Business Performance Analysis for a Local Hardware Store

A Final report for the BDM capstone Project

Submitted by

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Declaration Statement

I am Manjusha, working on a Project titled **"Business Performance Analysis for a Local Hardware Store"**. I extend my appreciation to '**Shri Dattakrupa Traders, Sirsam(Bk.)',** 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: (**Digital Signature**)

Name: Manjusha Sanjay Pundkar

Date: 03 July 2025

Table of Contents

1. Executive Summary 3-4

2. Explanation of Analysis Procedure 4-6

   2.1 Categorical Influence on Sales 4-5
   2.2 SKU Performance Classification 5
   2.3 Market Basket Analysis using Apriori 5
   2.4 Customer Insights 6
   2.5 ARIMA Sales Forecasting 6

3. Results and Findings 6-14

   3.1 Categorical Influence on Sales 6-8
   3.2 SKU Performance Classification (ABC) 9-11
   3.3 Market Basket Analysis using Apriori Probability 11
   3.4 Customer Insights 11-12
   3.5 ARIMA Sales Forecasting 13-14

4. Interpretation of Results and recommendations 14-17

   4.1 Category Influence on Sales 14
   4.2 SKU Performance Classification 15
   4.3 Market Basket Analysis using Apriori 16
   4.4 Customer Insights 16
   4.5 ARIMA Sales Forecasting 17

5. Conclusion 17-19

1. Executive Summary

This project focused on analyzing the business performance of Shri Dattakrupa Traders, a small rural hardware store located in Sirsam (Bk.), Hingoli, Maharashtra.
The store mainly served local contractors, farmers, and homeowners, selling cement, tiles, paints, wires, plumbing, and electrical materials.
The store faced common challenges like managing stock, handling seasonal demand changes, and tracking credit-based sales.

The main objective of this project was to use one year of sales data to understand which products perform best, how customers shop, and how sales change across seasons.
Data from 604 transactions between June 2024 and May 2025 was collected from handwritten invoices, digitized, and cleaned in Excel.
Analytical methods like ABC classification, Market Basket Analysis, Customer Insights, and ARIMA forecasting were applied using Python to generate meaningful insights.

The findings showed that Building Materials were the key revenue drivers, with cement and tile adhesive being the most important products.
Combo opportunities such as Cement + Putty and Paint + Brush were identified, and contractors generated more than half of the total revenue, often buying items on credit.
The ARIMA forecast showed sales peaks during August to October and lower sales in February and March, which can help the shop plan inventory and manage cash flow better.

Through this project, the shop can reduce dead stock, focus on high-performing items, create combo offers, and introduce loyalty benefits for regular customers.
It also proved that even a small rural business can improve profitability using simple data-driven strategies.

Link to dataset :

https://docs.google.com/spreadsheets/d/1XFd1Lf3p0j9unJSEe4jZqFOvYVlXHyPH/edit?usp=sh aring&ouid=101293942699599729942&rtpof=true&sd=true

