

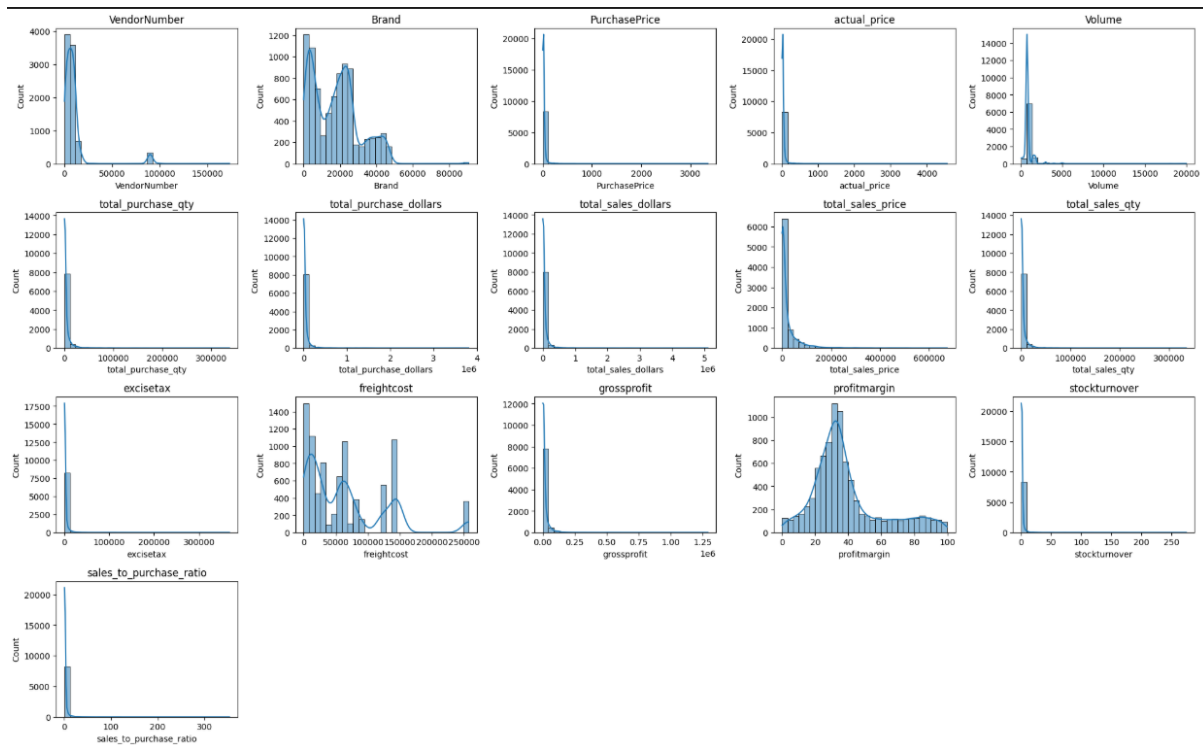
Business Problem

Effective inventory and sales management are critical for optimising profitability in the retail and wholesale industry. Organisations need to ensure they are not incurring losses due to inefficient pricing, poor inventory 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.
- Analyse impact of bulk purchasing on unit costs.
- Assess inventory turnover to reduce holding costs and improve efficiency.
- Investigate profitability variance between high-performing and low-performing vendors.

