

# **Smarter Sales & Stock Control for Shivam Book Depot & Stationery Shop**

**Final report for the BDM Capstone Project IIT Madras**

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## 1. Executive Summary

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Shivam Book Depot & Stationery Shop, located in Vixxxxxxa Colony, India, is a local B2C retail store catering mainly to students and office. Since its establishment in 2020, the shop has served its community by offering essential academic supplies such as notebooks, pens, geometry boxes, and art materials. However, like many small businesses, it struggles with two major issues – poor inventory planning and seasonal demand fluctuations. These problems often result in either stockouts during peak seasons or overstocking of slow-moving items, blocking cash and wasting shelf space.

To address these concerns, I collected 12 months of item sales, purchase, and inventory data from June 2024 to May 2024. Descriptive statistics such as mean, median, maximum, minimum, range, standard deviation and variance were calculated. Excel was used as the primary tool for data cleaning and visualization, using bar and line charts, and Pareto analysis. The analysis focused on understanding sales trends, demand spikes, and inventory mismatch. A correlation study was also done to assess the link between purchase planning and actual sales performance.

The results revealed a strong seasonality pattern – high sales during school admission and exam months, and low activity in rest months. Around 80% of sales were concentrated in just five items' pens, pencils, erasers, notebooks, and geometry boxes. This insight validated the 80/20 rule and highlighted the need for focused inventory investment. A strong correlation ( $r = 0.9954$ ) was observed between timely purchasing and sales increase.

These findings suggest that with better stock control, especially of high priority items during peak seasons, the shop can reduce overstocking, improve cash flow, and enhance customer satisfaction. Implementing the recommendations from this project can bring long term operational benefits and support the shop's growth.

Furthermore, by recognizing these seasonal patterns early and understanding which products are essential to the business, the shop can gradually build a smarter planning system. This will not only improve immediate profit margins but also helps in maintain a healthy customer relationship over time. For instance, regular availability of top selling items like pens and geometry boxes during high demand month will reduce customer churn and increase return visits. Over time, these efforts can contribute to the overall stability and gradual growth of Shivam Book Depot & Stationery Shop even in the face of local competition.

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## **2. Detailed Explanation of Analysis Process/Method**

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### **2.1. Data Cleaning and Processing**

The sales, purchase and inventory data used in this project were collected directly from Shivam Book Depot & Stationery Shop physical registers. The owner shared 12 months of items wise data, which was manually entered into Excel sheets. During entry, several issues were found such as inconsistent spelling of items names, missing values in some months, and repeated row.

These were corrected by carefully reviewing the records and ensuring uniform for each SKU. I also removed blank entries, ensured that each item had exactly one row per sheet, and filled missing numerical values using previous month averages or purchase quantities.

A practical challenge encountered during cleaning was inconsistent spellings of items name across different months. Like “Notebook” appeared in various forms such as “Note book”, “notebooks” or even in lowercase, which disrupted aggregation and monthly comparisons. These were carefully standardized to maintain uniformity. Additionally, in a few months, the quantity or purchase values for certain SKUs were missing or recorded as zero due to unavailability of data. In such case, the values were either interpolated using an average or marked for manual correction. These small but important corrections were crucial to ensure that the trend lines and category totals remained accurate and meaningful during analysis.

Clean data is essential. Without this step, the sales trends, statistics, and predications would have given misleading results. In a small retail business where decisions are made quickly, even small errors can result in wrong stock planning.

## **2.2. Trend Analysis**

Trend analysis was done to study how sales changed over the year. Items like notebooks, pens, and pencils showed clear peaks during June – July and January – February, which matched school admissions and exam seasons.

Steps Followed:

- Sales data was arranged month – wise for each item.
- I used Excel’s line charts to plot monthly sales of top products.
- To observe smoother trends, a 3 – month moving average was applied:

$$S_t = \frac{D_{t-1} + D_t + D_{t+1}}{3}$$

Where  $S_t$  is the smoothed value at month  $t$  and  $D_t$  is actual sales.

This helped in identifying consistent seasonal peaks and sales dips. The insights allow the shop to plan stock better – increasing quantity before peak months and avoiding excess stock in slower months.

