Final Project for DEPI

Supply Chain

Retail Stores Inventory and Demand Business Insights Report

The Final Project for Top Analyst Team

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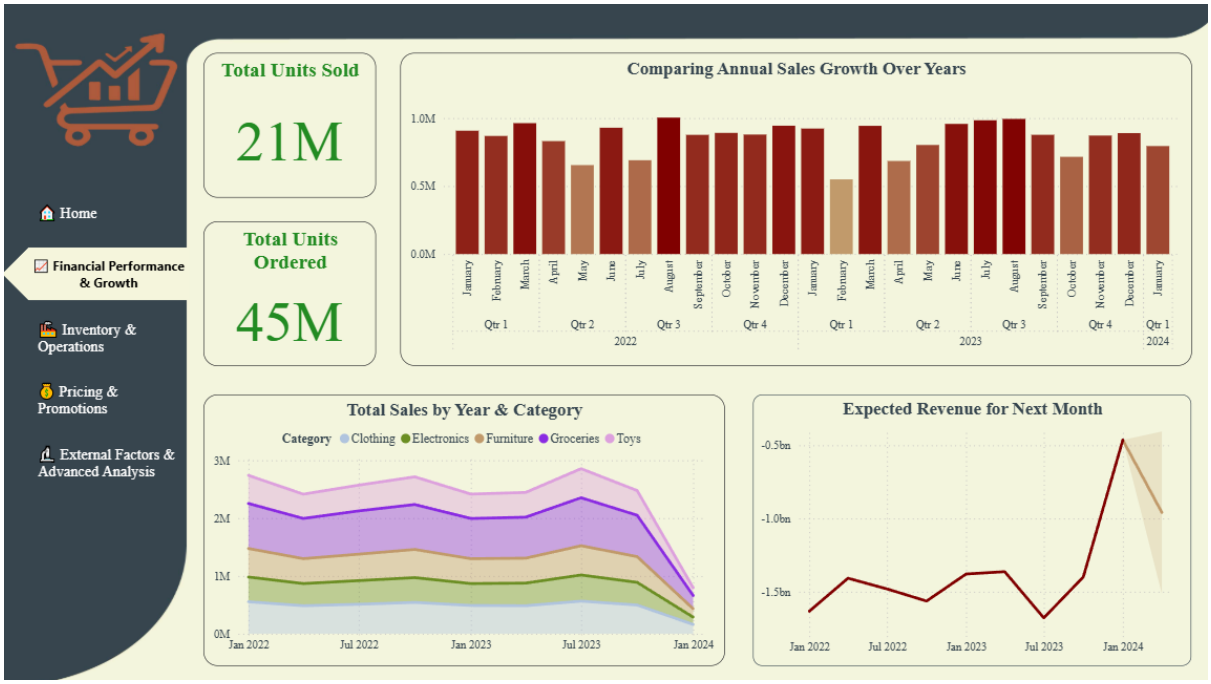
Introduction

This project analyzes “Retail Stores Inventory and Demand” from 2022 to 2024 in terms of observing consumer behavior, pricing strategies and product availability across the year. It includes prices of various categories, offering insights into price trends, consumer behavior and an epidemic feature to simulate retail conditions during COVID-19 pandemic period enhancing the realism and practical value of the data.

The analysis reveals a concerning gap between **45 million units** ordered and **21 million units** actually sold. The **North** region is the strongest performer in both sales and inventory turnover. Promotional offers show a positive effect (**0.26 Uplift**), but attention must be paid to the finding that customer ratings are not correlated with the financial value of their purchases, highlighting the importance of the service experience.

Dashboard 1: Financial Performance & Growth

This dashboard provides an overview of the organization's financial performance, comparing ordered units against actual sales, showing year-over-year sales trends, category distribution and future revenue forecasts. Data indicates a period of growth in 2023 vs. 2022, but the organization faces a severe challenge in order fulfillment.



1. Total Units Sold vs. Units Ordered

Explanation: This chart highlights that 21 million units were sold compared to 45 million units that were ordered. This massive discrepancy suggests a major issue in the fulfillment process or the accuracy of initial demand forecasting.

Improvement Suggestions: An immediate Gap Analysis is required to determine why 24 million orders failed to convert into sales (e.g., inventory shortages, cancellations, or recording errors). Future purchase orders must be aligned more accurately with actual sales figures.

