Streamlining Inventory and Logistics: A Data-Driven Approach for New Agarwal Footwear

Final Submission for the BDM capstone Project

Submitted by

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Declaration Statement

I am working on a Project titled "**Streamlining Inventory and Logistics: A Data-Driven Approach for New Agarwal Footwear**". I extend my appreciation to New Agarwal Footwear, for providing the necessary resources that enabled me to conduct my project.

I hereby assert that the data presented and assessed in this project report is genuine and precise to the utmost extent of my knowledge and capabilities. The data has been gathered from primary sources and carefully analyzed to assure its reliability.

Additionally, I affirm that all procedures employed for the purpose of data collection and analysis have been duly explained in this report. The outcomes and inferences derived from the data are an accurate depiction of the findings acquired through thorough analytical procedures.

I am dedicated to adhering to the principles of academic honesty and integrity, and I am receptive to any additional examination or validation of the data contained in this project report.

I understand that the execution of this project is intended for individual completion and is not to be undertaken collectively. I thus affirm that I am not engaged in any form of collaboration with other individuals, and that all the work undertaken has been solely conducted by me. In the event that plagiarism is detected in the report at any stage of the project's completion, I am fully aware and prepared to accept disciplinary measures imposed by the relevant authority.

I understand that all recommendations made in this project report are within the context of the academic project taken up towards course fulfillment in the BS Degree Program offered by IIT Madras. The institution does not endorse any of the claims or comments.

Signature of Candidate: 

Name: Aditya Singh

Date: 2024-02-12

1 Executive Summary and Title

This Business Data Management (BDM) report offers a detailed analysis of New Agarwal Footwear, focusing on data-driven strategies for inventory and logistics optimization. By delving into key metrics such as Inventory Turnover, Return Rate, Sell-Through Rate, Price Elasticity, and Sales Forecasting, the report extracts valuable insights to guide strategic decision-making and enhance overall business performance.

The analysis reveals distinct dynamics across product categories. While the Sports category faces a moderate decline in turnover, signaling potential challenges, Casual Pairs showcase stability with a notable improvement in turnover. The Sandals category consistently exhibits strong turnover rates, reflecting efficient stock movement. Return rate variations indicate that Sports experiences moderate return rates, Casual Pairs show fluctuations, and Sandals maintain consistently low return rates, reflecting positive customer satisfaction.

Sell-Through Rate insights emphasize opportunities for enhancing marketing strategies in Sports, monitoring inventory closely in Casual Pairs, and capitalizing on strong customer demand in Sandals. Price Elasticity dynamics highlight the need for strategic pricing adjustments in Sports, adaptive pricing strategies in Casual Pairs, and consistent pricing strategies in Sandals.

Incorporating forecasted sales data for July, the report provides actionable recommendations. These include optimizing Sports inventory management, refining marketing tactics for Casual Pairs, leveraging the strong performance of Sandals, continuous quality improvement, implementing adaptive pricing strategies, strategic sales forecasting, and vigilant market monitoring and adaptation.

These recommendations position New Agarwal Footwear for sustained success, enhanced market share, and a competitive edge in the dynamic footwear industry.

2 Detailed Explanation of Analysis Process

Step 1: Data Collection and Entry

The initial phase involved collecting raw data from New Agarwal Footwear, which was previously managed manually in a register. Recognizing the untidy and clumsy nature of the manual records, a decision was made to focus on three months of data. This data included both sales and inventory information. Collaborating closely with the business owner, the collected data was then meticulously entered into Microsoft Excel.

Step 2: Data Cleaning and Standardization

Commencing with the transition from manual register entries to a digital format using Microsoft Excel, the primary focus was on converting the raw, untidy data from New Agarwal Footwear into a standardized and organized dataset. During this process, sales data for the month of April, May, June and corresponding inventory records were meticulously entered, ensuring accuracy and completeness.

