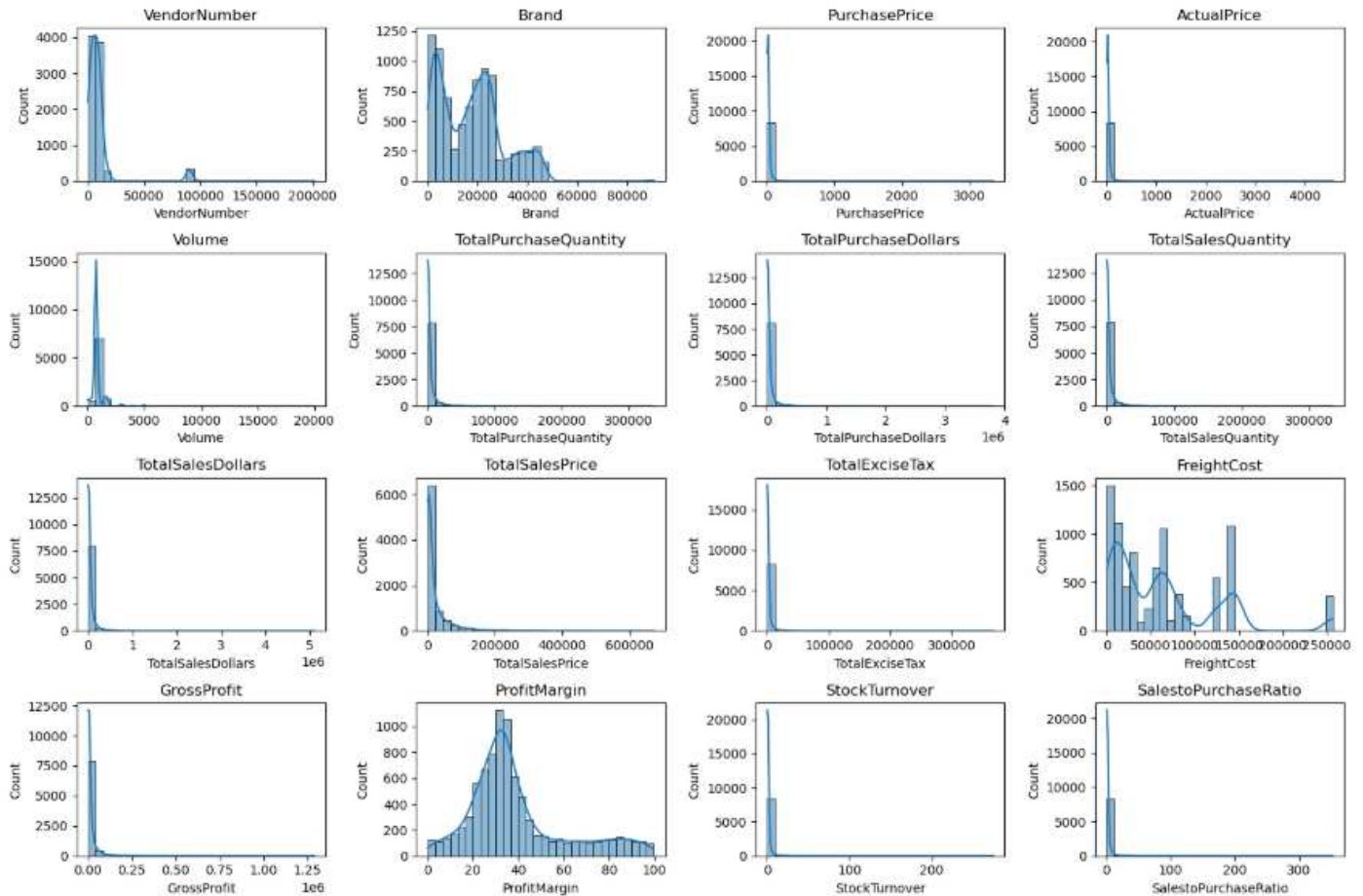


Vendor Performance Analysis: Key Insights & Recommendations

Exploratory Data Analysis (EDA) Insights

1. Summary Statistics Highlights

	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



Negative & Zero Values:

- **Gross Profit:** Minimum of -52,002.78, indicating some vendors are selling at a loss—possibly due to excessive discounts or high costs.
- **Profit Margin:** Some values are zero or negative, suggesting revenue is zero or lower than costs.
- **Total Sales Quantity & Sales Dollars:** Products with zero sales indicate potential issues with inventory turnover or demand forecasting.