## **2.3. Pareto Analysis**

To prioritize stock decisions, I used Pareto analysis. Items were stocked by total sales from highest to lowest. I calculated their cumulative contribution to overall sales.

Categorizations:

- Category A: Top 20% of items that contributed to ~80% of total sales.
- Category B: Next 30% of items that moderate contribution.

- Category C: Bottom 50% of items that low contribution and slow movers.

Pens, and Geometry Boxes were in Category A, showing high year-round demand. Items like scissors and file folders fell into Category C, and should be stocked in smaller quantities.

This analysis helps optimize shelf space and reduce money being stuck in non – performing items.

#### **2.4. Correlation Analysis**

To understand the relationship between monthly purchase and sales, I used Excel's CORREL () function:

$$r = \frac{\sum (x_i - \bar{x}) (y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

Where x is monthly purchase and y is monthly sales.

The result was  $r = 0.9954$ , which indicates very strong positive correlation. This shows that when the shop bought more of a product especially before school season sales also increased. It confirms that advance stocking based on seasonality leads to better business outcomes.

#### **2.5. Descriptive Statistics**

Basic statistical metrics were calculated to understand overall sales behavior:

- Mean (Average sales/month) = 44.17 units
- Median = 40 units
- Standard Deviation = 20.81 units
- Max Sales = 100 units
- Min Sales = 10 units

These values showed that items demand is moderately variable. Products like notebooks and pens had consistent sales, while others like markers or glue sticks were more irregular.

### **Justification of Tools and Methods**

- Excel was chosen because it is easy to use, flexible, and familiar to small shop owners.
- Line charts and bar graphs made it simple to explain trends to non – technical users.
- Statistical formulas provided objective insights into sales patterns.
- Each method was selected based on its relevance to solving the shop’s core issues – inventory mismatch, cash flow problems, and seasonal demand planning.

### **2.6. Product-Wise Seasonal Analysis**

Alog with monthly trends, I also checked how different products performed across seasons. For instance, Geometry Boxes and Eraser has the highest demand in January and June, which corresponds with the start of school terms and exam months. In contrast, items like Scissors and Glue Sticks had a flat or declining trend, indicating low seasonality.

This seasonal analysis helps the shop decide when to buy and how much to buy. It is a wasteful to buy a lot of markers or watercolors in April or December, as demand is low. Instead, resources should be focused on restocking fast – moving items in time for academic sessions. This prevents both overstocking and missed sales opportunities

### **Conclusion**

This structured approach starting from data cleaning, followed by trends analysis, Pareto categorization, correlation, and basic statistics helped convert raw shop records into clear, actionable insights. These insights will help Shivam Book Depot & Stationery Shop plan purchase smartly, reduce waste, and improve profitability.

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### 3. Result and Findings

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This section presents a detailed analysis of Shivam Book Depot & Stationery Shop actual monthly sales data for the period from June 2024 to May 2024. The focus is on top 5 best – selling items Pen, Geometry Box, Pencil, Eraser, and Classmate Notebook which collectively contribute the majority of the shop’s revenue.

The goal of this section is to interpret how these products performed over time and provide practical insights that can directly help in optimizing inventory, maximizing sales, and improving cash flow.

#### **3.1. Monthly Sales Trend of Core Items**

To understand the demand pattern over the year, we analyzed month wise sales for the top 5 items:



