

Vendor Performance & Inventory Optimization Report

Executive Summary

This analysis examines vendor performance and inventory management across 10,692 unique product records to identify opportunities for margin expansion and operational efficiency. The study reveals critical insights about vendor concentration risks, bulk purchasing effectiveness, and profit margin variations that require strategic intervention. Key findings indicate that while top vendors drive volume, smaller vendors maintain significantly higher profit margins (41.57% vs 31.18%), and bulk purchasing benefits plateau beyond moderate order quantities.

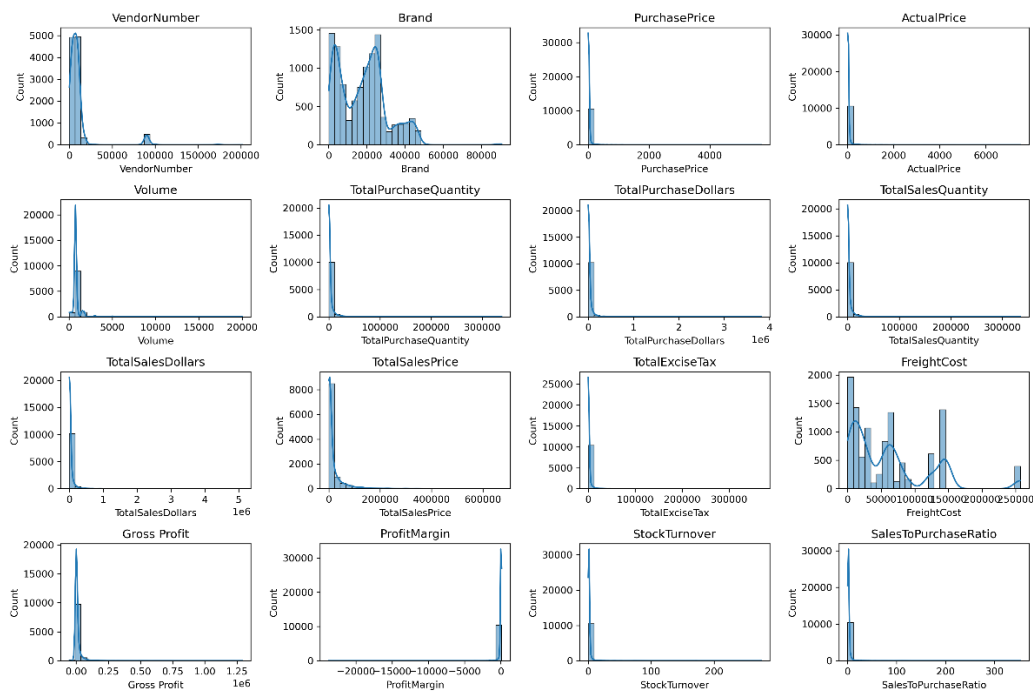
Business Problem & Objectives

Effective inventory and sales management are critical for optimizing profitability in the retail and wholesale industry. Companies must avoid losses from inefficient pricing, poor inventory turnover, and vendor over-dependency. This analysis aims to:

- Identify underperforming brands requiring 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
- Investigate profitability variance between high and low-performing vendors.

