

# VENDOR PERFORMANCE ANALYSIS

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## **BUSINESS PROBLEM**

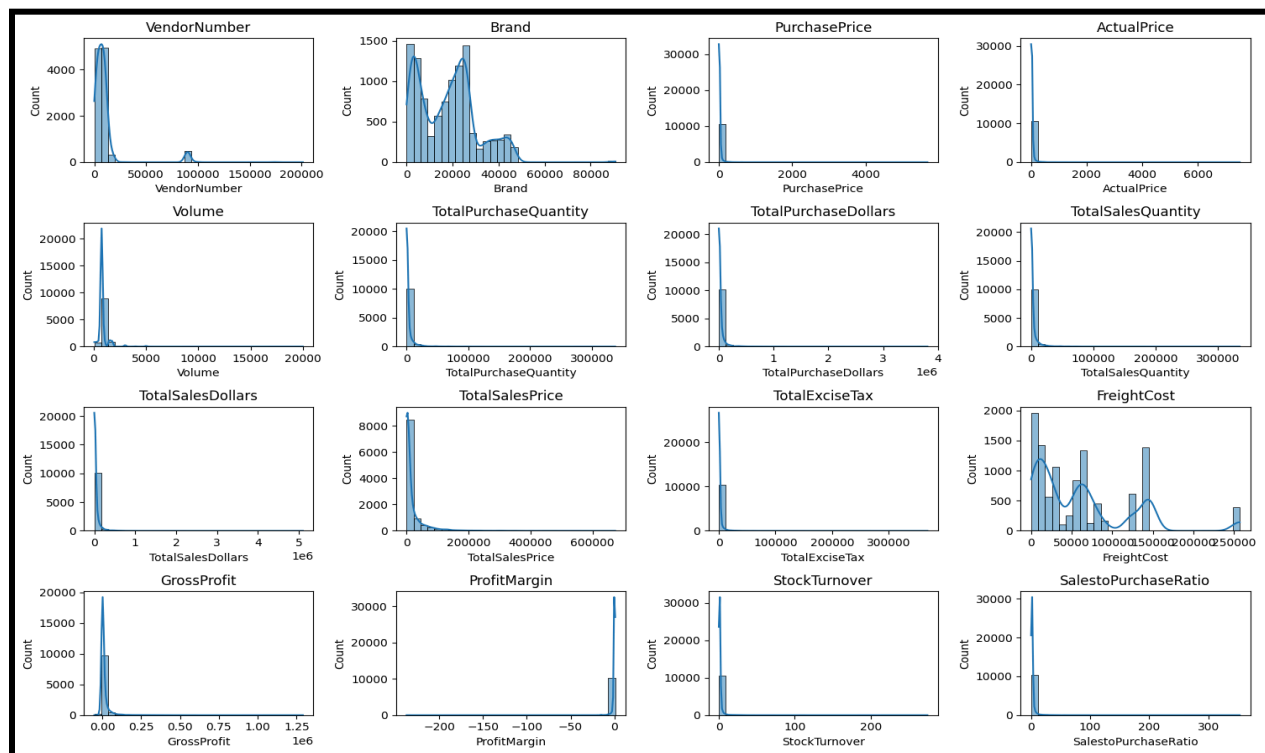
Effective inventory and sales management are critical for optimizing profitability in the retail and wholesale industry. Companies need to ensure that they are not incurring losses due to inefficient pricing, poor inventory turnover, or vendor dependency. The goal of this analysis is to:

- Identify underperforming brands that require promotional or pricing adjustments.
  - 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.
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# 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
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	0.133245	0.304055	0.399561	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



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### Negative & Zero Values:

- **Gross Profit:** Minimum value is -52,002.78, indicating losses. Some products or transactions may be selling at a loss 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.
- **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 Indicated by High Standard Deviations:

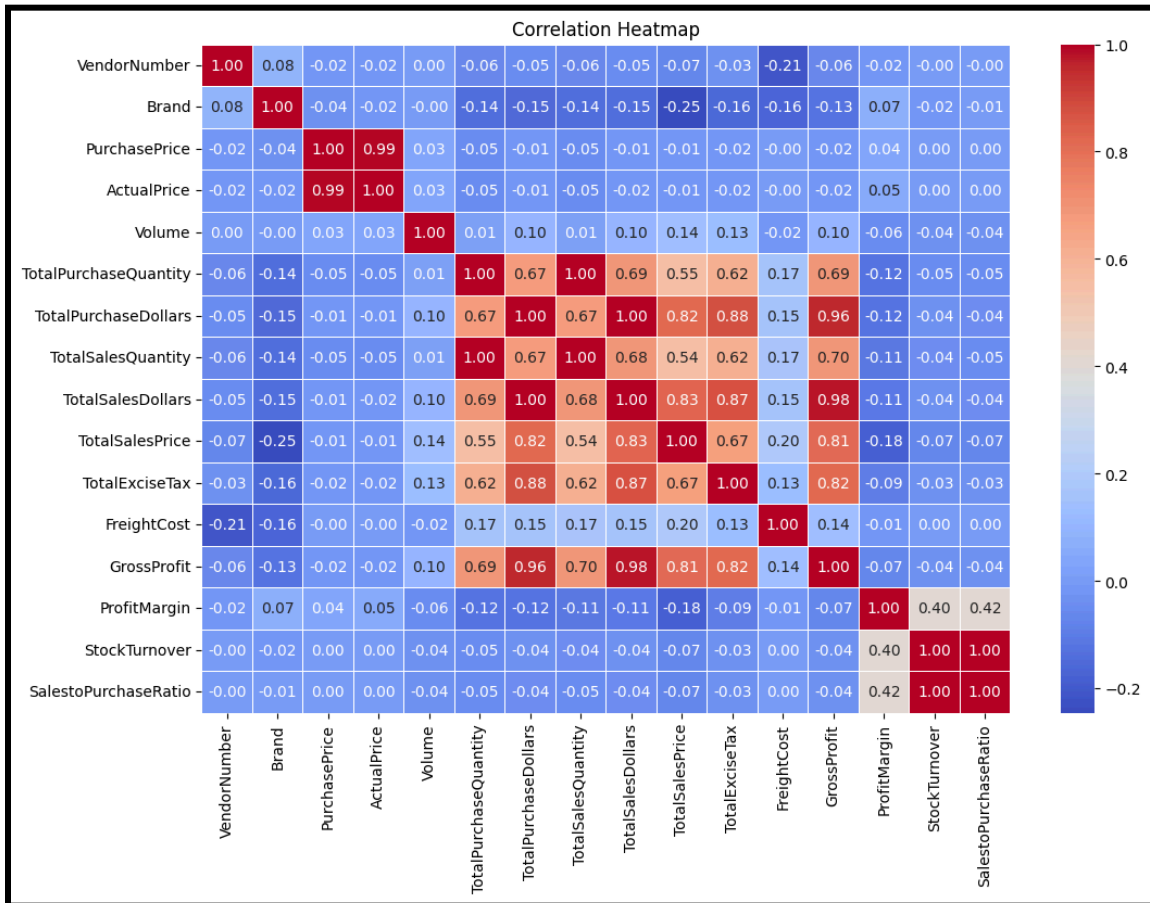
- **Purchase & Actual Prices:** The max values (5,681.81 & 7,499.99) are significantly higher than the mean (24.39 & 35.64), indicating potential premium products.
- **Freight Cost:** Huge variation, from 0.09 to 257,032.07, suggests logistics inefficiencies or bulk shipments.
- **Stock Turnover:** Ranges 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 enhance the reliability of the insights, we removed inconsistent data points where:

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

## Correlation Insights



- **PurchasePrice v/s TotalSalesDollars and GrossProfit:** Weak correlation(-0.012 and -0.016), suggesting that price variations do not significantly impact sales revenue or profit.
- **Total purchase quantity v/s Total sales quantity:** Strong correlation(0.999), confirming efficient inventory turnover.

- **Profit Margin & Total sales price:** Negative correlation (-0.179) suggests that as sales price increases, margins decrease, possibly due to competitive pricing pressures.
- **Stock Turnover vs GrossProfit and ProfitMargin:** Weak negative correlations with both(-0.038 and -0.055 respectively), indicating that faster turnover does not necessarily result in higher profitability.