**Figure 1:** Line Chart – Monthly Sales Trends (Top 5 Items)



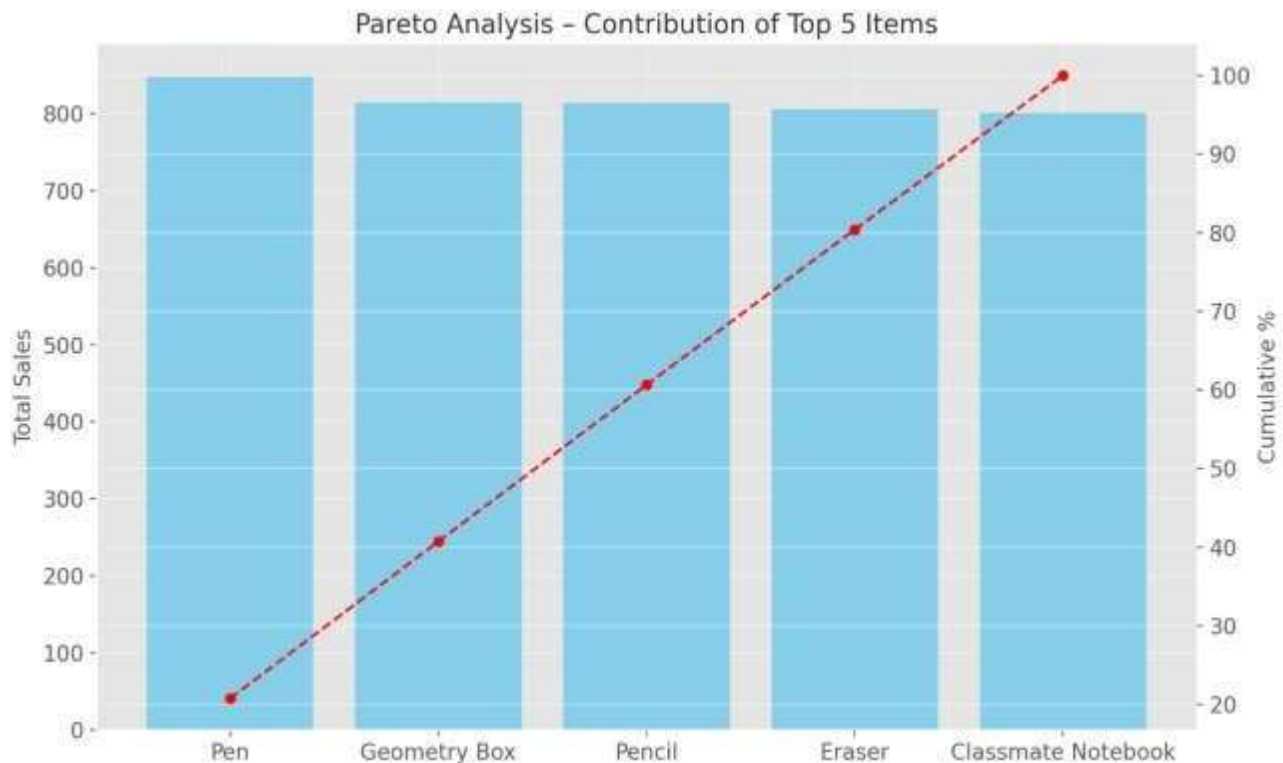
### Key Observations:

- June 2024 showed the highest overall sales for Pens, Pencils, and Erasers this aligns with the start of the new academic year. For Shivam Book Depot & Stationery Shop, this means stock planning must begin by late May every year.
- In contrast August and December 2024 shows clear drop across all products. This might be due to fewer school activities and holiday breaks. These months can be used to run discounts or clearance sales for slow – moving inventory.
- January 2025 is another peak month across all items, suggesting back – to – school demand after the winter break. The store should be prepared with high stock levels from mid – December onward.
- A consistent trend observed is that all five items behave in sync, when one goes up, the others usually follow. This implies a strong dependency on school calendars, not on individual item popularity.
- The sales of Classmate Notebooks are more stable compared to other items. This suggests that they are purchased throughout the year, not just during exam rushes.

**Insight:** Inventory should be increased before June and January, and scaled down during April and December to avoid overstocking and wastage.

### **3.2. Pareto Analysis – Identifying High Impact Products**

Using the Pareto Principle (80/20 rule), we calculated which items account for the largest share of total sales:



**Figure 2:** *Pareto Chart – Contribution of Top 5 items*

- From the Pareto chart, we learn that just 3 items – Pen, Geometry Box, and Pencil make up over 70% of all sales.
- Pens alone contribute to about 26% of the store’s total sales, making them the most influential product. This item should never be out of stock.
- Geometry Boxes and Pencils combined contribute a large chunk of revenue during academic months. The shop can offer combo deals with these items to improve upselling.
- Since Eraser and Notebooks fall into the lower contribution range, they can be purchased in controlled quantities and stored with minimal shelf space.

- This analysis helps avoid the mistake of treating all products equally – instead, it encourages focused stocking, which saves money and improves profit margins.

