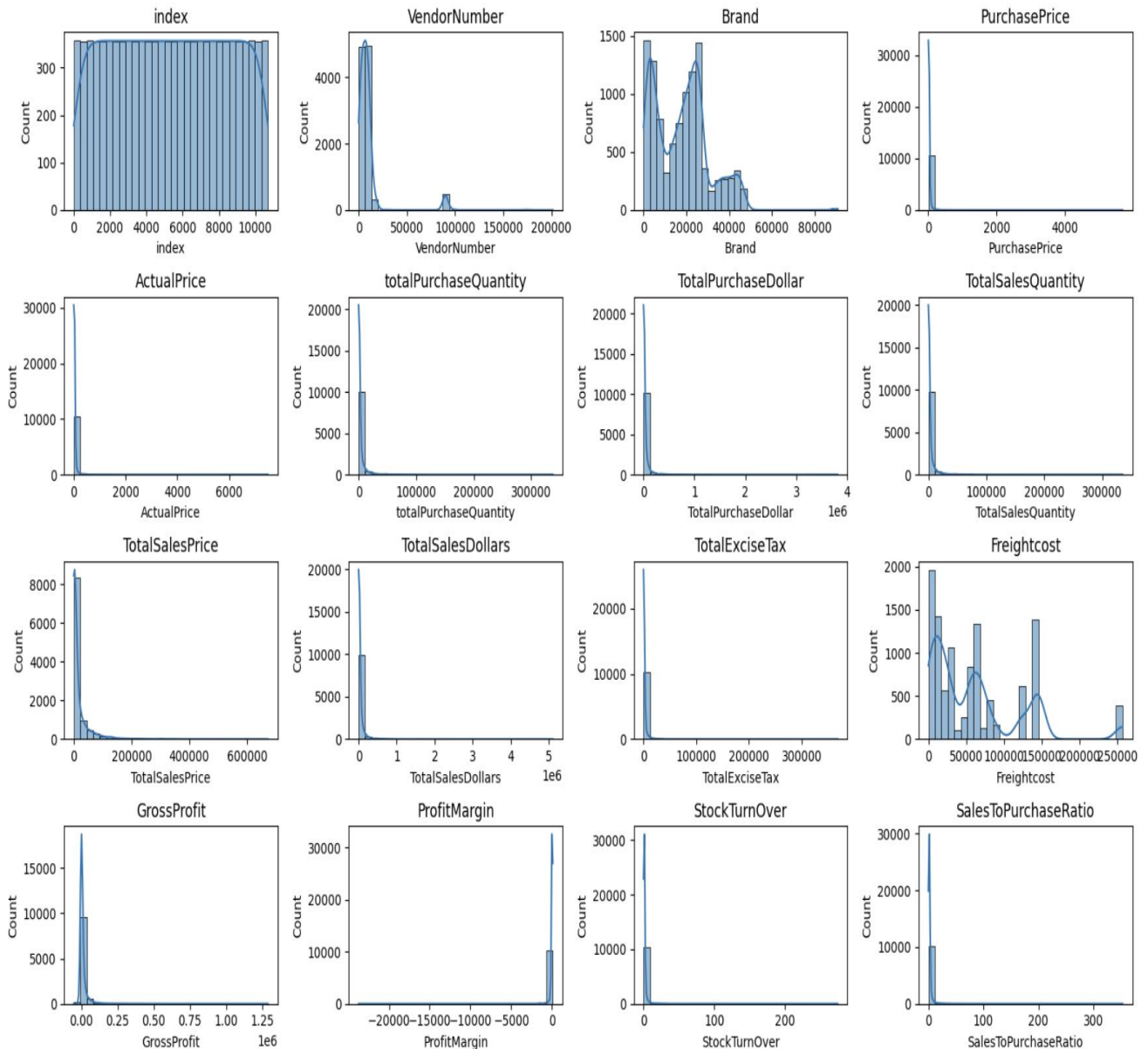


# Vendor Performance & Sales Analysis Report

## Exploratory Data Analysis Insights

### Summary Statistics

	count	mean	std	min	25%	50%	75%	max
index	10692.0	5345.500000	3086.658873	0.000000	2672.750000	5345.500000	8018.250000	1.069100e+04
VendorNumber	10692.0	10650.649458	18753.519148	2.000000	3951.000000	7153.000000	9552.000000	2.013590e+05
Brand	10692.0	18039.228769	12662.187074	58.000000	5793.500000	18761.500000	25514.250000	9.063100e+04
PurchasePrice	10692.0	24.385303	109.269375	0.360000	6.840000	10.455000	19.482500	5.681810e+03
ActualPrice	10692.0	35.643671	148.246016	0.490000	10.990000	15.990000	28.990000	7.499990e+03
totalPurchaseQuantity	10692.0	3140.886831	11095.086769	1.000000	36.000000	262.000000	1975.750000	3.376600e+05
TotalPurchaseDollar	10692.0	30106.693372	123067.799627	0.710000	453.457500	3655.465000	20738.245000	3.811252e+06
TotalSalesQuantity	10514.0	3129.583317	11037.801407	1.000000	36.000000	280.000000	1985.000000	3.349390e+05
TotalSalesPrice	10514.0	19111.958773	45264.605387	0.990000	334.890000	3020.085000	16442.477500	6.728193e+05
