Enhancing Profits through Demand Forecasting and Strategic Inventory Management

A Final term report for the BDM capstone Project

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Table of Contents

1.Executive Summary

SRJ Enterprises, located at E-108/1, Munirka Village, New Delhi, is a B2C stationary shop catering primarily to their students and working professional customer base, the business has been struggling with fluctuating sales performance due to poor alignment between inventory restocking and consumer demands. Challenges include inventory mismanagement, frequent overstocking of slow-moving items like Water Colors and Adhesive Tape, alongside inefficient estimation of upcoming seasonal demands spikes for essential product types such as Pens and Ruled notebooks during high-demand periods. These issues resulted in higher inventory holding costs, missed revenue opportunities, and declining profitability, prompting the need for a detailed data-driven assessment of their operations.

From the scope of this project, six months of sales activity data (January – June 2024) containing 64 sku's, was collected from the shop. Descriptive Statistics of the data showed wide variations in sales volume, with highest selling in June (**2,279 units**) and lowest in February with only **1,004** units being sold, suggesting signs of demand spikes based on seasonality. Microsoft Excel was used for the entire analysis, applying turnover ratios, growth rates, profit margin calculations. Line graphs, bar charts and scatter plots and pie charts were also used in order to understand and visualize the actual sales activity to create actionable plans to implement for solving problems faced by business.

The in-depth analysis revealed important insights regarding the sales volume activity, product types like Pens and Ruled notebooks consistently outperformed other categories in sales unit quantities, while items like Spiral notebooks and Adhesives demonstrated improper restocking volumes compared to the actual sales volume. High- profit margin product types like A4 sheets and staplers contributed disproportionately to overall profit levels. Moreover, product-level sales unit analysis helped to identify top selling products like Cello Finegrip and Nataraj pencils with stable and consistent monthly performance. Turnover ratio analysis helped to demonstrate strong inventory movement in product types such as Chart paper and Pens, while profit elasticity analysis revealed some surprising consumer purchase behaviour, such as higher sales volume for higher priced variants compared to lowered price variants, product types which showed this behaviour were Pens and Adhesive tapes.

From all the results, pattern and trends collected from the in-depth analysis to these, specific recommendations were devised—such as aligning restocking cycles with respect to seasonal demand spikes, reducing purchases or restocking of slow-moving items, and focusing more on profitable product types with higher profit margins. Since implementing a few of these preliminary strategies, such as adjusting stock levels for Pens and Notebooks before next cycle, SRJ Enterprises will observe improved inventory turnover and greater profit margins in key product categories. With continued application of the data-driven approach outlined in this report, the business is well-positioned to streamline operations and restocking methods, minimize wastage, unnecessary inventory holdings and boost overall profitability.

2. Detailed Explanation of Analysis processes and methods

For any data analysis projects especially when working using real sales data of a business for providing real-world insights, the processes of preprocessing and data cleaning plays very crucial role in robust analysis of data. The entire process of data cleaning and preprocessing has been done using Microsoft Excel and it's built in libraries and functions. The below is in-depth explanation of analysis processes and methods.

2.1 Data Collection and Overview

Past sales activity data of SRJ Enterprises were collected from January to June 2024 in monthly excel sheets, each data sheet containing key attributes like product name, stock levels and pricing. The data was initially showed issues such as missing values and inconsistent formatting. The first included merging, all the monthly sales data sheet into a single Excel workbook. A backup file of the raw data was also maintained before starting of cleaning and analysis process. The initial analysis of the raw data provided groundwork for structured data cleaning and transformation process as followed below:

2.2 Data Cleaning & Column Transformations

The sales inventory dataset collected directly from the business, provided detailed insights regarding the flow and sales activity. However, the raw data also contained several data fields which were irrelevant and not useful from the scope of analysis objective such as Supplier details and business notes. A structured method was initiated to remove these non-useful columns to reduce noise and improve analytical accuracy. Additionally few fields were also added such as **Units Sold** and **Total Revenue** to improve analysis depth. The goal was not only to clean the data but also to transform it into structured format for optimal data analysis.

1. **Column records that were present in the original dataset.**

   The below mentioned fields were initially present in the raw data collected from the business:

   - **Product Name:** Full info of the item such as brand name, size and type.
   - **Product Type:** A general classification of the products.
   - **Opening Stocks:** Quantity of each product at the start of the month.
   - **Purchases:** Number of units added to the inventory during the month.
   - **Closing Stock:** Quantity remaining in the inventory at the end of the month.
   - **Purchase Price:** Cost per unit paid to the supplier.
   - **Selling Price:** Price per unit at which the product was sold to customers.

- **Category Name:** Sometimes present as a loosely defined or inconsistently filled column, often duplicating or conflicting with "Product Type."
- **Supplier Name:** Name of the supplier from where the stocks were purchased.
- **Purchase Date:** Exact date of purchase for each item.
- **Stock Location:** Physical location within the shop, aiding in inventory management.
- **Notes / Remarks:** Field notes or any additional observations written by the owner for each product (e.g., "Delivery Pending," "Damaged stock").

This comprehensive structure ensured that all relevant details—both analytical and operational—were captured at the point of data collection.

Example of the raw dataset collected from the shopkeeper.

Product Name	Product Type	Opening Stocks	Purchases	Closing Stock	Purchase Price	Selling Price	Category Name	Supplier Name	Purchase Date	Stock Location	Notes / Remarks
Classmate Pulse 6 subject spiral Notebook (300 pages) (240mm X 180mm)	Spiral Notebook	42	22	46	90	120	Notebook	Ramesh Distributors	03-01-2024	Shelf 2	Payment pending

2. **Columns removed for better clarity**
   Several columns were removed from the raw dataset as they didn't have any contribution to inventory and demand forecasting analysis. These included **Supplier Name,** which didn't have any contribution to analysis process, **Purchase Date**, **Stock Location**, which wasn't analytical but rather operational, **Notes / Remarks**, which were inconsistent. Additionally, **Category Name** was similar and duplicated with **Product Type** and was therefore replaced with more streamlined classification. Removing these fields helped to eliminate analytical noise and improved data analysis process.

3. **Columns added to improve analysis depth**
   To get better insights and deeper analysis, few columns are added using formulas and logical mapping. These included **Units Sold;** this was calculated the formula: **Units Sold = Opening Stocks + Purchases − Closing Stock; Total Revenue** was added using **Total Revenue = Units Sold × Selling Price** to have comparisons of sales performance between different products and categories. **Total Cost** introduced using **Total Cost = Units Sold × Purchase Price** to get records of total cost for each product type. **Profit,** the addition of this field provided insights regarding the product performance using formula **Profit = Total Revenue − Total Cost,** A cleaned and

consistent **Product Category** column was added to reduce inconsistencies in the original **"Product Type"** and **"Category Name"** fields. These additions were essential for analysis product-level performance, stock movement efficiency, and profitability.