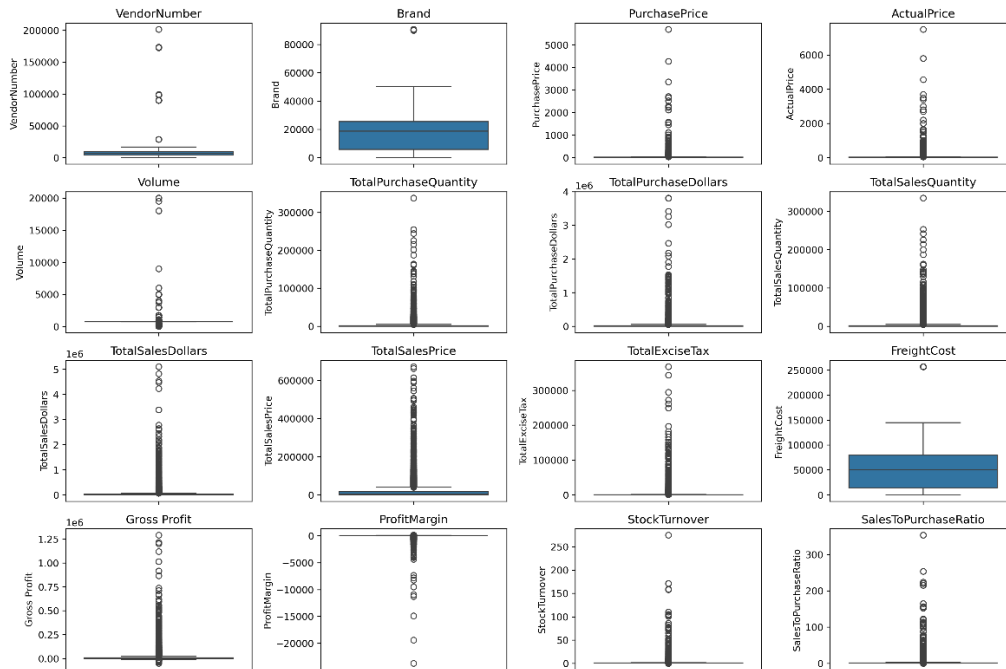
Exploratory Data Analysis

Data Distribution Overview

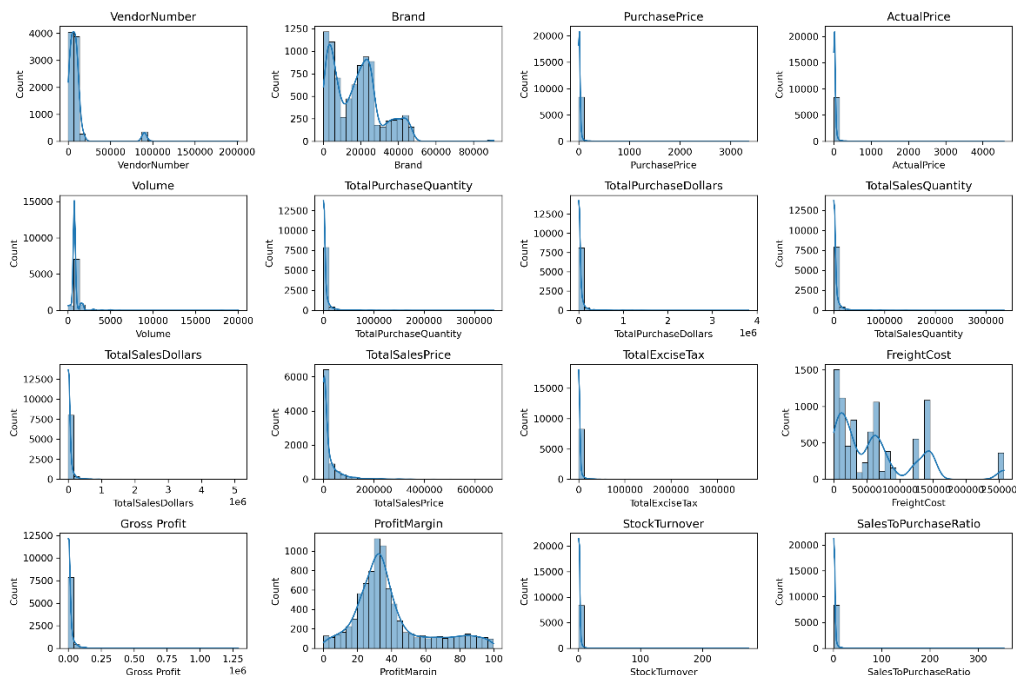


The distribution analysis reveals extreme right-skewness across all financial metrics. Most products cluster at low values with a long tail of high performers, confirming the Pareto

Principle: approximately 80% of revenue derives from 20% of products. This concentration creates operational challenges as the majority of SKUs contribute minimally while absorbing capital and shelf space.