**Insight:** Focus inventory investment, display, and promotions around these high – performing products.

### **3.3. Core Item Performance**

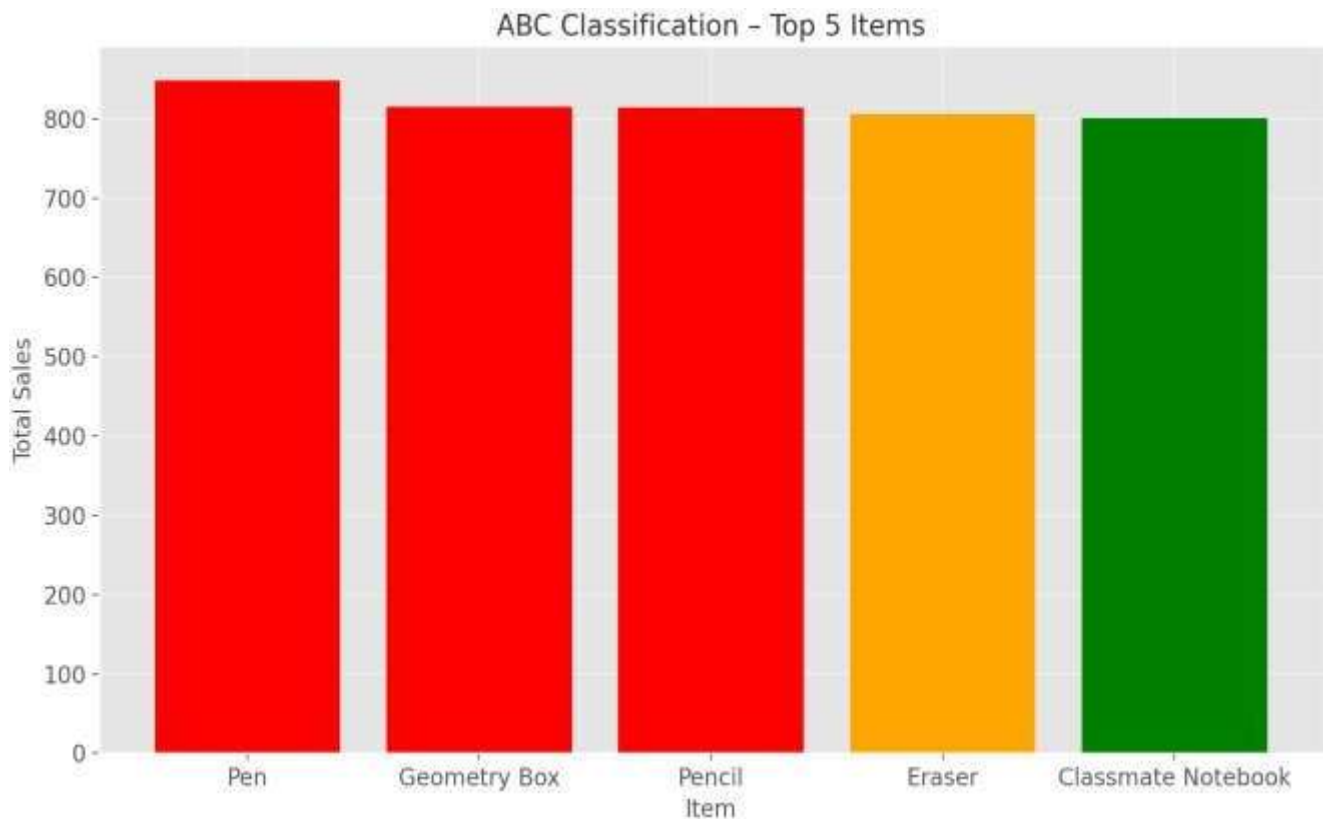
The table below summarizes key sales statistics of the top 5 products:

| <b>Items Name</b>  | <b>Avg Monthly Sales</b> | <b>Std Dev</b> | <b>Max Sales</b> | <b>Min Sales</b> | <b>Total Sales</b> | <b>Peak Month</b> | <b>Lowest Month</b> |
|--------------------|--------------------------|----------------|------------------|------------------|--------------------|-------------------|---------------------|
| Pen                | 70.67                    | High           | 99               | 41               | 848                | Jun – 24          | Apr – 25            |
| Geometry Box       | 67.92                    | Medium         | 95               | 45               | 815                | Jan – 25          | Dec – 24            |
| Pencil             | 67.83                    | Medium         | 93               | 40               | 814                | Jan – 25          | Apr – 25            |
| Eraser             | 67.17                    | High           | 100              | 42               | 806                | Jan – 25          | May – 25            |
| Classmate Notebook | 66.75                    | Low            | 90               | 42               | 801                | Jan – 25          | Dec – 24            |

