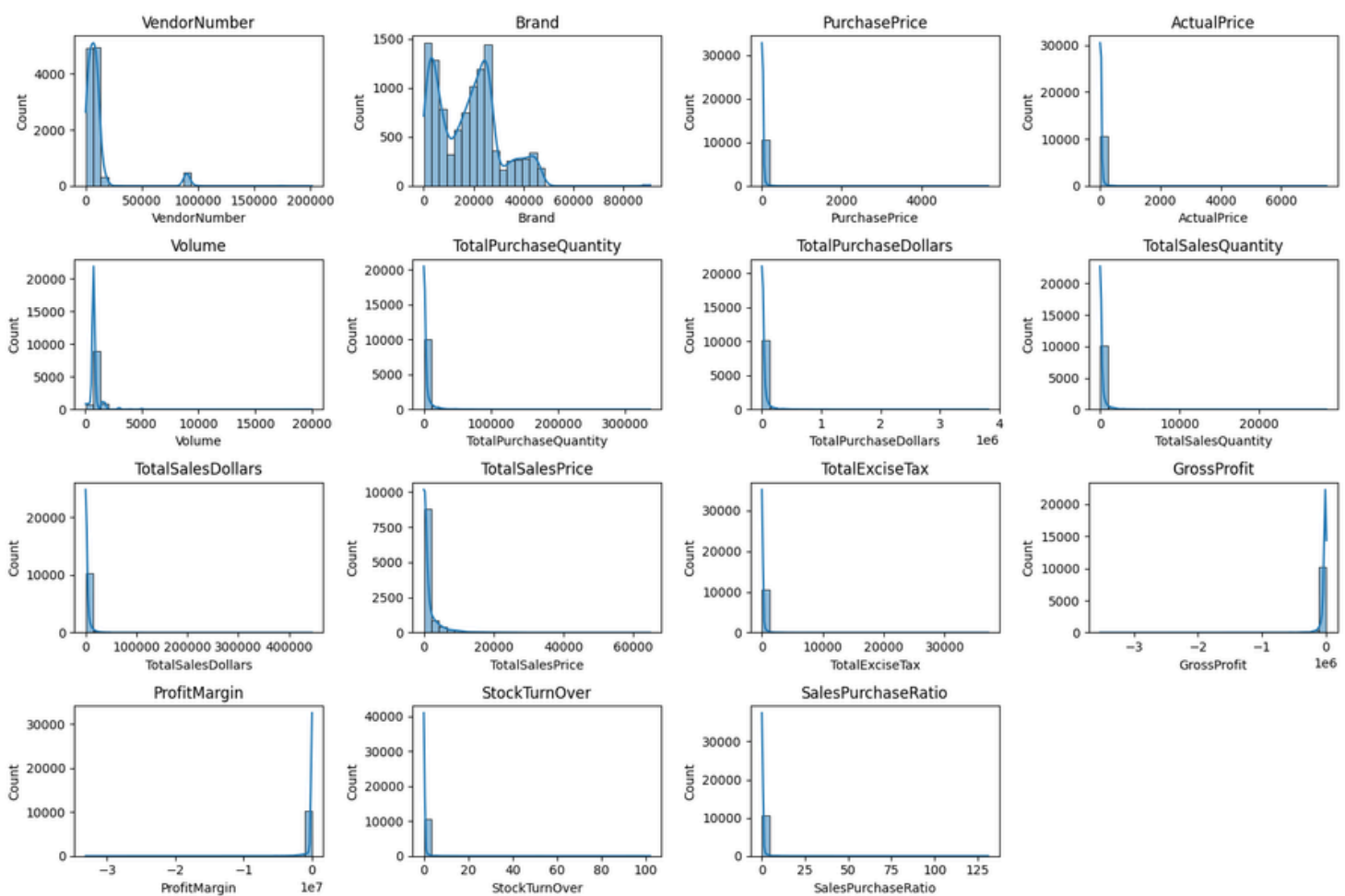


Exploratory Data Analysis Insights

Summary Statistics

	Count	Mean	Std	Min	25%	50%	75%	Max
VendorNumber	10692	10650.64946	18753.51915	2	3951	7153	9552	201359
Brand	10692	18039.22877	12662.18707	58	5793.5	18761.5	25514.25	90631
PurchasePrice	10692	24.38530303	109.2693746	0.36	6.84	10.455	19.4825	5681.81
ActualPrice	10692	35.64367097	148.2460162	0.49	10.99	15.99	28.99	7499.99
Volume	10692	847.3605499	664.3092121	50	750	750	750	20000
TotalPurchaseQuantity	10692	3140.886831	11095.08677	1	36	262	1975.75	337660
TotalPurchaseDollars	10692	30106.69337	123067.7996	0.71	453.4575	3655.465	20738.245	3811251.6
TotalSalesQuantity	10692	228.8878601	871.1277233	0	0	12	129.25	28544
TotalSalesDollars	10692	3089.647773	12181.13826	0	0	251.74	2089.5525	444810.74
TotalSalesPrice	10692	1508.300788	3902.425486	0	0	125.98	1220.6225	64889.97
TotalExciseTax	10692	130.022486	847.9179182	0	0	1.99	27.6	37163.76
GrossProfit	10692	-27017.0456	111707.1364	-3528878.25	-18548.765	-3179.925	-330.3075	12865.89