After the data collection, a thorough cleaning process was initiated to ensure the accuracy and reliability of the dataset.

Data Refinement Process:

- *Addressing Data Gaps:* Identifying and filling missing data points through discussions with the business owner to ensure completeness and accuracy.
- *Consistent Date Formatting:* Standardizing date formats within the sales data for uniformity and easing subsequent time-based analysis.
- *Enhanced Uniformity:* Employing techniques such as text normalization to rectify spelling errors and ensure a standardized dataset.
- *Integration of Sales and Inventory Data:* Merging sales and inventory datasets to facilitate a comprehensive overview of the business's performance.

After undergoing the meticulous data refinement process, the information within Microsoft Excel transformed into a systematically organized and coherent structure. This transformation not only enhanced the clarity of data representation but also laid the groundwork for a more comprehensive and efficient analytical exploration. The structured format within Excel now provides a solid foundation, allowing for a nuanced examination of sales patterns, inventory dynamics, and overall business performance with increased precision and interpretability.

Step 3: Inventory Turnover Analysis

Objective: Identify categories with slow inventory turnover, indicating potential excess stock.

1. **Calculate Average Inventory**

- In column H, a new header called “Average Inventory” is created
- For each category, the average inventory is calculated using the formula:

Average Inventory = (Beginning Inventory + Ending Inventory) / 2

2. **Calculate Inventory Turnover**

- In column I, a new header is created called "Inventory Turnover."
- For each category, the inventory turnover is calculated using the formula:

Inventory Turnover = Sold / Average Inventory

Significance of Analysis:

1. Understanding Inventory Turnover:
    - Inventory turnover gauges the speed at which products are sold and replenished.
    - A low turnover suggests sluggish sales, potentially leading to excess inventory.
2. Calculating Average Inventory:
    - Average inventory accommodates inventory level fluctuations over a specific period, offering a more accurate turnover assessment.

3. Interpreting Results:
    - A lower inventory turnover value signifies slower-moving stock, potentially indicating overstock issues.

Step 4: Return Rate Analysis

Objective: Identify categories with a higher likelihood of returns, indicating potential issues with the products.

1. **Calculate Return Rate**
    - In a new column, create a header called "Return Rate."
    - For each category, calculate the return rate using the formula:

$$Return\ Rate = Returns / Total\ Pairs\ Sold$$

Significance of Analysis:

1. Understanding Return Rates:
    - Return rates help pinpoint categories with a higher likelihood of returns, indicating potential issues with products.
2. Calculating Return Rate:
    - Return rates are quantified to reveal the proportion of sold items that are returned.
3. Interpreting Results:
    - A higher return rate indicates that customers are returning a significant portion of purchased items in that category.

Step 5: Sell-Through Rate Calculation

Objective: Assess the efficiency of selling products in each category, identifying potential slow-moving inventory.

1. **Calculate Sell-Through Rate**
    - In a new column, create a header called "Sell-Through Rate."

- For each category, calculate the sell-through rate using the formula:

Sell-Through Rate = Total Pairs Sold / Initial Inventory

Significance of Analysis:

1. Understanding Sell-Through Rate:
    - Sell-through rates help assess the efficiency of selling products in relation to the initial inventory levels.
2. Calculating Sell-Through Rate:
    - Sell-through rates are calculated to determine the percentage of initial inventory that is sold during a specific period.
3. Interpreting Results:
    - A lower sell-through rate suggests that the initial inventory may not be selling as efficiently, potentially contributing to excess stock.

Step 6: Sales Forecasting

Objective: Predict future total sales to inform strategic decision-making and resource allocation.

1. **Data Preparation:**
    - Organize sales data for all three footwear categories (Sports, Casual, Sandals) into a new worksheet, including historical total sales figures for the past months.
2. **Forecasting Method:**
    - Utilize Excel's built-in forecasting functions to generate forecasts for total sales, extrapolating trends from historical data across all categories combined.
3. **Forecast Accuracy Assessment:**
    - Evaluate the accuracy of the total sales forecasts by comparing them to actual total sales data for the forecasted period.

