

Analysing the Financial Performance of Top Shelf: A Stationery Retail Business

A Mid Term report for the BDM Capstone Project

Submitted by

Name : Kushagra

Roll number :24DS1000083



BS DEGREE PROGRAM

Indian Institute of Technology Madras

Chennai Tamil Nadu, India , 600036

Contents

1 Executive Summary	2
2 Proof of Originality	2
3 Metadata	3
4 Descriptive Statistics	3
5 Detailed Explanation of Analysis Process/Method	5
6 Results and Findings	6
7 Conclusion	10

1. EXECUTIVE SUMMARY

Top Shelf is a local stationery shop located in the student-dense area of North Campus, Delhi University. The store caters primarily to college students and experiences significant seasonal fluctuations in demand aligned with academic schedules. The key problems identified include inconsistent inventory levels, lack of visibility into product-wise profitability, and inefficient stock planning during exam peaks and semester breaks. These challenges impact profitability, shelf space utilization, and customer satisfaction.

To address these issues, primary data was collected directly from the shop owner in the form of monthly sales and stock records. The main dataset contains 400 rows and 7 key columns including product name, category, quantity sold, unit price, and total revenue across four months (March-June 2025). An additional inventory dataset was created with 21 columns, covering monthly opening stock, incoming stock, and closing stock. Descriptive statistics revealed May as the highest revenue month, with Paper and Writing Essentials as top-performing categories.

The cleaned data was analyzed using Python libraries such as Pandas and Matplotlib. Techniques included monthly trend analysis, seasonal demand mapping, product-wise profitability evaluation, and inventory turnover tracking. The mid-term results highlight strong seasonal sales patterns during academic peaks, profitability concentration in select categories like Paper, and excess inventory in low-demand segments.

These insights form the basis for strategic recommendations to optimize stock levels, enhance assortment planning, and improve overall profitability in the final phase of the project.

2. PROOF OF ORIGINALITY

All data used in this report has been sourced directly from Top Shelf, a stationery retail shop. A discussion was held with Mr. Mukul Agarwal, the proprietor of the store, to confirm the validity and reliability of the business data. Photographic evidence was collected during a site visit to the shop in the North Campus region of Delhi University. The relevant documents can be accessed through the following: [LINK](#).

3. METADATA

The sales data for this project was initially recorded manually and later transcribed into an Excel sheet. The dataset consists of 400 rows and 7 columns, containing key information such as product names, quantities sold, prices, and monthly stock data, including opening, incoming, and closing stock figures.

In addition to the sales dataset, an inventory dataset was created using stock records from incoming stock receipts. This dataset contains 100 rows and 21 columns, which include details like product ID, product name, category, opening stock, sales, incoming stock, and closing stock for each month.

ATTRIBUTE	DATA TYPE	DESCRIPTION
Date	Date	The date of each sale, required for monthly and seasonal analysis.
Product Id	String	Unique identifier for each product, distinguishing different products.
Product Name	String	The name of the product, used for SKU identification and market analysis.
Price	Numerical	Selling price of the product, used for total revenue analysis.
Cost Price	Numerical	Cost price of the product, necessary for profit margin calculations.
Category	String	Product category, important for market share and seasonal demand analysis.
Quantity Sold	Numerical	Number of units sold in a specific season or time period.
Total Revenue	Numerical	Total revenue generated by a product on a specific date.
Opening Stocks	Numerical	Number of units available at the beginning of the period.
Closing Stocks	Numerical	Number of stock units remaining at the end of the period.
Incoming Stocks	Numerical	Number of stock units received within a month.
Sales	Numerical	Total units sold during the month, used for performance analysis.

3.1 Data Cleaning Process: The data cleaning process began by addressing missing values. The dataset provided by the business included sales dates, product names, quantities, prices, and categories. However, many products had missing price entries, which were updated manually using a product catalog to ensure consistency.

While transferring the sales data into Excel, multiple challenges arose, including discrepancies, typographical errors, and formatting issues. These were carefully reviewed and corrected to maintain the data's quality. Python libraries like Pandas and Matplotlib were then used to process the cleaned data and create visualizations, providing deeper insights into sales trends and category performance.

