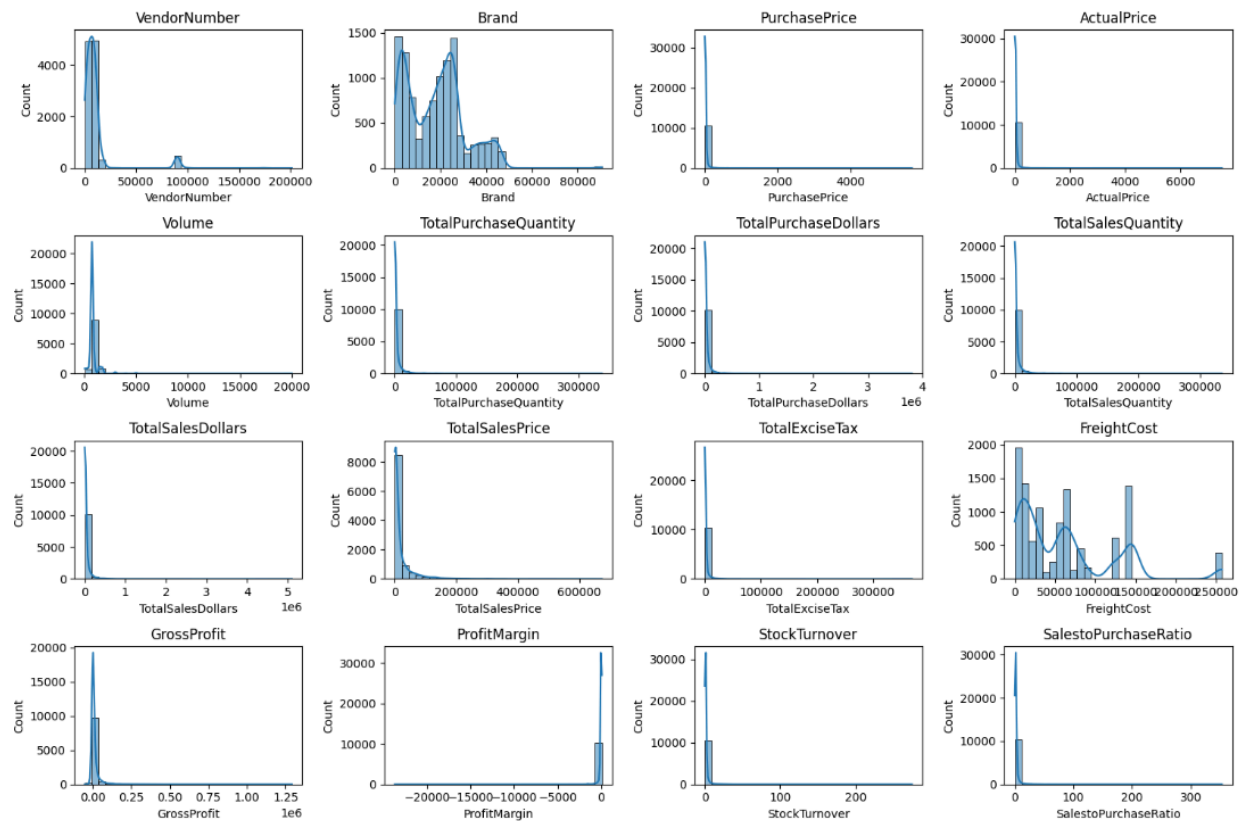
The goal of the analysis is to:

- identify underperforming brands that require pricing readjustment or promotions
- 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

Exploratory Data Analysis Insights

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
Gross Profit	10692.0	1.213238e+04	46224.337964	-52002.78	52.920000	1399.640000	8660.200000	1.290668e+06
Profit Margin	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
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
SalestoPurchaseRatio	10692.0	2.504390e+00	8.459067	0.00	1.153729	1.436894	1.665449	3.529286e+02



Negative & Zero Values:

Gross Profit: Minimum value is -52,002.78, indicating losses due to high costs or selling at discounts lower than the purchase price.

Profit Margin: Has a minimum of $-\infty$, which suggests cases where revenue is zero or even lower than costs leading to extreme negative profit margins.

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 Detected by High Standard Deviation:

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.

Freight Cost: Huge variation, from 0.09 to 257,032.07, suggests logistics inefficiencies or bulk shipments.