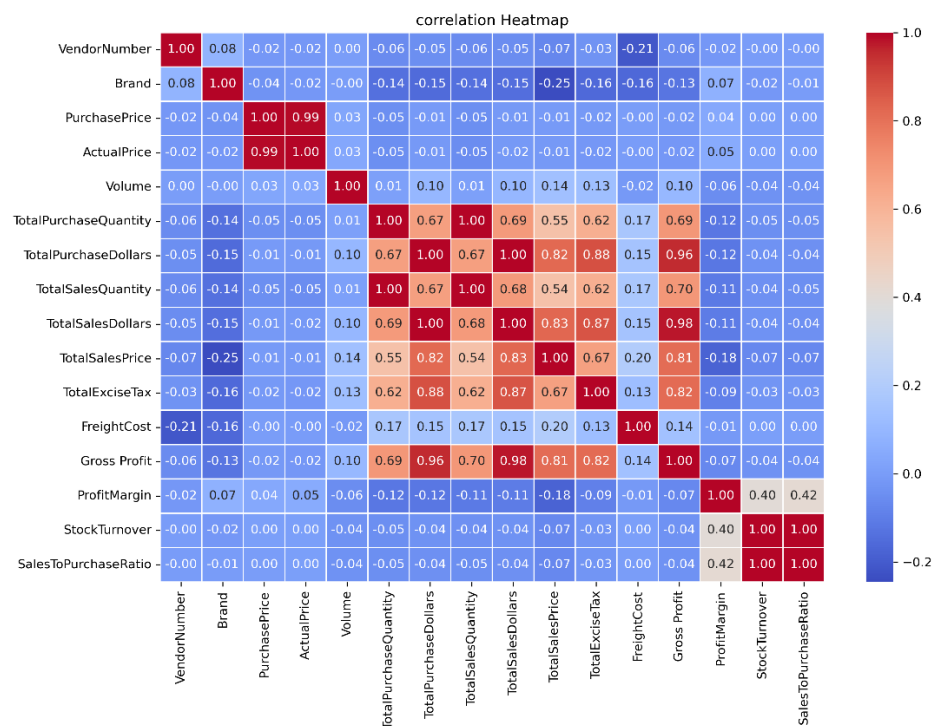


The boxplot analysis exposes significant outliers, particularly in purchase prices (ranging to \$5,681), actual prices (up to \$7,499), and freight costs (maximum \$257,032). These extremes indicate premium product offerings and potential logistics inefficiencies requiring investigation.



After filtering out unprofitable transactions (gross profit ≤ 0 , profit margin ≤ 0 , zero sales), the data shows a more normalized distribution. The profit margin histogram now displays a bell curve centered around 30-40%, indicating most profitable products operate within this margin band.

