**Retail-Supply-Chain-Sales Report**

**Let’s begin with some facts about our data:**

* The number of total unique orders is 5009 including 296 returns which we excluded from our calculations like the net revenue and profit to increase the performance of our analysis.
* The number of our total products is 1862 divided into 3 main categories (Furniture, Office supplies, and Technology) and 17 sub-categories.
* The average delivery time for shipping is 4 days Depending on the ship mode which divided into 4 modes (Same day, First class, Second class, and Standard class).
* The actual customer number is 791 divided into 3 segments (consumer, Home Office, Corporate) all over the United States in 4 main regions (West, South, East, Central).

# **Scope:**

## **Profitability Metrics:**

 Profit Margin: 14%  
Indicates that for every dollar of sales, the business earns $0.14 in profit. This reflects the overall efficiency in managing costs relative to revenue.

 Profit Per Unit: $7.96  
Represents the average profit earned on each unit sold, providing insight into product-level profitability.

 Customer Profitability: $332.70  
The average profit generated per customer, helping to identify high-value customers and evaluate customer segments more effectively.

 Return on Investment (ROI): 16.91%  
Measures the profitability of investments made—from product development to marketing campaigns. This means that for every dollar invested, the company gains approximately $0.17 in profit.

## **Discount Effectiveness:**

To identify potential over-discounting, we began by creating Discount Bands, knowing that discount values in our dataset range from 0% to 80%. Our analysis revealed that orders with discounts above 40% contribute very little to profit, though they account for only 10% of total orders. This could suggest that such heavy discounts are used to clear excess inventory—particularly in the Office Supplies category, where most extreme discounts are found in Appliances and Binders.

However, there's a deeper strategic layer to consider. Since 60% of all orders are Office Supplies, this aligns with the loss leader strategy—where heavily discounted products drive higher traffic and boost overall category profitability. In fact, despite having the highest average discount, Binders still generate positive profit, supporting this theory.

We also conducted a **correlation analysis** between **discount and profit margin**, which revealed a strong **negative correlation of -0.8**. This means that as discounts increase, profit margins drop significantly. The visual representation forms an **exponential downward curve**, confirming that over-discounting is directly hurting profitability. This insight reinforces the need to control discounting, especially on products that are already underperforming.

In contrast, Furniture products like Bookcases and Tables show a different trend: they receive high discounts but result in very low profitability, indicating a less effective discount strategy.

Based on this analysis, it would be wise to:

* Reduce discount levels on underperforming Furniture items (Bookcases and Tables)
* Reallocate discounts toward high-potential, under-promoted products—such as Copiers in the Technology category, which show strong profit margins and could benefit from a volume increase.

## **Returns Insights:**

We began this report by examining product returns, identifying a total of 296 returned orders, which translates to a return rate of 6% relative to total orders. While this overall rate appears within acceptable limits, a closer look reveals a significant regional disparity—the West region exhibits a return rate approximately four times higher that of the other regions.

This problem may be indicated by several factors:

* Shipping-related issues, such as product damage during transit, or potentially distinct customer behavior patterns within the region.
* Most of the returned items were delivered via Standard Class, which has an average shipping time of five days, possibly contributing to dissatisfaction.
* The West region also records the highest number of orders, including bulk purchases of certain items (e.g., blinders) that may have been returned unused.
* Additionally, the West has the lowest average discount percentage, which may influence purchasing decisions and subsequent returns.

Another notable trend is the spike in returns during Q4, particularly in November and December. This is likely driven by a seasonal increase in total order volume, coinciding with major promotional events such as Black Friday, leading to higher purchase activity—and naturally, a proportional rise in returns.

## **Customer’s performance**:

As part of our customer analysis, we focused on the actual number of active customers, excluding two individuals who returned every order they placed. Identifying customers with high return rates is a key step in enhancing our service quality.

At the same time, it's essential to highlight both our top-performing and underperforming customers. For instance, while Sean Miller is our highest sales contributor, his profit margin is notably low—indicating high spending with limited profitability. In contrast, Tamara Chand stands out as a true VIP customer, delivering both the highest revenue and strong profit margins.

To better evaluate customer performance, especially given the influence of discount strategies, we rely on net revenue (sales after discount) rather than gross sales. This provides a more accurate picture of true contribution.

Our customer base is segmented into three distinct groups:

* Consumers – Individual buyers making personal purchases, representing 50% of the customer base.
* Home Office – Small businesses operating from home, accounting for 20%.
* Corporate – Medium to large enterprises, comprising 30%.

These segment proportions remain consistent across total sales, order volumes, return rates, and discount usage. However, when it comes to customer profitability, the home Office segment leads—indicating higher efficiency and margin contribution from this group.

## Shipping Analysis:

By analyzing shipping costs across all four shipping modes, we can reasonably infer the likely locations of our distribution centers or regional branches. The assumption is that shipping costs are lowest when products are shipped from or near the distribution hub. Based on this pattern, we’ve identified the following likely hub locations for each region:

* Central Region: Lowest shipping costs are consistently observed in Iowa, suggesting it serves as the primary distribution point for this region.
* Southern Region: Mississippi stands out with the lowest shipping rates, indicating it is likely the regional hub.
* Eastern Region: Shipping costs are notably low in New York, making it the probable distribution center for the East.
* Western Region: This region presents some inconsistencies. While Washington shows the lowest average shipping cost overall, certain shipping modes are cheaper in other nearby states, suggesting a more complex distribution structure in the West.

Finally**,** we conducted a correlation analysis between **Shipping Cost** and **Profit.** a **moderate negative correlation of -0.43 is revealed,** indicating that as shipping costs increase, profit tends to decrease — though not in a strictly linear fashion.