Descriptive Statistics

	count	mean	std	min	25%	50%	75%	
index	10663.0	5.331000e+03	3078.287294	0.00	2665.500000	5331.000000	7996.500000	1.06
VendorNumber	10663.0	1.062987e+04	18689.758763	2.00	3924.000000	7153.000000	9552.000000	1.73
Brand	10663.0	1.804738e+04	12642.239905	58.00	5816.000000	18771.000000	25518.000000	9.06
PurchasePrice	10663.0	2.441477e+01	109.415399	0.36	6.840000	10.450000	19.520000	5.68
actual_price	10663.0	3.568668e+01	148.443819	0.49	10.990000	15.990000	28.990000	7.49
Volume	10663.0	8.477462e+02	664.896077	50.00	750.000000	750.000000	750.000000	2.00
total_purchase_qty	10663.0	3.149429e+03	11115.898670	1.00	36.000000	262.000000	1976.500000	3.37
total_purchase_dollars	10663.0	3.018857e+04	123300.198677	0.71	454.500000	3648.540000	20831.970000	3.81
total_sales_dollars	10663.0	4.224347e+04	167836.559043	0.00	724.260000	5247.500000	28391.825000	5.10
total_sales_price	10663.0	1.878724e+04	44992.230813	0.00	287.790000	2829.500000	16033.210000	6.72
total_sales_qty	10663.0	3.077569e+03	10963.961022	0.00	33.000000	259.000000	1924.500000	3.34
excisetax	10663.0	1.772837e+03	10984.905201	0.00	4.760000	46.180000	416.140000	3.68
freightcost	10663.0	6.141110e+04	61025.674272	0.27	14069.870000	50293.620000	79528.990000	2.57
grossprofit	10663.0	1.205490e+04	46347.240258	-214010.68	50.965000	1373.530000	8618.800000	1.29
profitmargin	10663.0	-inf	NaN	-inf	12.991013	30.363791	39.911352	9.97
stockturnover	10663.0	1.700246e+00	6.002869	0.00	0.803830	0.981132	1.038128	2.74
sales_to_purchase_ratio	10663.0	2.494855e+00	8.430874	0.00	1.149307	1.436035	1.664208	3.52



Negative and Zero values:

Gross Profit: min value is -52000 indicating losses. Some products or transactions might be selling at a loss or due to high costs or selling at discounts lower than purchase price.

Profit Margin: has a min of - infinity, which suggests cases where revenue is 0 or even lower than the costs.

Total Sales Qty & Sales Dollars: Min values are 0, meaning some products did not get sold. These could be slow moving or obstacle stock.

Outliers indicted by high SD:

Purchase and actual price: Max values of 5681 and 7499 are way higher than mean of 24.39 and 35.6 indicating potential premium products.

Freight costs: Huge variation, from 0.27 to 257032, suggests logistic inefficiencies or bulk shipments.

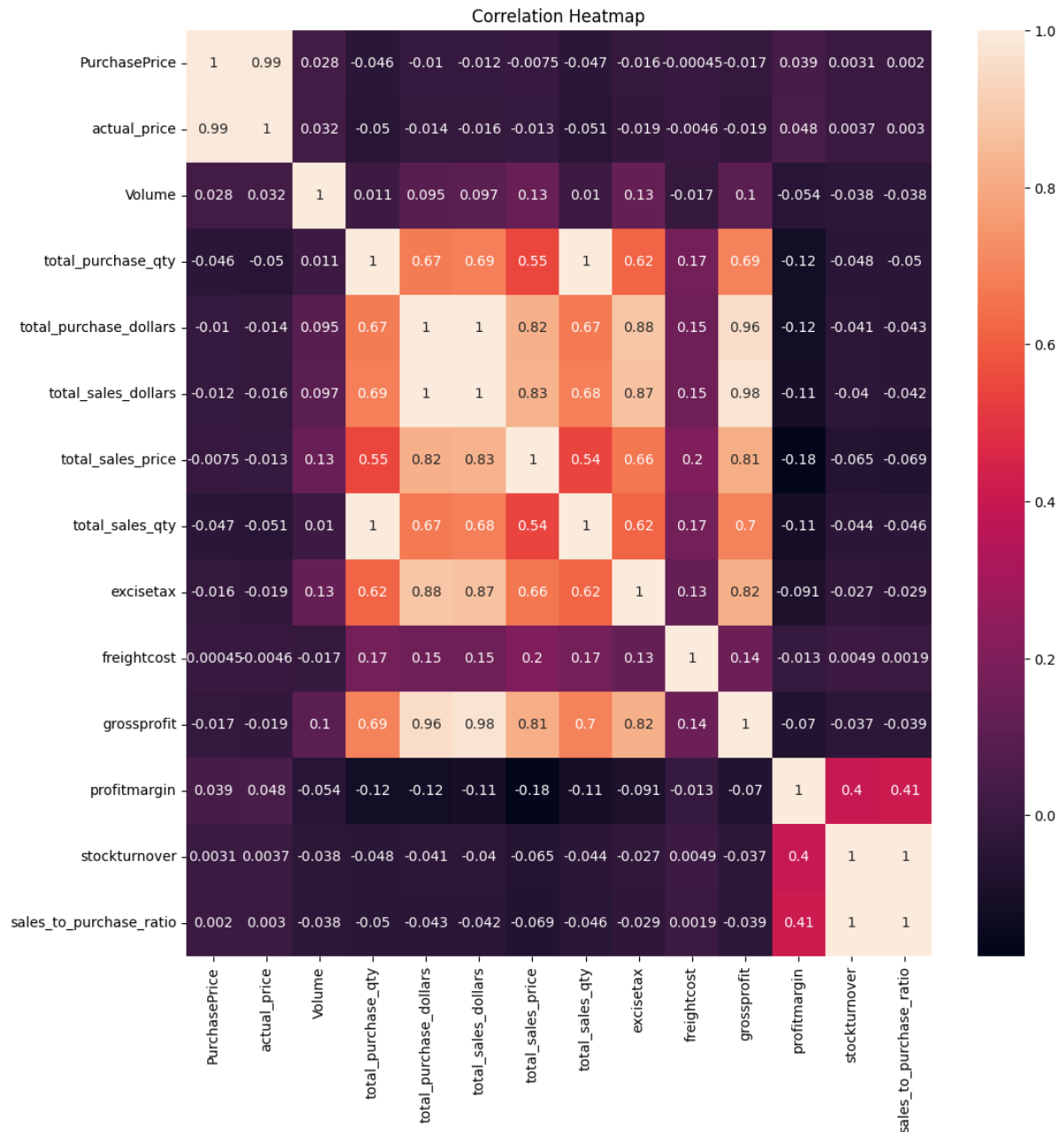
Stock turnover: Ranges from 0 to 274.5, implying some products sell extremely fast while others remain in stock indefinitely. Value more than 1 indicates sold quantity for that product is > purchased qty due to sales being fulfilled.