Significance of Analysis:

1. **Strategic Decision-Making:**
    - Total sales forecasts provide valuable insights for strategic planning and decision-making, guiding adjustments to inventory management, pricing strategies, and marketing efforts across all categories.
2. **Resource Optimization:**
    - Accurate forecasts of total sales facilitate efficient allocation of resources, such as inventory and manpower to meet anticipated overall demand levels.
3. **Risk Mitigation:**
    - Anticipating future total sales trends allows proactive measures to mitigate potential risks such as stockouts or excess inventory, ensuring smoother operations and improved customer satisfaction across all categories.

Results Interpretation:

- The forecasted total sales figures serve as a foundation for developing actionable strategies to optimize overall sales performance and maximize revenue generation across all footwear categories.

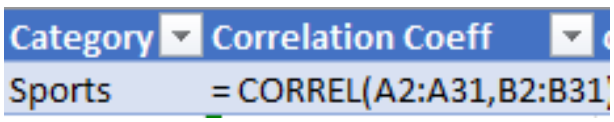
Step 7: Price Elasticity Analysis

Objective: Identify pricing strategies to maximize sales impact for each category.

1. Correlation Coefficient Calculation

In a new sheet, a table is created with columns for Sports Price, Casual Price, Sandals Price, Sports Pairs Sold, Casual Pairs Sold, and Sandals Pairs Sold.

We have utilized the CORREL function to determine the correlation coefficient between prices and pairs sold:



Significance of Analysis:

1. Understanding Price Elasticity:
   Price elasticity analysis is crucial for comprehending how variations in prices influence the quantity of goods sold.

2. Correlation Coefficient Calculation:
   The correlation coefficient quantifies the strength and direction of the relationship between two variables, specifically prices and pairs sold.

3. Results Interpretation:
   A positive correlation suggests that as prices increase, pairs sold also increase, and vice versa.

Step 8: Data Interpretation and Recommendations

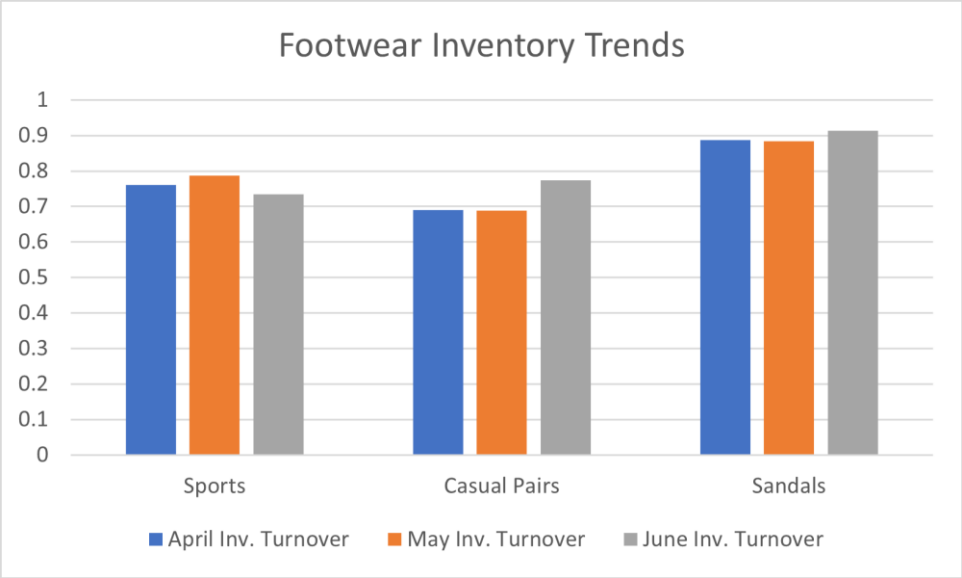
The comprehensive analysis conducted on New Agarwal Footwear culminated in a meticulous interpretation of the results, enabling the extraction of profound insights. These insights were instrumental in crafting tailored recommendations that are strategically aligned to overcome the challenges unique to New Agarwal Footwear. The identified challenges, ranging from inventory management to profitability and overall business performance, were addressed with precision through the formulation of practical and actionable recommendations. Each recommendation was meticulously designed to not only mitigate existing issues but also to propel the business towards sustainable growth and heightened competitiveness within the dynamic footwear market. By offering targeted solutions, the aim was to empower New Agarwal Footwear with a roadmap for strategic improvement, ensuring a resilient and prosperous future in the ever-evolving business landscape.