Cleaned data example, after performing all the changes related to columns

Product Name	Product Type	Opening Stocks	Purchases	Closing Stock	Units Sold	Purchase Price	Selling Price	Total Revenue	Total Cost	Profit
Classmate Pulse 6 subject spiral Notebook (300 pages) (240mm X 180mm)	Spiral Notebook	42	22	46	18	₹ 90.00	₹ 120.00	₹ 2,160.00	₹ 1,620.00	₹ 540.00

4. **Making Column names and formats consistent**
   To avoid calculation errors and inconsistency, all sales record sheets were updated to have identical and standardized column names. Errors caused by inconsistent naming, extra spaces and typos were corrected using manual editing and Excel's 'Find and Replace' tool. Data fields which are text-based such as 'Product Name' and 'Category Name' were formatted as Text, while numeric fields like 'Opening Stock', 'Total Revenue' and other pricing details were formatted as Number or Currency. This step was very important for maintaining consistency across all the sheets to prevent inconsistency issues during analysis.

5. **Handling Missing Values**
   To improve data accuracy, missing values were identified using Excel's inbuilt tool **'Go to Special'** and conditional formatting tools. For numerical data fields like 'Opening Stock' and 'Purchases', missing values were filled logically using available data, for example if 'Units Sold' was empty, then it was calculated using formula:

   Units Sold = Opening Stock + Purchases − Closing Stock

   For text fields such as 'Product Name' or 'Category Name', missing entries were filled by cross-referring to similar fields from other months to ensure consistency. Each missing value was derived using data-driven logic instead of assumption. This resulted in complete and reliable dataset which is suitable for analysis.

6. **Removing Duplicates**
   Presence of duplicate data fields is a common issue when raw datasets are collected from multiple sources and can affect the analysis results. To solve this, Excel's inbuilt tool "Remove Duplicates" was used to remove exact duplicate data fields focusing especially on key fields like **Product Name** and **Product Category**. Remaining partial duplicate entries, caused by variations such as inconsistent capitalization, extra spaces

and minor spelling errors were addressed using Excel's function like **TRIM ()** and **PROPER ()**, followed by manual review and analysis. For example, variations like 'spiral notebook' and 'Spiral Notebook' were normalised. This multi-step methods and approaches ensured that all records were unique, clean and consistent making a reliable foundation for the analysis.

2.3 Comprehensive Explanation of Methods and Analysis Used

This section outlines analytical techniques and methods used to generate insights from raw sales data collected. The entire analysis was conducted using Microsoft Excel, using combination of formulas, transformations and visualizations to get insights and derive actionable recommendations.

1. **Product-Level Sales Unit Analysis**
   Product-wise monthly sales trends were analysed using the "Units Sold" data field. This helped identify high-performing items like Cello Finegrip Pens and Nataraj 621 Pencils, which displayed consistent demand trend across months, making them ideal for prioritized restocking. On the other hand, product types such as Drawing Books and Markers showed weak sales despite large restocking amount, indicating overstocking or incorrect demand estimation. This sales tracking revealed which products had stable monthly performance and which ones showed seasonal spikes.

2. **Turnover Ratio Analysis**
   To calculate inventory efficiency, the Turnover Ratio was calculated using formula:

   Turnover Ratio = Units Sold / Closing Stock

   This helped to analyse how efficiently inventory was converting to sales. Products like Chart Paper and Pens displayed high turnover ratios, indicating proper stock movement. In contrary to Adhesive Tapes and Oil Pastels which reflected low turnover ratios, displaying poor inventory management. This strategy allowed to figure out items which need strategies to avoid overstocking.

3. **Seasonal Trend and Demand Spike Identification**
   A major part of the project focused on identifying **seasonal sales spike** patterns, especially between **April and June**, which aligned with school reopening and summer vacations. Line charts and month on month comparison metrics revealed that **Ruled Notebooks** showed **266% sales growth** from January to June, Water colors, Staplers and Art supplies also peaked sales volume during June.
   Although, April was expected to show highest demand spike due to academic session start, but the data showed higher sales volume in June. This anomaly pattern may be due to delayed customer purchases, e.g. students returning after vacations.

4. **Revenue-to-Inventory Ratio Analysis**
   To calculate how effectively the stock products contributed to the revenue, a **Revenue-to-Inventory Ratio** was evaluated:

   Revenue-to-Inventory Ratio = Total Revenue / Closing Stock Value

Product types such as **Pens**, **Staplers** and **A4 Sheets** ranked on top on this ratio table, displaying strong profitability per unit of stock held. In contrary, overstocked and slow-moving product types like **Chart Paper** and **Oil Paints** had shown poor ratio, displaying overstocking. This analysis helped to identify high-yielding product categories.

5. **Profit Margin Analysis**
   Profitability of different product types were evaluated using the formula

   Profit Margin (%) = (Selling Price – Purchase Price / Selling Price) x 100

   A4 Sheets (49.6%), **Staplers (47.1%)**, and **Chart Paper (45.3%)** came out as the most profitable items per unit. But **Spiral Notebooks (16.6%)** and **Geometry Boxes (16.7%)** had low profit margins even after decent sales performance. Combining profit margin and unit sales volume helped differentiate between high-profit drivers and low-margin bulk sales movers.

6. **Price Elasticity and Consumer Behaviour Analysis**
   A more focused analysis of pricing trend patterns and their effect on sales volume was conducted. Interestingly, **higher-priced variants of Pens and Notebook Covers** had greater sales volume than their lower-priced options, showing strong **brand trust and quality-driven purchases**. However, in categories like **A4 Sheets**, increasing price from ₹5 to ₹15 caused a sales volume dip, revealing **price sensitivity** in low-value items. This elasticity behaviour was analysed using simple scatter plots and unit-sales comparisons across variants, recommending formulation of pricing and bundling recommendations.

7. **Excel Functions and Visual Tools Used**
   - **Line Charts and Bar Graph:** Used to visualise and track month-wise growth and product-type wise contribution pattern and trends.
   - **Pie Chart:** Used to represent and analyse profit share of each product type.
   - **Scatter Plots:** Used for price elasticity analysis to analyse and visualize price vs units sold trends.
   - **Excel Functions: SUMIF, COUNTIF, IF, VLOOKUP, TRIM, PROPER** were extensively used for validations, calculation of metrics and transformations.

Some visualizations such as Seasonal Trend Analysis, Inventory Management Charts, and Revenue-to-Inventory Ratio, included in the mid-term report, were intentionally removed in the final version to avoid duplication and focus on more product-specific, actionable insights. Their insights were integrated into improved, category-level graphs and profitability metrics that better align with project's final objective of maximizing profit through demand-aligned stocking.

Main Inventory Dataset Link

Main Inventory Dataset Analysis Sheet

3. Results, Findings and Interpretation of Results

3.1 Purchase Trends and Pattern

The Purchasing data of the past sales data revealed various insights regarding the various stationary products. Among all of them

- Pens consistently dominated the restocking volumes across all the months with having maximum quantity during month of May (320 units) followed by June (312 units), project files showed a steady trend with increasing purchase values every month, from 22 units in January to 64 units in June.

- Several products like A4 Sheets, Color Pencils and Adhesives doesn't follow any kind of consistent trend or pattern, with having restocking values varying month by month as seen in Fig 1. The sales of these items seem to be dependent on specific seasons or demand.

