# Fashion Retail Inventory Analysis: A Pricing Paradox

## Problem Statement / Business Objective

Fashion retailers constantly battle stock imbalances—popular products run out too quickly, while others stagnate in inventory. This project analyzes inventory and discount behavior to uncover why this happens and how retailers can balance demand, pricing, and supply more effectively.

## About the Dataset

The dataset was sourced from the 30DaysDataChallengewithAnnie group. It consists of 15,001 rows and 13 columns, covering fashion retail inventory data from July to August 2019. It includes product types, brand names, discount levels, stock status, pricing, and timestamps.

## Data Cleaning Process

All data cleaning was done in Microsoft Excel without Power BI or Power Query. The process was guided by the business objective.

Step 1: The dataset was duplicated into a new worksheet to remove all color formatting. This made it easier to work with the raw data.

Step 2: The date column was formatted uniformly to ensure consistency and proper sorting.

Step 3: Each column was validated using Excel functions to identify and correct inconsistencies, especially in fields relevant to the business questions such as product type, stock status, and discount.

Step 4: Additional columns were engineered, including a 'Discount' column to quantify markdowns, and a 'Stock Category' column to classify products as In Stock, Out of Stock, or Unknown. Discount tiers were also created: Low (<15%), Medium (15–29%), and High (30% and above).

Step 5: The cleaned dataset was regularly saved to ensure no progress was lost.

The cleaning process was not merely cosmetic; it laid the foundation for reliable and focused analysis.

## Exploratory Data Analysis

Regression analysis revealed a near-perfect correlation between products in stock and those out of stock, with an R² value of 0.897 and a statistically significant p-value close to zero.

Among the top 20 product types, which represented approximately 70 percent of inventory activity, only three differed between the out-of-stock and in-stock with high-discount categories. Brands frequently out of stock included Anouk, Biba, Shree, Libas, Fabindia, Sangria, Indya, British Club, Soch, Aks, and The Indian Garage Co. Common product types facing stockouts were Straight Kurta, A-Line Kurta, Kurta with Pyjamas, Kurta with Palazzos, Maxi Dress, Top, Tunic, Kurta with Churidar, and Kurta with Churidar & Dupatta.

## Dashboard Summary

The Power BI dashboard presents a comprehensive view of inventory status by brand and product type, correlates discount levels with stock outcomes, and offers interactive filters for exploring key insights. It includes metrics for identifying out-of-stock trends and their relation to pricing behavior.

## Insights and Recommendations

### Insights

Ninety percent of out-of-stock products had discounts of 30 percent or more. Discounted demand is not linear. Low discounts under 15 percent showed moderate performance, while medium discounts from 15 to 29 percent showed a surprising dip. High discounts triggered a sharp spike in conversions.

This pattern suggests that customers are highly price-sensitive and often wait for substantial markdowns before purchasing. The overlap of product types in both high-discount and out-of-stock categories indicates that timing and depth of discounts are stronger sales drivers than the product types themselves.

### Recommendations

1. Smarter Discount Structuring: Introduce early-access offers with lower discount tiers, and move away from permanent markdowns in favor of time-limited promotions.

2. Demand-Aligned Inventory: Replenish fast-selling items in smaller, more frequent batches. Use just-in-time inventory triggers to respond quickly to demand without overstocking.

3. Build Value Beyond Price: Bundle slower-moving items with trending products. Use storytelling and highlight craftsmanship to justify premium pricing without relying on discounts.

## Tools Used

Microsoft Excel (for data cleaning and preparation)

Power BI (for data visualization and dashboard creation)

## Lessons Learned / Reflections

This project reinforced that effective data cleaning is about preparing for meaningful analysis, not just formatting. A strong understanding of the business problem should guide every cleaning and transformation step. Additionally, visual patterns supported by statistical insights offer more compelling and trustworthy recommendations.