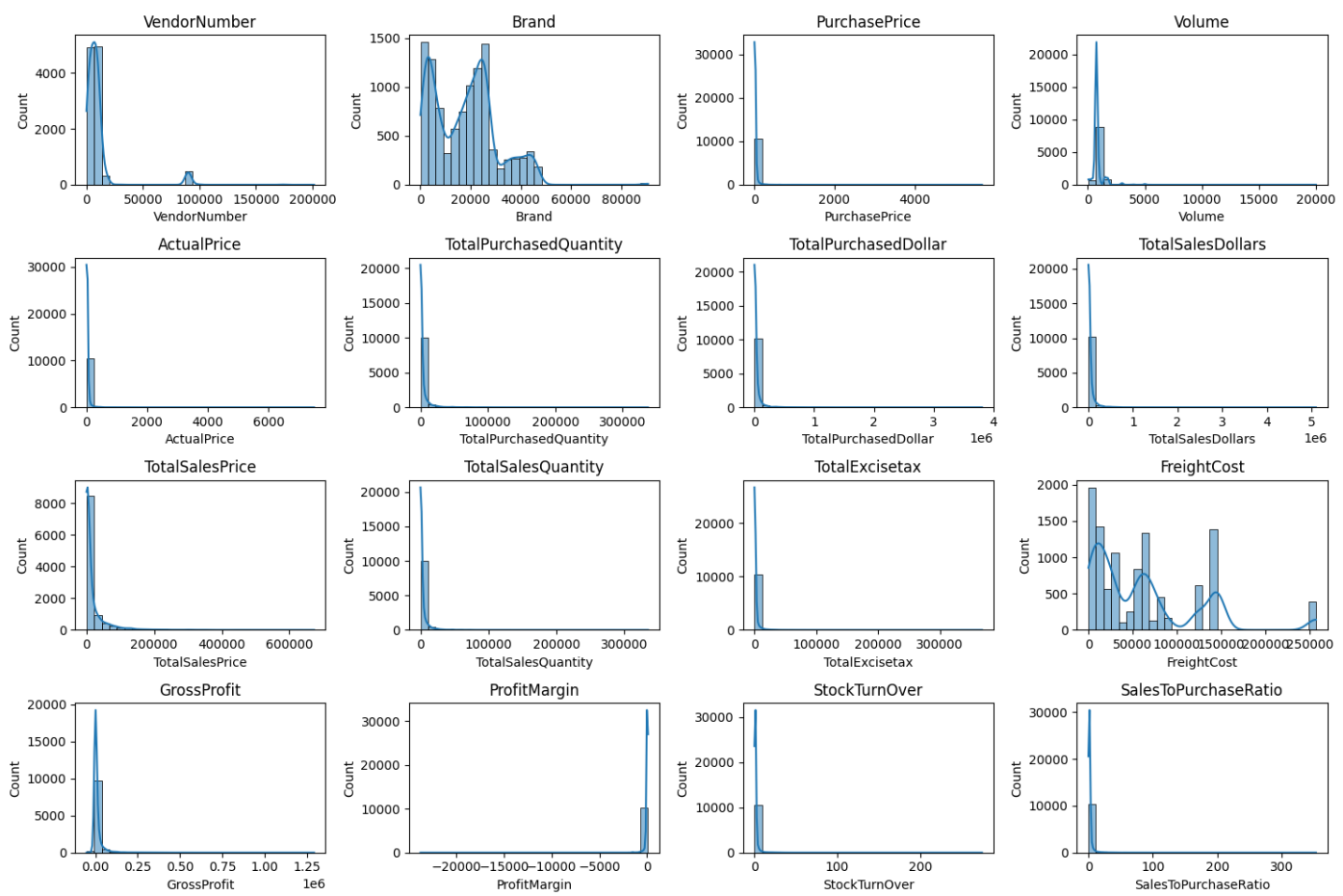


EXPLORATORY DATA ANALYSIS INSIGHTS

Summary Statistics

...	# count	# mean	# std	# min	# 25%	# 50%	# 75%	# max
VendorNumber	8564.0	10107.07	17635.71	2.0	3664.0	7153.0	9552.0	201359.0
Brand	8564.0	17614.67	12946.13	58.0	5375.75	17606.0	24935.25	90631.0
PurchasePrice	8564.0	21.78	81.19	0.36	6.66	10.06	17.85	3352.93
Volume	8564.0	864.33	724.24	50.0	750.0	750.0	750.0	20000.0
ActualPrice	8564.0	32.3	112.42	0.49	9.99	14.99	25.99	4559.99
TotalPurchasedQuantity	8564.0	3772.01	12276.96	1.0	42.0	431.0	2666.75	337660.0
TotalPurchasedDollar	8564.0	35887.25	136723.0	0.71	546.19	5018.4	26610.18	3811251.6
TotalSalesDollars	8564.0	51542.28	186071.49	1.98	1355.58	8483.78	40622.11	5101919.51
TotalSalesPrice	8564.0	22759.27	49305.27	0.99	584.79	4549.75	22595.25	672819.31
TotalSalesQuantity	8564.0	3748.98	12125.7	1.0	62.0	490.5	2675.0	334939.0
TotalExcisetax	8564.0	2182.81	12225.92	0.1	9.45	84.81	594.78	368242.8
FreightCost	8564.0	63449.65	62268.88	0.09	14836.57	55551.82	89286.27	257032.07
GrossProfit	8564.0	15655.02	51004.19	0.04	491.8	3087.05	12461.18	1290667.91
ProfitMargin	8564.0	38.72	21.37	0.02	25.93	33.36	44.12	99.72
StockTurnOver	8564.0	2.03	6.69	0.43	0.95	1.0	1.12	274.5
SalesToPurchaseRatio	8564.0	2.99	9.39	1.0	1.35	1.5	1.79	352.93
UnitPurchasePrice	8564.0	21.78	81.19	0.36	6.66	10.06	17.85	3352.93
UnsoldInventoryValue	8564.0	316.23	6033.44	-185590.8	-357.54	0.0	517.05	169785.74



Negative and Zero Values:

- **Gross Profit:** Minimum of -52.002.78, indicating potential losses due to high costs or heavy discounts. This could be due to selling products at lower prices than their purchase costs.
- **Profit Margin:** Has a minimum of $-\infty$, which suggests instances where revenue is zero or even lower than the total cost, leading to extreme negative profit margins.
- **Total Sales Quantity and Sales Dollars:** Some products show zero sales, indicating they were purchased but never sold. These may be slow-moving or obsolete stock, leading to inventory inefficiencies.

Outliers Detected by High Standard Deviations:

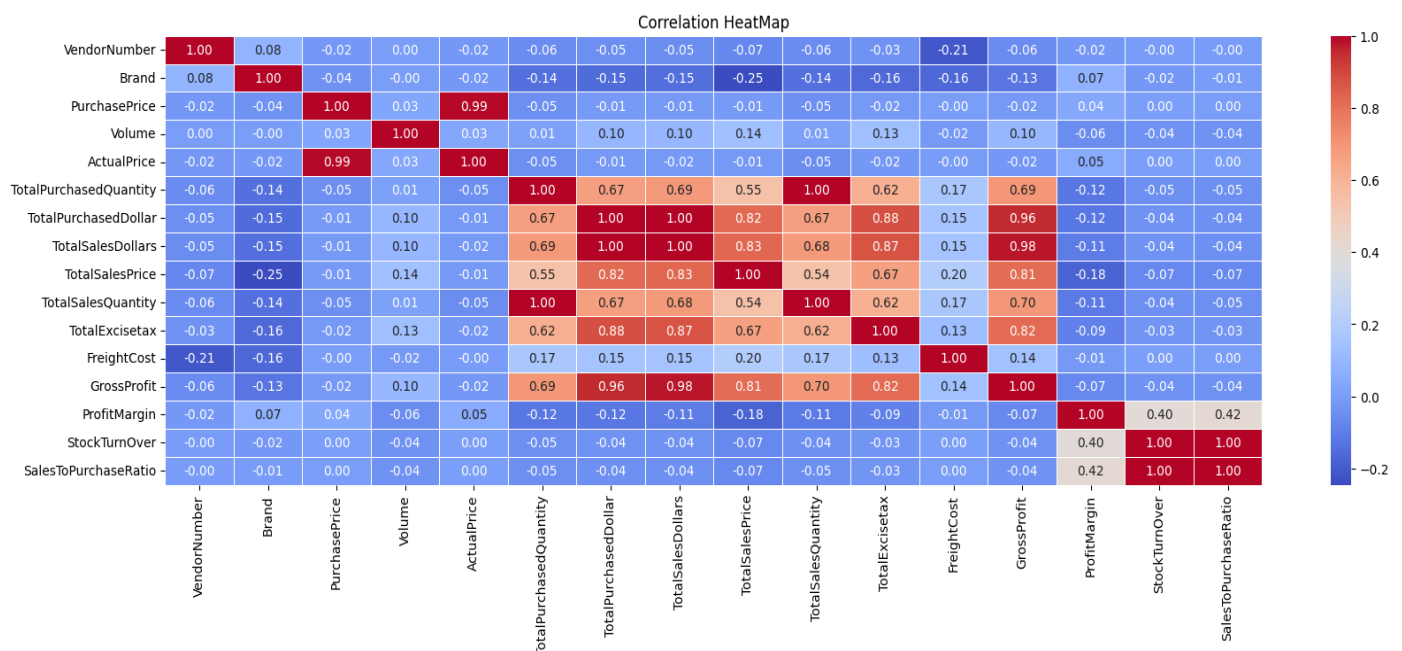
- **Purchase & Actual Prices:** The maximum values (5,681 & 7499) are significantly higher than the mean (24.39 & 35.64), indicating premium product offerings.
- **Freight Cost:** Extreme variations from 0.09 to 257,032.07, suggests logistics inefficiencies, bulk shipments, or erratic shipping costs across different products.
- **Stock Turnover:** Ranges from 0 to 274.5, suggesting some products sell rapidly, while others remain unsold for long periods. A value greater than 1 indicates that sales for a product exceed the purchased quantity due to older stock fulfilling orders.

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 vs. Total Sales Dollars & Gross Profit: Weak correlation (-0.012 and -0.016), indicating that price variations do not significantly impact sales revenue or profit.

Total Purchase Quantity vs. Total Sales Quantity: Strong correlation (0.099), confirming efficient inventory turnover.

Profit Margin vs. Total Sales Price: Negative correlation (-0.179), suggesting increasing sales prices may lead to reduced margins, possibly due to competitive pricing pressures.

Stock Turnover vs. Gross Profit & Profit Margin: Weak negative correlation (-0.038 & -0.055), indicating that faster stock turnover does not necessarily equate to higher profitability.

Research Questions & Key Findings

1. Brands for Promotional or Pricing Adjustments

Brand with Low Sales Performance but with high Profit Margin			
	Description	# TotalSalesDollars	# ProfitMargin
6199	Santa Rita Organic Svgn Bl	9.99	66.47
2369	Debauchery Pnt Nr	11.58	65.98
2070	Concannon Glen Ellen Wh Zin	15.95	83.45
2188	Crown Royal Apple	27.86	89.81
6237	Sauza Sprklg Wild Berry Marg	27.96	82.15
4828	Merry Irish Cream Liqueur	35.97	73.53
7184	Tracia Syrah	44.94	88.5
600	Basilica Amaretto	47.45	85.08
2934	Flag Hill Heritage Rd NH	49.96	65.53
5124	New Amsterdam Red Berry Vdka	63.96	81.21

