

Vendor Performance Analysis Report

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Problem Statement:

In the retail industry, profitability is highly dependent on effective sales performance, inventory management, and vendor strategy. Inefficiencies in pricing, inventory turnover, and over-reliance on specific vendors can lead to revenue loss and increased operational costs.

This analysis aims to evaluate vendor and product performance using sales and purchase data to uncover inefficiencies, optimize procurement decisions, and improve overall profitability.

Key Objectives

- Identify underperforming products and brands that may require pricing revisions or targeted promotional strategies.
- Analyze vendor contributions to total sales and gross profit to understand revenue concentration and dependency risks.
- Evaluate the impact of bulk purchasing on unit costs to identify optimal procurement volumes.
- Assess inventory turnover to detect slow-moving inventory and reduce holding costs.
- Compare profitability across vendors to understand performance variance and highlight optimization opportunities.

Database Description:

The database consists of **six tables** used for analyzing vendor purchases, sales and inventory movement:

- **Vendor Invoice:** Contains details of purchase invoices raised by vendors, including purchase order date, payment date, quantity ordered and purchase price.
- **Sales:** Stores product sales information such as sales quantity, sales price, sales volume and other sales-related metrics.
- **Purchase Prices:** Maintains purchase pricing details, including the listed purchase price and the actual price paid. This table contains data similar to the **vendor invoice** table and is primarily used for price comparison analysis.
- **Purchases:** Records purchase transactions with details such as quantity purchased, invoice date, receiving date, and other procurement-related information.
- **Begin Inventory:** Contains inventory details at the start of the year (01/01/2024).
- **End Inventory:** Contains inventory details at the end of the year (31/12/2024).

Dataset Creation Workflow:

- Raw CSV files containing purchase, sales, pricing, and inventory data were ingested into a SQLite database using Python and SQLAlchemy to enable structured storage and efficient querying.
- Multiple transactional tables were merged and aggregated using SQL queries to create a consolidated vendor-level summary dataset.

Final Dataset:

VendorName	VendorNumber	Brand	Description	PurchasePrice	ActualPrice	Volume	TotalPurchaseQuantity	TotalPurchaseDollars	TotalSalesDollars	TotalSalesPrice	TotalSalesQuantity	TotalExciseTax	F
MARTIGNETTI COMPANIES	4425	25729	Chappellet Mt Cuvee Napa	19.35	29.99	750	721	13951.35	17754.08	9146.95	592.0	65.84	
CONSTELLATION BRANDS INC	1392	24568	PopCrush Sparkling Wine	6.12	8.99	750	12	73.44	107.88	8.99	12.0	1.35	
ULTRA BEVERAGE COMPANY LLP	9165	24515	Cartlidge & Browne Chard	9.39	13.99	750	583	5474.37	3952.27	2095.03	433.0	48.19	
PINE STATE TRADING CO	7153	21788	LiDestri Bloody Mary	6.89	9.99	1500	12	82.68	35.96	35.96	4.0	0.88	
MILTONS DISTRIBUTING CO	5612	17637	Laurent Reverdy Sancerre	8.70	13.49	750	24	208.80	323.76	26.98	24.0	2.70	

Data Cleaning and Preparation:

- The **Volume** column is converted from object to float.
- Missing values are filled with zero to avoid calculation issues.
- Trailing whitespaces are removed from the **VendorName** column to ensure consistency.

Feature Engineering:

New analytical columns are created:

- **GrossProfit**
- **ProfitMargin**
- **StockTurnover**
- **SalestoPurchaseRatio**

Numerical Columns Statistics Summary:

	count	mean	std	min	25%	50%	75%	max
VendorNumber	10692.0	1.065065e+04	18753.519148	2.00	3951.0000	7153.0000	9552.000000	201359.000
Brand	10692.0	1.803923e+04	12662.187074	58.00	5793.5000	18761.5000	25514.250000	90631.000
PurchasePrice	10692.0	2.438530e+01	109.269375	0.36	6.8400	10.4550	19.482500	5681.810
ActualPrice	10692.0	3.564367e+01	148.246016	0.49	10.9900	15.9900	28.990000	7499.990
Volume	10692.0	8.473605e+02	664.309212	50.00	750.0000	750.0000	750.000000	20000.000
TotalPurchaseQuantity	10692.0	3.140887e+03	11095.086769	1.00	36.0000	262.0000	1975.750000	337660.000
TotalPurchaseDollars	10692.0	3.010669e+04	123067.799627	0.71	453.4575	3655.4650	20738.245000	3811251.600
TotalSalesDollars	10692.0	4.223907e+04	167655.265984	0.00	729.2200	5298.0450	28396.915000	5101919.510
TotalSalesPrice	10692.0	1.879378e+04	44952.773386	0.00	289.7100	2857.8000	16059.562500	672819.310
TotalSalesQuantity	10692.0	3.077482e+03	10952.851391	0.00	33.0000	261.0000	1929.250000	334939.000
TotalExciseTax	10692.0	1.774226e+03	10975.582240	0.00	4.8000	46.5700	418.650000	368242.800
FreightCost	10692.0	6.143376e+04	60938.458032	0.09	14069.8700	50293.6200	79528.990000	257032.070
GrossProfit	10692.0	1.213238e+04	46224.337964	-52002.78	52.9200	1399.6400	8660.200000	1290667.910
ProfitMargin	10692.0	-inf	NaN	-inf	13.3275	30.4050	39.960000	99.720
StockTurnover	10692.0	1.706793e+00	6.020460	0.00	0.8072	0.9815	1.039325	274.500
SalestoPurchaseRatio	10692.0	2.504390e+00	8.459071	0.00	1.1540	1.4370	1.665000	352.929

Summary Insights:

- **Observations on Zero and Negative Data:**

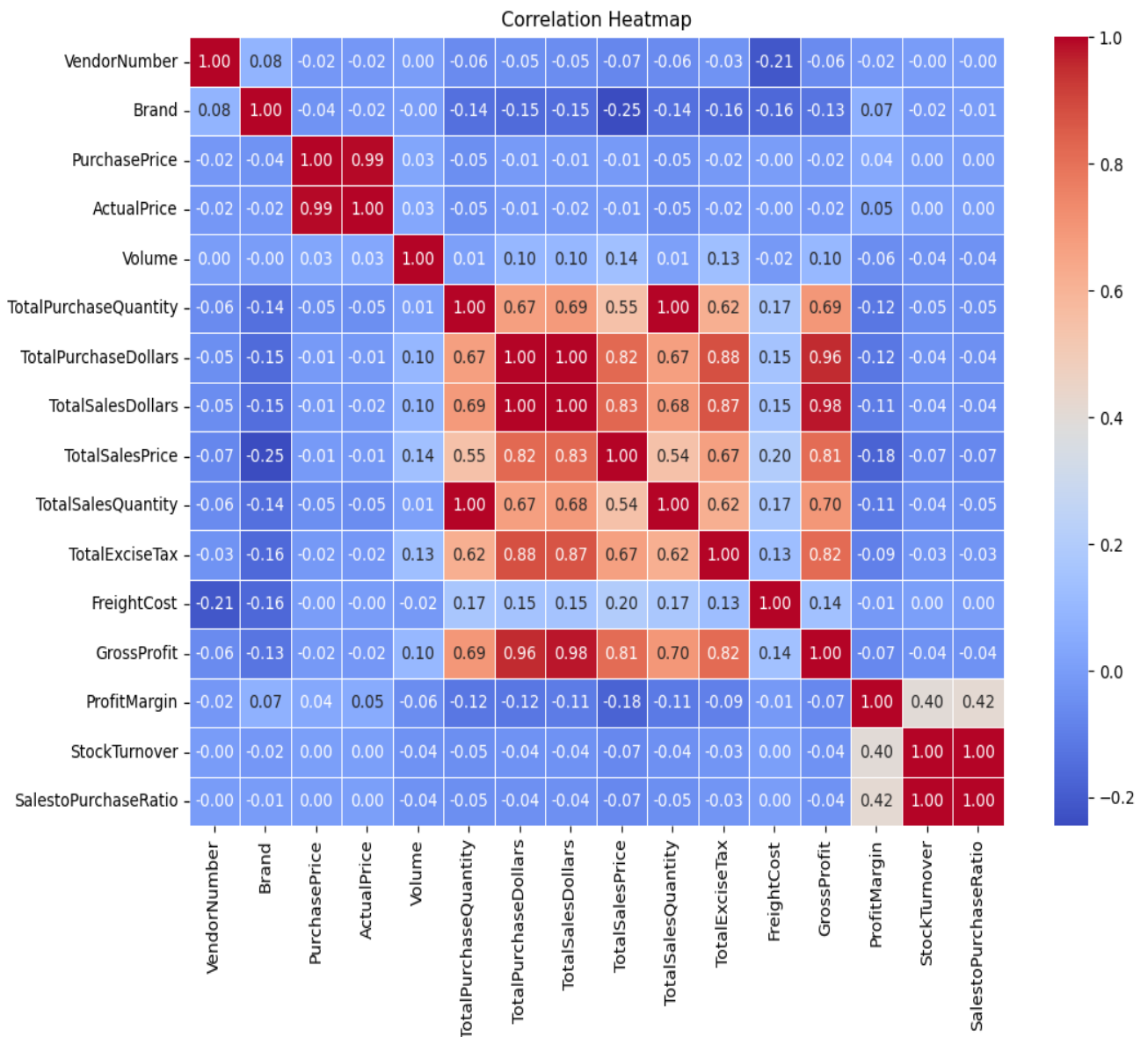
- **Gross Profit:** The raw data contained negative gross profit values, indicating instances where products were sold below cost, likely due to high procurement expenses or discount-driven pricing strategies.
- **Profit Margin:** Undefined or negative profit margins were observed in cases with zero sales, resulting in invalid profitability calculations.
- **Sales Performance:** Products with zero sales quantity or sales value were identified, highlighting slow-moving or non-performing inventory that may require corrective action.