4. DESCRIPTIVE STATISTICS

This section focuses on structuring and summarizing the data to present it in a clear and meaningful way using statistical key metrics.

Month and Year	Total Revenue	Mean Revenue	Median Revenue	Most Sold Product	Least Sold Product
Mar-25	₹233,095.00	₹2,330.95	₹2,030.00	Apsara Non-Dust Eraser	Uniball Eye Fine Pen
Apr-25	₹242,090.00	₹2,420.90	₹1,910.00	UHU Glue Tube	Camlin Artist Brushes (pack of 7)
May-25	₹249,387.00	₹2,493.87	₹1,945.00	Luxor Chalk Marker	Helix Oxford Geometry Box
Jun-25	₹238,650.00	₹2,386.50	₹1,940.00	Doms Divider	Parker Vector Roller Ball Pen

The descriptive statistics for the period from March 2025 to June 2025 show strong sales performance, with May 2025 recording the highest total revenue of ₹249,387.00, followed by April at ₹242,090.00. The mean revenue was also highest in May at ₹2,493.87, indicating strong average sales. The median revenue followed a similar trend, with May leading at ₹1,945.00. Apsara Non-Dust Eraser was the most sold product in March, UHU Glue Tube in April, Luxor Chalk Marker in May, and Doms Divider in June. The least sold products varied each month, with Uniball Eye Fine Pen, Camlin Artist Brushes, Helix Oxford Geometry Box, and Parker Vector Roller Ball Pen taking the lowest spots. These insights provide valuable data for refining inventory and sales strategies.

Category	COUNT	MEAN	MEDIAN	MODE	P25	P50	P75	MIN	MAX
Adhesive	44	₹2,216.18	₹2,047.00	₹1,785	₹1,571.25	₹2,047.00	₹2,655.00	₹630.00	₹4,410.00
Art Supply	20	₹2,546.25	₹2,280.00	₹2,070	₹1,537.50	₹2,280.00	₹3,356.25	₹560.00	₹6,150.00
File	40	₹2,688.88	₹2,220.00	₹1,080	₹1,387.50	₹2,220.00	₹3,450.00	₹420.00	₹7,560.00
Instruments	40	₹1,964.38	₹1,710.00	₹1,050	₹1,050.00	₹1,710.00	₹2,727.50	₹410.00	₹4,680.00
Notebook	40	₹2,423.88	₹2,260.00	₹660	₹1,643.75	₹2,260.00	₹3,450.00	₹550.00	₹5,175.00
Office Supply	28	₹2,648.75	₹2,445.00	₹1,200	₹1,485.00	₹2,445.00	₹3,442.50	₹1,200.00	₹6,420.00
Paper	40	₹4,842.38	₹4,100.00	₹690	₹2,205.00	₹4,100.00	₹6,420.00	₹300.00	₹13,500.00
Sticky Notes	12	₹2,401.25	₹2,265.00	₹1,020	₹1,925.00	₹2,265.00	₹2,992.50	₹1,020.00	₹4,230.00
Writing Essentials	136	₹1,728.13	₹1,327.50	₹1,680	₹738.75	₹1,327.50	₹2,105.00	₹160.00	₹8,700.00

The category-wise statistics table provides an overview of sales performance across product categories. Paper leads with the highest mean revenue of ₹4,842.38 and a median of ₹4,100.00. The Writing Essentials category, with 136 products, has a mean of ₹1,728.13 but a wide range from ₹160.00 to ₹8,700.00. Notebook and Art Supply also perform well, with means of ₹2,423.88 and ₹2,546.25, respectively, although Art Supply shows more variation. Instruments and File categories perform steadily but with lower revenues. Overall, Paper and Writing Essentials are the top performers, while Adhesive and Art Supply show more variability.

5. DETAILED EXPLANATION OF ANALYSIS PROCESS/METHOD

5.1 Data Loading and Initial Exploration: The data was compiled and imported into a Pandas DataFrame for analysis. The initial exploration focused on key columns such as product names, quantities sold, prices, and monthly stock details, including opening,

incoming, and closing stocks. This step provided an understanding of the data structure and allowed for a preliminary assessment of the dataset.