## Research Questions and Key Findings

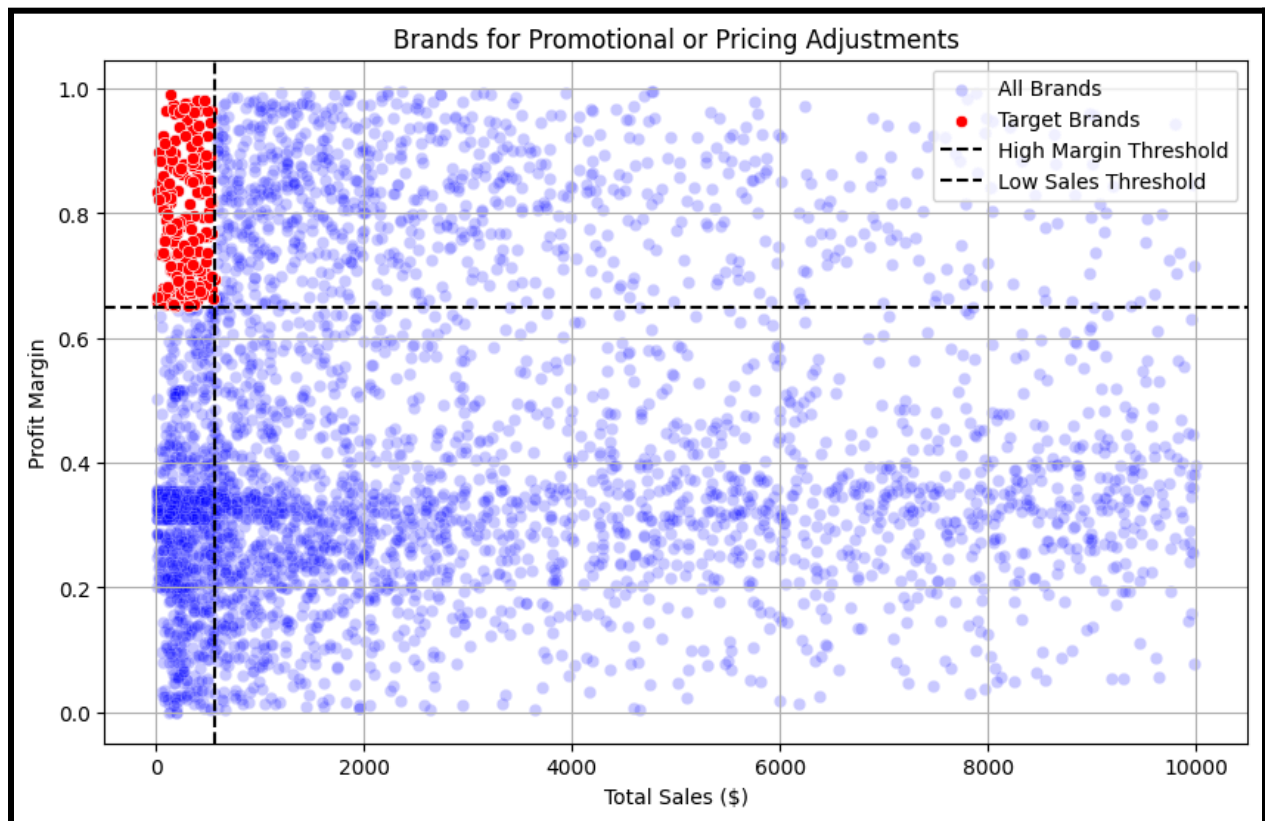
### 1. Brands for Promotional or Pricing Adjustments:

Brands with Low Sales but High Profit Margin:

	Description	TotalSalesDollars	ProfitMargin
6199	Santa Rita Organic Svgn Bl	9.99	0.664665
2369	Debauchery Pnt Nr	11.58	0.659758
2070	Concannon Glen Ellen Wh Zin	15.95	0.834483
2188	Crown Royal Apple	27.86	0.898062
6237	Sauza Sprklg Wild Berry Marg	27.96	0.821531
...	...	...	...
5074	Nanbu Bijin Southern Beauty	535.68	0.767473
2271	Dad's Hat Rye Whiskey	538.89	0.818516
57	A Bichot Clos Marechaudes	539.94	0.677409
6245	Sbragia Home Ranch Merlot	549.75	0.664447
3326	Goulee Cos d'Estournel 10	558.87	0.694348