High Standard Deviation Signals Outliers:

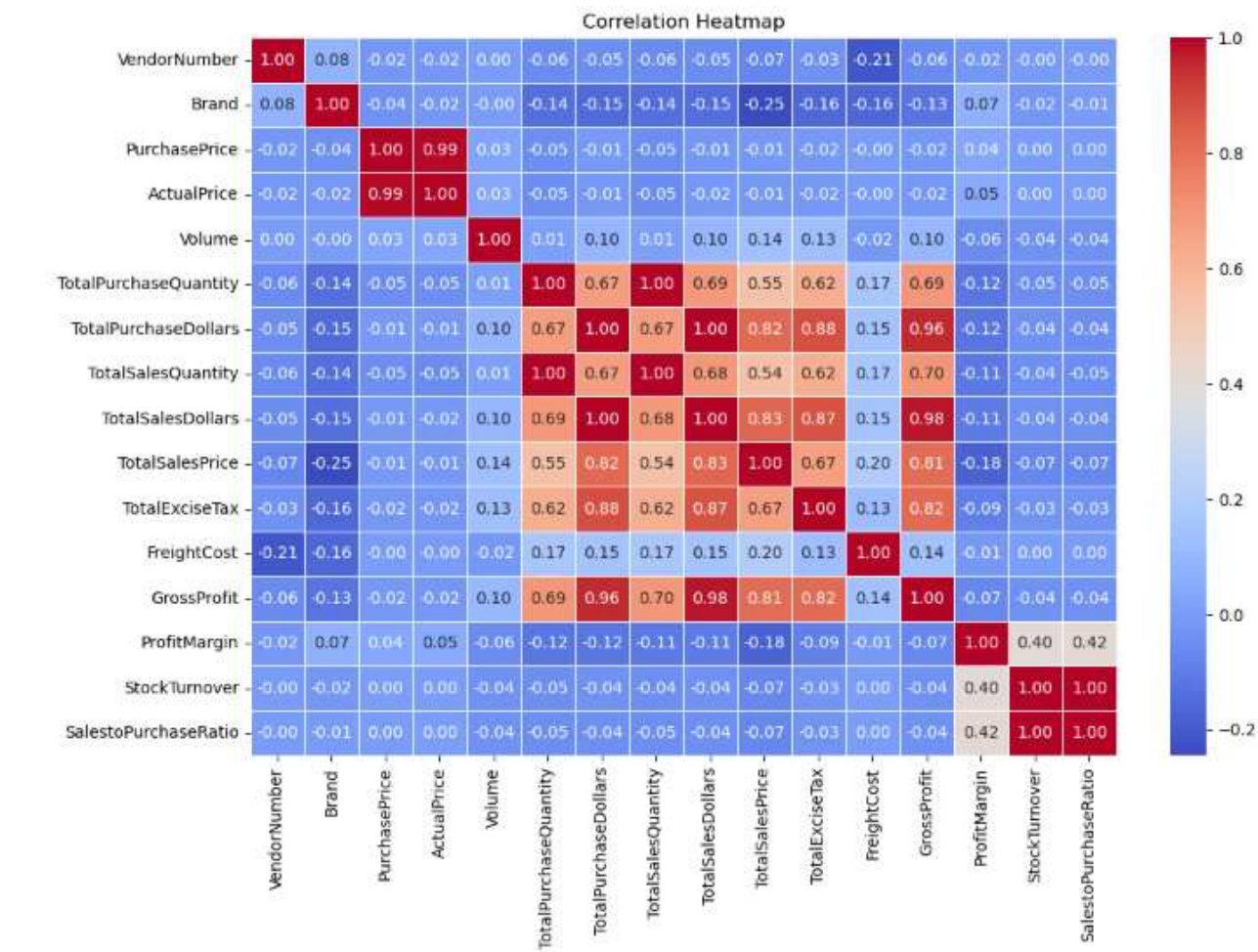
- **Purchase & Actual Prices:** Extremely high maximum values (\$5,681.81 and \$7,499.99) vs. means (\$24.39 and \$35.64) suggest premium products skew the distribution.
- **Freight Cost:** Ranges from \$0.09 to \$257,032.07, highlighting large variation in logistics efficiency.
- **Stock Turnover:** Spans from 0 to 274.5 — indicating some products sell rapidly, while others stagnate.