Data filtering

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

- Gross Profit ≤ 0 (exclude transactions leading to losses)
- Profit Margin ≤ 0 (to ensure insights are based only on profitable transactions)
- Total Sales Qty = 0 (to eliminate inventory which was never sold)

Correlation Insights



Corelation Insights

- **Purchase Price vs Total Dollar Sales & Gross Profit:** PurchasePrice has weak correlation with TotalSalesDollars (-0.012) and GrossProfit (-0.017), implying price variation does not significantly impact sales revenue or profit.

- **Total Purchase Qty vs Total Sales Qty:** Strong correlation b/w total_purchase_qty and total_sales_qty(1), implying efficient inventory turnover.

- **Profit Margin vs Total Sales Price:** Negative correlation between profitmargin and total_sales_price(-0.18) this implies both are inversely proportional to one another.

- **Stock Turnover vs Gross Profit & Profit Margin:** Stockturnover has weak negative corellations with both GrossProfit(-0.037) and Profitmargin(0.40) does not indicate that faster turn over results in higher profitability.

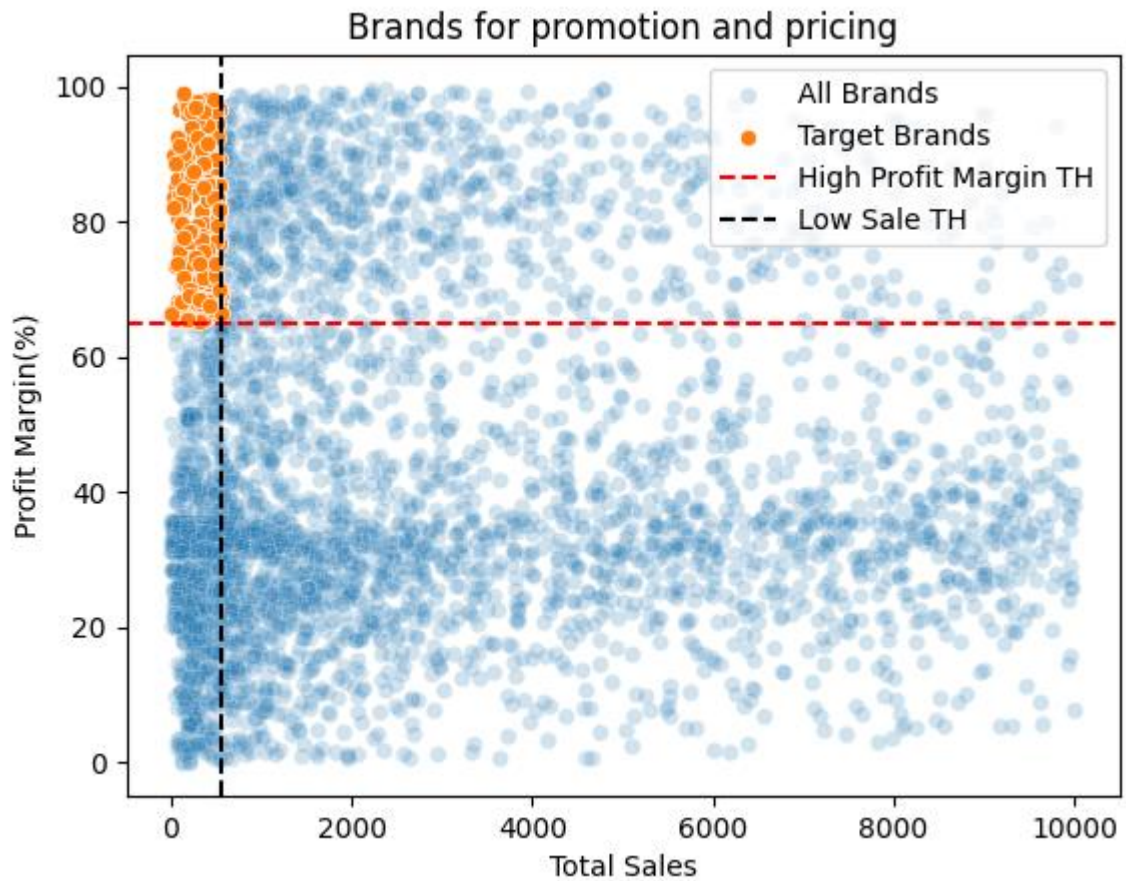
Research Questions and Key Findings

1. Brands who need promotions or price adjustments.

The brands with lower sales and higher profit margins are:

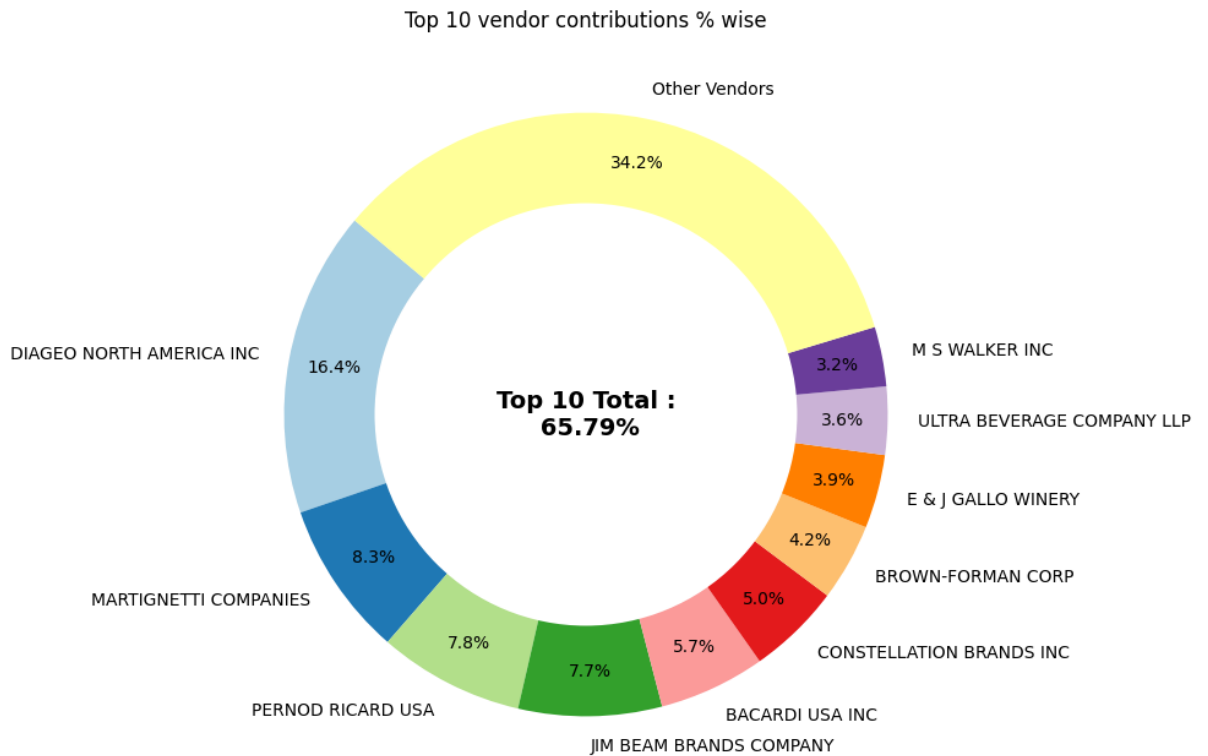
	Description	total_sales_dollars	profitmargin
6187	Santa Rita Organic Svgn Bl	9.99	66.466466
2363	Debauchery Pnt Nr	11.58	65.975820
2065	Concannon Glen Ellen Wh Zin	15.95	83.448276
2182	Crown Royal Apple	27.86	89.806174
6225	Sauza Sprklg Wild Berry Marg	27.96	82.153076
...
5062	Nanbu Bijin Southern Beauty	535.68	76.747312
2265	Dad's Hat Rye Whiskey	538.89	81.851584
57	A Bichot Clos Marechaudes	539.94	67.740860
6233	Sbragia Home Ranch Merlot	549.75	66.444748
3319	Goulee Cos d'Estournel 10	558.87	69.434752
197 rows × 3 columns			

