Vendor Performance Analysis

Business Context -

Vendor performance plays a central role in retail profitability. Companies depend on vendors for stable prices, timely delivery, consistent product quality, and favorable credit terms. Poorly performing vendors can lead to:

- High holding costs due to slow-moving inventory
- Margin leakage due to inconsistent pricing
- Stockouts from unpredictable supply
- Reduced profitability across categories

To address these challenges, organizations increasingly rely on data analytics to evaluate vendor contribution and improve supply chain decisions.

Business Problem -

The company lacks clear insights into:

- Which vendors contribute most to sales and profit
- Whether bulk purchasing truly leads to cost savings
- Which brands require intervention (discounts, promotions, discontinuation)
- How well inventory is being utilized (turnover efficiency)
- Profitability differences across vendors and brands

A structured analysis is needed to identify inefficiencies and optimization opportunities.

Project Goal -

This project focuses on building an end-to-end analytics solution to:

1. **Identify high-performing and low-performing vendors**
   - Based on sales, gross profit, and profitability ratios.

2. **Assess impact of bulk purchases on cost**
   - Analyze the relationship between purchase quantities and unit cost.

3. **Evaluate inventory turnover**
   - Calculate opening, closing, and average inventory value by SKU and vendor.

4. **Provide actionable recommendations**
   - Renegotiate pricing
   - Reduce dependence on low-performing vendors

- Optimize purchase quantities
- Improve inventory allocation

The Dataset -

There are 6 Tables in csv format :-

- begin_inventory
- end_inventory
- sales
- vendor_invoices
- purchase_prices
- purchases

Link – Vendor_data

Table 1 - begin_inventory

InventoryId	Unique item identifier
Store	Store ID
City	Store location
Brand	Brand ID
Description	Product name
onHand	Package size
Size	Opening quantity
Prize	Selling price
startDate	Should be the date when opening inventory is recorded

Table 2 - end_inventory

InventoryId	Unique item identifier
Store	Store ID
City	Store location
Brand	Brand ID
Description	Product name

onHand	Package size
Size	Opening quantity
Prize	Selling price
endDate	Should be the date when opening inventory is recorded

Table 3 - purchase_prices

Brand	Brand ID
Description	Product description
Price	Retail price
Size	e.g., 750mL
Volume	numeric size (but string in this dataset)
Classification	Category code
PurchasePrice	unit cost from vendor
VendorNumber	Vendor identifier
VendorName	Name of vendor

Table 4 - vendor_invoices

VendorNumber	Vendor identifier
VendorName	Name of vendor
InvoiceDate	Date vendor issued invoices
PONumber	Unique Purchase Order Identifier
PODate	Purchase Order Date
PayDate	Date at which Paid To Vendor
Quantity	Number of Quantity goods Purchased
Dollars	Total Invoice Value (including Freight)
Freight	Shipment Cost

Approval	Invoice Approval Flag

Table 5 - Sales

InventoryId	Unique item identifier
Store	Store ID
Brand	Brand ID
Description	Product Name
Size	E.g. in 750ml
SalesQuantity	Total Sales Quantity
SalesDollars	Total Sales Price
SalesPrice	Per Unit Price at which Sold
SalesDate	Date at which Sold
Volume	Volume level
Classification	No information Available
ExciseTax	Tax charged on Sales
VendorNo	Vendor Identifier
VendorName	Name of Vendor

Table 6 - Purchases

InventoryID	(store + city + brand)ID
Store	Store ID
Brand	Brand ID
Description	Product Name
Size	Pack Size Purchase
VendorNumber	Vendor ID
VendoreName	Vendor Supplying the Product

POnumber	Purchase Order ID
POdate	Date PO was created
Receiving Date	Date goods were received
InvoiceDate	Vendor Invoice Date
PayDate	Vendor Payment Date
Purchase Price	Unit purchase Price
Quantity	Number of units purchase
Dollars	Purchase Price * Quantity
Classification	Product Category

Executive Summary ~ Vendor Performance Analysis

Business Context

Effective inventory and vendor management are critical to sustaining profitability in retail operations. This analysis evaluates vendor and brand performance across **sales, profitability, procurement efficiency, and inventory health** to identify margin leakage, operational risk, and cost optimization opportunities.
The study integrates **sales, purchases, vendor invoices, and inventory data** to provide a holistic, end-to-end view of vendor performance.