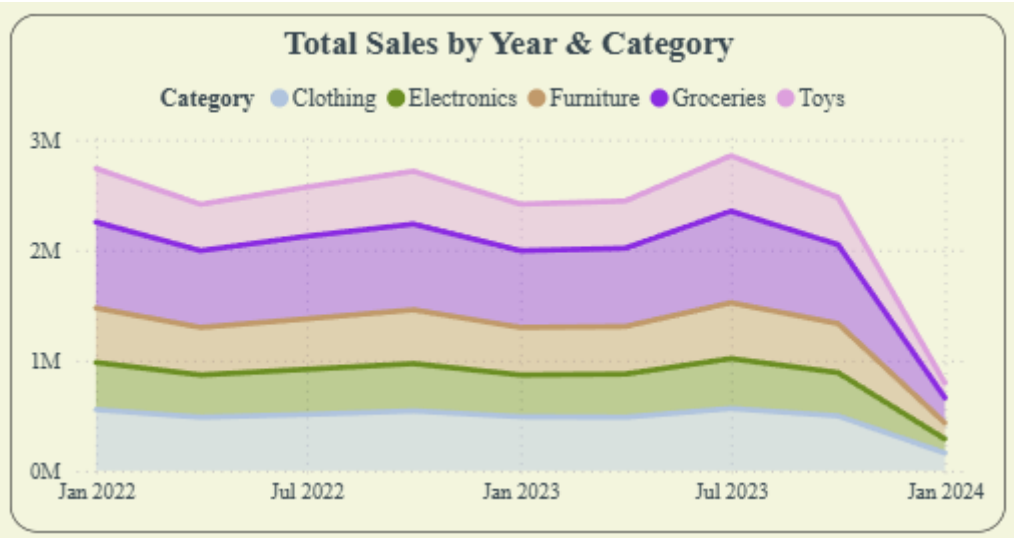
2. Year-over-Year Sales Growth Comparison

Explanation: Monthly sales from 2022 to January 2024 are displayed. Most months in 2023 showed better sales than their counterparts in 2022, though a few months (like April and May 2023) saw a slight decrease compared to 2022.

Improvement Suggestions: Study the factors causing lower sales in historically weak months (April, May) and apply successful strategies from high-growth months to stabilize and boost sales during these periods.

3. Total Sales by Year and Category

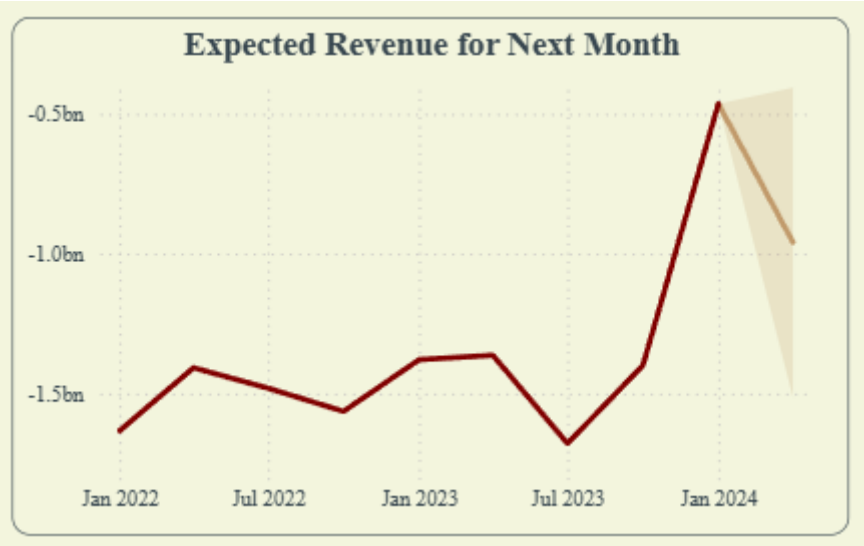
Explanation: A sharp, across-the-board decline is visible in sales for January 2024 across all product categories (Clothing, Electronics, Furniture, Groceries, Toys) compared to the start of previous years.



Improvement Suggestions: Launch focused, robust promotional campaigns early in the year (January) to proactively counteract this sharp, seemingly seasonal post-holiday sales decline affecting all categories.

4. Revenue Forecast for the Next Month

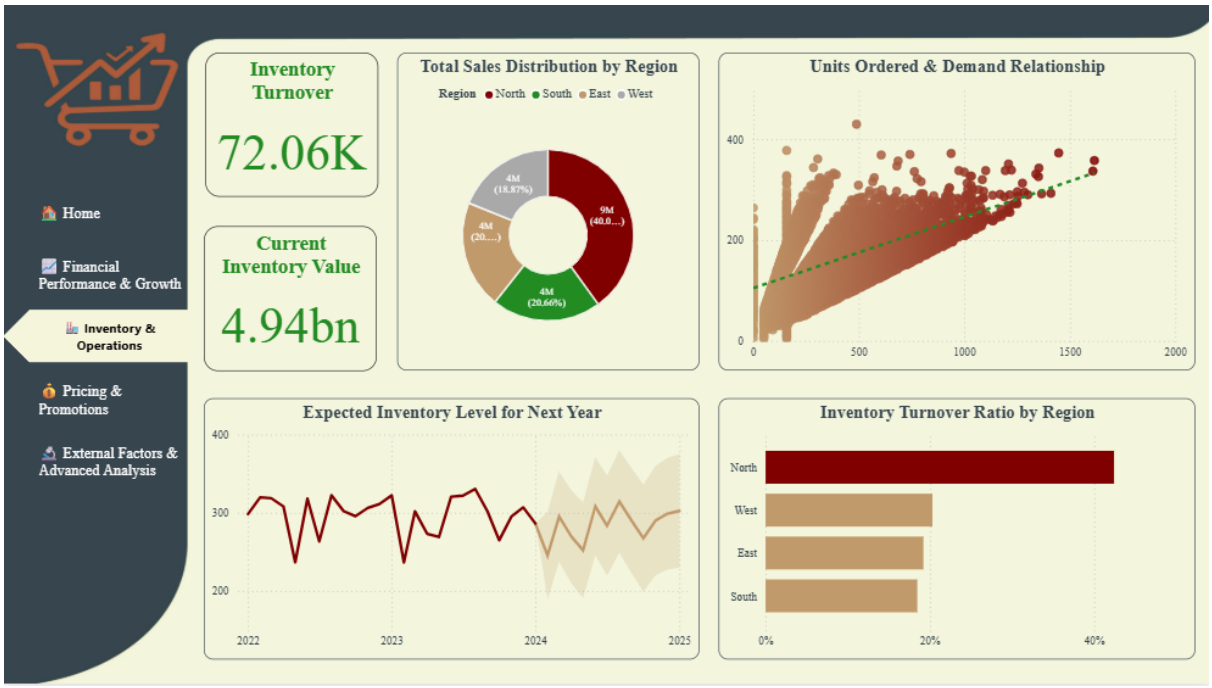
Explanation: The trend line forecasts a significant increase and recovery in projected revenue for January 2024, following a period of relative volatility and decline in late 2023.