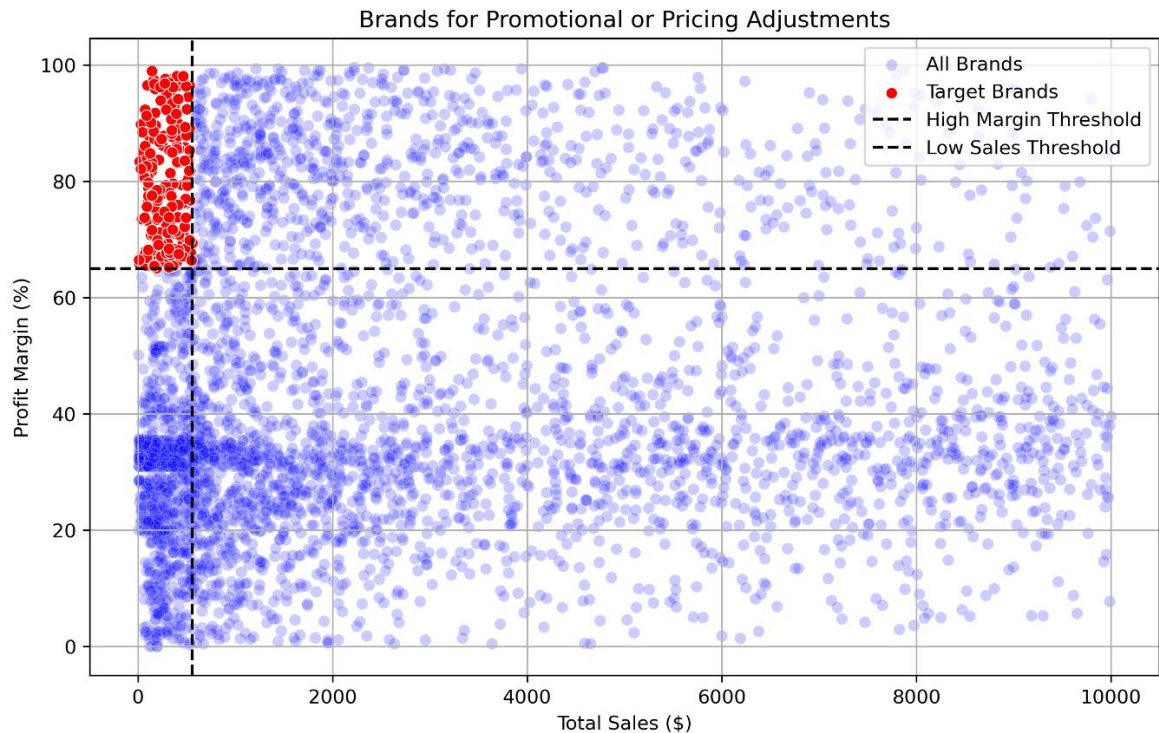
Correlation Analysis



The correlation heatmap reveals several critical relationships. Total purchase quantity and total sales quantity show near-perfect correlation (0.99), confirming efficient inventory turnover. However, purchase price demonstrates weak correlation with sales dollars (-0.012) and gross profit (-0.016), suggesting pricing variations minimally impact revenue. Notably, profit margin shows negative correlation with total sales price (-0.179), indicating competitive pricing pressures that compress margins as prices increase.

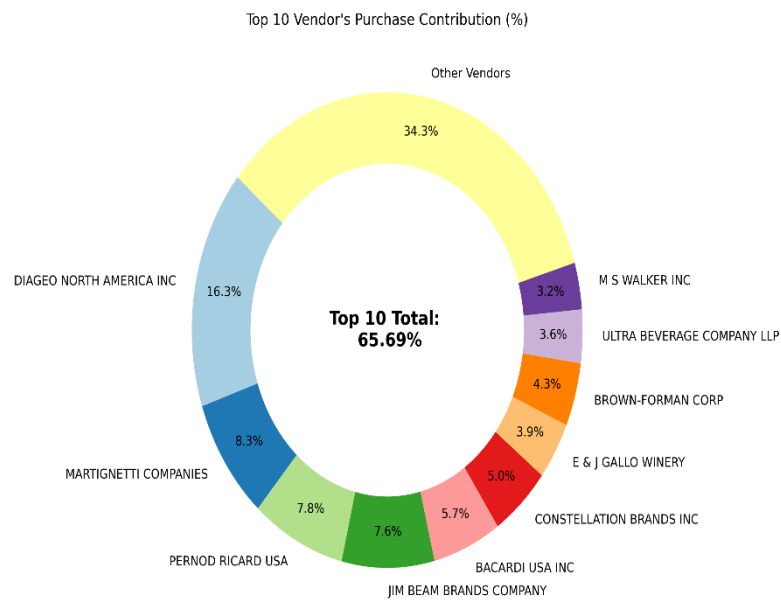
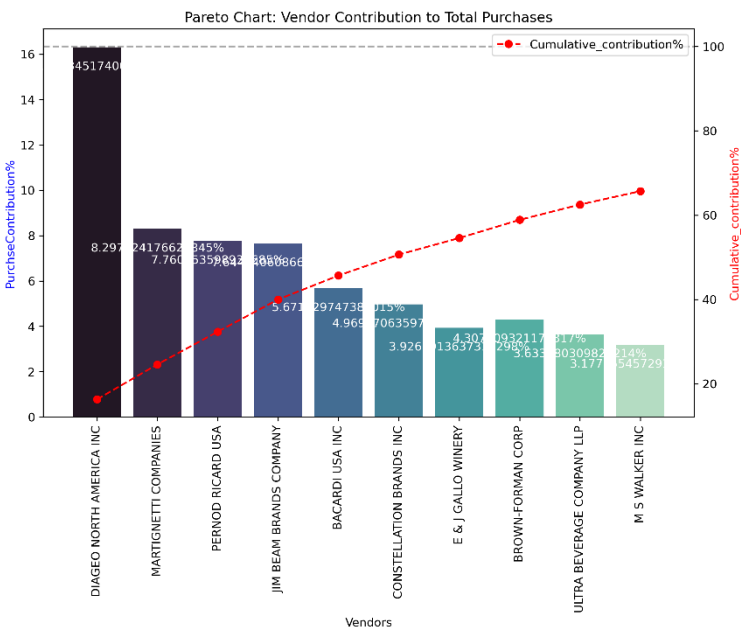
Key Findings