ProfitMargin	10692	-181927.9419	801143.6141	-33134038	-20572.75	-1030.627387	-518.5237338	99.23747277
StockTurnOver	10692	0.296504236	1.992573509	0	0	0.056837886	0.105530953	102
SalesPurchaseRatio	10692	0.431502967	2.776484125	0	0	0.087812698	0.161065815	131.1428571



Negative & 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 & 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 (5,681.81 & 7,499.99) are significantly higher than the mean (24.39 & 35.64), indicating premium

Freight Cost: Extreme variation from 0.09 to 257,032.07 suggests logistics inefficiencies, bulk shipments, or erratic shipping costs across different products.

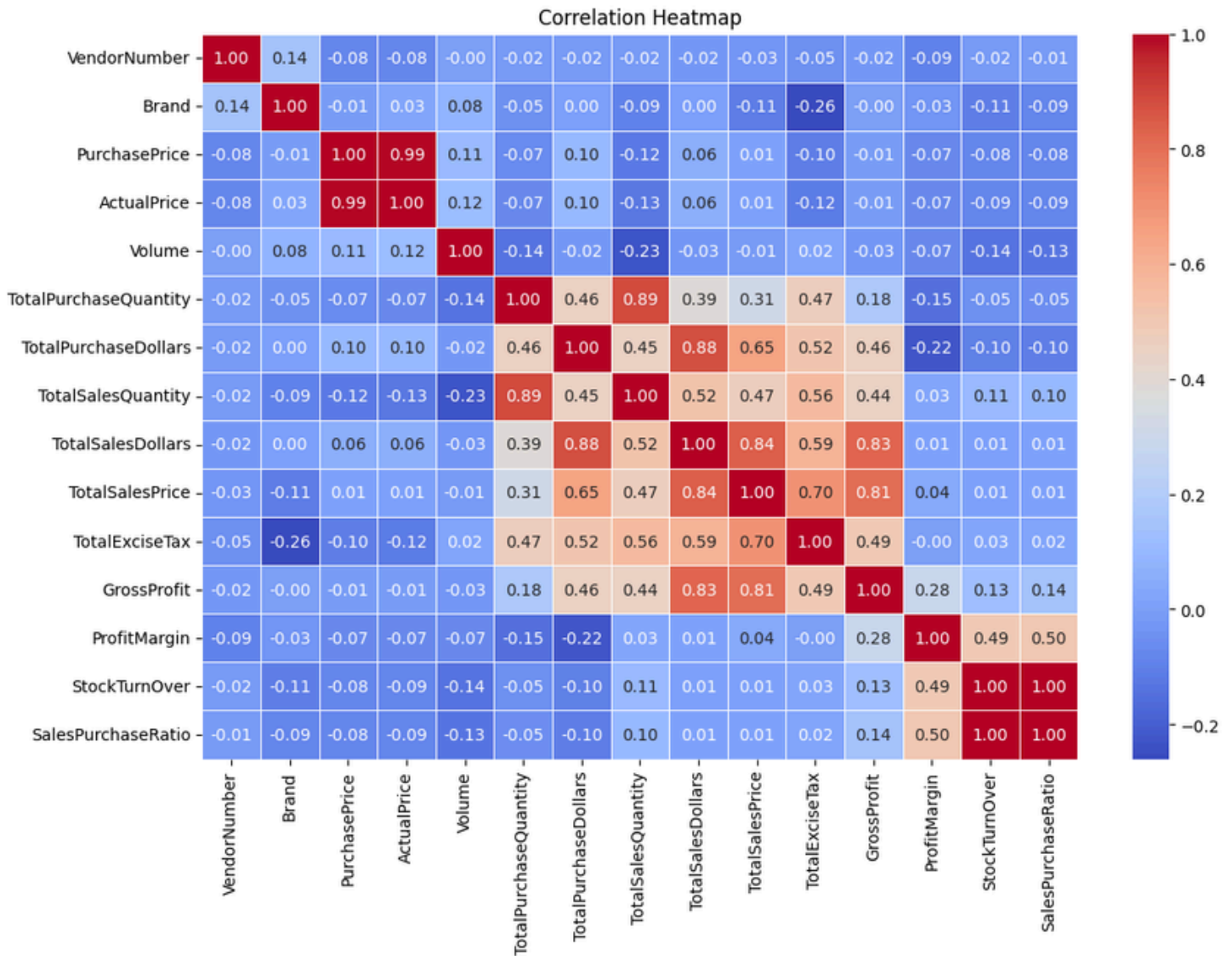
Stock Turnover: Ranges from 0 to 274.5, suggesting some products sell rapidly while others remain unsold for long periods. A value greater than 1 indicates that sales for a product exceed the purchased quantity due to older stock fulfilling orders.