Key Findings

1. **Widespread Margin Erosion at Brand Level**

- A significant proportion of brands operate **below the acceptable 15% gross margin threshold**, with many exhibiting negative gross margins
- Several brands generate low sales while incurring large losses, indicating inefficient product assortment and pricing misalignments.
- High sales volume does not guarantee profitability, highlighting cost and pricing inefficiencies.

2. **Revenue Concentration Does Not Equal Profitability**

- A small group of vendors contributes a large share of total revenue, yet many of these vendors generate substantial gross losses.
- Vendor contribution analysis reveals a clear **revenue–profit mismatch**, where scale amplifies losses instead of offsetting them.
- Only a limited subset of vendors consistently delivers **both revenue and profit**, making them true value creators.

3. **Bulk Purchasing Delivers Massive Cost Savings but Is Underutilized**
- Bulk purchasing reduces unit cost by **over 90% compared to small orders.**
- Despite this, **more than 95% of purchase orders are small-sized**, indicating severe underutilization of bulk procurement.
- Fragmented purchasing behavior is one of the **largest drivers of avoidable cost leakage.**

4. **Inventory Turnover Issues Drive Holding Cost Risk**
- Inventory turnover is **skewed toward low values**, with many brands operating near or below turnover < 1.
- Low turnover strongly correlates with **dead stock accumulation**, locking capital in unsellable inventory.
- Dead stock risk is **highly concentrated among a small set of brands**, while overstock issues are widespread and systemic.

5. **Vendor Profitability Varies in Stability, Not Just Cost**
- Several vendors exhibit **high unit cost volatility and freight impact**, making profitability unpredictable.
- Lead time averages are similar across vendors, but **lead time reliability varies significantly**, increasing safety stock requirements.
- A small group of vendors accounts for **disproportionate financial and operational risk**, despite representing a minor share of the vendor base.

Overall Business Impact

➔ Margin erosion driven by pricing, freight, and cost volatility
➔ Excess working capital locked in slow-moving and dead inventory
➔ Over-reliance on high-volume but low-profit vendors
➔ Reduced forecasting accuracy and procurement efficiency

Strategic Recommendations

A) Optimize Brand Portfolio
   - **Discontinue or rationalize consistently loss-making brands**, especially those with low sales and negative margins
   - Reprice or renegotiate high-volume, low-margin brands to convert scale into profitability.
   - Promote brands with positive margins but moderate sales to scale profitably.

B) Shift Vendor Strategy from Revenue to Profit
   - Reduce dependency on vendors that consistently dilute margins.
   - Introduce a **vendor profitability scorecard** combining:
     a) Revenue Contribution
     b) Gross Profit Contribution
     c) Cost Volatility

d) Flight Impact
e) Lead Time Reliability

C) Consolidate Purchases to Unlock Cost Savings
- Aggressively **consolidate small orders into bulk purchases** where operationally feasible.
- Establish **minimum order quantity (MOQ) guidelines** to discourage inefficient procurement.
- Centralize procurement planning for high-frequency SKUs.

D) Strengthen Inventory Governance
- Apply **turnover-based replenishment controls** for slow-moving brands.
- Actively liquidate dead stock through markdowns or delisting.
- Recalibrate safety stock and reorder points for overstock-heavy brands.

E) Manage Vendor Risk Proactively
- Renegotiate contracts with high-volatility vendors to include:
  a) Price stabilization clauses
  b) Freight cost caps
  c) Long-term rate agreements
- Diversify sourcing away from unstable vendors, even at slightly higher unit cost.
- Align safety stock policies with vendor delivery reliability.