5.2 Data Preprocessing: The dataset had missing product prices, which were addressed by referring to available data sources. Additionally, products were grouped into broader categories to streamline the dataset, allowing for a more organized and insightful analysis.

5.3 Descriptive Statistics: A comprehensive summary of the dataset was prepared by calculating important metrics like the mean, median, and other statistical measures for each category. Monthly data was also compiled to track total revenue and identify the highest and lowest performing products and categories. This analysis offered valuable insights into the key trends and variations within the dataset.

5.4 Monthly Trend Analysis: A line graph was created to analyze monthly sales revenue and quantities sold, allowing for a deeper understanding of business performance and demand patterns. This analysis helped identify trends in sales fluctuations, variations in product demand, and revenue shifts across the months, providing a clearer view of how different products performed throughout the period from March to June 2025.

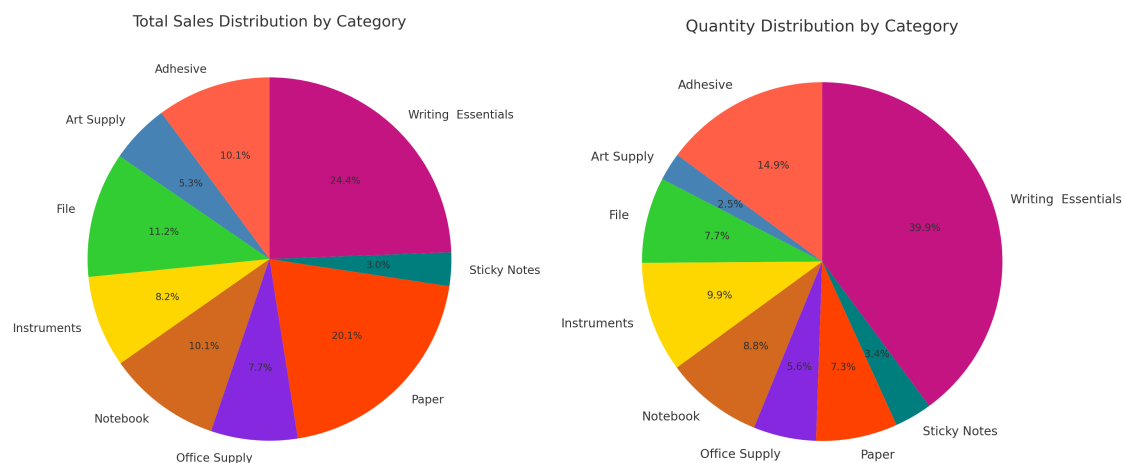
5.5 Inventory Management Analysis: A **bar plot** was used to analyze stock turnover, identify stock-out risks, and highlight overstock issues. This analysis helped pinpoint fast-selling products that frequently ran out of stock, indicating the need for better restocking practices. The plot also revealed overstocked items, leading to unnecessary storage costs and potential waste. These insights emphasize the importance of effective inventory management to prevent losses and maintain an optimal stock balance.

5.6 Seasonal Trend Analysis: A stacked area chart was used to analyze sales trends, highlighting demand fluctuations during exam periods and regular months. The analysis showed higher sales for certain products during exams, while others maintained steady demand. These insights aid in inventory planning, demand forecasting, and seasonal marketing strategies, ensuring optimized stock levels and maximizing revenue during peak periods.

5.7 Product Profitability Analysis: This analysis assessed the profitability of each product category by comparing total sales revenue against associated costs. It helped identify both high-performing and underperforming categories, enabling data-driven decisions for optimizing inventory and product assortment. To visually support this analysis, a bar chart was employed to illustrate total profitability across different categories.