Data Filtering:

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

- **Gross Profit** ≤ 0 (to exclude transaction leading to losses.)
- **Profit Margin** ≤ 0 (to ensure analysis focuses on profitable transaction)
- **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 (0.999), 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:

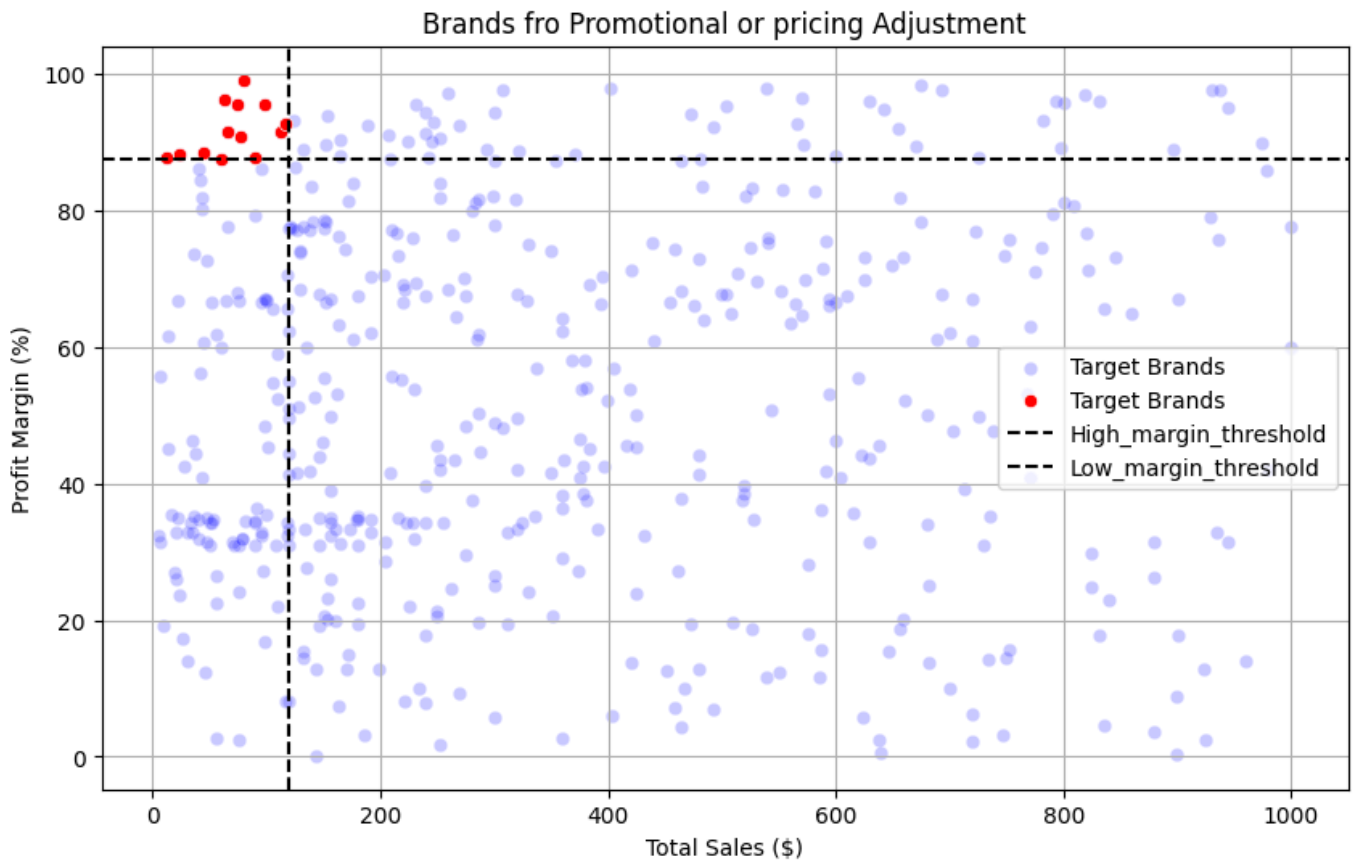
Weak negative correlation (-0.038 & -0.055), indicating that faster stock turnover does not necessarily equate to higher profitability.