TotalSalesDollars	10514.0	42954.173834	168977.755843	1.980000	809.820000	5599.700000	29524.250000	5.101920e+06
TotalExciseTax	10514.0	1804.263569	11065.659557	0.060000	5.382500	50.425000	436.730000	3.682428e+05
Freightcost	10692.0	61433.763214	60938.458032	0.090000	14069.870000	50293.620000	79528.990000	2.570321e+05
GrossProfit	10514.0	12364.618776	46576.616345	-52002.780000	66.975000	1496.490000	8970.040000	1.290668e+06
ProfitMargin	10514.0	-15.885227	447.289882	-23730.638953	15.353839	30.778375	40.210967	9.971666e+01
StockTurnOver	10514.0	1.735689	6.067081	0.002817	0.829761	0.983431	1.042183	2.745000e+02
SalesToPurchaseRatio	10514.0	2.546789	8.524047	0.004196	1.181388	1.444635	1.672548	3.529286e+02



## 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 -0, 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 product offerings.

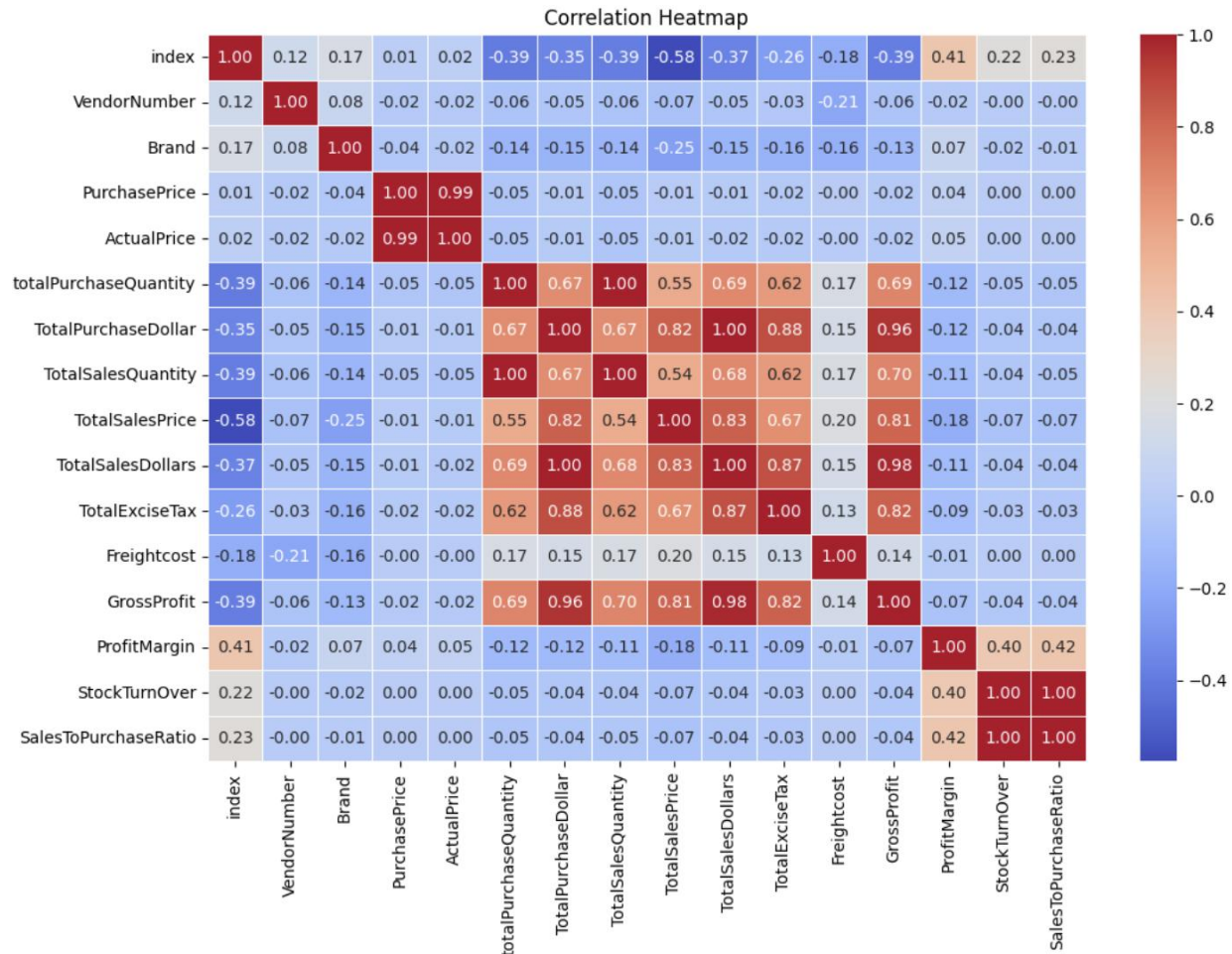
**Freight Cost:** Extreme variation from 0.09 to 257,032.07 suggests logistics inefficiencies, bulk shipments, or erratic shipping costs across different products.

