Vendor Performance Analysis

1.Project Overview

Effective inventory and sales management are pivotal to sustaining profitability in the retail and wholesale sectors. This project addresses the pressing challenges faced by businesses—namely, losses stemming from inefficient pricing strategies, poor inventory turnover, and over-reliance on specific vendors.

Objective:

- Identify underperforming brands that required promotional or pricing adjustment.

- Determine top vendors contributing to sales and gross profit.

-Analyzing the impact of bulk purchasing on unit costs.

-Assess inventory turnover to reduce holding costs and improve efficiency.

2.Dataset Summary
This project has 6 structured csv files containing multi dimensional data relevant to inventory sales,vendor performance.

-Vendor_invoice
-Sales
-Purchases
-Purchase_price
-begin_inventory
-end_inventory

3.Loading the dataset

A Python-based ingestion script was created to automate loading of six CSV files into a SQLite database. It reads each file from the `data/` folder, converts it into a DataFrame, and stores it as a table using SQLAlchemy. Logging is implemented to track ingestion status and time taken. This ensures a clean, repeatable pipeline for downstream analysis.

4.Exploratory Data Analysis using Python

-Loop implemented to display the record count

```
----------------------------------------- purchases ----------------------------------------
Count of records: 2372474
```

	InventoryId	Store	Brand	Description	Size	VendorNumber	VendorName	PONumber	PODate	ReceivingDate	InvoiceDate	PayDate	PurchasePrice	C
0	69_MOUNTMEND_8412	69	8412	Tequila Ocho Plata Fresno	750mL	105	ALTAMAR BRANDS LLC	8124	2023-12-21	2024-01-02	2024-01-04	2024-02-16	35.71	
1	30_CULCHETH_5255	30	5255	TGI Fridays Ultimte Mudslide	1.75L	4466	AMERICAN VINTAGE BEVERAGE	8137	2023-12-22	2024-01-01	2024-01-07	2024-02-21	9.35	
2	34_PITMERDEN_5215	34	5215	TGI Fridays Long Island Iced	1.75L	4466	AMERICAN VINTAGE BEVERAGE	8137	2023-12-22	2024-01-02	2024-01-07	2024-02-21	9.41	
3	1_HARDERSFIELD_5255	1	5255	TGI Fridays Ultimte Mudslide	1.75L	4466	AMERICAN VINTAGE BEVERAGE	8137	2023-12-22	2024-01-01	2024-01-07	2024-02-21	9.35	
4	76_DONCASTER_2034	76	2034	Glendalough Double Barrel	750mL	388	ATLANTIC IMPORTING COMPANY	8169	2023-12-24	2024-01-02	2024-01-09	2024-02-16	21.32	

```
----------------------------------------- purchase_prices ----------------------------------------
Count of records: 12261
```

	Brand	Description	Price	Size	Volume	Classification	PurchasePrice	VendorNumber	VendorName
0	58	Gekkeikan Black & Gold Sake	12.99	750mL	750	1	9.28	8320	SHAW ROSS INT L IMP LTD
1	62	Herradura Silver Tequila	36.99	750mL	750	1	28.67	1128	BROWN-FORMAN CORP
2	63	Herradura Reposado Tequila	38.99	750mL	750	1	30.46	1128	BROWN-FORMAN CORP

As the data we need for analysis is distributed in different tables,we need to create a summary table.

```
        VendorNumber              VendorName   Brand  \
0               1128  BROWN-FORMAN CORP         1233
1               4425       MARTIGNETTI COMPANIES 3405
2              17035  PERNOD RICARD USA         8068
3               3960  DIAGEO NORTH AMERICA INC  4261
4               3960  DIAGEO NORTH AMERICA INC  3545
...              ...                ...          ...
10687           9815  WINE GROUP INC            8527
10688           8004  SAZERAC CO INC            5683
10689           3924  HEAVEN HILL DISTILLERIES  9123
10690           3960  DIAGEO NORTH AMERICA INC  6127
10691           7245  PROXIMO SPIRITS INC.      3065

                   Description  Actual_price  PurchasePrice Volume  \
0           Jack Daniels No 7 Black     36.99         26.27   1750
1              Tito's Handmade Vodka    28.99         23.19   1750
2                    Absolut 80 Proof  24.99         18.24   1750
3            Capt Morgan Spiced Rum    22.99         16.17   1750
4                    Ketel One Vodka   29.99         21.89   1750
...                          ...        ...           ...    ...
10687   Concannon Glen Ellen Wh Zin    4.99          1.32    750
10688  Dr McGillicuddy's Apple Pie    0.49          0.39    50
10689               Deep Eddy Vodka   0.99          0.74    50
10690  The Club Strawbry Margarita    1.99          1.47    200
10691     Three Olives Grape Vodka    0.99          0.71    50

       Total_purchaseQuantity  Total_purchaseDollars  Totalsales_quantity  \
0                      145080             3811251.60                 None
1                      164038             3804041.22                 None
2                      187407             3418303.68                 None
3                      201682             3261197.94                 None
4                      138109             3023206.01                 None
...                       ...                  ...                   ...
10687                       2                2.64                  None
10688                       6                2.34                  None
10689                       2                1.48                  None
10690                       1                1.47                  None
10691                       1                0.71                  None

       Totalsales_price  Totalsales_Dollars  Total_Excisetax  Total_Freightcost
0                  None                None             None           68601.68
1                  None                None             None          144929.24
```