Improvement Suggestions: Ensure complete operational readiness, including sufficient inventory levels and adequate staffing, to successfully meet this projected revenue increase and prevent lost sales opportunities.

Dashboard 2: Inventory & Operations

This dashboard evaluates inventory management efficiency and the distribution of financial and operational weight across geographical regions. The North region clearly dominates while the South region faces inventory efficiency challenges.



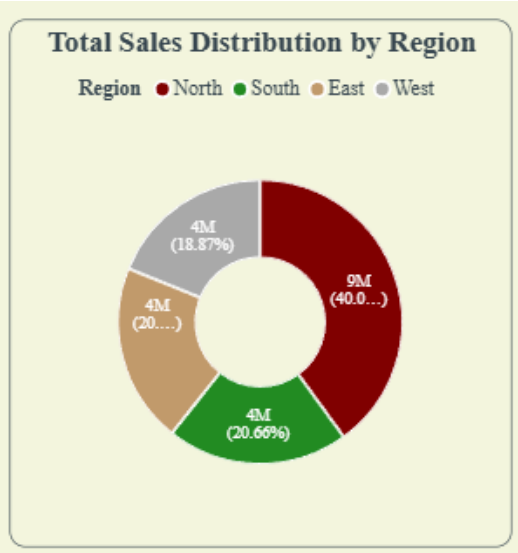
1. Inventory Turnover and Current Value

Explanation: The Inventory Turnover is 72.06K, indicating good efficiency in converting stock to sales. The Current Inventory Value is substantial at 4.94 Billion.

Improvement Suggestions: Maintain the high turnover while closely monitoring the substantial inventory value (4.94 Billion) to ensure effective capital management and avoid unnecessary storage costs.

2. Total Sales Distribution by Region

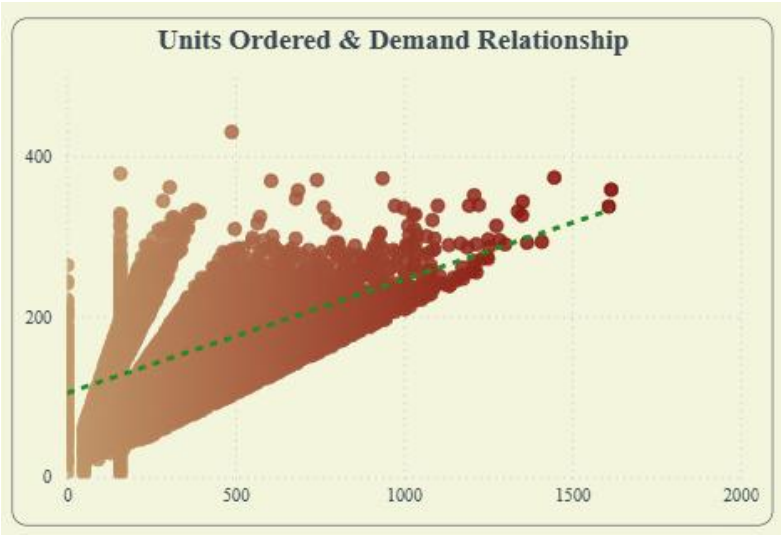
Explanation: The North region dominates sales at 40.0%, making it the primary business driver. The other regions (South, West, East) share the remaining percentage.



Improvement Suggestions: Allocate increased marketing and promotional resources to the lower-performing regions, especially the East region, to boost their sales contribution and reduce over-reliance on the North region's performance.