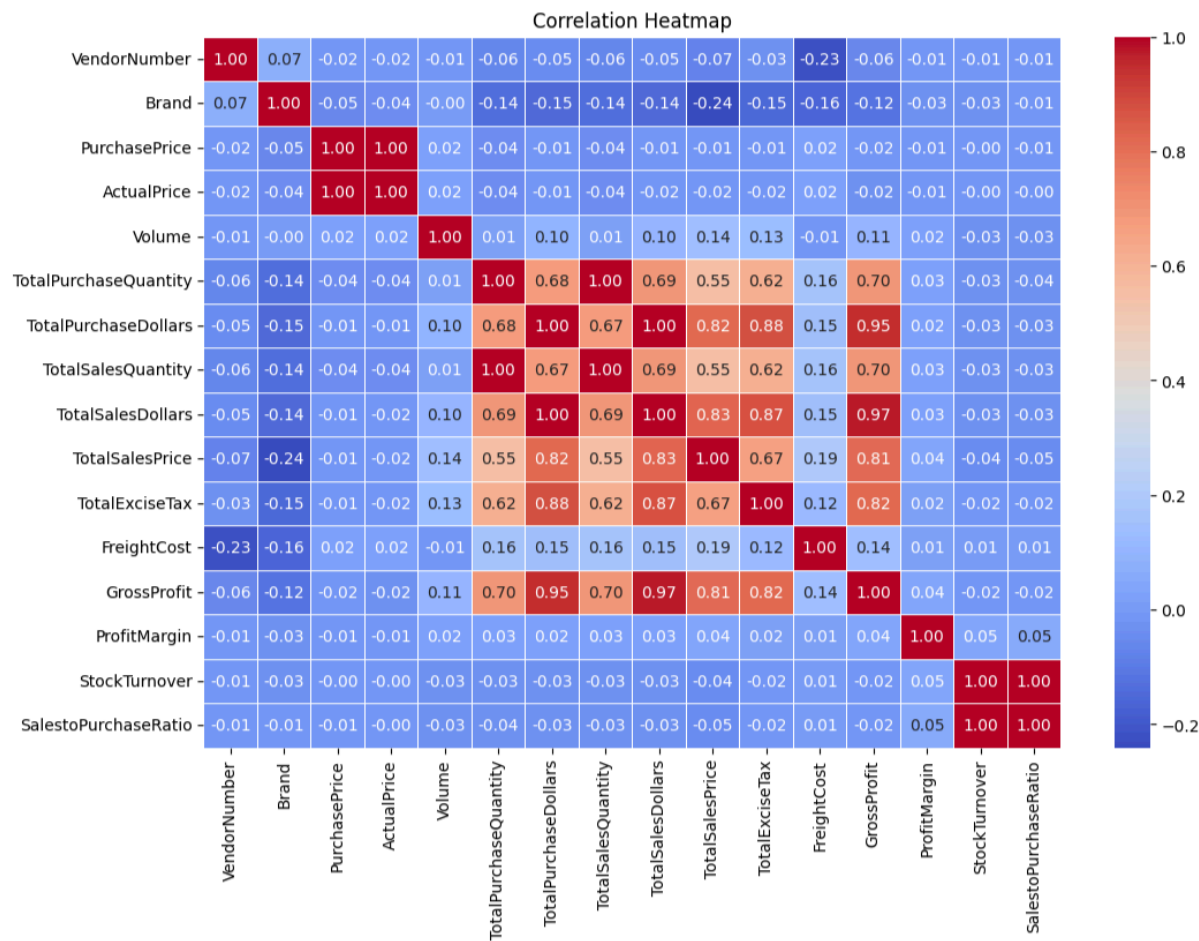
Stock Turnover: Ranges from 0 to 274.5, implying some products sell extremely fast while others remain in stock indefinitely. Value more than 1 indicates that Sold quantity for that product is higher than purchased quantity due to either sales being fulfilled from older stock.

Data Filtering

To produce higher quality insights, the data was filtered using the following conditions:

- $\text{Gross Profit} \leq 0$ (to exclude transactions leading to losses)
- $\text{Profit Margin} \leq 0$ (to ensure analysis focuses on profitable transactions)
- $\text{Total Sales Quantity} = 0$ (to eliminate inventory that was never sold)

Correlation Insights



Purchase Price vs. Total Sales Dollars & Gross Profit: Purchase Price has weak correlations with Total Sales Dollars (-0.01) and GrossProfit (-0.02), suggesting that price variations do not significantly impact sales revenue or profit.

Total Purchase Quantity vs. Total Sales Quantity: Strong correlation between Total Purchase Quantity and Total Sales Quantity (1.00), confirming efficient inventory turnover.

Profit Margin vs. Total Sales Price: Positive correlation between Profit Margin & Total Sales Price (0.04) suggests that as sales price increases, margins increase, possibly due to perceived value of brand or product.