6. RESULTS AND FINDINGS

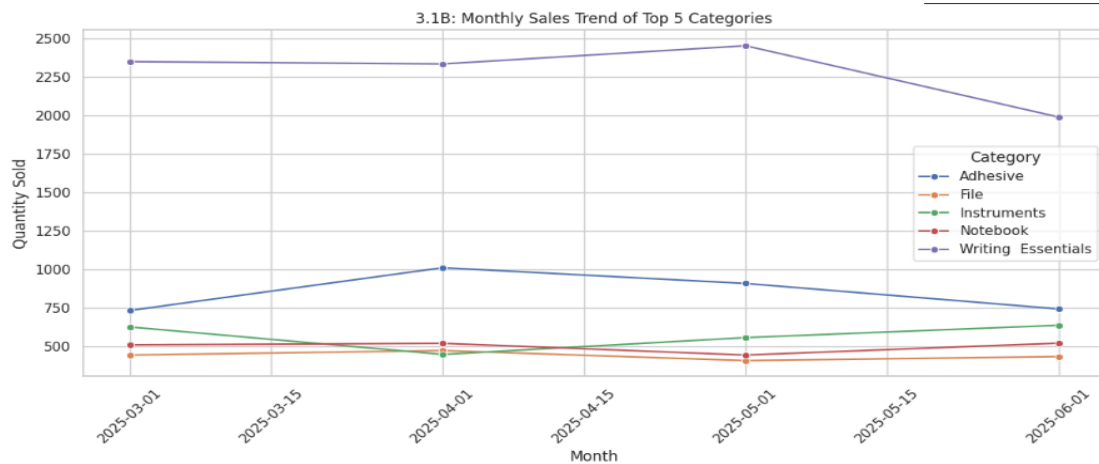
6.1 Overview: A pie chart was created to represent the percentage distribution of quantity sold and total sales across product categories, with exact figures detailed in the tables above. These charts provide a statistical breakdown of sales performance by category.



Writing Essentials hold the largest share in both quantity (39.9%) and total sales (24.4%), confirming their dominance in overall product demand and revenue generation. Paper follows closely with a significant contribution to total sales, highlighting its strong performance. Adhesive also contributes notably to both quantity and sales, while categories like Art Supply and Office Supply show steady, moderate demand.

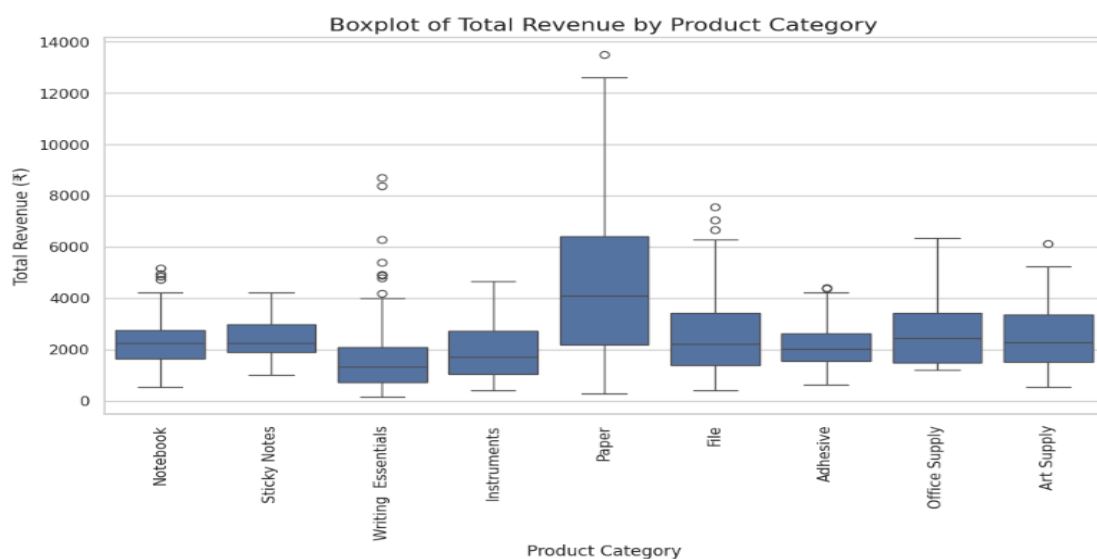
6.2 Monthly Trend Analysis: The graph illustrates the monthly sales trends for the top 5 product categories. Writing Essentials leads with a significant spike in sales during March 2025, followed by a gradual decline. Similarly, Adhesive shows a peak in March, but its sales taper off in the subsequent months. These trends indicate that both categories experience seasonal demand, likely driven by academic cycles.