**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 removed inconsistent data points where:

- $\text{Gross Profit} \leq 0$  (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).



**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 Questions & Key findings

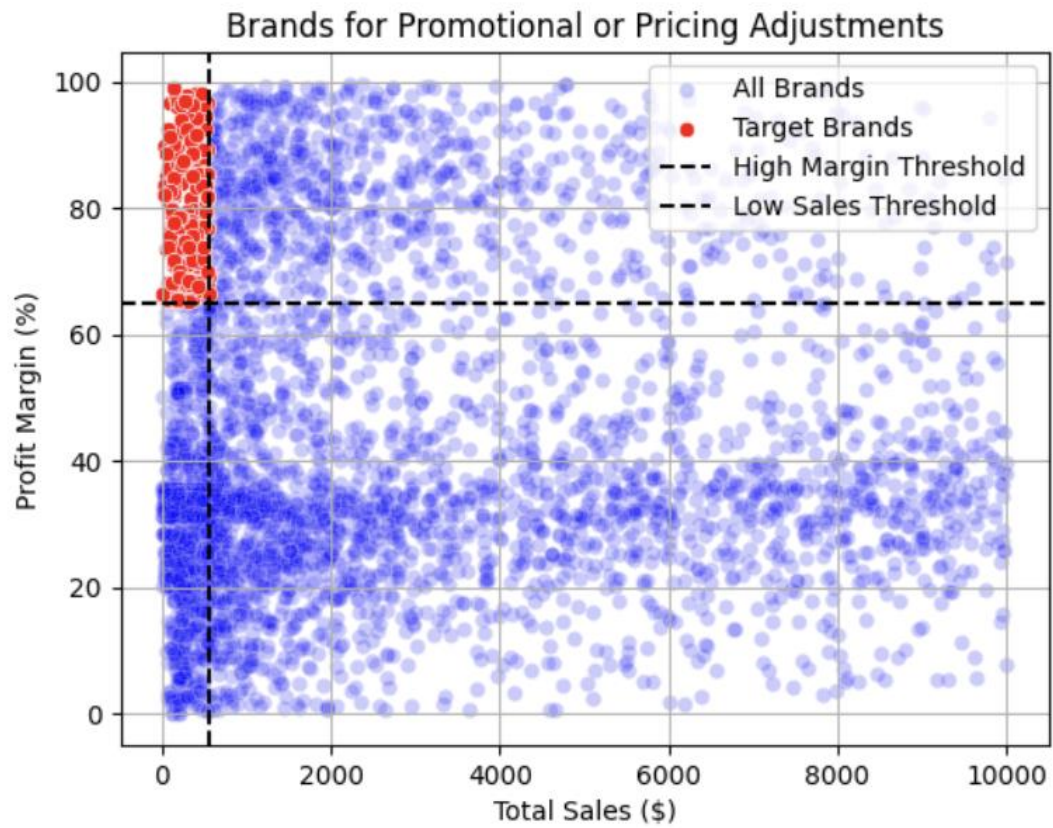
## 1. Brand for Promotional or Pricing Adjustments