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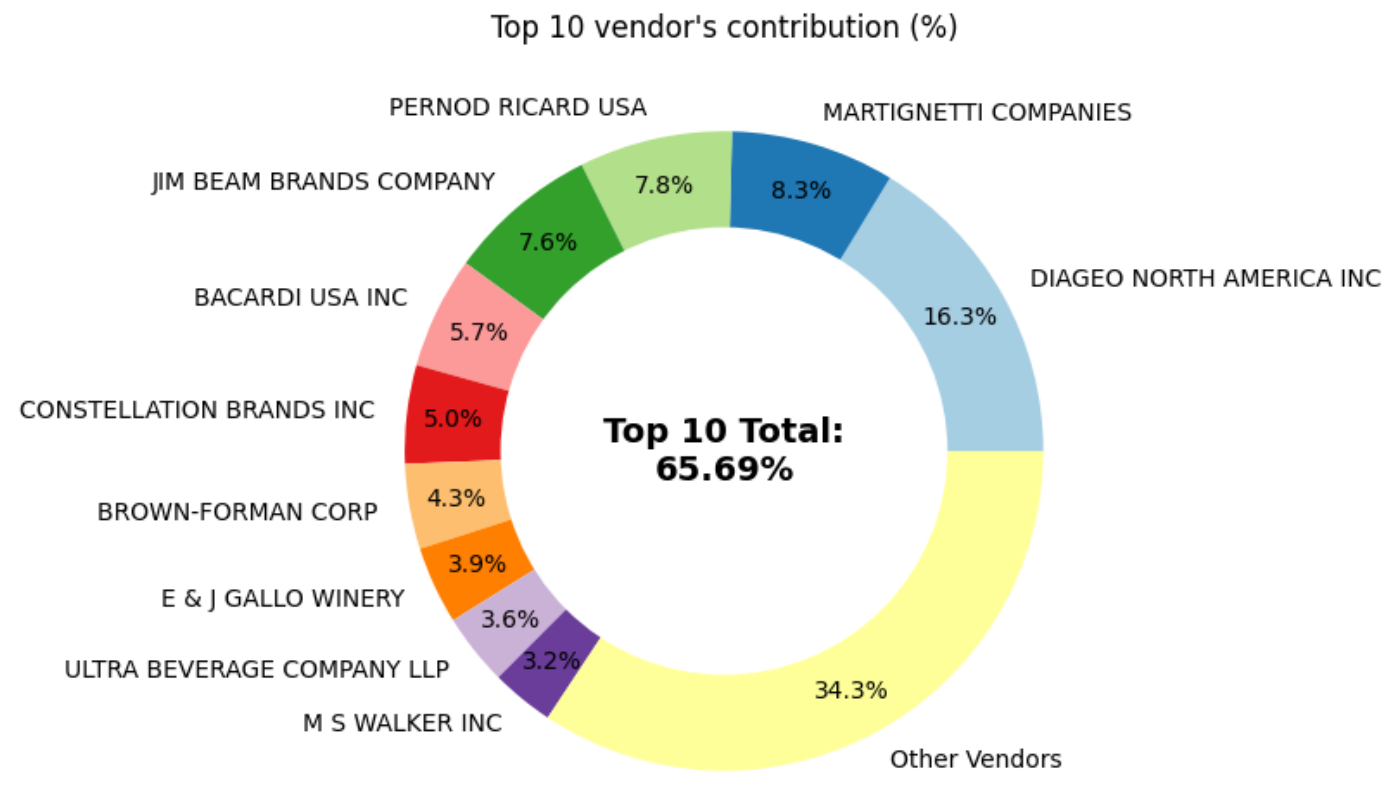
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198 brands exhibit lower sales but higher profit margins, which could benefit from targeted marketing, promotions, or price optimizations to increase volume without compromising profitability.



2. Top Vendors by Sales & Purchase Contribution

The top 10 vendors contribute 65.69% of total purchases, while 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 72% lower unit cost (\$10.78 per unit vs. higher unit costs in smaller orders).

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

OrderSize	#	UnitPurchasePrice
Small		39.07
Medium		15.49
Large		10.78

4. Identifying Vendors with Low Inventory Turnover

Total Unsold inventory Capital: \$2.71M

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

Identifying vendors with low inventory turnover enables better stock management, minimizing financial strain.