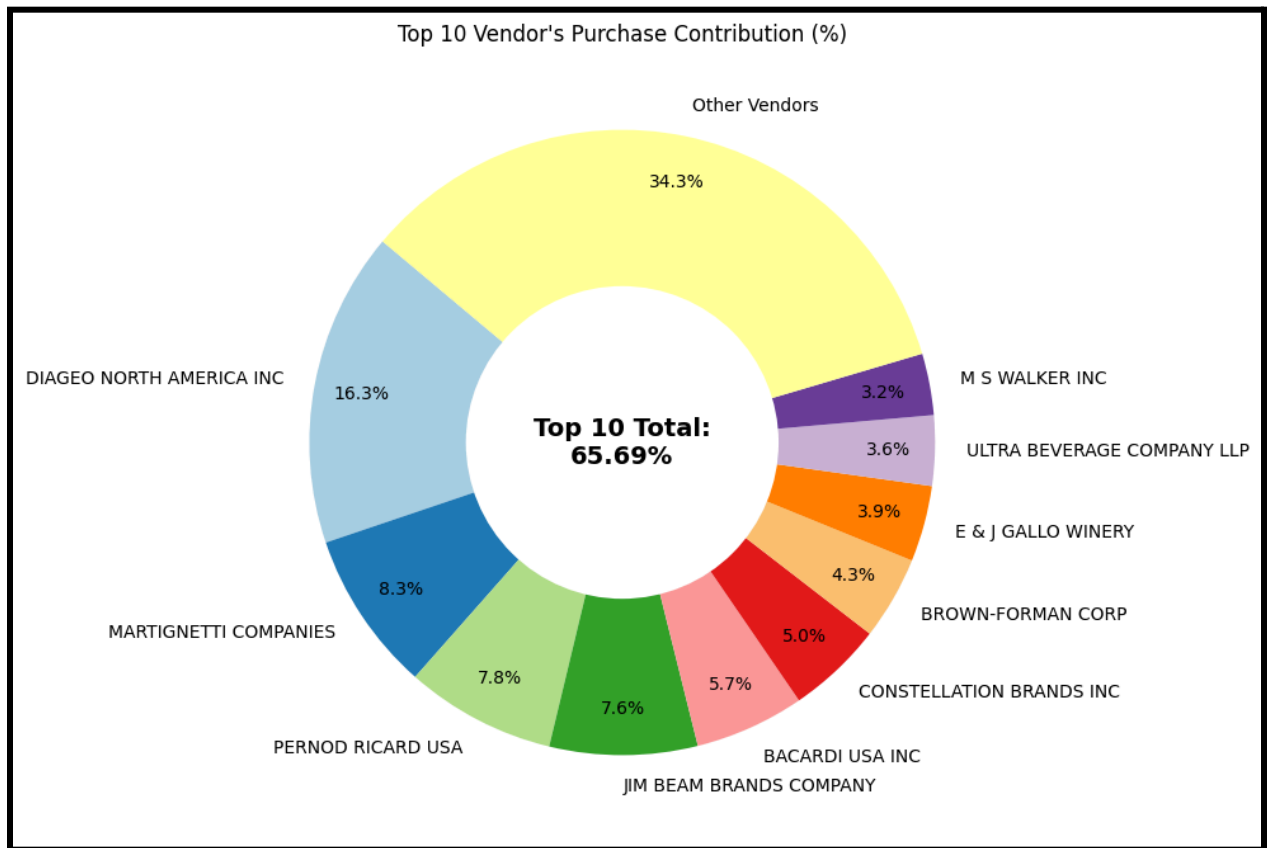
198 rows × 3 columns

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 and Purchase Contribution:

The top 10 vendors contribute 65.69% of the total purchases, while 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 cost units in smaller orders). Bulk pricing strategies encourage larger orders, increasing total sales while maintaining profitability.