3. Relationship between Units Ordered and Demand

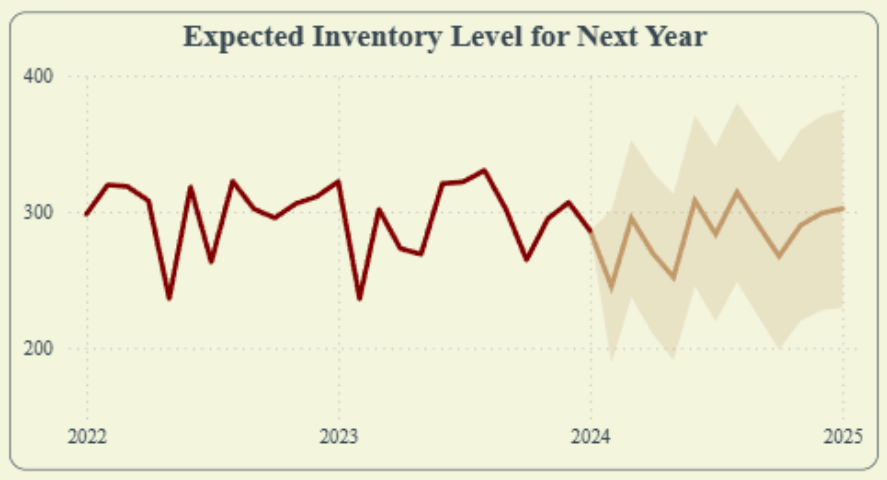
Explanation: The scatter plot shows a strong positive correlation between Units Ordered and Actual Demand, suggesting that ordering decisions generally align with market trends.



Improvement Suggestions: Despite the positive correlation, efforts must focus on improving the accuracy of demand forecasting to eliminate the huge discrepancy between units ordered (45M) and units sold (21M).

4. Inventory Level Forecast for the Coming Year

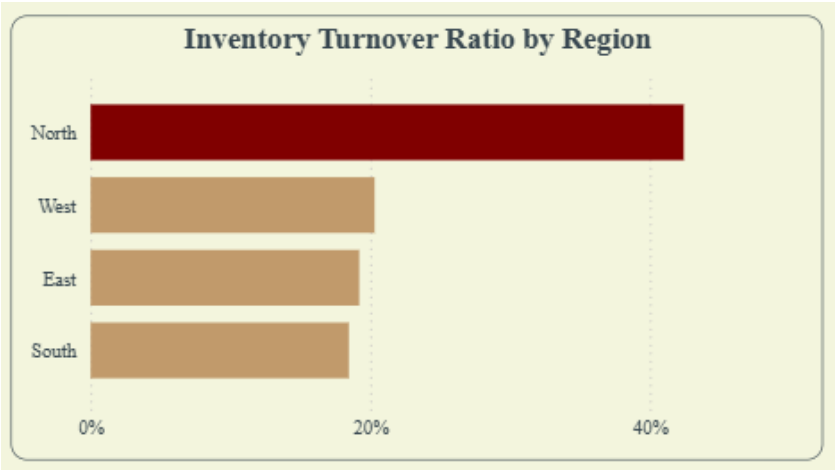
Explanation: The chart shows forecasts for inventory level fluctuations through 2025, with a wide confidence range indicating significant uncertainty.



Improvement Suggestions: Revise the inventory forecast model for the coming year and incorporate more external variables (such as seasonality or planned promotional events) to increase forecast accuracy and reduce uncertainty.

5. Inventory Turnover Rate by Region

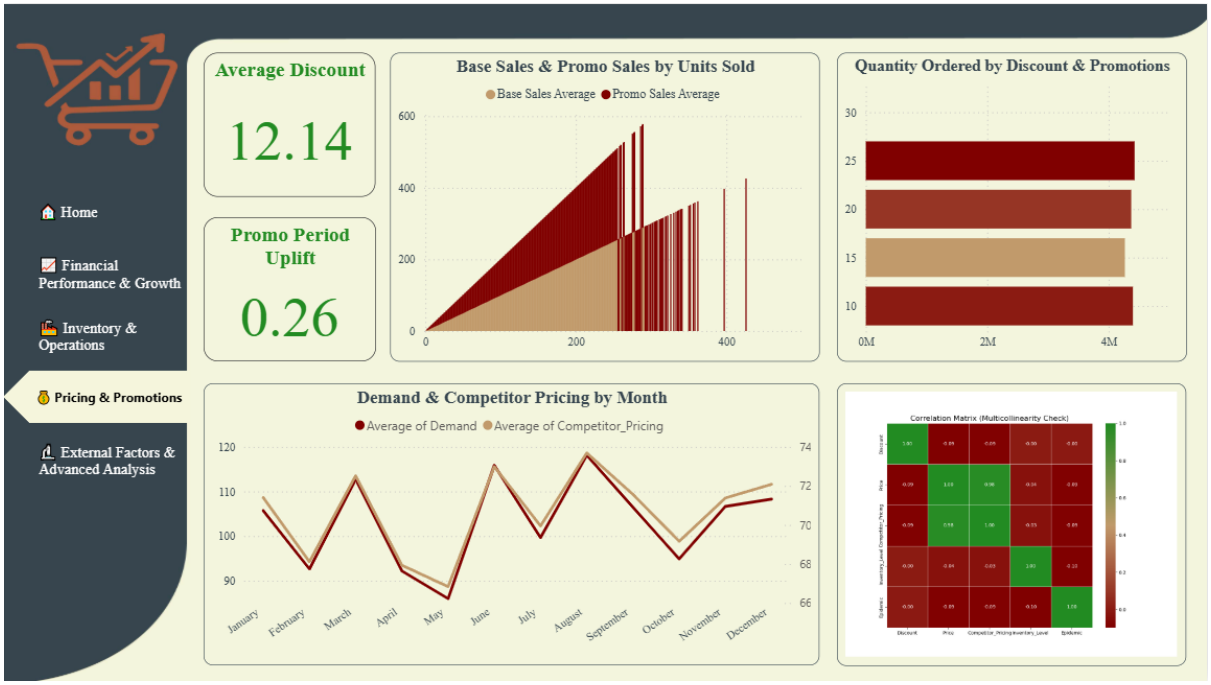
Explanation: The North region confirms its superiority with the highest inventory turnover rate, while the South region registers the lowest rate.