198 brands exhibit lower sales but higher profit margin, which can be increased by promotions, targeted marketing or price optimisations to increase volume without compromising on profitability.



2. Vendors and Brands showing highest sales performance.

These top 10 vendors contribute 65.79% of total purchase, while the remaining vendors contribute only 34.21%. This over reliance on a few vendors may introduce risks such as supply chain disruptions, indicating a need for diversification.



3. Effect of bulk purchasing in reducing unit price and optimal purchase volume for cost saving.

Vendors buying in large quantities receive appx 71% lower **per** unit cost (\$10.77) compared to those of small quantities (\$39.15).

Bulk purchasing strategies encourage large orders, increasing total sales while maintaining profitability.

unit_purchase_price	
order_size	
Small	39.150566
Medium	15.482323
Large	10.776461

4. Vendors having low inventory turnover, indicating excess stock and slow-moving products.

Total Unsold Inventory Capital: \$2.71M

Slow moving inventory increases storage costs, reduces cash flow efficiency, and affects overall profitability. Identifying vendors with low stock turnover enables stock management, thereby minimising financial strain.

stockturnover	
VendorName	
ALISA CARR BEVERAGES	0.615385
HIGHLAND WINE MERCHANTS LLC	0.708333
PARK STREET IMPORTS LLC	0.751306
Circa Wines	0.755676
Dunn Wine Brokers	0.766022
CENTEUR IMPORTS LLC	0.773953
SMOKY QUARTZ DISTILLERY LLC	0.783835
TAMWORTH DISTILLING	0.797078
THE IMPORTED GRAPE LLC	0.807569
WALPOLE MTN VIEW WINERY	0.820548

Final Recommendation

1. Re-evaluate pricing for low sales, high profit margin brands to boost sales volume without sacrificing profitability.
2. Diversify vendor partnerships to reduce dependency on a few suppliers and mitigate supply chain risks.
3. Leverage bulk purchasing advantages to maintain competitive pricing while optimising inventory management.
4. Optimise slow-moving products by adjusting purchase quantities, enhancing clearance sales or revisiting storage strategies.
5. Enhancing marketing and distribution strategies for low performing vendors to drive higher sales volumes without compromising on profit margins.
6. By implementing these strategies, company can achieve sustainable profitability, mitigate risks, and enhance overall operational efficiencies.