- **Variability and Outlier Analysis:**

- **Purchase Price and Actual Price:** Significant deviations from average values indicate the presence of premium or high-value products within the portfolio.
- **Freight Cost:** High variability in freight costs points to potential inefficiencies or inconsistencies in logistics operations.

- **Stock Turnover:** Wide dispersion in stock turnover reflects uneven inventory movement, with certain products selling rapidly while others remain in inventory for prolonged periods.

Correlation Heatmap:



Insights:

- **Purchase Price** shows weak correlations with **Total Sales Dollars (-0.012)** and **Gross Profit (-0.016)**, suggesting that price variations have minimal impact on overall sales revenue and profitability.
- There is a **strong positive correlation** between **Total Purchase Quantity** and **Total Sales Quantity (0.999)**, indicating efficient inventory movement.
- A **negative correlation** between **Profit Margin** and **Total Sales Price (-0.179)** suggests that higher sales prices may be associated with lower margins, possibly due to competitive pricing or discounting strategies.
- **Stock Turnover** has weak negative correlations with both **Gross Profit (-0.038)** and **Profit Margin (-0.055)**, indicating that faster inventory turnover does not necessarily translate into higher profitability.

Key Findings:

- **Brands for Promotional or Pricing Adjustments:**

Top 10 Products with High Profit Margins but Low Sales:

	Description	TotalSalesDollars	ProfitMargin
6957	The Club Strawbry Margarita	143.28	98.97
452	Bacardi Oakheart Spiced Trav	399.60	98.13
1873	Chi Chi's Chocolate Malt RTD	461.58	98.11
6	12 Days of Pearls Gift Set	309.69	97.68
4592	Mad Dogs & Englishmen Jumil	279.80	97.67
5977	Riunite Sweet White	161.73	97.46
4923	Mojoshot Blue Lagoon RTD	316.80	97.00
2337	DeKuyper Mixed Berry Medley	252.77	96.85
7384	Vigne A Porrone Rosso	272.79	96.83
6236	Sauza Sparkling Margarita	167.76	96.79

Insights:

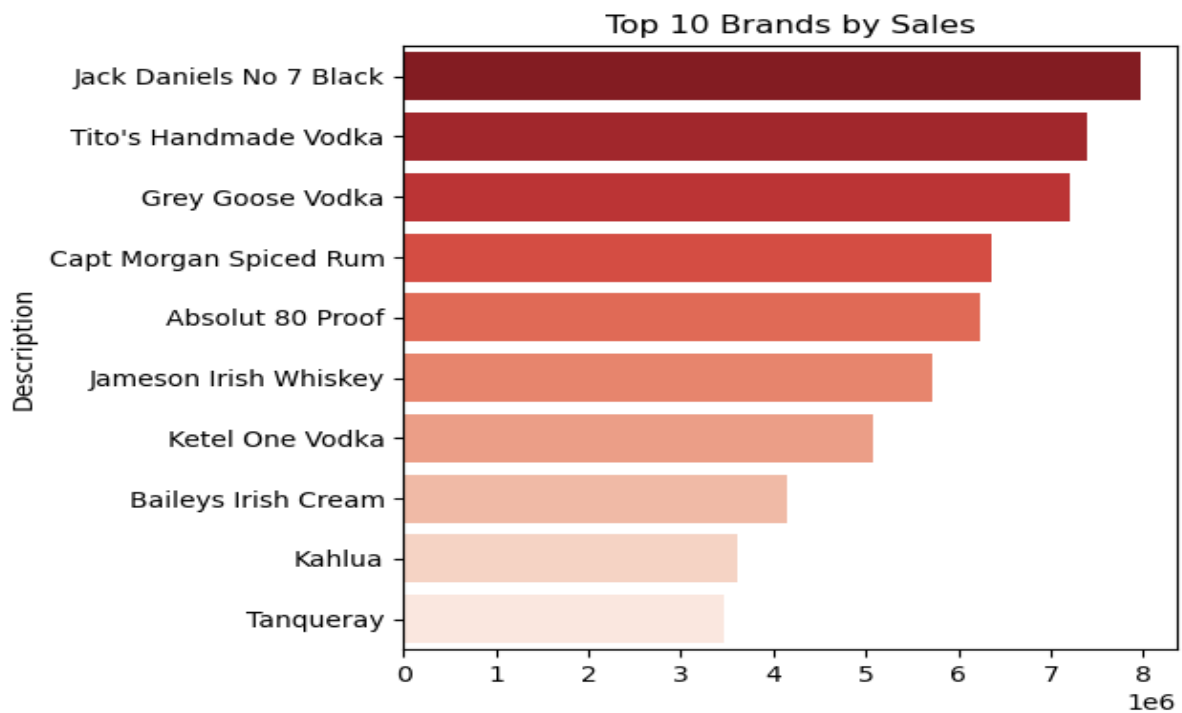
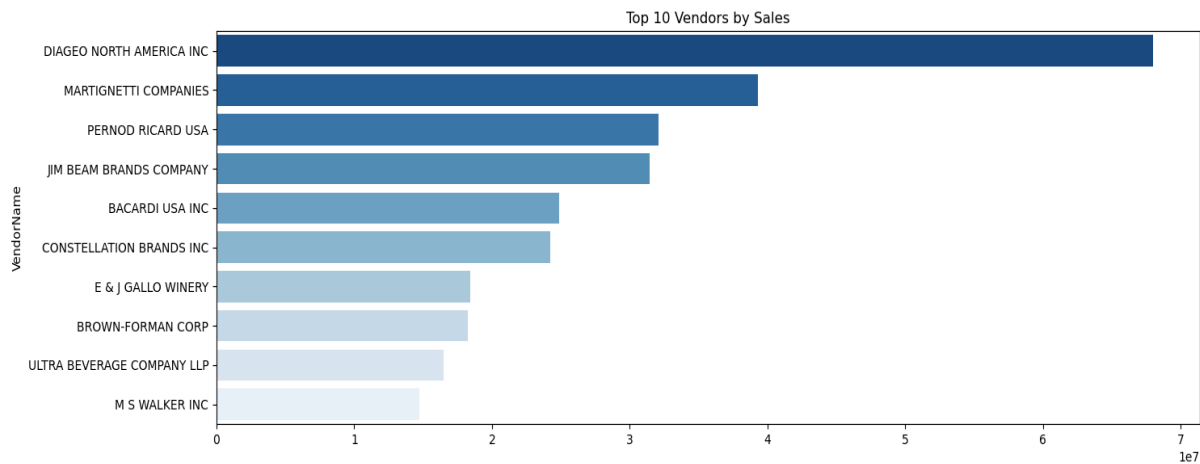
These products exhibit **high profit margins** but **low sales volumes**, indicating strong profitability potential.

Recommended Business Actions:

- Run targeted promotions to increase awareness and demand without significantly impacting profit margins.
- Improve product visibility through better placement or featured listings to capture untapped demand.

- Pilot sales initiatives before scaling procurement to validate demand and minimize inventory risk.