Brand Performance: Promotional Opportunities

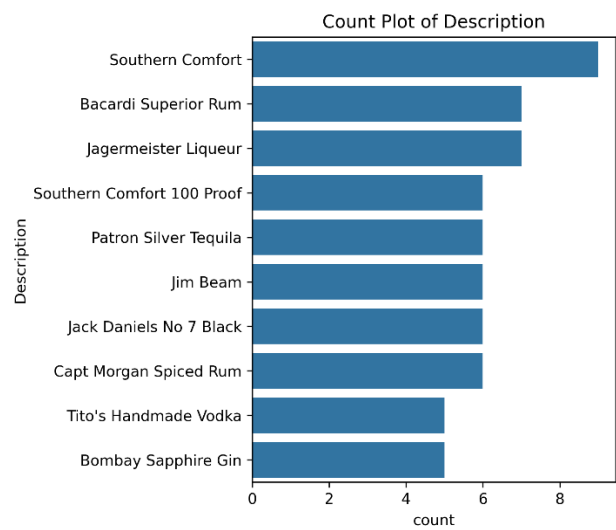
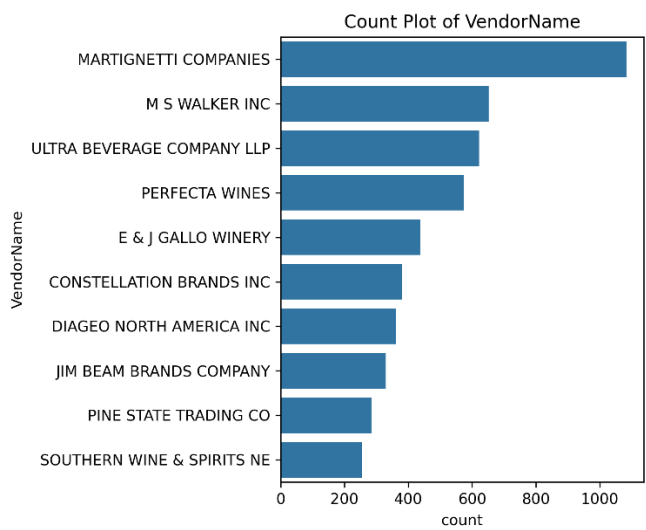


The scatter plot identifies 198 brands (shown in red) with high profit margins (>65%) but low sales (<\$1,000). These products represent trapped capital—inventory purchased but not converting to revenue. The concentration of red dots in the upper-left quadrant signals immediate action items. These brands are prime candidates for 10-15% promotional discounts to boost volume without sacrificing overall profitability.