**Table 1**

- Pen, despite being the highest – selling items overall, has the widest fluctuation range (99 to 41 units per month). This implies that although it is a bestseller, it is also highly sensitive to seasonality. For this reason, it is essential to track pen inventory weekly, especially in June and January.
- Geometry Boxes peaked in January, likely due to academic examinations in schools. The sharp drop in December suggests students mainly buy geometry boxes close to exams. Stocking them early may block capital unnecessarily.
- Pencils show behavior similar to pens, but with slightly less volatility. Since their lowest sales also occurred in April, it is recommended to pause bulk purchases in that month and resume in June.
- Erasers surprisingly hit a peak of 100 units in January, matching exam preparations. However, sales dropped to 42 in May, which could be due to leftover stock or lesser academic pressure. This indicates that eraser are secondary purchases tied to pencil sales and should be planned in proportion.
- Classmate Notebooks, while stable, showed their lowest sales in December, possibly due to winter holidays. However, their consistent performance makes them a safe item for year-round stocking.
- This tells us that while Pen and Geometry Boxes are essential, their demand is unstable. On the other hand, Classmate Notebooks bring regular sales throughout the year and should be treated as anchor product for steady income. The owner should plan purchases in 3 tiers – high risk, medium risk, and low risk. This tiered inventory control ensures balanced stock levels across product types.