Improvement Suggestions: Conduct a review of supply chain and inventory management processes in the South region to determine the cause of the slow turnover. This may require changing the product mix or optimizing storage and distribution logistics.

Dashboard 3: Pricing & Promotions

This dashboard assesses the effectiveness of pricing and promotional strategies in driving demand, comparing base sales against promo sales and monitoring competitor pricing movements.



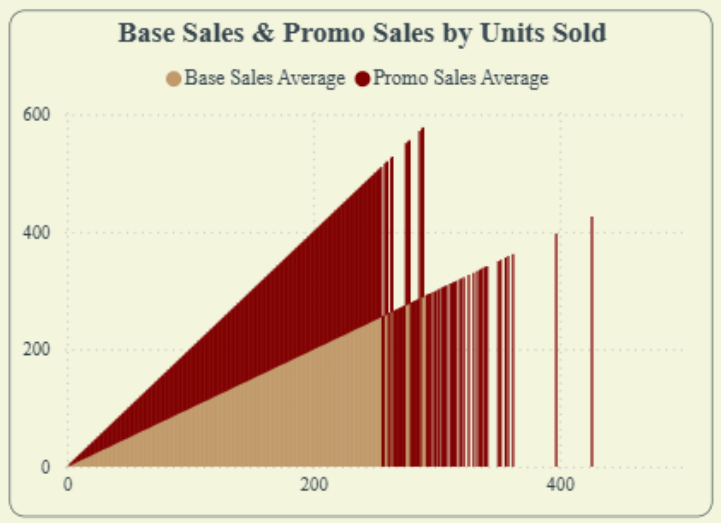
1. Average Discount and Promo Period Uplift

Explanation: The average discount is 12.14. The Promo Period Uplift result of 0.26 is positive, indicating that promotional offers are effective in boosting sales.

Improvement Suggestions: Test price elasticity. Can a similar uplift (0.26) be achieved with an average discount less than 12.14? If so, lowering the discount would significantly increase profit margins.

2. Base Sales vs. Promotional Sales

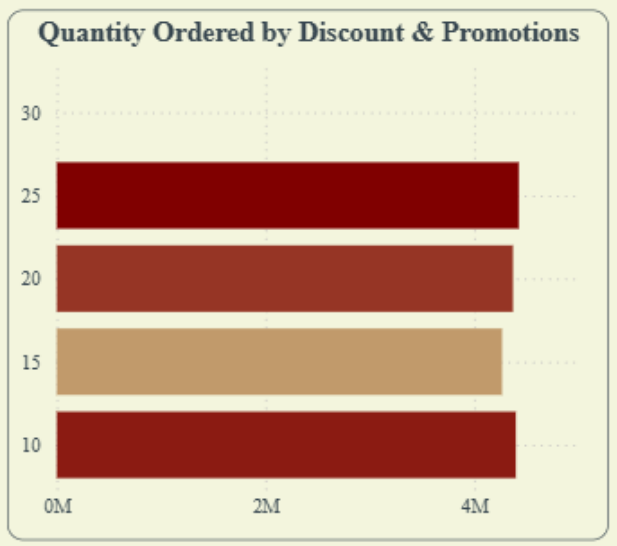
Explanation: The chart shows that unit sales during promotional periods (Promo Sales) surpassed sales at the full price (Base Sales) at multiple time points.



Improvement Suggestions: Use promotions strategically to clear slow-moving inventory or promote new product launches. Be cautious about the frequency of discounts to avoid "discount fatigue" among customers.