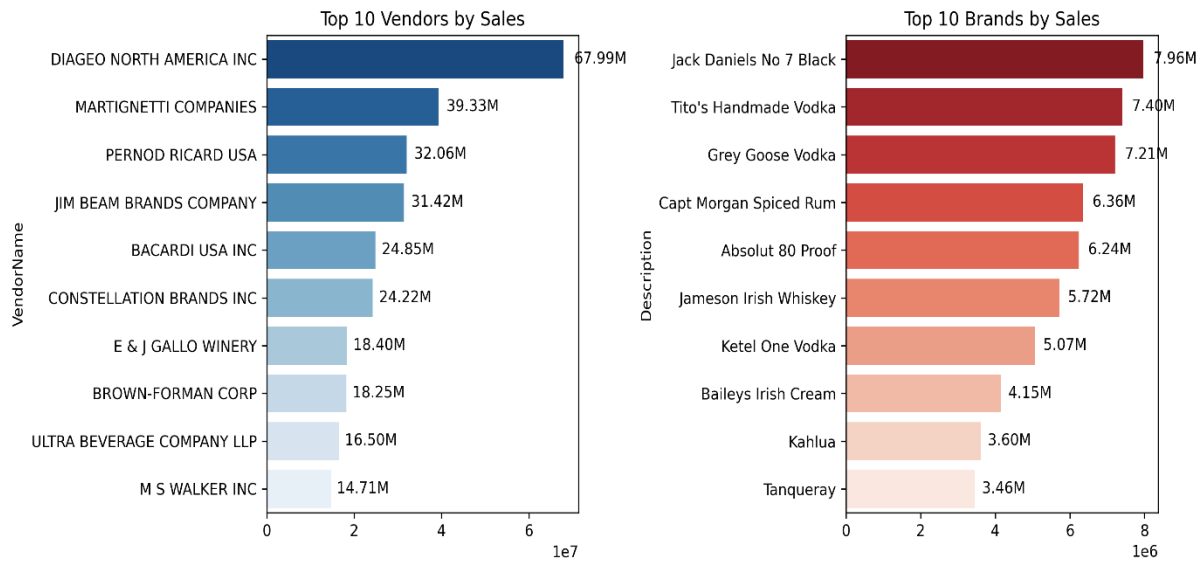
Vendor Concentration Risk



The Pareto analysis demonstrates severe vendor concentration: the top 10 vendors account for 65.69% of total purchases, with DIAGEO NORTH AMERICA INC alone contributing 16.3%. The cumulative contribution curve shows that just 20 vendors represent approximately 80% of procurement spend. While these relationships provide volume stability and negotiating efficiency, this concentration exposes the business to significant supply chain disruption risks.