- **Top-Performing Vendors and Brands**



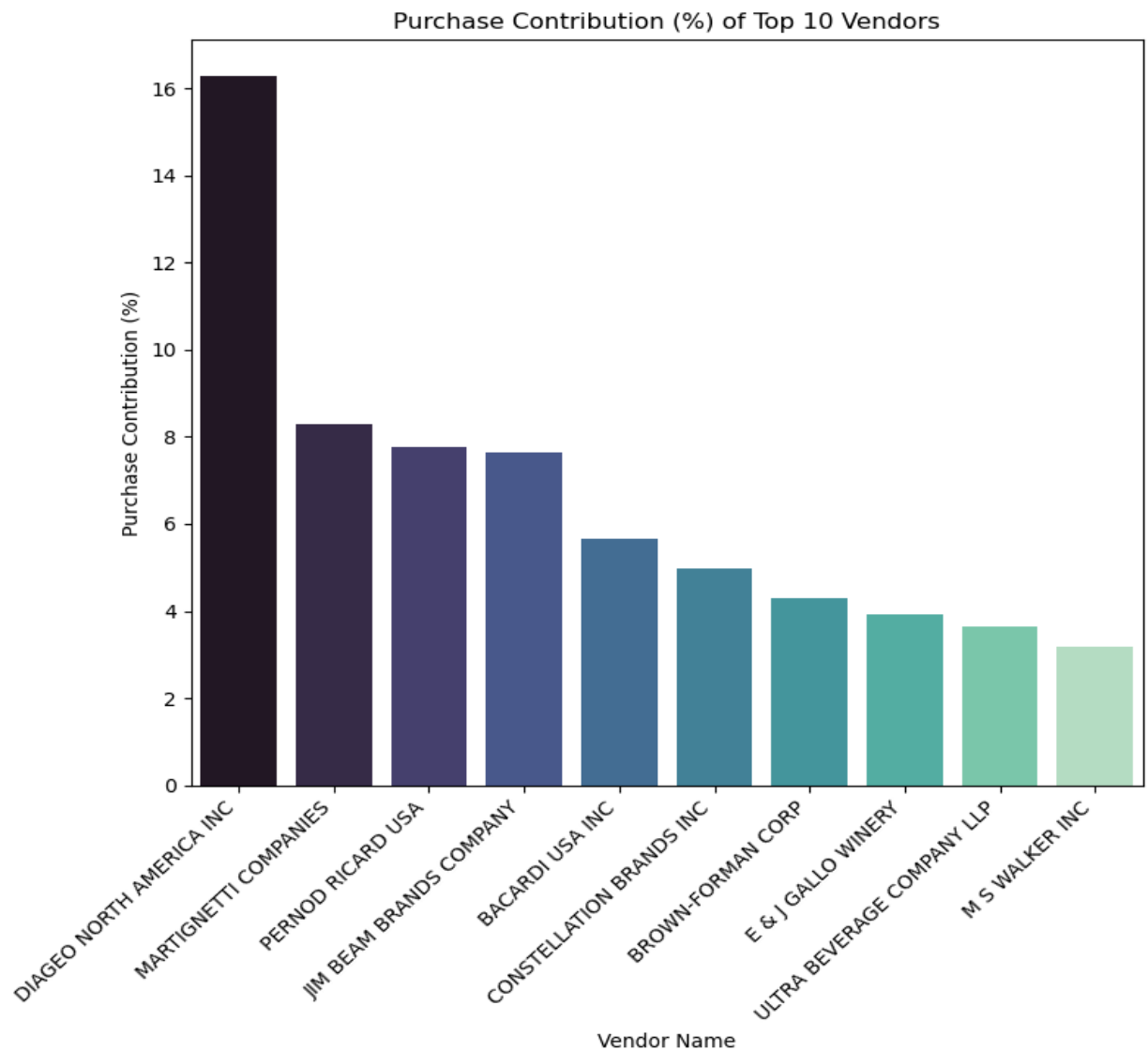
Insights:

Sales performance is **highly concentrated among a small group of vendors and flagship brands**, indicating strong brand-driven demand. Heavy reliance on a few top performers exposes the business to **concentration and dependency risk**.

Recommended Business Actions:

- **Strengthen strategic partnerships** with top vendors to secure favourable pricing, supply continuity, and promotional support.
- **Diversify revenue sources** by investing in high-potential mid-tier vendors and brands through targeted marketing and distribution expansion.
- **Monitor concentration risk** by tracking vendor contribution trends and setting thresholds for dependency management.