3. Quantity Demanded by Discount and Promotions

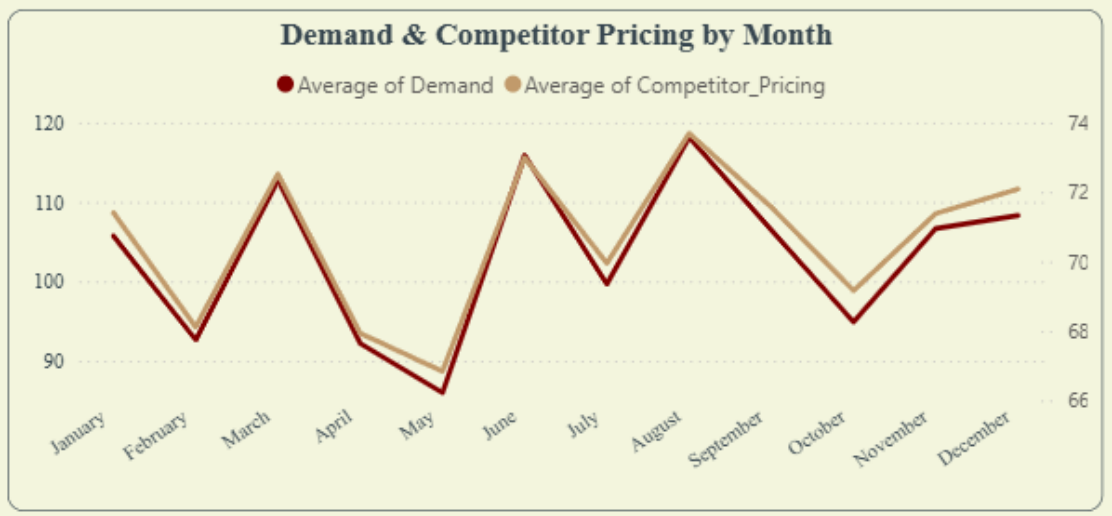
Explanation: The combination of Discount and Promotions is the strongest driver for quantity demanded (over 4 million).



Improvement Suggestions: Continue leveraging the dual discount strategy for high-margin products or to encourage larger basket sizes, motivating customers to increase their purchase quantity.

4. Demand vs. Competitor Pricing by Month

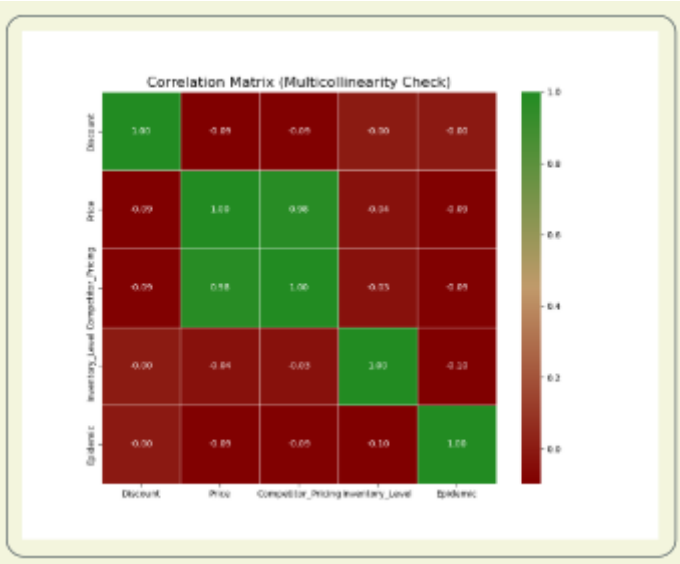
Explanation: The chart shows a close relationship between demand and competitor pricing, with demand tending to fluctuate parallel to competitor prices. Competitor pricing surpassed demand during the April-June period.



Improvement Suggestions: Implement dynamic pricing strategies that allow for quick adjustments in response to competitor movements, especially during periods like Q2 (April-June) to maintain market share and competitiveness.

5. Correlation Matrix (Linear Interference Analysis)

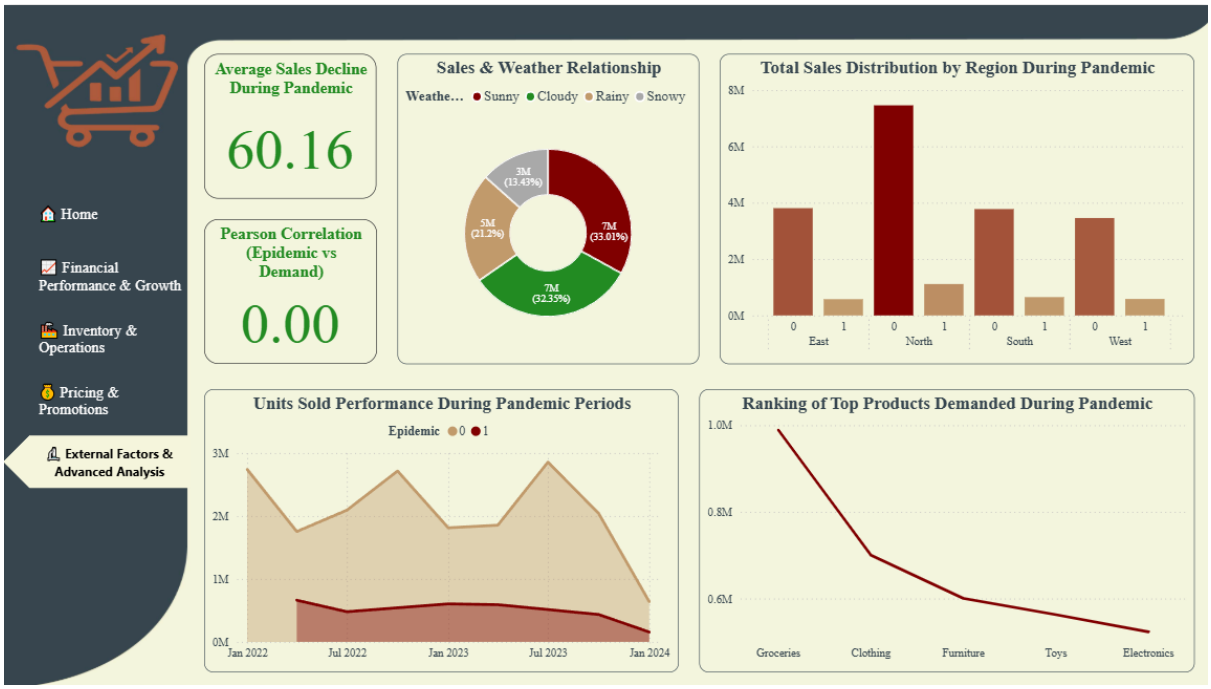
Explanation: The correlation matrix shows a very strong relationship between the price variable and the competitor's pricing variable (value 0.98).