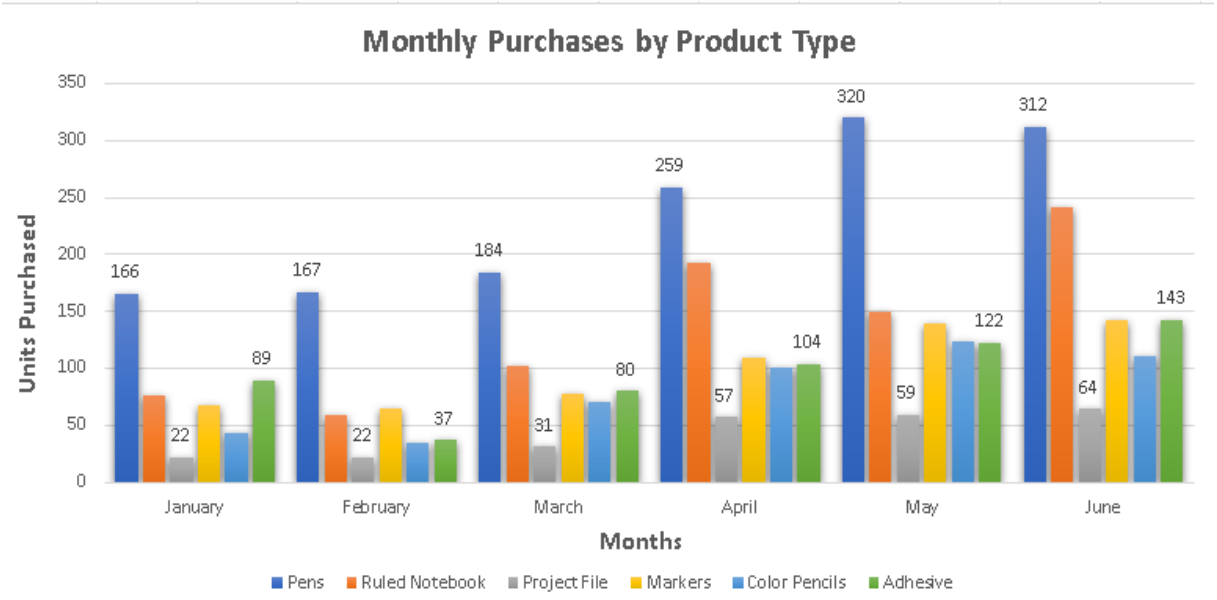

Fig 1. Monthly Purchases by Product Type (Jan–Jun 2024)

- Ruled Notebooks and Spiral Notebooks have significant purchase spikes from April to June as seen in Fig 2. Suggesting these patterns align to upcoming seasonal demand spike. Similarly, items such as Water colors and oil paint showed massive restocking spikes to accommodate the increased demand due to school reopening sales spike.

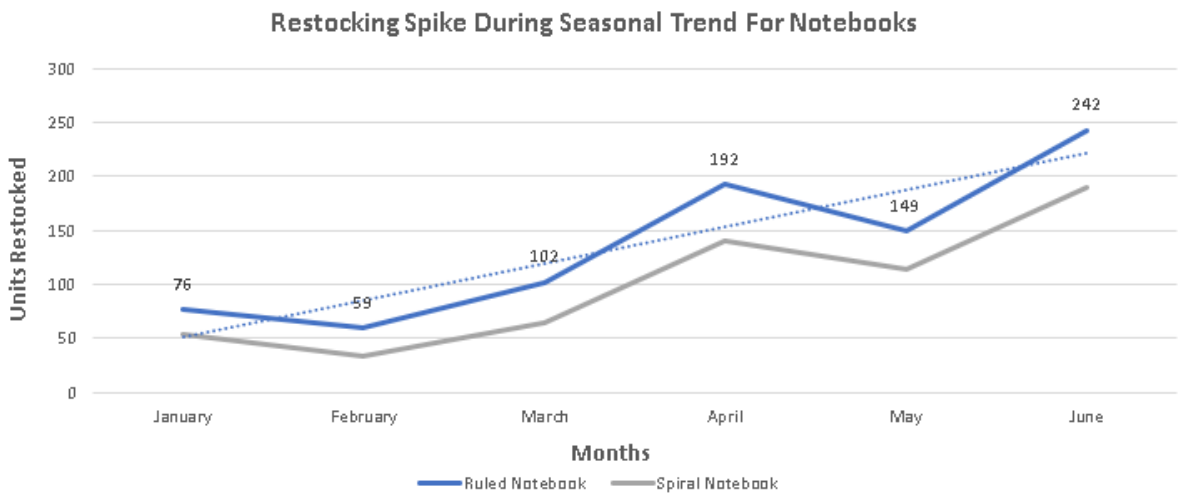

Fig 2. Purchasing Trend for Ruled and Spiral Notebook

However, even though heavily restocking items in the inventory during the season demand spike months, certain products showed signs of overstocking. For example,

- Drawing Books were purchased **359 units** yet only **211 units** were sold, which shows either an overestimation of demand or a very slow-moving inventory due to being not so essential purchase priority for most customers.

- Markers were purchased **600 units**, with only **415 units** being sold. This could be possibly due to bulk purchase expecting a huge seasonal demand, but failed to convert into sales due to possible seasonal dip.

- Water Colors and Oil Paints showed similar risk of overstocking, with **592 units** being procured yet made only **421units.** These products related to art are very customer specific or depends majorly on seasonal activities like Summer Vacations.

These inconsistencies suggest restocking with improper demand estimation. These can result in overstocking and lead to increased holding costs and reduce overall profitability in longer run.

On the positive side, there were many products which showed stocking efficiencies, where the purchases were nearly equal to sales and the demand estimation were almost accurate like:

- Staplers, 212 units were bought and around **208 units** were sold, which is nearly accurate match that minimizes the risk of overstocking.

- Geometry Boxes were also restocked with **163 units** with overall sales of 165 units, interestingly, sales exceeded the purchase quantity, may be due to carryover inventory from earlier months.

After observing the entire sales and restocking data, **most products have purchase quantities greater than their respective monthly sales.** This is a common strategy performed by businesses to tackle unexpected seasonal demand spikes. However, in niche product or low-

volume product categories, even small quantities of overstocking can lead into significant inefficiencies.