- **Vendor Contribution to Total Purchase Spend**



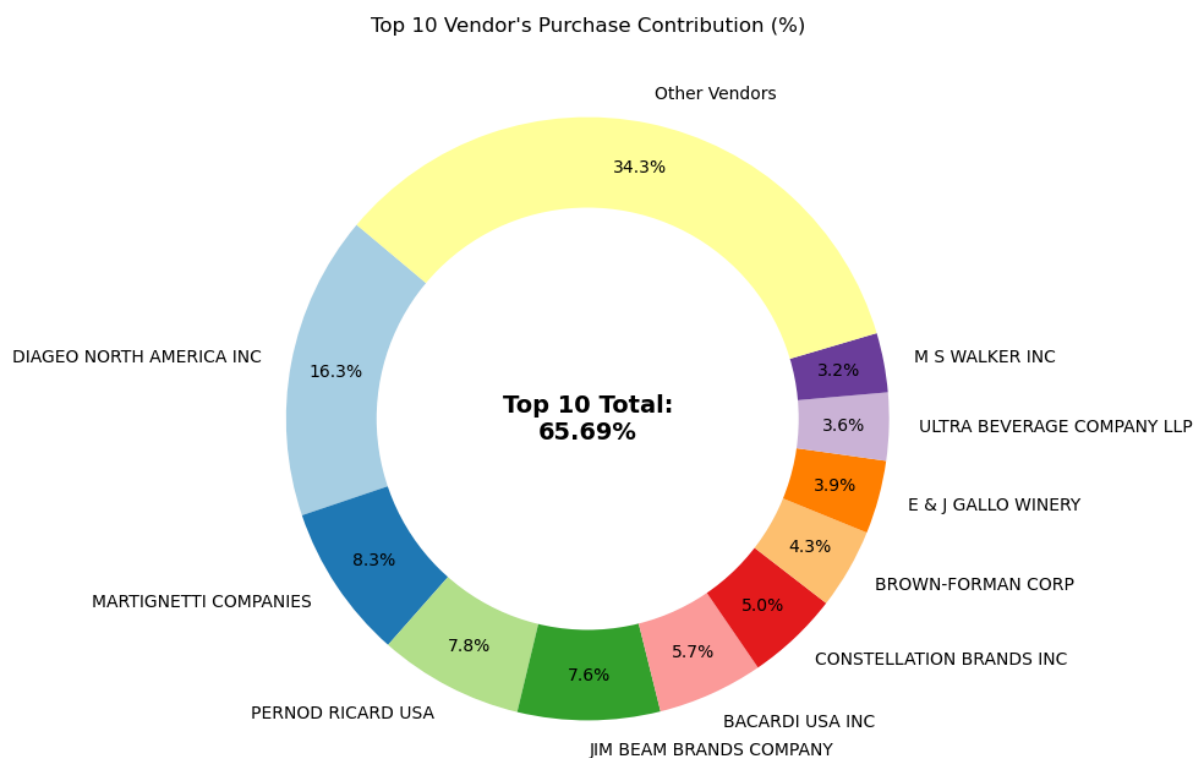
Insights:

The analysis shows that total purchase spending is highly concentrated among a small group of vendors, who also account for a significant share of overall sales and gross profit. This indicates a strong dependency on top-performing vendors for procurement, making these relationships critical to operational continuity and cost efficiency.

Recommended Business Actions:

- **Strengthen strategic vendor partnerships** with high-spend vendors to negotiate better pricing, payment terms, and freight cost efficiencies.
- **Reduce dependency risk** by gradually diversifying procurement across capable mid-tier vendors where feasible.
- **Implement vendor performance monitoring** to regularly assess purchase concentration, cost trends, and supply reliability.

• Procurement Dependency on Top Vendors



Insights:

The analysis shows that the **top 10 vendors account for approximately 65.7% of total procurement spend**, indicating a high level of dependency on a limited set of suppliers. While this concentration can improve purchasing leverage and operational efficiency, it also exposes the business to **supply chain, pricing, and negotiation risks**.

Recommended Business Actions

- **Strengthen strategic relationships** with top vendors to secure favorable pricing, reliable supply, and long-term contractual stability.
- **Mitigate dependency risk** by gradually diversifying procurement across capable mid-tier vendors where cost and quality allow.
- **Track vendor concentration regularly** using procurement contribution metrics to ensure dependency remains within acceptable risk thresholds.