Step 9: Report Presentation

Finally, the comprehensive analysis, methodologies used, key insights, and recommendations were presented in a detailed report. The report incorporated graphical aids, such as charts and tables, to enhance the understanding of the analysis and improve overall readability. The report aimed to provide actionable insights that could guide informed decision-making and drive positive changes in business strategies.

3 Results and Findings:

3.1 Inventory Turnover Analysis



Exploring Inventory Efficiency Across Categories and Months

This section delves into the efficiency of inventory turnover for three key categories—Sports, Casual Pairs, and Sandals—across the months of April, May, and June. The analysis uncovers distinct trends and patterns, offering actionable insights for optimizing inventory management strategies.

Key Findings:

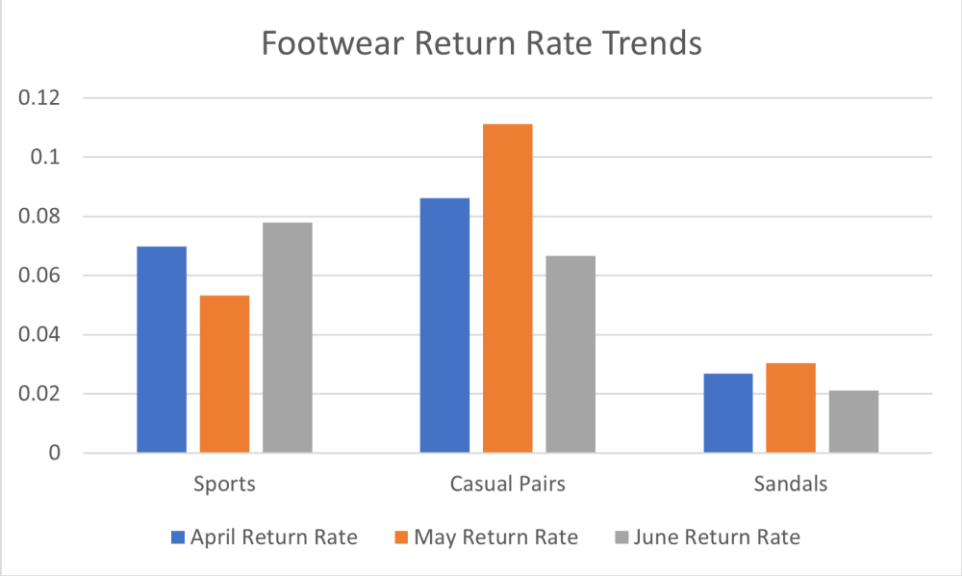
1. **Sports Category: Declining Turnover Rates**
    - Despite a steady turnover in April (0.76), the Sports category experienced a moderate decline in turnover from May (0.79) to June (0.73). This downward trend signals potential challenges in stock movement, necessitating targeted interventions to revitalize sales momentum.
2. **Casual Pairs Category: Stability Amidst Improvement**
    - While maintaining relatively stable turnover between May and April (0.69), the Casual Pairs category witnessed a notable improvement in turnover from May (0.69) to June (0.77). This indicates opportunities for refining inventory management practices to sustain and build upon positive performance.