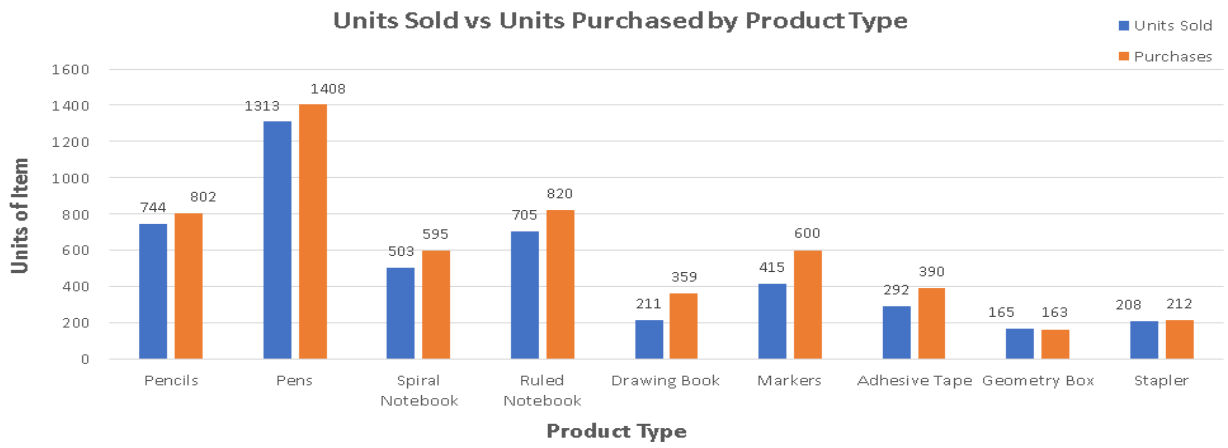

Fig 3. Sales vs Purchase Trend by Product Types

- The monthly restocking data indicates **batch-based procurement behaviour,** where various products are restocked or purchased in large quantities at beginning of the month, this could be due to minimum order requirements or fixed supplier schedule, which if isn't get aligned with the actual sales could result in stock misalignment.
- Water Colors and Drawing Books showed high purchase trend early in the month cycle but delivered slower sales in the following months. Spiral Notebooks also showed similar behaviour, purchase spikes in March and May for preparation for April-June demand, but sales did not match the demand prediction.

3.2 Sales Growth and Seasonal Demand Patterns

- Pens showed a clear upward trend, from sales increasing from **215 units** in the month of January to **304 units** in June as seen in Fig 4.

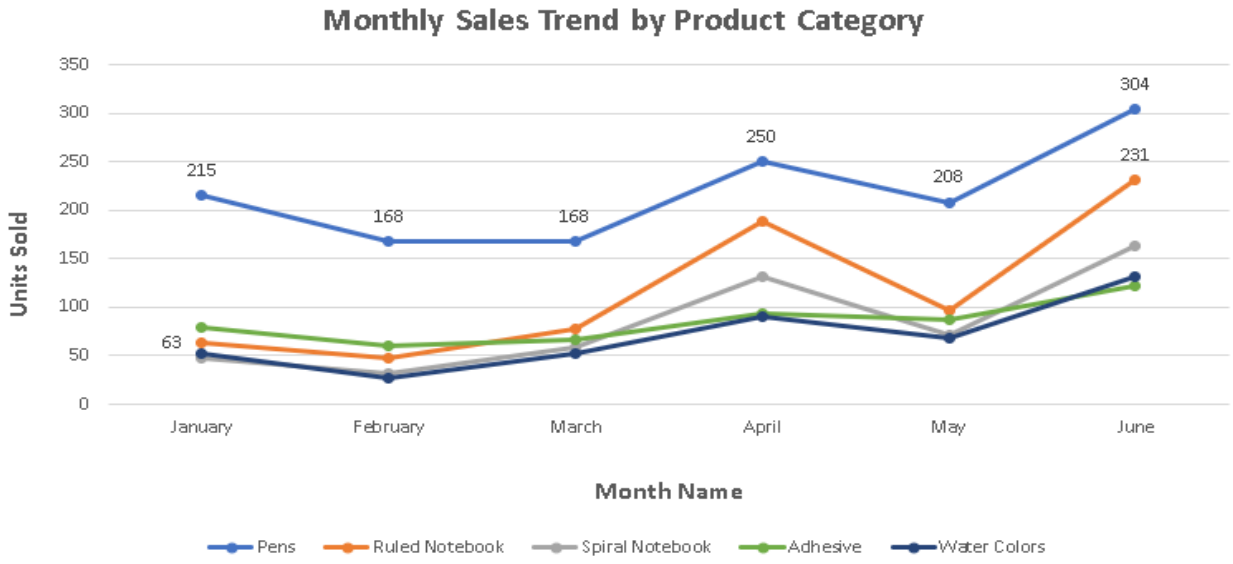

Fig 4. Sales Trend by Product Type

This **41.4% growth rate** indicates a constant and consistent sales pattern, due to academic and professional customer base. The sales trend showed pens as a brilliant revenue generating product type, with predictable growth and high turnover.

- Ruled notebooks showed even more positive upward trend, with having sales of **63 units in January** to **231 units in June**, showing of a staggering **266% increase** in growth rate. The main cause of this explosive spike could be seasonal academic cycles, where students purchase notebooks more during school reopening season.

- Pens and notebooks both showed a huge sales demand spike between April and June, directly corelating the academic calendar, especially during school reopening period. This sales pattern provides a predictable demand spike, which the business can easily leverage.
- Art Supplies like Water colors, made highest sales **in June with 132 units.** This corresponds with summer vacation period demand spikes, when students often make projects or other art related activities for school submission, making June a very crucial month for sales of this product type.

- Adhesive products like glue sticks and tape maintained a steady sales demand trend of **around 80 units per month** throughout the duration of six-months. Their demand seems to be irrespective and independent of seasonal trends, suggesting it as a general-use product type purchased by customers from schools, offices and homes year-round.

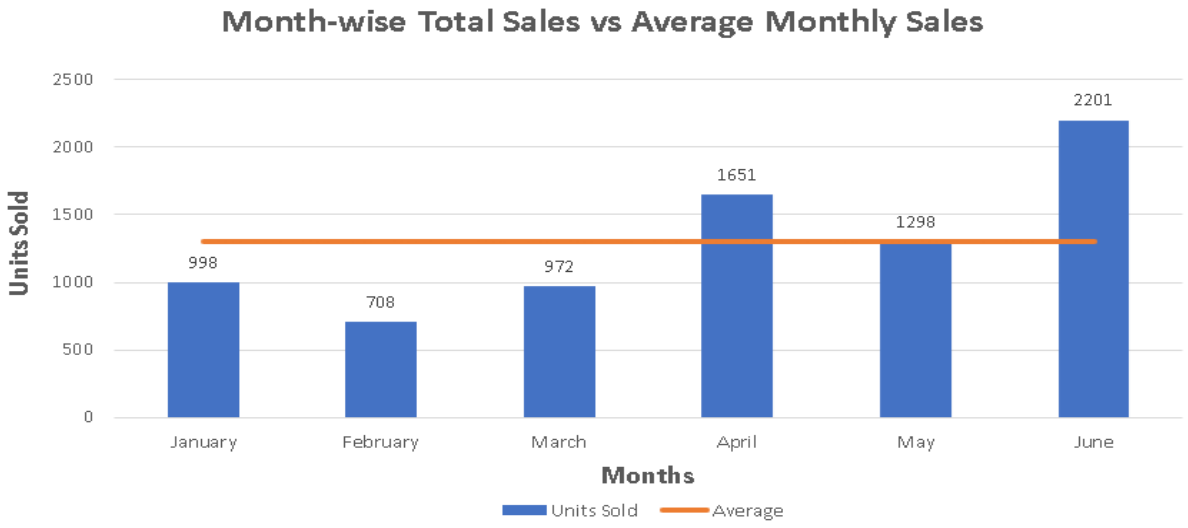

Fig 5. Monthly Sales Comparison with Average Sales

The above-mentioned Fig 5. also shows a clear trend of seasonal spike, like from how the sales in month of April and June crosses the average sales of **1305 units.** Months like February underperformed way below the average sales, showing a low sales period, likely due to sales dip before the seasonal trend.