Research question & Key findings :

1. Brands for Promotional or pricing adjustment

Brands with low sales but high profit margins			
	Description	TotalSalesDollars	ProfitMargin
616	The Club Strawbry Margarita	11.94	87.688442
229	Crown Royal Apple	23.88	88.107203
635	Tracia Syrah	44.94	88.495772
46	Bacardi Oakheart Spiced Trav	59.94	87.554221
256	Dr McGillicuddy's Apple Pie	62.72	96.269133
579	St Elder Elderflower Liqueur	66.33	91.436756
31	Aresti Pnt Nr Curico Vly	74.85	95.617902
239	DeKuyper Buttershots Trav	76.93	90.718835
626	Three Olives Grape Vodka	80.19	99.114603
580	St Germain Liqueur	89.94	87.658439
481	Piehole Apple Pie	98.01	95.592287
431	Mojoshot Blue Lagoon RTD	112.86	91.591352
654	Vigne A Porrone Rosso	116.91	92.592593

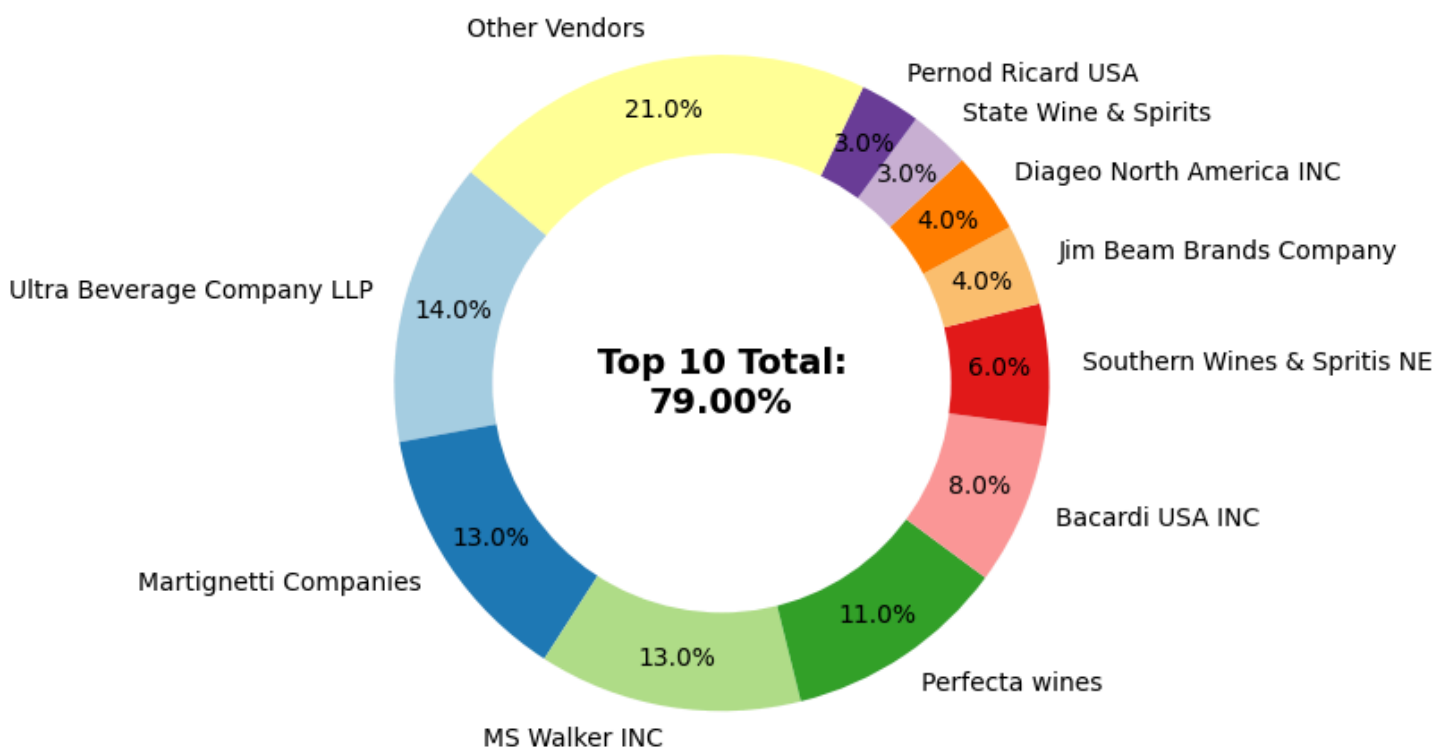
- 13 Brands exhibit lower sales but higher profit margin , which could benefit from targeted marketing , promotions or pricing optimizations to increase volume without compromising profitability



2. Top vendors by sales & Purchase Contribution :