3. **Sandals Category: Consistently Strong Turnover**
    - The Sandals category showcased robust turnover rates across all three months—0.91 in June, 0.88 in May, and 0.89 in April. This consistent performance underscores efficient stock movement, suggesting the need for proactive measures to align inventory levels with market demand fluctuations

Interpretation:

Across Sports, Casual Pairs, and Sandals categories, varying turnover dynamics emerge. While Sports shows a slight decline, Casual Pairs fluctuates, and Sandals maintains strong turnover. These insights underscore the need for agile inventory strategies to sustain sales momentum and align with market demand effectively.

3.2 Return Rate Analysis



Exploring Return Trends Across Categories and Months

This section investigates return rates for three key categories—Sports, Casual Pairs, and Sandals—during the months of April, May, and June. The analysis uncovers distinctive patterns, providing insights for optimizing product quality and customer satisfaction strategies.

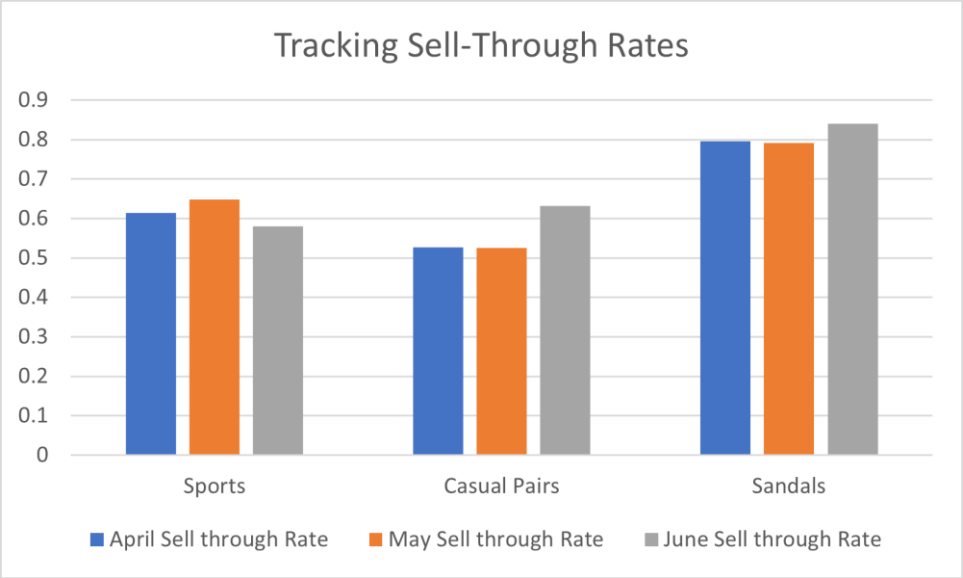
Key Findings:

1. **Sports Category: Varied Return Rates**
    - Despite a slight increase in May (0.053) compared to April (0.070), the return rate for the Sports category remained relatively low throughout the three months. June saw a slight uptick in return rate (0.078), indicating potential areas for enhancing product quality and customer service to minimize returns.
2. **Casual Pairs Category: Fluctuating Return Rates**
    - The return rate for Casual Pairs showed fluctuations across the months, with May (0.111) exhibiting the highest return rate and June (0.067) showing a decrease. These variations suggest the importance of monitoring customer feedback and product satisfaction to mitigate returns effectively.
3. **Sandals Category: Consistently Low Return Rates**
    - The Sandals category maintained consistently low return rates across all three months, with June (0.021) demonstrating the lowest return rate. This trend reflects positive customer satisfaction levels and indicates the effectiveness of product quality assurance measures implemented by the company.

Interpretation:

The analysis highlights varying return rate dynamics across categories, with the Sports category showing moderate return rates, the Casual Pairs category experiencing fluctuations, and the Sandals category maintaining consistently low return rates. These findings underscore the importance of continuous monitoring and improvement of product quality and customer satisfaction strategies.