- **Impact of Bulk Purchasing on Unit Cost:**

Unit Purchase Price by Order Size	
OrderSize	
Medium	39.068186
Small	15.486414
Large	10.777625

Insights:

The analysis clearly shows that **unit purchase price decreases as order size increases**. Large orders have the **lowest average unit cost** compared to medium and small orders, confirming that bulk purchasing provides significant cost advantages. This indicates strong economies of scale, where higher purchase volumes lead to better pricing efficiency and reduced per-unit costs.

Recommended Business Actions

- **Prioritize larger order sizes** for high-demand and fast-moving products to maximize cost savings.
- **Consolidate purchases** where feasible to move from small or medium orders to bulk orders without increasing inventory risk.
- **Balance bulk buying with inventory turnover**, ensuring that increased order sizes are aligned with demand forecasts to avoid excess stock.

- **Vendors with Low Inventory Turnout:**

Vendors having lowest stock inventory turnover

VendorName

ALISA CARR BEVERAGES	0.615400
HIGHLAND WINE MERCHANTS LLC	0.708300
PARK STREET IMPORTS LLC	0.751300
Circa Wines	0.755677
Dunn Wine Brokers	0.766038
CENTEUR IMPORTS LLC	0.773950
SMOKY QUARTZ DISTILLERY LLC	0.783800
TAMWORTH DISTILLING	0.797100
THE IMPORTED GRAPE LLC	0.807582
WALPOLE MTN VIEW WINERY	0.820533

Name: StockTurnover, dtype: float64

Insights:

The analysis identifies a group of vendors with **low stock turnover**, indicating slow-moving inventory and excess stock levels. This suggests that products from these vendors are not converting into sales efficiently, leading to higher holding costs and working capital being tied up in inventory.

Recommended Business Actions:

- **Reassess procurement volumes** for low-turnover vendors to better align purchases with actual demand.
- **Implement targeted clearance or promotional strategies** to accelerate inventory movement and reduce holding costs.
- **Review vendor and product mix** to determine whether certain offerings should be reduced, renegotiated, or discontinued.

- **Unsold Inventory and Capital Lock-In by Vendor**

Top 10 Vendors by Unsold Inventory Value

	VendorName	UnsoldInventoryValue
25	DIAGEO NORTH AMERICA INC	722.21K
46	JIM BEAM BRANDS COMPANY	554.67K
68	PERNOD RICARD USA	470.63K
116	WILLIAM GRANT & SONS INC	401.96K
30	E & J GALLO WINERY	228.28K
79	SAZERAC CO INC	198.44K
11	BROWN-FORMAN CORP	177.73K
20	CONSTELLATION BRANDS INC	133.62K
61	MOET HENNESSY USA INC	126.48K
77	REMY COINTREAU USA INC	118.60K

Key Insights

The analysis reveals that a **substantial amount of working capital is locked in unsold inventory**, with a significant share concentrated among a small group of vendors. This concentration indicates that excess inventory risk is not evenly distributed but driven primarily by key vendors. While these vendors may also be strong contributors to sales, high unsold inventory levels highlight gaps in demand forecasting, procurement planning, or inventory allocation.

Recommended Business Actions

- **Prioritize inventory optimization efforts** for vendors contributing the most to unsold inventory value to unlock working capital.
- **Align procurement decisions with demand patterns** by adjusting order quantities and replenishment cycles for high-risk vendors.
- **Use targeted promotions or clearance strategies** to reduce excess stock while minimizing margin erosion.

Limitations:

- The analysis is based on **historical transactional data**, and therefore does not account for future demand fluctuations, seasonality, or market dynamics.
- Customer-level demand, promotional impact, and external factors such as competitor pricing or macroeconomic conditions were not available and hence not included.
- Inventory holding costs, storage constraints, and vendor-specific contractual terms were assumed to be uniform due to data unavailability.
- Profitability and turnover metrics are derived from aggregated data, which may mask product-level or time-specific variations.

Conclusion:

This analysis provides a comprehensive view of **vendor performance, profitability, procurement efficiency, and inventory health**. The findings highlight strong revenue and profit concentration among a limited number of vendors, significant cost advantages from bulk purchasing, and notable capital lock-in due to slow-moving inventory.

By leveraging these insights, the business can strengthen strategic vendor partnerships, optimize procurement volumes, improve inventory turnover, and unlock working capital.

Overall, the analysis supports **data-driven decision-making** aimed at improving operational efficiency, reducing risk, and enhancing long-term profitability.