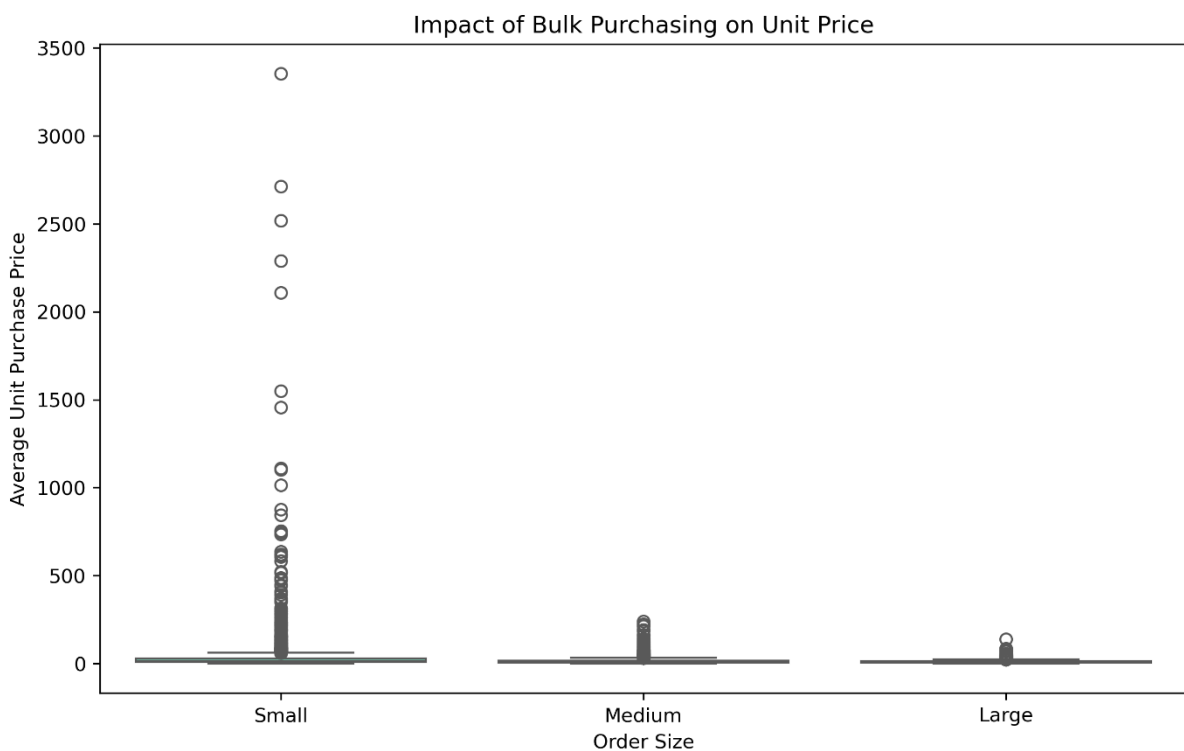


MARTIGNETTI COMPANIES leads with over 1,000 product records, while Southern Comfort dominates the brand description counts. The contrast between vendor count and brand count reveals that large vendors provide product diversity, whereas the "long tail" of small vendors increases administrative complexity without proportional profit contribution.



DIAGEO NORTH AMERICA INC generates \$67.99M in sales—nearly double the second-place MARTIGNETTI COMPANIES at \$39.33M. At the brand level, Jack Daniels No 7 Black leads with \$7.96M, followed by Tito's Handmade Vodka at \$7.40M. These "power brands" drive cash flow but also create dependency risks.