3.3 Sell-Through Rate Analysis



Exploring Sell Through Trends Across Categories and Months

This section delves into sell-through rates for three key categories—Sports, Casual Pairs, and Sandals—across April, May, and June. The analysis uncovers unique patterns, offering insights to optimize inventory management and sales strategies.

Key Findings:

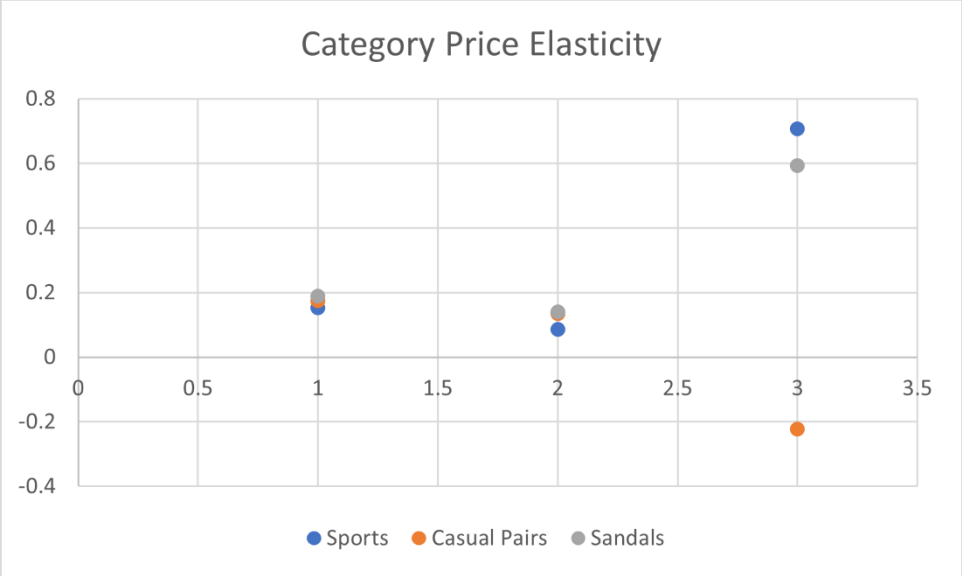
1. **Sports Category: Varied Sell Through Rates**
    - Despite a slight fluctuation, the sell-through rate for Sports remained relatively stable across the three months, with May exhibiting the highest rate (0.648). Opportunities exist to enhance product placement and marketing strategies for consistent performance.
2. **Casual Pairs Category: Fluctuating Sell Through Rates**
    - Sell-through rates for Casual Pairs showed fluctuations, with June showcasing the highest rate (0.632). Monitoring inventory levels and customer demand closely can help mitigate fluctuations and optimize sell-through rates effectively.
3. **Sandals Category: Consistently High Sell Through Rates**
    - The Sandals category demonstrated consistently high sell-through rates throughout the three months, with June achieving the highest rate (0.840). This

consistent performance underscores strong customer demand and effective inventory management practices.

Interpretation:

The analysis reveals diverse sell-through dynamics across categories, with Sports showing moderate stability, Casual Pairs exhibiting fluctuations, and Sandals maintaining consistently high rates. These findings emphasize the importance of aligning inventory levels with customer demand and implementing targeted strategies to optimize sell-through rates effectively.

3.4 Price Elasticity Analysis



Scatter plot visualizes the correlation between price and quantity demanded for each category, providing a graphical representation of price sensitivity trends.

Exploring Price Sensitivity Across Categories and Months

This section investigates price inelasticity for three key categories—Sports, Casual Pairs, and Sandals—across April, May, and June. Using correlation coefficients, the analysis unveils insights into the responsiveness of quantity demanded to price changes.