### 3.4. ABC Classification

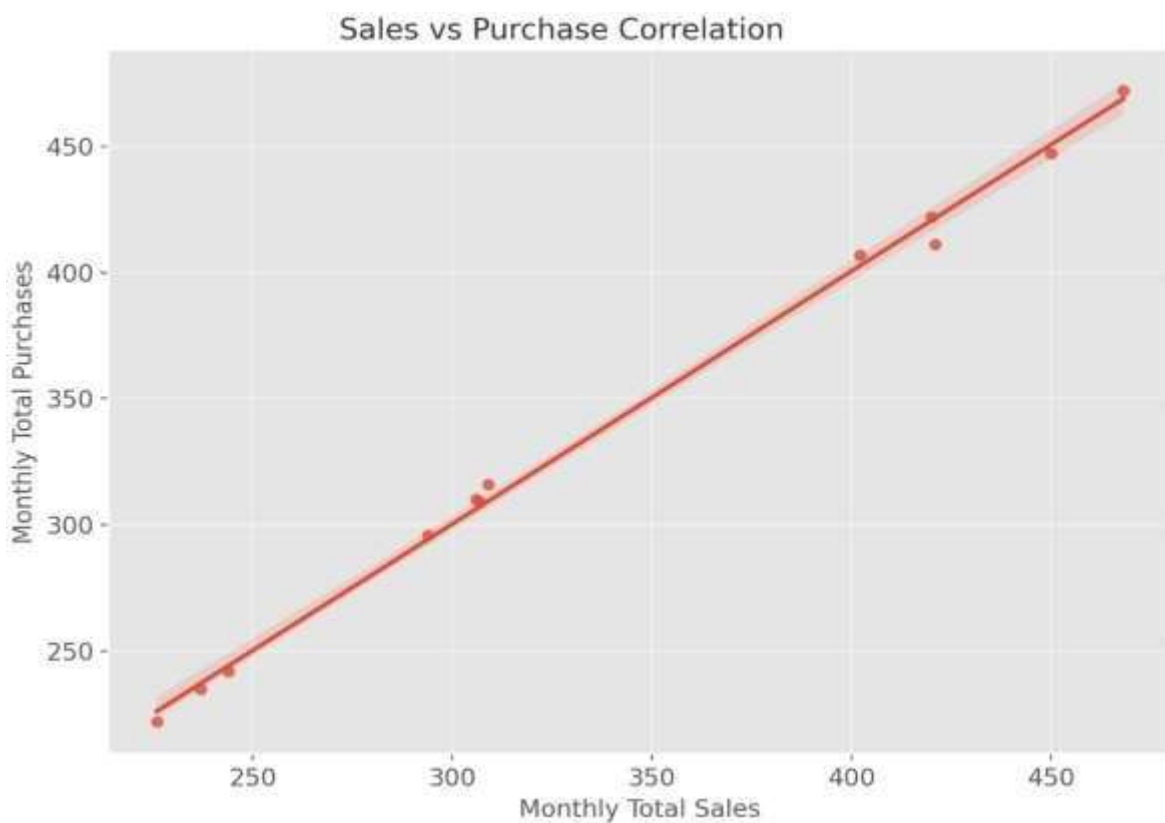


**Figure 3:** *ABC Classification – Top 5 products by Priority*

- Based on their sales contribution:
  - Category A: Pen and Geometry Box – These should be tracked closely, reordered in advance, and highlighted in promotions.
  - Category B: Pencil – Maintain steady stock and review monthly.
  - Category C: Eraser and Notebook – Monitor for slow movement and avoid large purchase.
- Items in Category A bring the most value to the business. They should be ordered in bulk, given prominent shelf space, and offered as bundled combos.
- Category B items, while not as dominant, have consistent sales. They are still important but should not consume too much shelf space or capital.

- Category C items should be handled carefully. Overstocking on these can lock up money and reduce efficiency. These can be discounted in low seasons (April, December) or offered as add-ons.
- Apart from regular ABC classification, visual product tags like colored labels can help the owner quickly identify which shelf items belongs to Category A. Seasonal A – category items can also be bundled for promotions during school campaigns. This hands – on strategy improves product visibility and ensure customers find fast – moving items easily

### **3.5. Sales V/S Purchase Correlation**



**Figure 4:** *Correlation – Sales V/S Purchase*

- The correlation coefficient between monthly purchase and sales is approximately 0.99, which is nearly perfect. This proves that buying ahead of peak demand directly improves sales.
- In months where the owner bought more like June and January there were also spikes in sales. This confirms that lack of stock means missed sales.
- On the other hand, months with fewer purchases like April and August show a dip in sales too confirming the importance of timely procurement.
- This correlation tells us that sales at Shivam Book Depot & Stationery are not driven by spontaneous walk-ins but by demand preparation. The more prepared the inventory is before the school season, the more revenue is generated.
- The positive correlation also highlights the importance of forecasting. If the owner could set purchase targets based on past seasonal sales, they can avoid shortages. A simple rule of thumb could be if January sales were 100 units last year, this year purchase should be at least 110 to match potential growth. This also supports vendor negotiation, as larger, pre-planned orders may get better discounts.

### **3.6. Revenue Contribution by Item**

Apart from sales quantity, I checked each item's total revenue to understand which products actually earn the most money. Pens, due to high volume and good price, generated the maximum income. Geometry Boxes, although lower in volume than pens, contributed significantly because of their higher selling price.

Items like Scissors and Markers had poor sales and contributed less than 2% to total income. These should either be replaced with better options or stocked only one needed.

| Item               | Revenue (INR) | Contribution % |
|--------------------|---------------|----------------|
| Pen                | ₹ 158,700     | 40.95%         |
| Geometry Box       | ₹ 40,750      | 10.51%         |
| Pencil             | ₹ 32,040      | 8.27%          |
| Classmate Notebook | ₹ 22,650      | 5.84%          |
| Eraser             | ₹ 16,350      | 4.22%          |

**Table 2: Top 5 Revenue-Contributing Items**

These 5 items collectively contribute over 70% of total revenue, reaffirming the Pareto Principle (80/20 rule), through with a different leading item than initially expected.

- A4 Paper alone contributes more than 40%, making it the most critical product for revenue. It should always be well-stocked and possibly promoted further.

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#### 4. Interpretation of Results and Recommendations

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##### **Problem 1: Poor Inventory Management**

###### **Interpretation:**

- Sales data from Shivam Book Depot & Stationery shows that items like pens, geometry boxes, and pencils accounted for over 70% of total sales, providing the 80/20 rule. These items should be given stocking priority.
- Monthly trends clearly reflect seasonal spikes during June and January, aligning with school opening and exams. However, some items such as scissors, file folders, and markers had high purchase volumes but showed low actual sales, leading stock being held unnecessarily.