Improvement Suggestions: When building any regression model to forecast sales or demand, attention must be paid to this linear interference. It is recommended to remove one of the variables (price or competitor's pricing) or use a model that tolerates linear interference to avoid inflating the regression coefficients.

Dashboard 4: External Factors & Advanced Analysis

This dashboard analyzes how uncontrollable external factors, such as weather and pandemic periods, influence sales behavior and product demand preferences.



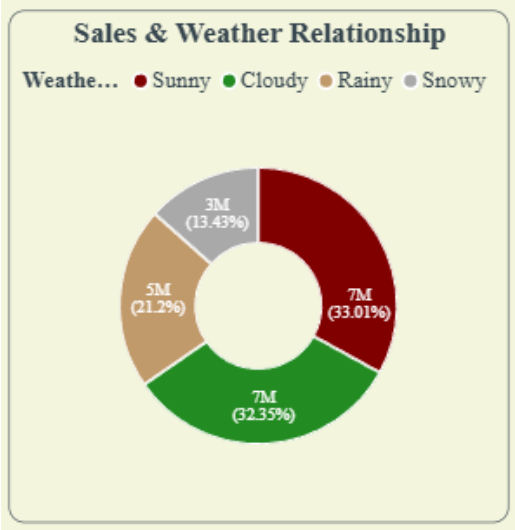
1. Sales Drop During Pandemic and Pearson Correlation

Explanation: The average sales drop during the pandemic was 60.16. The Pearson correlation between the pandemic period and overall demand is 0.00, suggesting the pandemic impacted how sales occurred rather than the total volume of demand.

Improvement Suggestions: Develop a robust crisis response plan focused on resilient sales channels (e.g., e-commerce) to mitigate sales drops of this magnitude in future unexpected circumstances.

2. Sales in Relation to Weather During the Pandemic

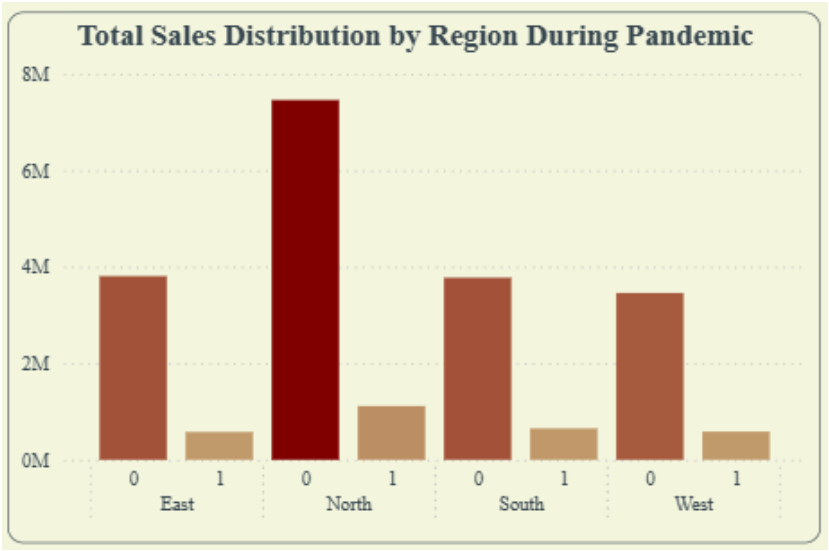
Explanation: Sunny days contributed the most to total sales (33.31%), followed closely by Rainy days (32.33%).



Improvement Suggestions: Capitalize on sunny days with in-store marketing campaigns. On rainy and snowy days, significantly boost focus on online sales and delivery services to capture demand from customers preferring to stay home.

3. Total Sales Distribution by Region During Pandemic

Explanation: This graph compares total sales for each region (North, South, East, West) between pre-pandemic periods (0) and pandemic periods (1).