3.3 Product-Level Monthly Sales Insights

- Cello Finegrip Pens showed exceptional sales performance as seen in Fig 6, with massive high sales volumes every month consistently. This sales trend suggests they serve as **staple writing instrument** which are preferred mostly by students and working professional customer base.

- Similar trends have been shown by Nataraj 621 Writing Pencils as well by maintaining constant high sales through six months, positioning themselves as one of the **most essential classroom supplies.**

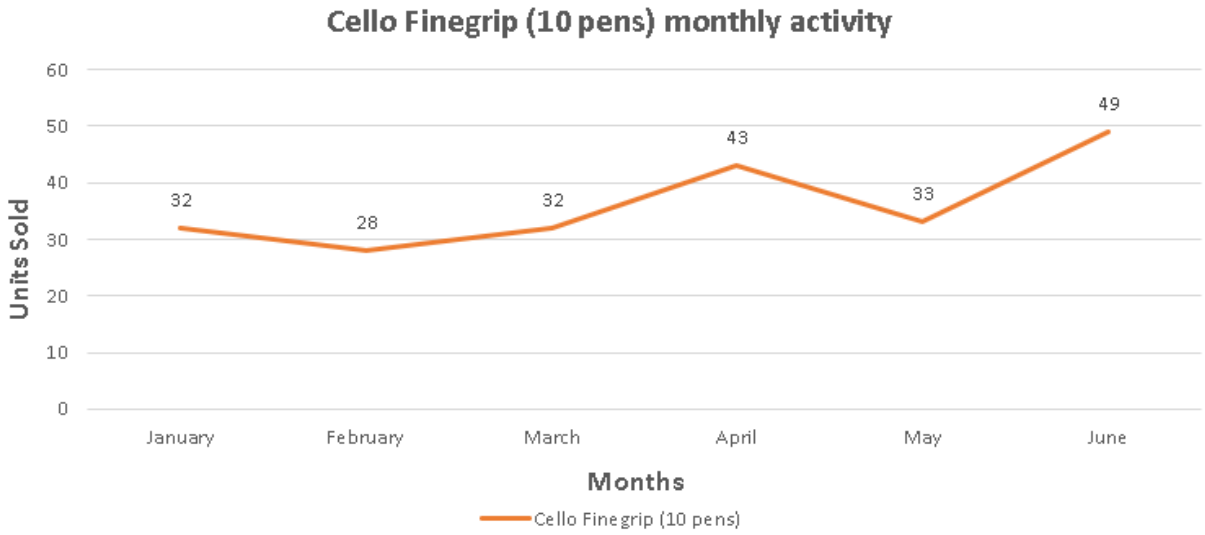

Fig 6. Cello Finegrip Monthly Sales Performance

- Classmate Pulse 6 Subject Notebooks (300 pages) also showed significant sales spikes in April with 49 units and June with 62 units, aligning with start of academic season.

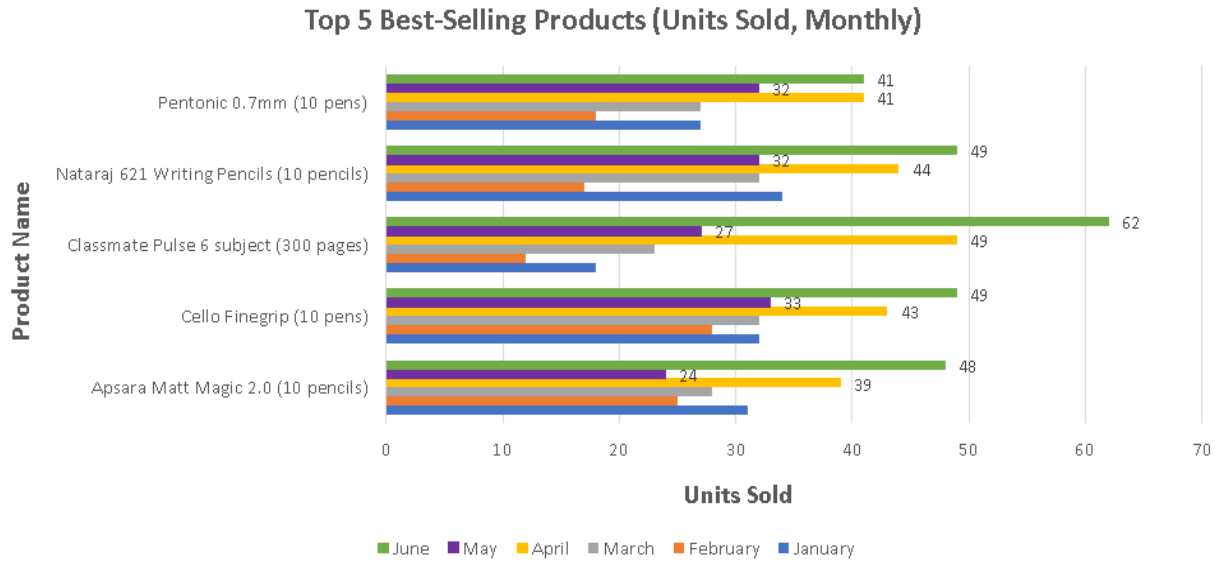

Fig 7. Top Selling Product's Monthly Sales Performance

- Apsara Matt Magic 2.0 Pencils exhibited their highest sales in June with 48 units, indicating effect of seasonal demand for writing instruments due to school reopening.

- Pentonic 0.7mm Pens also displayed consistent and moderate sales trend, with small spikes in April and June indicating the effect of seasonal demand, this product has maintained a sense of reliability among the customer base.

3.4 Closing Stock Analysis

- Pens consistently had highest inventory closing rate, from 309 units left in stock in January to 495 units by June. The reason for this might be due to **buffer stock strategy,** expecting sales demand or possibly due to overstocking.

- Pencils and Notebooks (both ruled and spiral notebooks) showed gradual and constant proportional increase in stock inventory levels as seen in Fig 8. These closing stock trends also go in with their respective sales performance, showing that the inventory levels were consumed effectively and in line with sales activity, reflecting great management of inventory.