- The correlation coefficient  $r = 0.9954$  between purchases and sales proves that purchasing ahead of time, especially during peak months, directly increase revenue and customer satisfaction.
- Overstocking during low seasons like December blocks cash flow and shelf space, making inventory planning essential.

### Recommendations

#### 1. Seasonal Stock Planning (SMART):

- *Specific:* Increase stock for top 5 items (Pen, Geometry Box, Pencil, Eraser, Notebook) by 30% before June and January.
- *Measurable:* use historical monthly sales data as benchmarks.
- *Time – bound:* Implement this by 25<sup>th</sup> May and 15<sup>th</sup> December every year.
- *Impact:* Avoid stockouts during peak demand, improve sales.

#### 2. Tiered Inventory Control (ABC Classification):

- *Specific:* Categorize inventory as A (Fast – moving), B (Moderate), and C (Slow – moving).
- *Action:* Focus shelf space and bulk purchase on Category A items. Keep minimal stock of Category C items or make them available on order only.
- *Time – bound:* Complete categorization and adjust storage within 2 weeks.
- *Impact:* Reduces wastage and blocked capital.

#### 3. Inventory – Purchase Alignment:

- *Specific:* Create monthly purchase targets based on previous year's trends + 10% buffer.
- *Measurable:* Track actual V/S Planned purchases.
- *Impact:* Reduces under – or over – stocking risks.

### **Problem 2: Seasonal Demand & Stockout Risk**

#### **Interpretation:**

- Sales peaks in June and January suggest academic seasonality.
- Poor planning before these months results in stockouts, especially for high – demand items like pens and notebooks.
- Classmate Notebooks showed consistent sales year – round, indicating that some products should be stocked regular, not just seasonally.

#### **Recommendations:**

##### **1. Demand Forecasting Tools:**

- *Specific:* Excel – based moving average to predict item – wise monthly sales.
- *Time – bound:* Prepare demand forecasting by the 25<sup>th</sup> of each month.
- *Impact:* Enables timely and accurate restocking, reduces missed sales.

##### **2. Promotional Bundling:**

- *Specific:* Offer combo packs like Geometry Box + Pencils during exam season.
- *Impact:* Increases items visibility, moves more units, and adds convenience for customers.

### **Problem 3: Limited Space and Cash Flow**

#### **Interpretation:**

- Shelf space is being occupied by Category C items with low demand.
- Items like pens fluctuate more but bring higher revenue, while products like glue sticks and markers move slowly and block funds.

### Recommendations:

#### 1. Optimize Shelf Space:

- *Specific:* Allocated 60% of shelf space to Category A items.
- *Action:* Moving Category C items to upper/lower shelves or switch to order – on – demand.
- *Time – bound:* Adjust shelf layout within 1 week.
- *Impact:* Increase sales visibility and shelf turnover.

#### 2. Discount Slow – Moving Stock:

- *Specific:* Offer 10 – 15% discount on items with >3 months shelf time.
- *Impact:* Clears inventory, improve cash flow.

| Month  | Action Item                              | Product Focus               | Category | Notes                                     |
|--------|--|-----------------------------|----------|---|
| May    | Pre-stock for school opening             | Pen, Notebook, Geometry Box | A        | Use past sales +10% for quantity estimate |
| June   | Monitor weekly sales                     | All                         | A & B    | Adjust purchase in case of fast sellout   |
| August | Review shelf space & discount C-category | Scissors, Glue              | C        | Offer 10–15% off                          |
| Dec    | Pre-stock for January session            | Pen, Eraser, Notebook       | A        | Plan bulk order with vendor discounts     |

**Table 3:** *Action Plan Calendar*

### Implementation and Long – Term Impact

If implemented, these strategies can help Shivam Book Depot & Stationery avoid stockouts, reduce waste, and maintain strong cash flow. Seasonal planning and ABC – based inventory control can lead to higher revenue, happier customers, and smarter operations. In the long run, a consistent supply of high – demand items and cleaner inventory management can improve the shop profitability and reputation in the local market.