The top 10 vendors contribute 79.0% of total purchase , while the remaining vendors contribute only 21% . This over-reliance on a few vendors may introduce risk such as supply chain disruptions , indicating a need for diversification

Top 10 Vendor's Purchase Contribution (%)



3. Impact of bulk purchasing on cost savings:

- Vendors buying in large quantities receive 72% lower unit cost (\$10.78 per unit vs higher unit cost in smaller orders).
- Bulk Pricing strategies encourage larger orders , increasing total sales while maintaining profitability.

OrderSize	Unit Purchase Price
• Small	• 39.057543
• Medium	• 15.486414
• Large	• 10.777625

4. Identify Vendors with low turn over :

- Total Unsold Inventory Capital : \$1.92M
- 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.

	StockTurnOver
VendorName	
BANFI PRODUCTS CORP	0.650000
HEAVEN HILL DISTILLERIES	0.660000
SURVILLE ENTERPRISES CORP	0.666667
WILLIAM GRANT & SONS INC	0.695652
STATE WINE & SPIRITS	0.707093
VINEXTRA INC	0.716981
SOUTHERN WINE & SPIRITS NE	0.729167
TREASURY WINE ESTATES	0.745798
E & J GALLO WINERY	0.746296
KOBRAND CORPORATION	0.750000