In contrast, Instruments, Notebook, and File display relatively consistent sales with minimal fluctuations. These categories suggest steady demand over time, without significant peaks or drops.



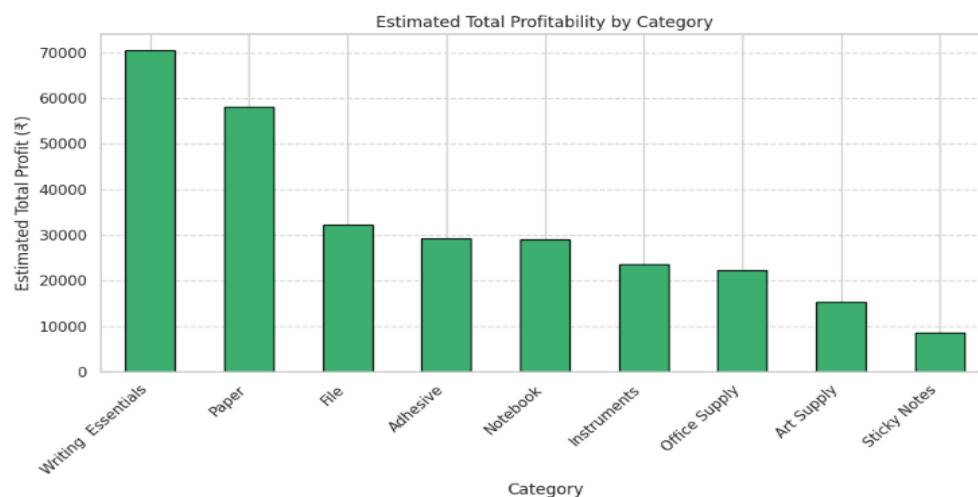
This pattern emphasizes the need for seasonal inventory adjustments for high-demand categories like Writing Essentials, while ensuring consistent stock levels for more stable categories.

6.3 Inventory Management Analysis: The box plot reveals noticeable variation in total revenue across product categories. Paper shows the highest variability, indicating the presence of both high and low revenue-generating products within the category. Categories like Sticky Notes and Notebook exhibit more consistent revenue performance, with tighter interquartile ranges and fewer outliers.



Writing Essentials, despite having some high-performing products, show relatively lower median revenues. Outliers in categories such as Instruments and File suggest occasional spikes in sales. Overall, the analysis helps identify both stable and volatile categories, enabling more focused inventory planning and strategic sales efforts based on revenue performance patterns.

6.4 Product Profitability Analysis: The chart highlights that Writing Essentials and Paper are the most profitable categories, generating the highest estimated total profit. Their strong performance suggests consistent customer demand and a higher return on investment, making them ideal candidates for focused inventory planning and promotional efforts.



In contrast, categories such as Sticky Notes and Art Supply reflect relatively low profitability. This may be due to low sales volume or limited margins, indicating the need to review their shelf space allocation. Streamlining these slower-moving products can free up resources to invest in higher-performing categories and improve overall business profitability.

7. CONCLUSION

The mid-term analysis of the stationery shop's sales and inventory data led to several meaningful findings. Seasonal trends showed a significant rise in sales during the beginning of semesters and exam periods, confirming the need for demand-based inventory planning. This highlights the opportunity to stock up on fast-moving products before academic peaks and reduce surplus during breaks, ensuring better stock rotation and minimizing capital lock-in. Profitability analysis revealed that categories like Writing Essentials and Stationery

Sets consistently drive high revenue, whereas items such as Sticky Notes and certain File products showed lower returns. These findings suggest a need to reallocate shelf space and investment toward high-performing items. Overall, the results support a more efficient, data-driven approach to product planning, stocking, and profitability enhancement.