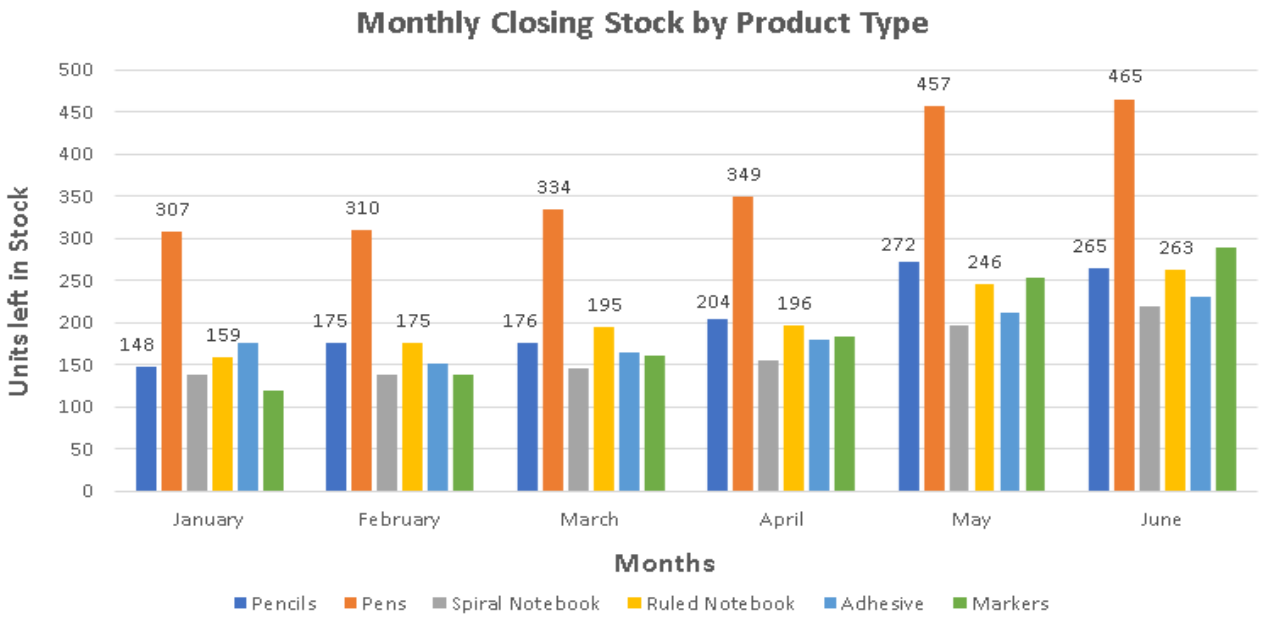

Fig 8. Monthly Closing Stock Levels of Different Product Types

- Markers and Adhesives started accumulating in the inventory more during starting of the month March, even though their sales activity doesn't match their high inventory levels, suggesting an **overestimation of upcoming demand trend** or **low stock turnover.**

- A4 sheets and chart paper had comparatively more maintained and stable closing stock levels through the six months. This behaviour suggests **controlled and predictable demand**, opting for a leaner inventory strategy with minimal waste.

- Staplers and geometry boxes performed with low and steady closing stock levels, suggesting presence of **just-in-time inventory management.** The sales and stock usage seems well in control, minimizing the risk of excess closing stock or overstocking.

- Inventory levels for core academic products like Pens and Notebooks saw a huge significant spike during April and May, likely due to the stocking strategies implemented to prepare for seasonal demand spikes, ensuring availability of products in the inventory to avoid last minute restocking.

3.5 Profit Margin and Category Contribution to Profitability

- A4 Sheets delivers the **maximum average profit margin of 49.6%,** making them the **most profitable item per unit** even having comparatively lower sales volume to writing instruments as seen in Fig 9.

- Staplers with **profit margin of 47.1%** and **Chart Paper with 45.3%** also contributes as **profit-rich categories.** Even though not being in the top-selling items in terms of sales unit, their profit margin suggests as high earning product types.

- Pens, even being the best-selling categories, delivered **average margin of 22.2%**. This combination of high sales volume and moderate profit margins, contributes into the total profit substantially.

- Ruled Notebooks and Unruled Notebooks **contributed to 33.5% and 36.7% profit margins**, reflecting a decent blend of demand and profitability, suggesting that **academic centric products** are well positioned in customer demand and profit return.

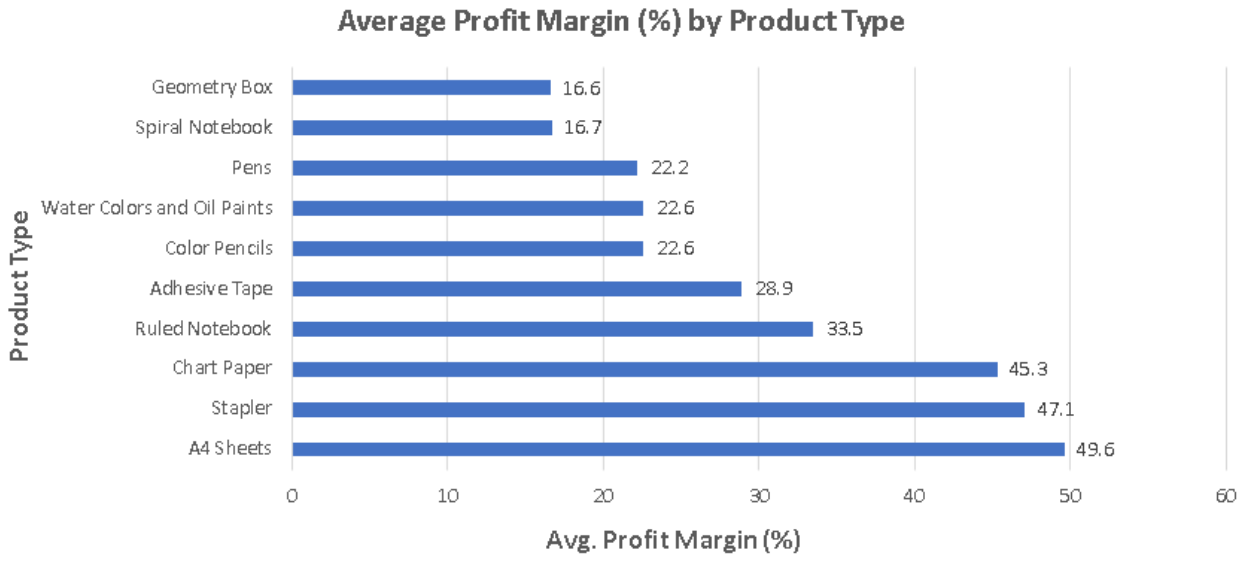

Fig 9. Average Profit Margin Analysis by Product Type

- Spiral Notebooks and Geometry Boxes are among product types with lowest margin contributors with having margins of **16.6%** and **16.7%**, respectively. Even having high sales volume, the profit margin is comparatively very less.

- Water colors and Color Pencils also maintained average margins between 22-23%. Considering their seasonal popularity trend, these margins are moderate and could be improved.

- Pens emerges as the highest profit generating product type with profit generation of around ₹23,395. Art Supplies (including Water Colors, Oil Paints and Color Pencils) also termed as top contributors for overall profit generation. The seasonal academic demand has highly positively contributed to the overall profitability.

- Spiral Notebooks and Pencils also provide constant, steady profit trend despite having low per-unit profit margin. But their consistent sales demand throughout the entire academic year shows their importance as prominent revenue and profit drivers.