- Check for missing value using.isnull().sum() and fill it using .fillna()

- Remove the whitespace using .str.strip()

- change the datatype of volume as float64

- Created new columns such as Grossprofit, Profitmargin, StockTurnover and SalespurchaseRatio

- Used df.describe() for summary statistics

Summary Statistics Insight:

Negative and Zero values: -Gross profit minimum value is -52002.78 indicating losses. Some products or transactions may be selling at a loss due to high cost or sellings at discount lower than the purchase price.

- Profit margin has a minimum of -∞ which suggests cases where revenue is zero or even lower than costs
- Total sales quantity and sales dollar minimum values are 0 which means some products were purchased but never sold.

Check for outliers – (Using distribution plots)
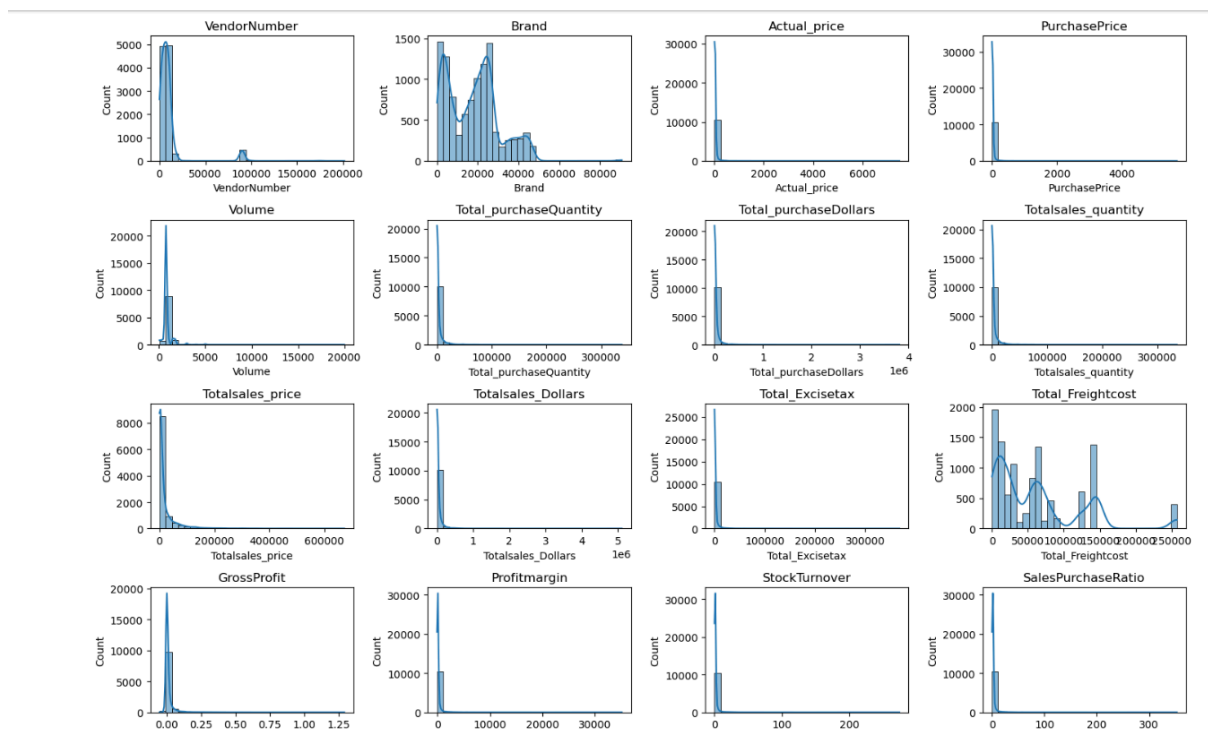
(Using count plots)

```
[12]:  #Count plots for categorical columns
       categorical_cols = ["VendorName","Description"] #"Description"
       plt.figure(figsize=(12,5))
       for i, col in enumerate(categorical_cols):
           plt.subplot(1,2,i+1) #adjusting grid layout as needed
           sns.countplot(y=df[col],order=df[col].value_counts().index[:10]) # top 10 categories
           plt.title(f"count plot of {col}")
       plt.tight_layout()
       plt.show()
```
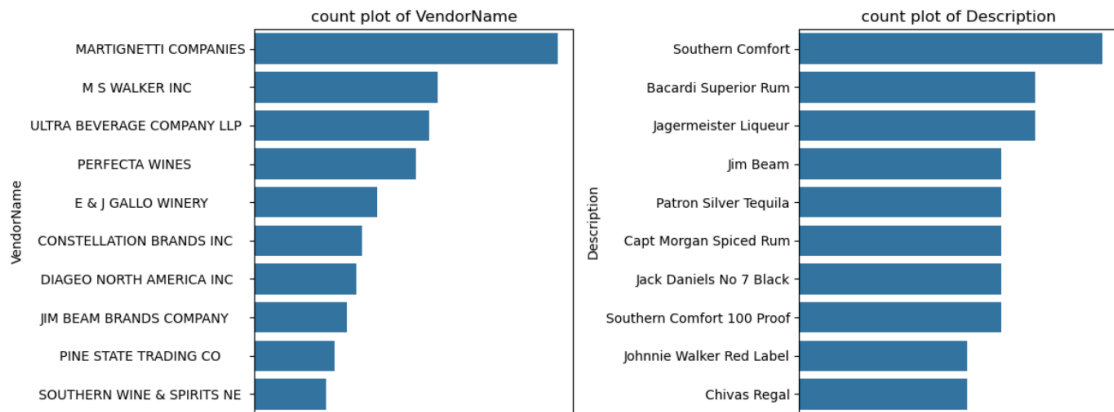