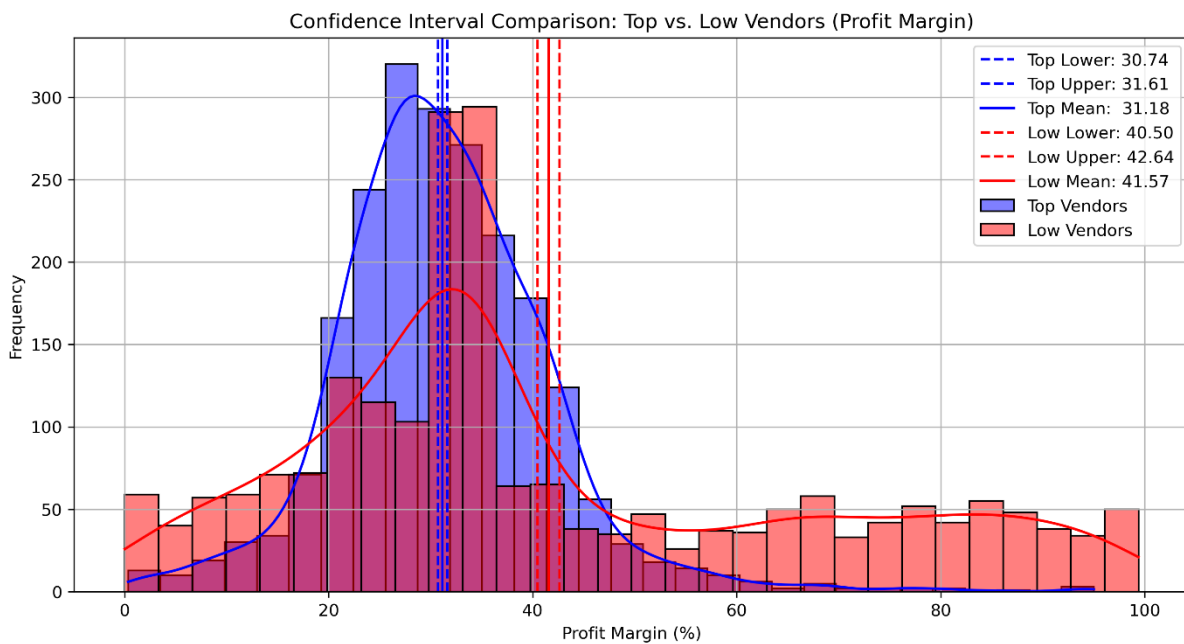
Bulk Purchasing Analysis



The scatter plot demonstrates that unit prices drop sharply from small to medium order sizes, with bulk buyers achieving approximately 72% lower unit costs. However, the curve flattens significantly beyond medium quantities. Large orders (>10,000 units) yield minimal additional price reduction compared to medium orders, suggesting that excessive bulk purchasing produces diminishing returns. The storage and carrying costs for oversized orders likely exceed the marginal savings from fractional price reductions.

Strategic Implication: Cap bulk orders at the "knee" of the curve where price benefits plateau to avoid excess inventory holding costs.

Profit Margin Comparison: Top vs. Low Vendors



Statistical hypothesis testing reveals a counter-intuitive finding: low-performing vendors operate at significantly higher average profit margins (41.57%, CI: 40.50%-42.64%) compared to top vendors (31.18%, CI: 30.74%-31.61%). The non-overlapping confidence intervals confirm this difference is statistically significant, allowing rejection of the null hypothesis.

Interpretation: Top vendors drive volume and cash flow through competitive pricing, while low vendors operate in niche markets with premium margins but limited sales reach. This finding challenges conventional wisdom and suggests that indiscriminately cutting low-volume vendors would harm overall margin mix. The business needs both: top vendors for revenue stability and low vendors for margin enhancement.

Recommendations

Pricing Strategy

Re-evaluate pricing for the 198 identified low-sales, high-margin brands. Implement targeted 10-15% promotional campaigns to boost volume while maintaining healthy margins. Use the high baseline margins to fund marketing initiatives.

Vendor Diversification

Reduce dependency on the top 3 vendors by cultivating relationships with mid-tier suppliers. Establish contingency partnerships to mitigate supply chain disruption risks. Target a reduction in top-10 concentration from 66% to 55% over 18 months.

Optimized Bulk Purchasing

Implement purchasing guidelines that cap bulk orders where the price-quantity curve flattens. Conduct a comprehensive analysis comparing marginal price savings against storage costs, insurance, and working capital requirements.

Inventory Optimization

Launch automatic quarterly reviews for brands with sales-to-purchase ratios below 0.8. Implement clearance strategies (15-20% markdowns or bundle promotions) to convert

\$2.71M in unsold inventory capital back to cash. Establish minimum turnover thresholds for new product introductions.

Strategic Vendor Segmentation

Maintain separate strategies for high-volume and high-margin vendors. Focus cost-efficiency negotiations with top vendors while preserving pricing power with niche suppliers. Avoid consolidation efforts that eliminate profitable low-volume vendors.

Conclusion

This analysis uncovers a complex vendor ecosystem requiring nuanced management. The business successfully maintains efficient inventory turnover (0.99 correlation between purchases and sales) but faces concentration risks and capital trapped in slow-moving inventory. The most critical finding—that low-performing vendors deliver superior margins—should reshape vendor management philosophy. By implementing targeted promotions for underperforming brands, optimizing bulk purchase quantities, and maintaining a balanced vendor portfolio, the organization can simultaneously improve cash flow, reduce risk, and enhance overall profitability.