Key Findings:

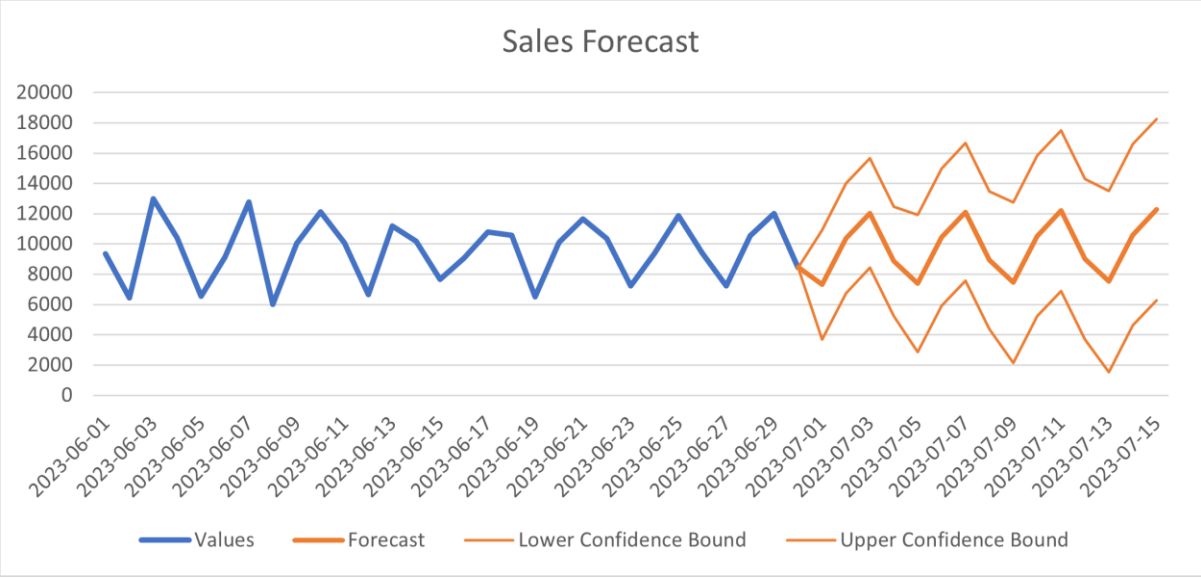
1. **Sports Category:**
    - The correlation coefficient for Sports indicates a moderate positive relationship between price and quantity demanded in April (0.152), followed by a decrease in May (0.085). However, June shows a substantial increase

(0.706), suggesting price sensitivity and potential opportunities for strategic pricing adjustments.

2. **Casual Pairs Category:**
    - For Casual Pairs, the correlation coefficient fluctuates, indicating varying degrees of price sensitivity. April and May show moderate positive correlations (0.175 and 0.135, respectively), while June exhibits a negative correlation (-0.222), suggesting an inverse relationship between price and quantity demanded.
3. **Sandals Category:**
    - The Sandals category demonstrates a consistent positive correlation between price and quantity demanded across all months, with April (0.189), May (0.141), and June (0.594). This indicates moderate to strong price sensitivity, emphasizing the importance of strategic pricing strategies to maximize sales impact.

Interpretation: The analysis uncovers diverse price sensitivity dynamics across categories, with Sports showing increasing sensitivity in June, Casual Pairs exhibiting fluctuations, and Sandals demonstrating consistent sensitivity. These insights underscore the need for tailored pricing strategies to optimize sales performance and maximize revenue across different product categories.

3.5 Sales Forecasting



Exploring Sales Trends and Forecasting for July

This section delves into sales forecasting for the month of July based on historical sales data and the use of the forecast function in MS Excel. The analysis provides insights into anticipated sales trends and potential business performance for the upcoming period.