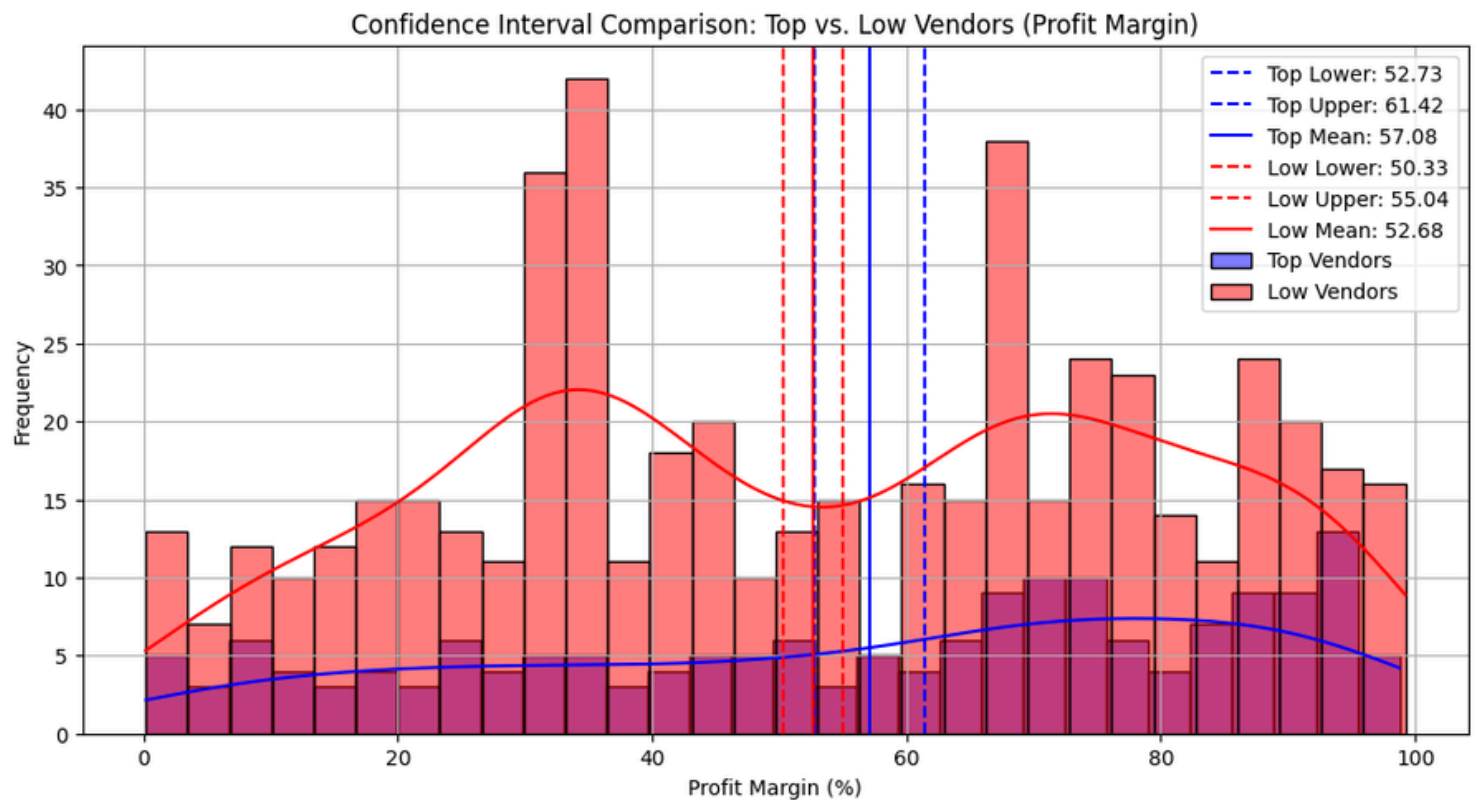
VendorName	UnsoldInventoryValue
TREASURY WINE ESTATES	339.94
SURVILLE ENTERPRISES CORP	240.72
BANFI PRODUCTS CORP	205.41000000000003
NICHE W & S	202.94
ATLANTIC IMPORTING COMPANY	124.08
VINEXTRA INC	112.2
POVERTY LANE ORCHARDS	87.41999999999999
Dunn Wine Brokers	77.88
THE IMPORTED GRAPE LLC	74.48
WILLIAM GRANT & SONS INC	34.719999999999985

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

- Top Vendors' Profit Margin (95% CI): (52.73%, 61.42%), Mean: 57.08%
- Low Vendors' Profit Margin (95% CI): (50.33%, 55.04%), Mean: 52.68%
- 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:

- H_0 (Null Hypothesis): No significant difference in profit margins between top and low-performing vendors.
- H_1 (Alternative 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 margins 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.