2. Data Filtering for Quality Insights

To ensure meaningful analysis, we excluded:

- Rows where **Gross Profit** ≤ 0 (loss-generating)
- **Profit Margin** ≤ 0 (non-profitable)
- **Total Sales Quantity** = 0 (unsold inventory)

Correlation Analysis



Relationship	Correlation	Interpretation
Purchase Price vs Sales/Gross Profit	-0.012 / -0.016	Very weak — price changes don't affect revenue/profit much
Purchase Quantity vs Sales Quantity	0.999	Very strong — shows tight inventory control
Profit Margin vs Sales Price	-0.179	As prices increase, margins may drop — competitive pricing?
Stock Turnover vs Profitability	~ -0.05	Faster turnover doesn't guarantee higher profit

Key Research Findings

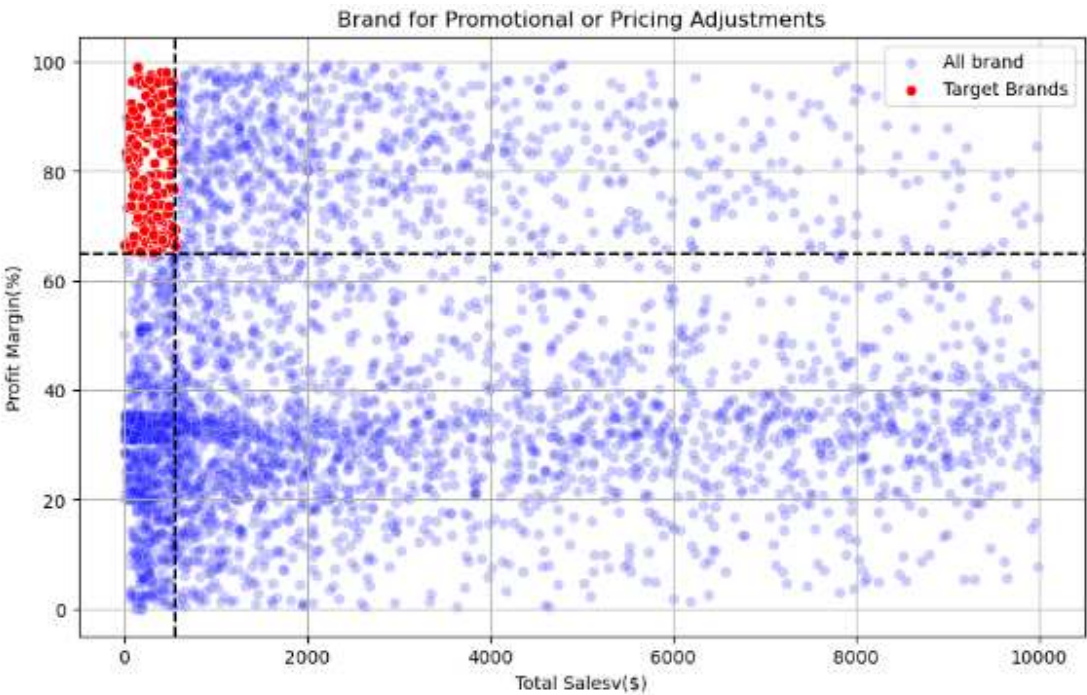
1. Underutilized High-Margin Brands

Brand with low Sales but High Margin Profit:

	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

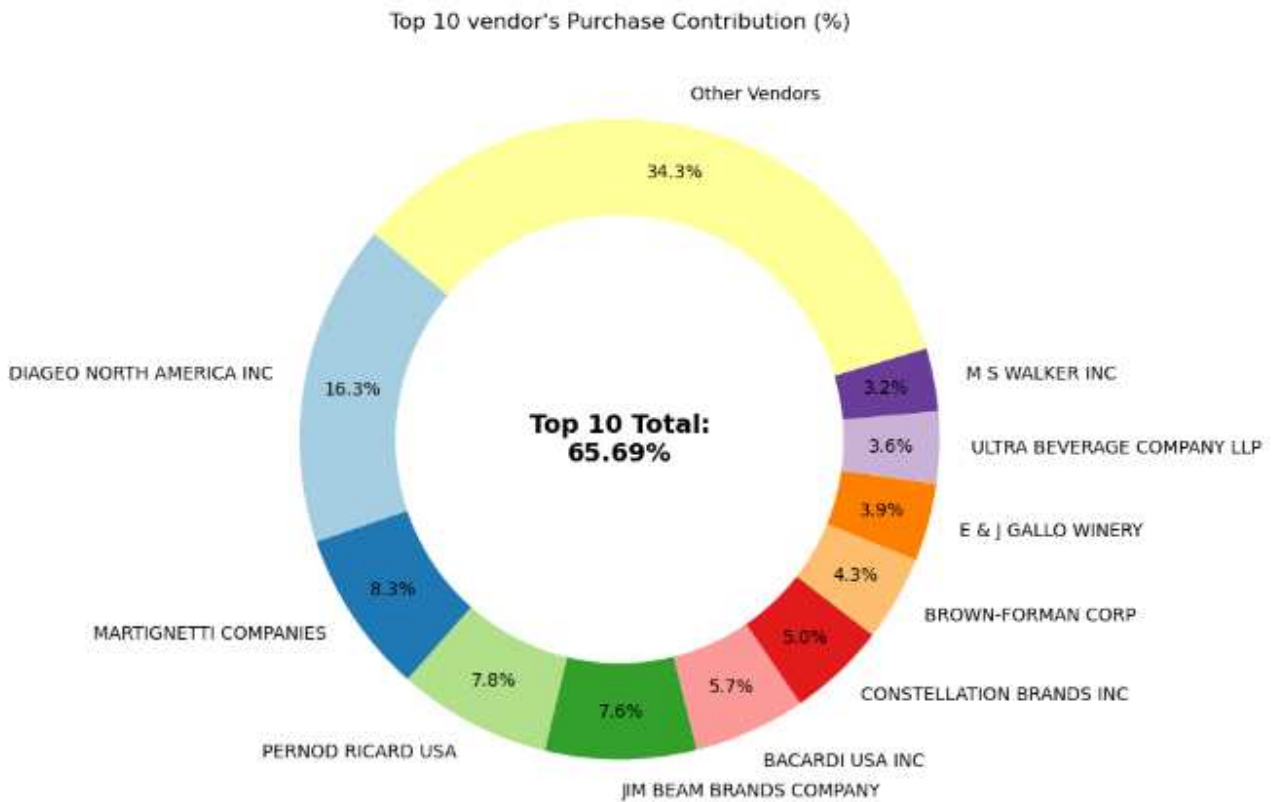
198 rows × 3 columns

- Identified **198 brands** with **low sales but high profit margins**.
- Potential actions: promote these brands via marketing or targeted discounts to boost volume without hurting profitability.



2. Vendor Contribution Disparity

- **Top 10 vendors** account for **65.7% of purchases**.
- Relying heavily on few vendors exposes the business to **supply chain risk** → consider diversification.