VendorName			#	StockTurnOver	VendorName		UnsoldInventoryValue
ALISA CARR BEVERAGES				0.62	25	DIAGEO NORTH AMERICA INC	722.21 K
HIGHLAND WINE MERCHANTS LLC				0.71	46	JIM BEAM BRANDS COMPANY	554.67 K
PARK STREET IMPORTS LLC				0.75	68	PERNOD RICARD USA	470.63 K
Circa Wines				0.76	116	WILLIAM GRANT & SONS INC	401.96 K
Dunn Wine Brokers				0.77	30	E & J GALLO WINERY	228.28 K
CENTEUR IMPORTS LLC				0.77	79	SAZERAC CO INC	198.44 K
SMOKY QUARTZ DISTILLERY LLC				0.78	11	BROWN-FORMAN CORP	177.73 K
TAMWORTH DISTILLING				0.8	20	CONSTELLATION BRANDS INC	133.62 K
THE IMPORTED GRAPE LLC				0.81	61	MOET HENNESSY USA INC	126.48 K
WALPOLE MTN VIEW WINERY				0.82	77	REMY COINTREAU USA INC	118.60 K

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

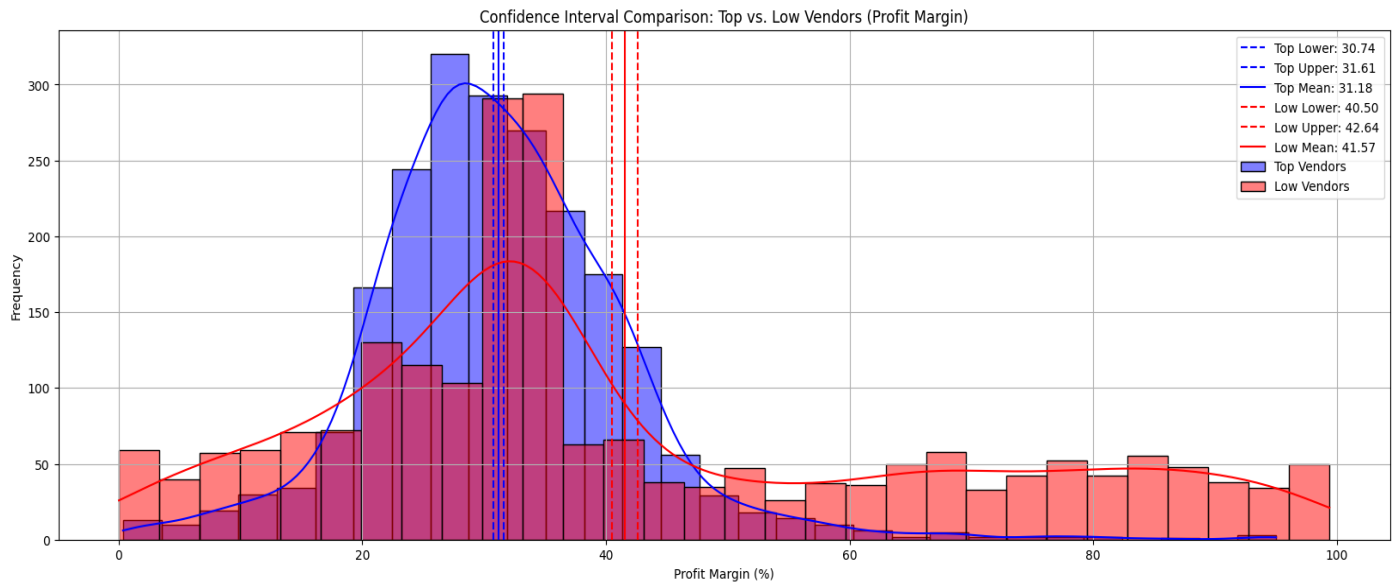
Top vendors’ Profit Margin (95% CI): (30.74%, 31.61%), Mean: 31.18%

Low vendors’ Profit Margin (95% CI): (40.50%, 42.64%), 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.



6. Statistical Validation of Profit Margin Differences.

Hypothesis testing:

H₀ (Null Hypothesis): There is no significant difference in the mean profit margins of top performing and low performing vendors

H₁ (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.

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 vendors 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.