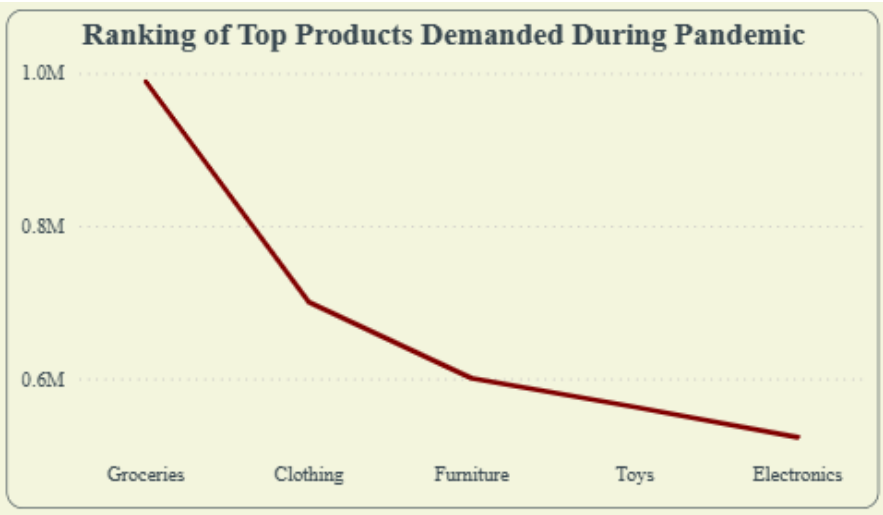
Improvement Suggestions

- **Northern Sales Protection Strategy:** Efforts should focus specifically on protecting revenue in the northern region. For example, launching free or discounted delivery services specifically for this region during crises, given its high value in regular sales.
- **Developing Regional Digital Channels:** Investing in e-commerce platforms and digital services tailored to each region ensures continued access to products when in-

store shopping becomes difficult, thus improving sales resilience across all regions during crises.

4. Top Products Demanded During the Pandemic

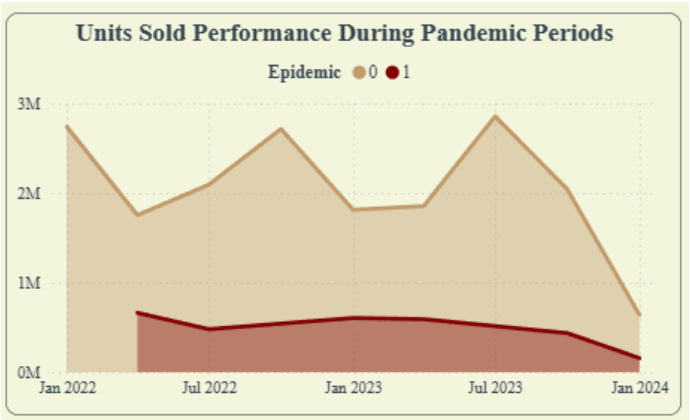
Explanation: The Groceries category topped the list of most demanded products during the pandemic (about 1.0 million units).



Improvement Suggestions: Ensure permanent buffer stock for the Groceries category, as it demonstrated high resilience and demand during crisis times, making it a critical, non-volatile category.

5. Units Sold Performance During Pandemic Periods

Explanation: This graph compares the performance of units sold over approximately two years between pandemic periods (indicated by 1) and normal periods (indicated by 0). It also shows that the average sales decline during the pandemic was 60.16%.



Improvement Recommendations:

- **Develop a Business Continuity Plan (BCP):** A crisis response plan should be developed that focuses on channel shifting from physical stores to e-commerce and delivery services to ensure that non-linear demand, which did not disappear entirely, is met.
- **Protection Against Contraction:** The operational activities that led to the sharp decline (60.16%) should be reviewed, and efforts should be made to strengthen the supply chain to ensure stable supply in the face of any external disruptions.

General Summary of Improvement Recommendations

The following are the overarching strategic recommendations derived from the data analysis:

1. **Resolve the Demand-Fulfillment Gap:** Urgently investigate and resolve the massive discrepancy between **45 million** units ordered and **21 million** units sold to improve sales conversion and forecasting accuracy.
2. **Elevate Underperforming Regions/Branches:** Implement the successful operational models of the **North Region** and **Branch C** across the **South/East Regions** and Branches A/B to balance sales contribution and inventory turnover.
3. **Optimize Pricing for Profitability:** Maintain the effective promotional uplift (0.26) but conduct testing to determine if a lower average discount (currently 12.14) can be used to achieve similar results, thereby increasing profit margins.
4. **Strengthen Non-Financial Customer Experience:** Shift focus from transaction size to service quality. Since customer ratings are not correlated with purchase value, invest in excellent **customer service and post-sale experience** to drive positive ratings and loyalty.
5. **Develop Crisis and Seasonal Agility:** Implement a robust crisis plan to mitigate severe sales drops (like the 60.16 drop during the pandemic). Use **weather-based targeting** to capitalize on both sunny (in-store) and rainy/snowy (online) conditions.