Brands with Low sales but Hight 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

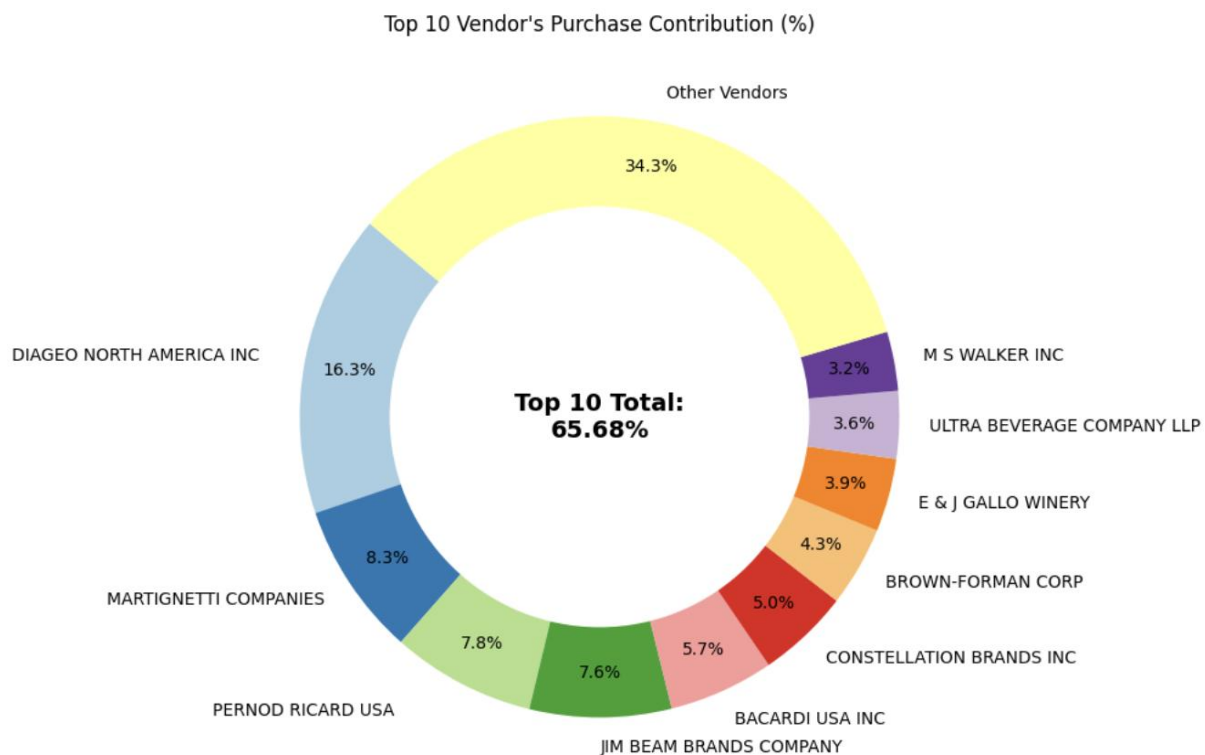
198 rows × 3 columns

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	39.057543
Medium	15.486414
Large	10.777625