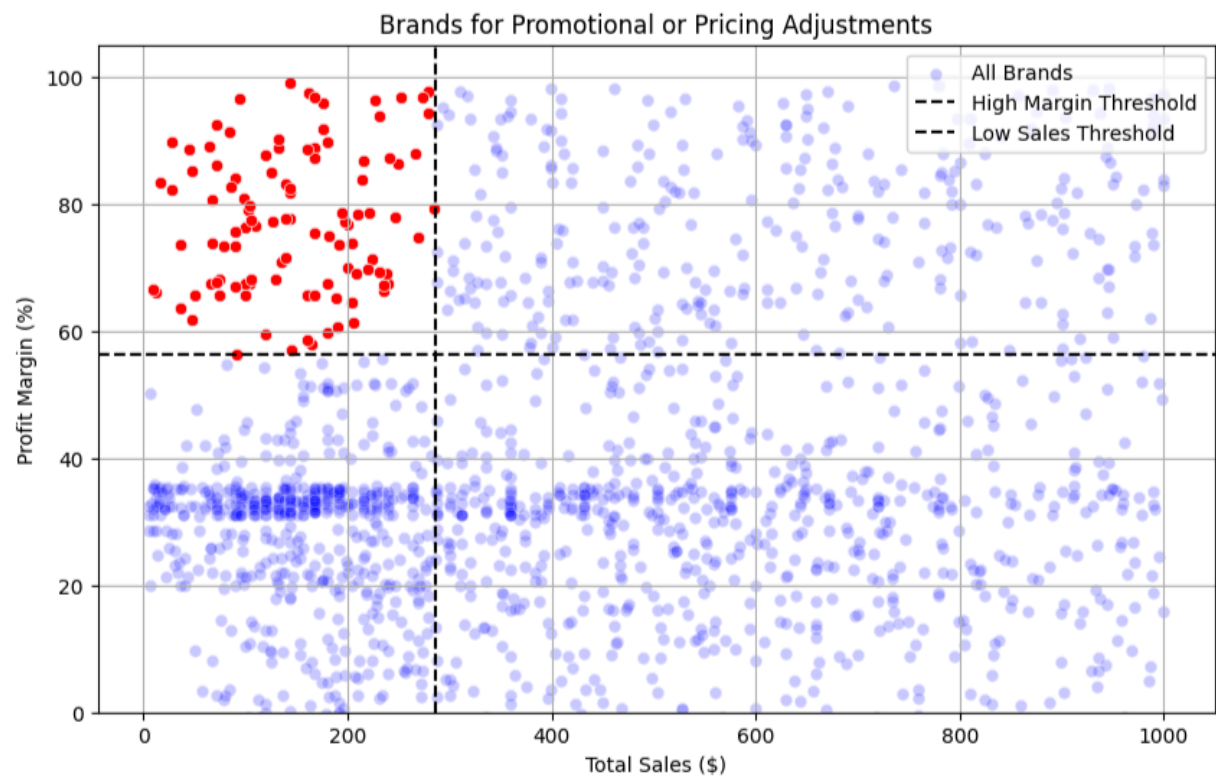
Stock Turnover vs. Gross Profit & Profit Margin: Stock Turnover has weak negative correlations with Gross Profit (-0.02) and a positive correlation with Profit Margin (0.05), indicating that faster Stock Turnover doesn't necessarily lead to more absolute dollars in Gross Profit, possibly due to aggressive pricing or focus on low-margin products. However, it does seem to offer a slight advantage in terms of the percentage profit earned on sales, likely by reducing inventory holding costs and ensuring fresher stock.

Research Questions & Key Findings

1. Brands for Promotional or Pricing Adjustments

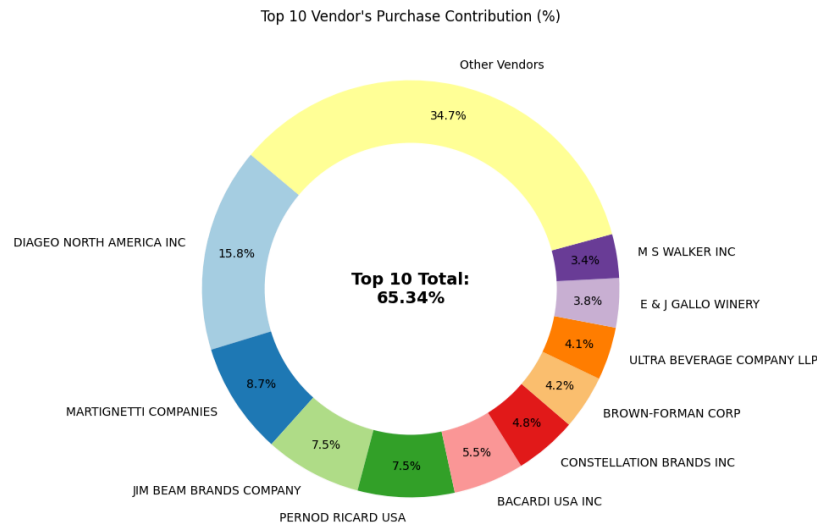
	Description	TotalSalesDollars	ProfitMargin
7777	Santa Rita Organic Svgn Bl	9.99	66.466466
2896	Debauchery Pnt Nr	11.58	65.975820
2537	Concannon Glen Ellen Wh Zin	15.95	83.448276
2677	Crown Royal Apple	27.86	89.806174
7818	Sauza Sprklg Wild Berry Marg	27.96	82.153076
...
8939	Tommasi Poggio Tufo Cab Svgn	269.73	74.789604
9229	Vigne A Porrone Rosso	272.79	96.825397
3980	Gifft Chardonnay	279.80	94.245890
5736	Mad Dogs & Englishmen Jumil	279.80	97.666190
6249	Morande Edicion Limitada	284.81	79.354657