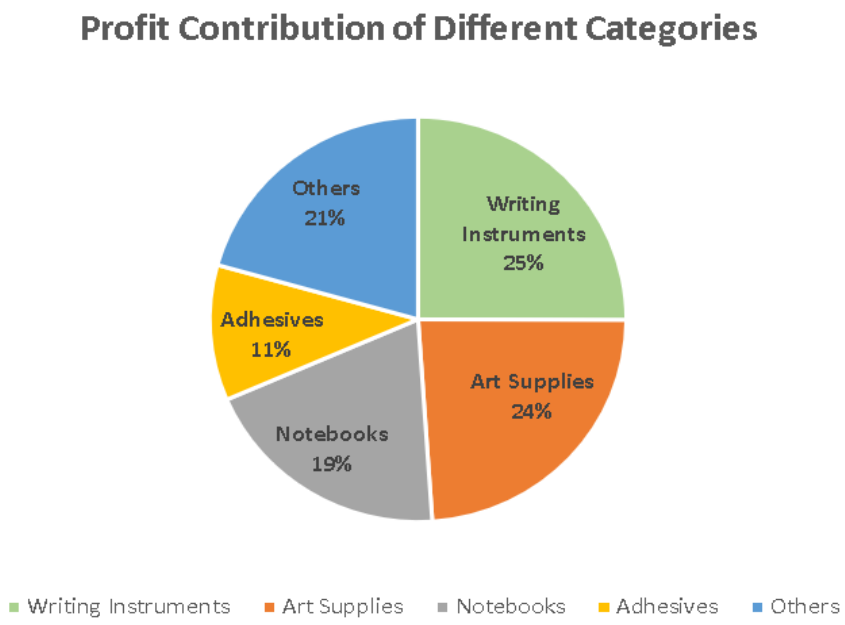

Fig 10. Profit Contribution Pie Chart Analysis

- The analysis showed the top 4 product categories contribute towards the majority of overall profit generation as seen in Fig 10. These categories – Writing Instruments (Pens and Pencil), Art Supplies (Water Color and Oil paint, Color Pencils and Drawing book), Notebooks (Spiral, Unruled and Ruled notebook) and Adhesives (Adhesives and Adhesive Tapes) and Others (include less frequently sold items like Staplers and Notebook Cover).

- Chart Paper, Adhesive Tape and Register were underperforming categories, delivering minimum profit returns. The reason for this negative impact might be due to low demand for the product, overstocking or over purchasing, very less profit margins.

3.6 Turnover Ratio-Based Product Performance

- Chart Paper displayed exceptional growth trend in its turnover ratio, increasing from **0.40 in January to 1.14 in June, a 185% improvement.** This indicates a **strong trend in demand,** likely cause of academic season demand spikes during the summer months.

- Pens demonstrated **consistent high turnover ratio,** varying between 0.6 to 0.9 throughout the six months. This steady and consistent outflow even though having high stock inventory levels suggests that this product category has continuous sales demand.

- Staplers and Geometry Boxes also delivered stable and moderate turnover ratio levels, which goes in line with their **just-in-time restocking pattern** and good stock control to minimize inventory mismanagement.

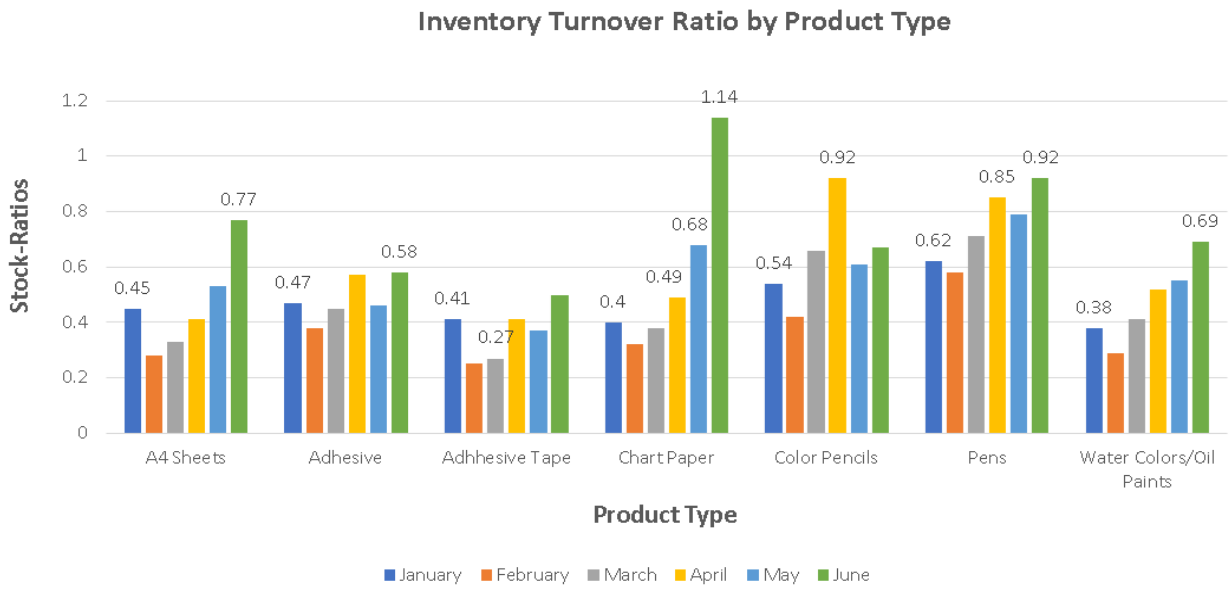

Fig 11. Monthly Inventory Turnover Ratio

- Adhesive Tape had a **very low turnover ratio in March (0.27),** due to overstocking or poor estimation of demand spikes. Despite having steady and consistent sales volume, the stock wasn't absorbed or utilised efficiently during this timeline, suggesting to poor restocking in hope of demand trend.

- Water Colors showed signs of instability with turnover ratio **fluctuating between 0.29 and 0.69**, likely due to misalignment in restocking timing. For example, restocking before the actual demand spike occurred.

- Oil pastels and Color Pencils also displayed similar inconsistency behaviour, with turnover ratios dipping despite having decent sales in some months, leading to the conclusion of to create more synchronized restocking strategies.

3.7 Price Elasticity and Costumer Behaviour

- Pens showed an unusual **inverse elasticity pattern** as seen in Fig 12. The variant sold for 100 had recorded around **1313 units sold**, surpassing the 50 variants with only **744 units sold**, Notebook Covers (₹15-₹40) also showed better sales volume in higher priced variants. This implies that customers trust in higher priced writing tools for better quality and performance.