OrderSize	UnitPrice
Small	39.068186
Medium	15.486414
Large	10.777625

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## 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 and minimizes financial strain.

StockTurnover		VendorName	UnsoldInventoryValue
VendorName			
	ALISA CARR BEVERAGES	0.615385	25 DIAGEO NORTH AMERICA INC 722.21k
	HIGHLAND WINE MERCHANTS LLC	0.708333	46 JIM BEAM BRANDS COMPANY 554.67k
	PARK STREET IMPORTS LLC	0.751306	68 PERNOD RICARD USA 470.63k
	Circa Wines	0.755676	116 WILLIAM GRANT & SONS INC 401.96k
	Dunn Wine Brokers	0.766022	30 E & J GALLO WINERY 228.28k
	CENTEUR IMPORTS LLC	0.773953	79 SAZERAC CO INC 198.44k
	SMOKY QUARTZ DISTILLERY LLC	0.783835	11 BROWN-FORMAN CORP 177.73k
	TAMWORTH DISTILLING	0.797078	20 CONSTELLATION BRANDS INC 133.62k
	THE IMPORTED GRAPE LLC	0.807569	61 MOET HENNESSY USA INC 126.48k
	WALPOLE MTN VIEW WINERY	0.820548	77 REMY COINTREAU USA INC 118.6k

## 5. Identifying Vendors with Low Inventory Turnover:

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%

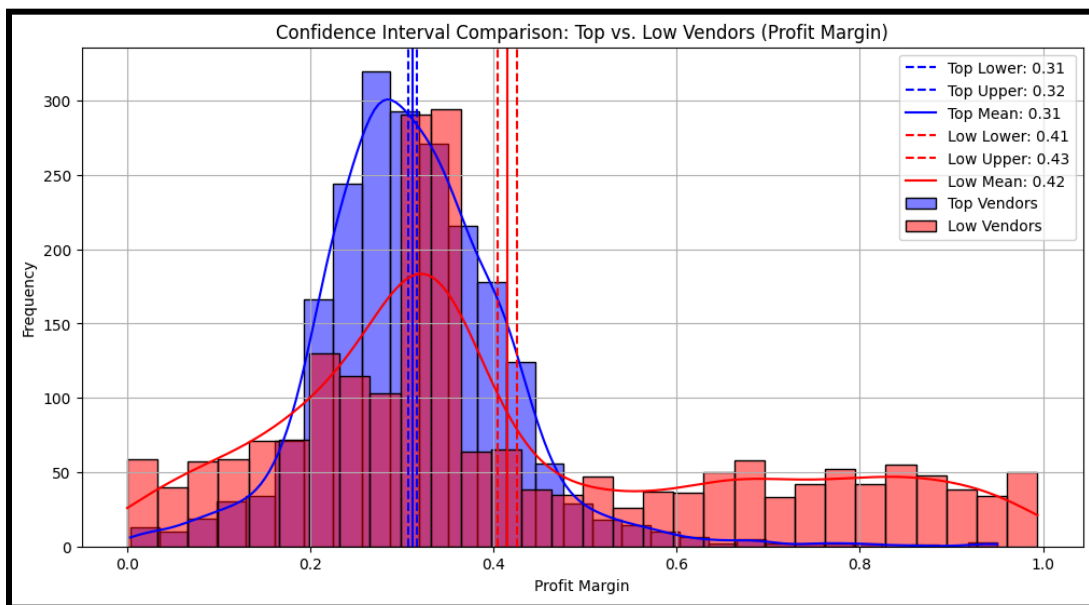
Low performing vendors maintain higher profit margins, but struggle with sales volumes, indicating potential pricing inefficiencies or market reach issues.



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### Actionable Insights:

- **Top Vendors:** Optimize profitability by adjusting pricing, reducing operational costs, or offering bundled promotions.
- **Low Vendors:** Improve marketing efforts, optimize pricing strategies, and enhance distribution networks.



## 6. Statistical Validation of Profit Margin Differences:

### Hypothesis Testing:

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

H1 (Alternative Hypothesis): The mean profit margins of top-performing and low-performing vendors are significantly different.

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**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 can 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.