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



2. Top Vendors by Sales & Purchase Contributions

The top 10 vendors contribute 65.34% 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 74% lower unit cost (\$11.31 per unit vs. higher unit costs in smaller orders).

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

UnitPurchasePrice	
OrderSize	
Small	43.776954
Medium	17.894005
Large	11.308807

4. Identifying Vendors with Low Inventory Turnover

Total Unsold Inventory Capital: \$8.75M

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

Identifying vendors with low inventory turnover promotes better stock management while minimizing financial strain.

	VendorName	UnsoldInventoryValue
28	DIAGEO NORTH AMERICA INC	980.09K
63	MARTIGNETTI COMPANIES	928.99K
50	JIM BEAM BRANDS COMPANY	857.80K
114	ULTRA BEVERAGE COMPANY LLP	780.27K
73	PERFECTA WINES	571.81K
74	PERNOD RICARD USA	554.74K
59	M S WALKER INC	469.96K
125	WILLIAM GRANT & SONS INC	436.49K
33	E & J GALLO WINERY	315.20K
14	BROWN-FORMAN CORP	284.91K

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

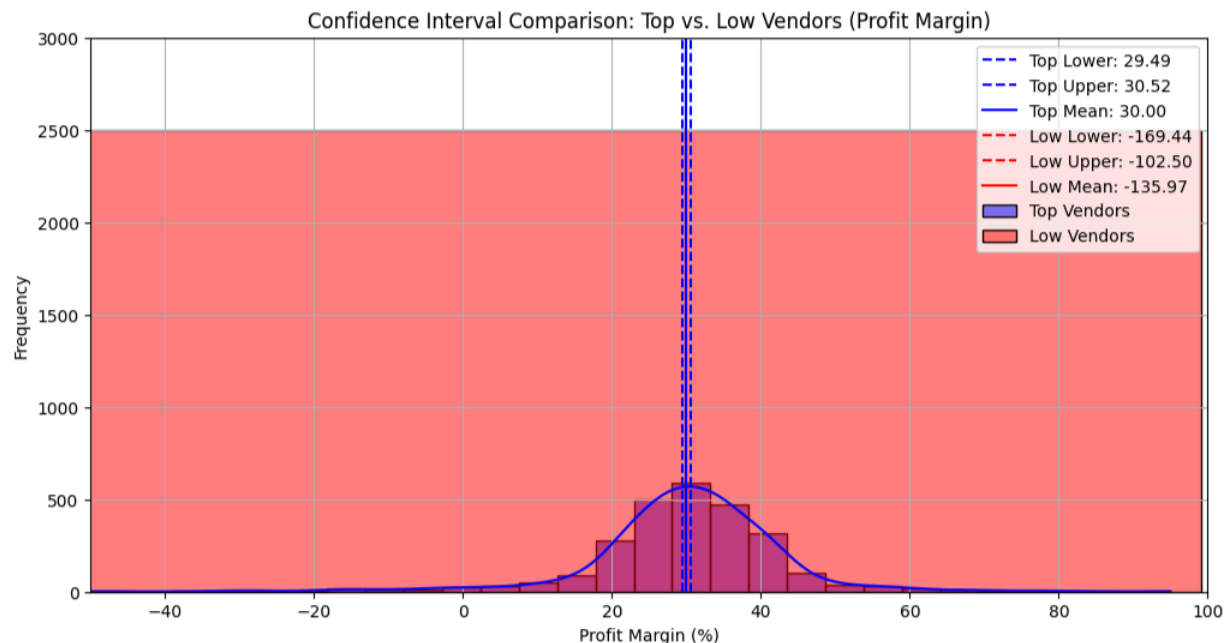
Top Vendors' Profit Margin (95% CI): (29.49%, 30.52%), Mean: 30%

Top Vendor's Profit Margin (95% CI): (-169.44%, -102.50%), Mean: -135.97%

Low-performing vendors maintain higher margins but struggle with sales volume, 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.



6. Statistical Validation of Profit Margin Differences

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

H_1 (**Alternate 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 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.