Key Findings:

- **Sales Trends in June:** The sales data for June reveals fluctuations in daily sales volumes, with varying values recorded throughout the month. These fluctuations may be attributed to factors such as seasonal demand, promotional activities, or market dynamics.
- **Forecasting for July:** Utilizing the forecast function in MS Excel, sales projections for July have been generated. The forecasted values provide estimates of daily sales volumes for the first 15 days of July, along with corresponding lower and upper confidence bounds.
- **Insights and Interpretation:** The forecasted sales values offer valuable insights into anticipated sales performance for the beginning of July. These projections can serve as a basis for strategic decision-making, resource allocation, and inventory management to meet anticipated demand and optimize business operations.

Interpretation:

The sales forecasting analysis enables businesses to anticipate demand trends and make informed decisions to effectively manage resources and operations. By leveraging the forecasted sales data, businesses can proactively address market dynamics, capitalize on sales opportunities, and ensure alignment with organizational goals and objectives.

4 Interpretation of Results and Recommendation

After conducting in-depth analyses on inventory turnover, return rates, sell-through rates, price elasticity, and sales forecasting for the categories—Sports, Casual Pairs, and Sandals—several key insights have emerged. These insights provide valuable guidance for optimizing inventory management, enhancing product quality, and maximizing sales performance.

1. **Inventory Turnover Dynamics:**
    - The Sports category experienced a moderate decline in turnover, signaling potential challenges in stock movement.
    - Casual Pairs demonstrated stability with a notable improvement in turnover, indicating opportunities for refinement.
    - Sandals exhibited consistently strong turnover rates, highlighting efficient stock movement.
2. **Return Rate Variations:**
    - Sports showed moderate return rates, with fluctuations observed over the months.
    - Casual Pairs experienced fluctuating return rates, emphasizing the importance of monitoring customer feedback.
    - Sandals maintained consistently low return rates, reflecting positive customer satisfaction.
3. **Sell-Through Rate Insights:**
    - Sports exhibited relatively stable sell-through rates, suggesting opportunities for enhancement in marketing strategies.
    - Casual Pairs displayed fluctuations in sell-through rates, requiring closer monitoring of inventory levels and customer demand.
    - Sandals maintained consistently high sell-through rates, indicating strong customer demand and effective inventory management.
4. **Price Elasticity Dynamics:**
    - Sports showed increasing price sensitivity in June, suggesting potential opportunities for strategic pricing adjustments.
    - Casual Pairs exhibited fluctuating price sensitivity, necessitating adaptive pricing strategies.
    - Sandals demonstrated consistent price sensitivity, emphasizing the importance of strategic pricing strategies.

5. **Sales Forecasting Insights:**

    - The forecasted sales values for July provide valuable insights into anticipated sales performance, enabling proactive resource allocation and inventory management.

Recommendations:

1. **Optimize Sports Inventory Management:**

    - Implement targeted strategies to revitalize the Sports category, focusing on enhancing stock movement and sales momentum.

2. **Refine Casual Pairs Marketing Tactics:**

    - Tailor marketing strategies for the Casual Pairs category to mitigate fluctuations in sell-through rates and optimize sales performance.

3. **Leverage Sandals' Strong Performance:**

    - Maintain optimal inventory levels for Sandals to capitalize on consistently high sell-through rates and meet customer demand effectively.

4. **Continuous Quality Improvement:**

    - Continuously monitor product quality and customer feedback across all categories to minimize returns and enhance customer satisfaction.

5. **Adaptive Pricing Strategies:**

    - Implement dynamic pricing strategies based on price sensitivity insights to maximize sales impact and revenue generation.

6. **Strategic Sales Forecasting:**

    - Utilize sales forecasting data to anticipate demand trends and optimize resource allocation and inventory management for the upcoming period.

7. **Market Monitoring and Adaptation:**

    - Remain vigilant of market dynamics and adapt marketing and inventory strategies accordingly to maintain competitiveness and meet evolving customer needs.

These recommendations aim to optimize inventory management, enhance product quality, and maximize sales performance across the Sports, Casual Pairs, and Sandals categories, ultimately contributing to the long-term success of New Agarwal Footwear.

----------*End of Report*----------