3. Cost Savings from Bulk Purchases

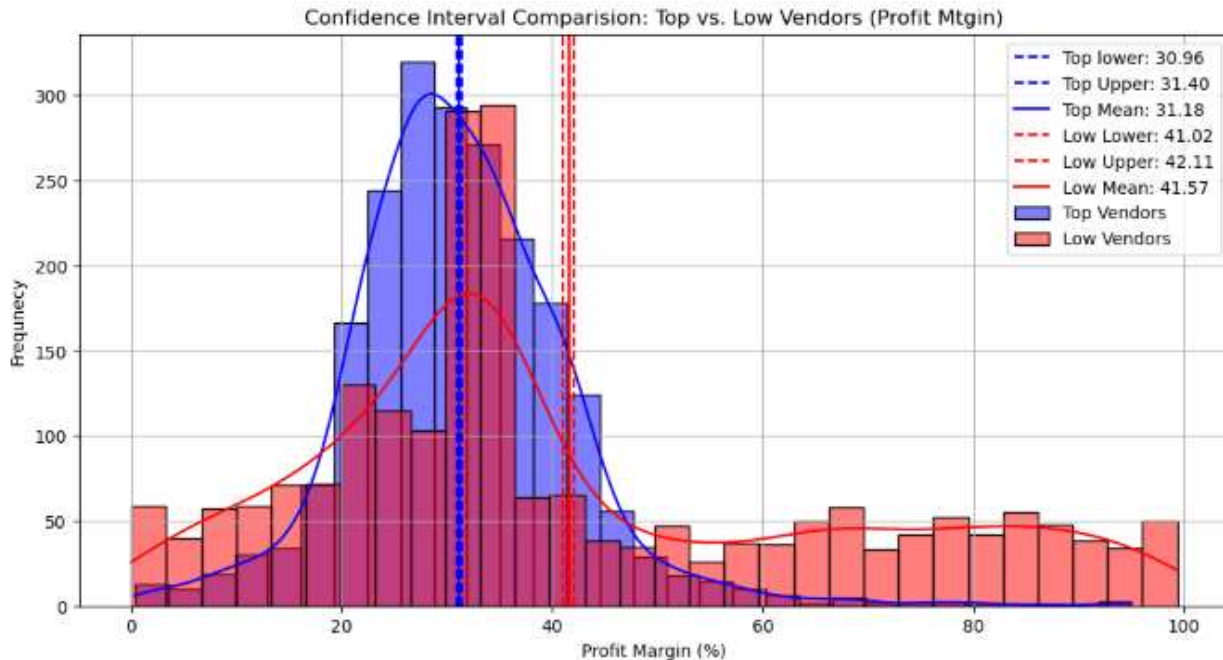
- Vendors placing **larger orders** get prices **72% lower**.
- Insight: bulk-buy pricing encourages volume purchases and enhances profitability.

4. Unsold Inventory Capital Tied Up

- Total unsold inventory value: **\$2.71M**.
- Suggests inefficiencies in stock planning — identify and manage slow-moving inventory more aggressively.

5. Profit Margin Comparison

- **Low-performing vendors** have a higher **mean profit margin** (~41.5%) than top sellers (~31.2%).
- Interpretation: these vendors may be using **premium pricing** but failing in **sales volume** or **reach**.



6. Hypothesis Testing: Profit Margin Differences

- **T-test Result:** Significant difference in margins between high- and low-performing vendors ($p\text{-value} < 0.05$).
- **Implication:** Top-selling vendors might gain by reducing costs, while low performers should aim for broader market access.

Final Recommendations

- **Reprice low-selling, high-margin brands** to improve volume without hurting profits.
- **Diversify vendor base** to reduce supply dependency risk.
- **Encourage bulk orders** with tiered pricing for cost-efficiency.
- **Manage slow-moving inventory** via better forecasting and markdown strategies.
- **Support low-performing vendors** with marketing or distribution improvements.

By acting on these insights, the company can unlock better profitability, reduce operational inefficiencies, and build resilience across its vendor network.