#### 4. Identifying Vendors with Low Inventory Turnover

Total Unsold Inventory Capital: \$2.71M 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		VendorName	UnsoldInventoryValues
ALISA CARR BEVERAGES	0.615385	0 DIAGEO NORTH AMERICA INC	722.21K
HIGHLAND WINE MERCHANTS LLC	0.708333	1 JIM BEAM BRANDS COMPANY	554.67K
PARK STREET IMPORTS LLC	0.751306	2 PERNOD RICARD USA	470.63K
Circa Wines	0.755676	3 WILLIAM GRANT & SONS INC	401.96K
Dunn Wine Brokers	0.766022	4 E & J GALLO WINERY	228.28K
CENTEUR IMPORTS LLC	0.773953	5 SAZERAC CO INC	198.44K
SMOKY QUARTZ DISTILLERY LLC	0.783835	6 BROWN-FORMAN CORP	177.73K
TAMWORTH DISTILLING	0.797078	7 CONSTELLATION BRANDS INC	133.62K
THE IMPORTED GRAPE LLC	0.807569	8 MOET HENNESSY USA INC	126.48K
WALPOLE MTN VIEW WINERY	0.820548	9 REMY COINTREAU USA INC	118.60K



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

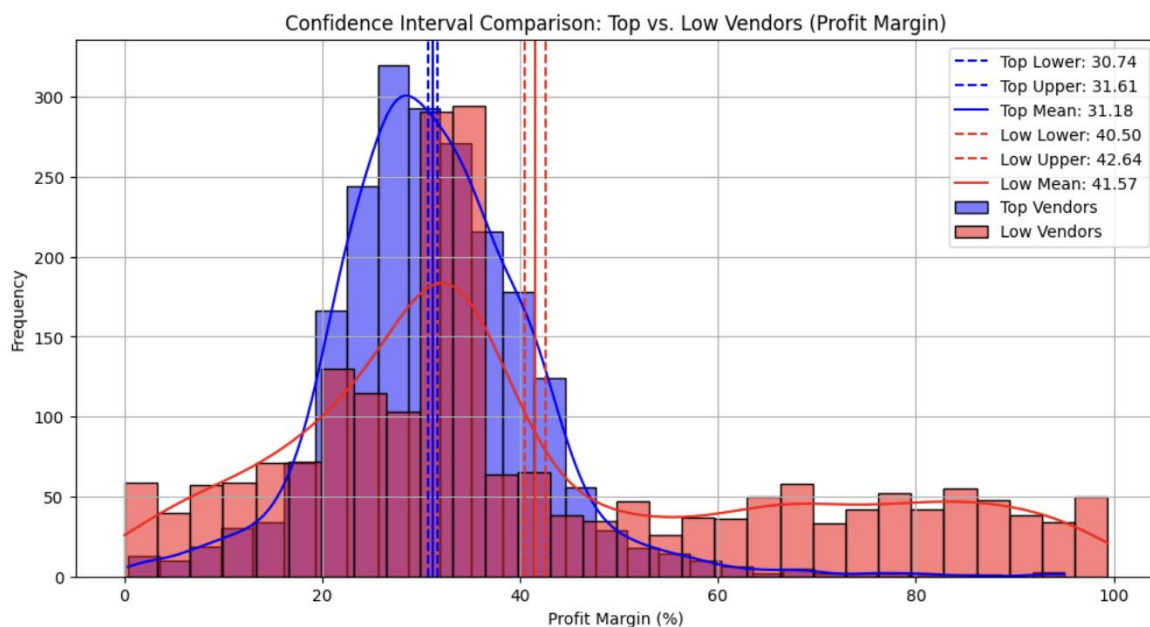
Top Vendors' Profit Margin (95% CI): (30.74%, 31.61%), Mean: 31.17%

Low Vendors' Profit Margin (95% CI): (40.48%, 42.62%), Mean: 41.55%

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<sub>0</sub>** (Null Hypothesis): No significant difference in profit margins between top and low-performing vendors.

**H<sub>1</sub>** (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

- **Review prices** of brands that have low sales but high profit. Slightly lowering the price may increase sales without reducing profit too much.
- **Work with more vendors** so the company doesn't depend on only a few suppliers. This will reduce risk if one vendor has issues.
- **Use bulk buying benefits** to get better prices and manage inventory more effectively.
- **Fix slow-moving stock** by buying smaller quantities, running clearance offers, or changing how it is stored.

- **Improve marketing and distribution** for vendors that are not performing well so their sales can increase without reducing profit margins.
- By following these steps, the company can **increase profit in a stable way**, reduce risks, and improve overall efficiency.