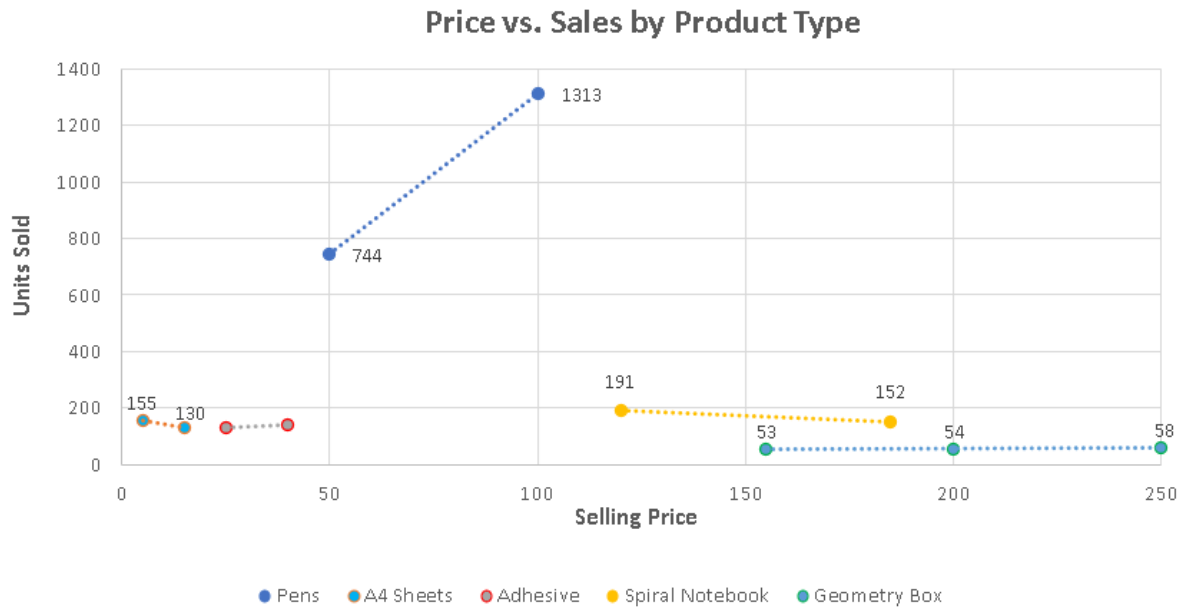

Fig 12. Price Elasticity Pattern Trend

- A4 Sheets displayed clear elasticity, ₹5 variant sold 155 units and ₹15 variant sold 130 units, a 3x price increase reduced the sales by 16%. This shows **price sensitivity in low-value products,** where customers respond to price increases due to availability of other options.

- Colour Pencils showed mostly stable and constant sales volume across all price points but observed a sharp sales quantity dip at the ₹360 variants, showing signs of customers hitting threshold levels where they consider higher priced products of the same product type or category unjustifiable for the value it's providing for the given price point.

- While analysing units sold helps identify elasticity, it's also important to evaluate revenue behaviour. For example, the ₹100 pen variant sold only 1313 units, generating revenue of ₹1,31,300, exceeding the ₹50 variant with ₹37,200. Similarly, higher-priced notebook covers and geometry boxes, though similar in quantity sold, contributed more to overall revenue due to their higher pricing. This shows the importance of targeting high-margin, high-value products in restocking and promotional strategies, especially when consumer preference supports premium variants.

Note: Only few selected product types were analysed in detail such as Pens, Notebooks, A4 Sheets, and Art Supplies, because these had complete data across all six months, high sales volume trend, and had direct impact on profitability.

4. Interpretation of Results and Recommendations

The analysis of SRJ Enterprise's sales and inventory data records (Jan-June 2024) revealed patterns across product categories activity, showcasing both inefficiencies and strength. Based on these insights, the below mentioned recommendations are proposed.

4.1 Interpretation of Key Findings

- **Sales spikes during seasonal demand drive:** Products like Ruled Notebooks, Pens and Water Colors displayed significant demand increase during **April to June**, aligning with school reopening and academic season.
- **Overstocking patterns in low-demand items:** Product types like Markers, Drawing Books and Adhesives were heavily restocked even after poor sales performance, showing inefficient demand spike estimation.
- **Strong vs Weak profit contributors:** Product types such as Pens, Art supplies and Notebooks were major profit contributors, whereas items like Registers, Chart Paper and Stapler showed low profit margin even after steady sales activity.
- **Unique price elasticity pattern:** Premium items like higher-priced Pens and Covers outperformed their cheaper alternatives in sales, showing customer preference for quality products. Base Product types like Color Pencil and Pencils remained highly price sensitive.
- **Inefficiency of Inventory Management:** Turnover ratios showed high stock holding for various low-demand items, effecting the revenue without sales returns.

4.2 Actionable Recommendations

Urgent Recommendations (0-3 Months)

1. Control Overstocking in Low-Turnover Categories
    - **Action:** Reducing restocking slow-moving items like Markers, Drawing Books and Adhesive by 30%.
    - **Implementation:** Use recent 6-month sales trend activity as baseline for restocking estimations.
    - **Expected Outcome:** Reduced capital wastage and optimize inventory.

2. Revising Pricing for High-Volume, Low-Margin Products
    - **Action:** Increase the selling price or introduce bundled offers for product types like Spiral Notebooks and Geometry Boxes (16-17% profit margin)
    - **Implementation:** Use combo packs or discount thresholds to maintain sales volume while also increasing the profitability.
    - **Expected Outcome:** Improved per-unit profit margins with very less impact on sales volume.

3. Promote High-Margin Items During Demand Spikes
    - **Action:** Promote more product types like A4 Sheets, Chart Paper and Staplers (which has profit margin above 45%) using in-store display, promotions and early restocking.
    - **Implementation:** Understand past sales and keep in track of expected demand spikes such as school reopening, exam season and summer vacations etc, restock the inventory timely before these demand spikes based on seasonality.
    - **Expected Outcome:** A 20% boost in sales of these product types are expected in during next demand spike.

4. Align Restocking Behaviours with Deman Trends
    - **Action:** Shift the stock buildup for seasonal items like Notebooks, reduce the restocking of low value items, only restock after they are about to get replenished and based on their demand spike pattern.
    - **Implementation:** Align restocking timelines with school reopening season and by analysis previous month's sales activity data.
    - **Expected Outcome:** Will reduce the capital loss and unwanted inventory buildup by optimising the inventory to demand patterns.

Medium to Long-Term Recommendations (6-12 months)

1. **Re-evaluate Non-Performing Product Types**
   Regularly analyse the sales pattern and audit low-margin or low-sales products (like Chart Paper, Adhesive Tape and Geometry Boxes) and phase out or replace them depending upon their sales performance.

2. **Introduce Profit Based Pricing Strategy**
   By leveraging elasticity trends develop a pricing strategy. Promote premium product types like art supplies, while competitively pricing sensitive items like A4 sheets to maintain sales volume.

3. **Implement Strategic Product Bundles**
   Using sales activity and profit data, the business could implement strategic bundles (e.g., pens + notebooks or geometry boxes + pens) to increase the average transaction and profit value.

4. **Introduce Digital Sales Tracking System**
   To improve long-term efficiency, the shop can gradually shift to using basic tools like Microsoft Excel to track restocking, sales volume, and profit margins in real time. This will help the owner to take timely action when items start becoming overstocked or undersold and have a better understanding over the flow of business.

These recommended strategies from urgent to long term strategies are designed to increase the overall profitability, improve inventory management and seasonal demand estimation. By taking action on these recommendation through data driven insights and seasonal trend patterns, SRJ Enterprises can improve their overall profitability.