5.Data Analysis

- Filter out brands with less sales but high profit margin
- Checked top_vendor and top_brands
- Total purchase contribution column created
- Checked which vendors have low inventory turnover
- top 10 vendors

	VendorName	Totalsales_Dollars	GrossProfit	Total_purchaseDollars	PurchaseContribution%
25	DIAGEO NORTH AMERICA INC	67.99M	17.89M	50.10M	0.16
57	MARTIGNETTI COMPANIES	39.28M	13.81M	25.46M	0.08
69	PERNOD RICARD USA	32.06M	8.21M	23.85M	0.08
46	JIM BEAM BRANDS COMPANY	31.42M	7.93M	23.49M	0.08
6	BACARDI USA INC	24.85M	7.42M	17.43M	0.06
20	CONSTELLATION BRANDS INC	24.22M	8.95M	15.27M	0.05
11	BROWN-FORMAN CORP	18.25M	5.01M	13.24M	0.04
30	E & J GALLO WINERY	18.40M	6.33M	12.07M	0.04
107	ULTRA BEVERAGE COMPANY LLP	16.50M	5.34M	11.17M	0.04
53	M S WALKER INC	14.71M	4.94M	9.76M	0.03

Plot for top 10 brands and vendors -
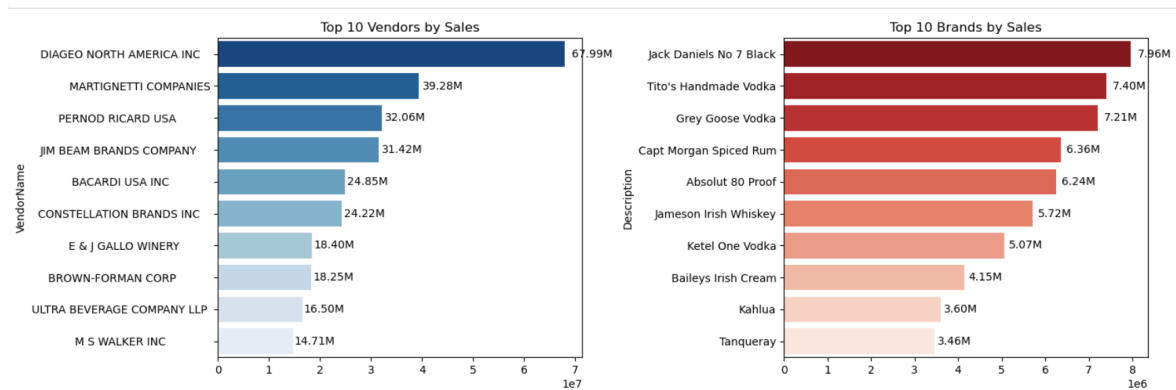
6. Dashboard in Power Bi

Finally, we built an interactive dashboard in Power BI to present insights visually.