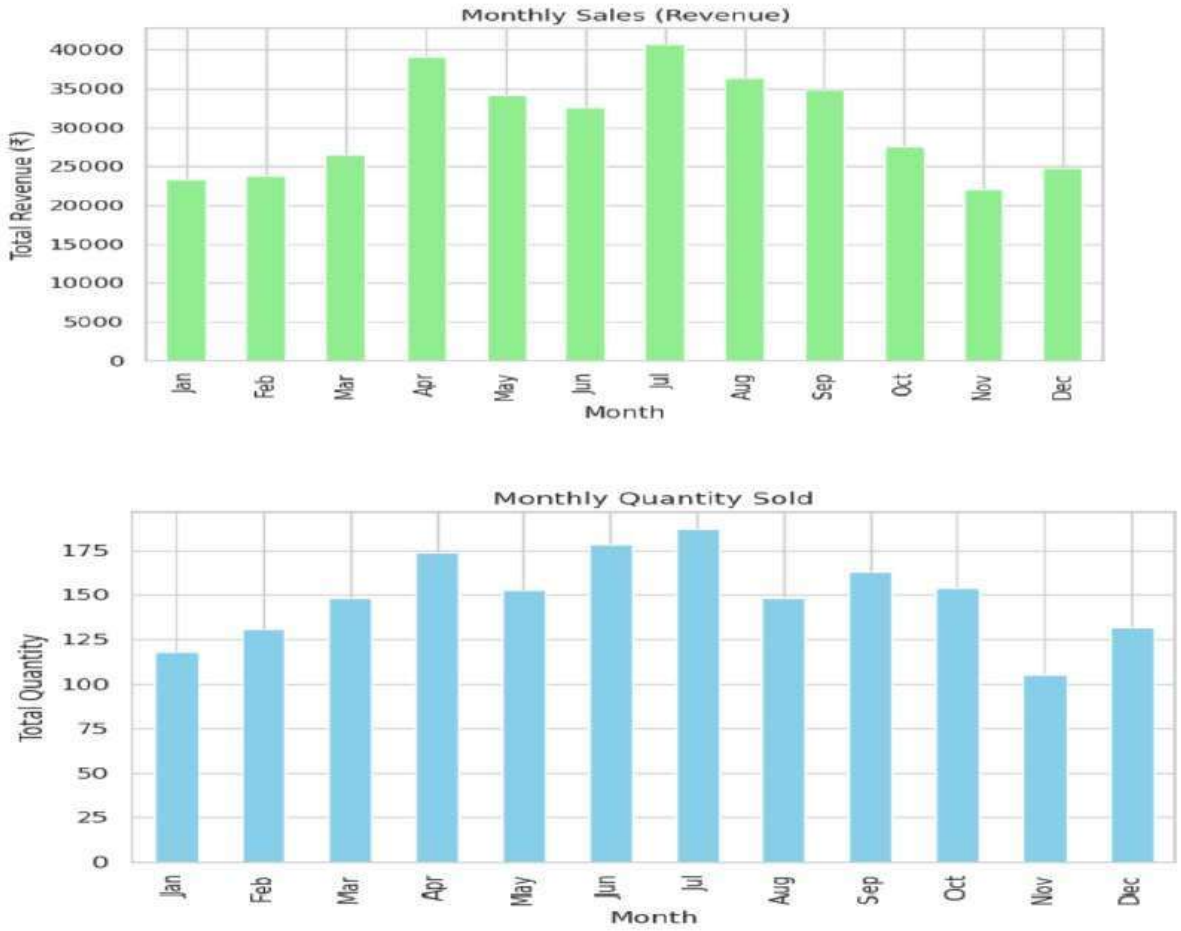
Google drive link :

https://drive.google.com/drive/folders/1H-M31r4MGT0TmaFxVKIgLEU52o3yx1I?usp=sharing

2. Explanation of Analysis Procedure

To address the business concerns and extract meaningful trends, the following analytical methods were applied:

2.1 Categorical Influence on Sales



Bar Charts of Months vs Sales and Quantity

Fig 1.

Aim: To analyze the performance of each category beyond total revenue, considering the number of SKUs in each.

Method: Categories were evaluated using both total revenue and revenue-per-SKU (sales density). This approach ensured that categories with fewer products but higher impact, like Building Materials, were not overshadowed by high-SKU categories like Paint or Electrical. Normalized metrics provided a fair comparison.

2.2 SKU Performance Classification

Aim: Identify which products contribute most to revenue and which contribute least.

Method: The ABC analysis was implemented based on cumulative sales:

- **Class A:** Top 70% of revenue → Core products
- **Class B:** Next 20% → Secondary contributors
- **Class C:** Bottom 10% → Underperforming SKUs

The analysis also included derived metrics such as frequency of purchase and total quantity sold to evaluate customer preference and stock movement.

2.3 Market Basket Analysis using Apriori

Aim: To understand purchase combinations and product associations.

Method: Using the Apriori algorithm (with min support of 0.02 and confidence > 0.2), frequent product combinations were identified. This analysis helps in designing bundle offers and shelf placements to drive cross-selling and higher average bill values.

2.4 Customer Insights

Aim: Analyze customer segmentation and behavior.

Method: Customers were segmented based on type (contractor, homeowner, etc.) and purchase mode (cash, UPI, credit). Repeat purchase behavior was analyzed to identify loyal customers. A significant number of credit transactions (Khata) were observed, prompting the need for improved cash flow strategies.

2.5 ARIMA Sales Forecasting

Aim: Predict monthly revenue for the upcoming quarter.

Method: ARIMA (1,1,1) model was applied to monthly aggregated revenue data. Stationarity of the data was ensured using differencing, and the model was validated using ACF and PACF plots. The results forecasted seasonal trends and informed stock planning.

3. Results and Findings

3.1 Categorical Influence on Sales

Explanation: This section presents the comparative performance of each product category using both raw revenue and normalized sales density (revenue per SKU). Two separate bar charts were created:

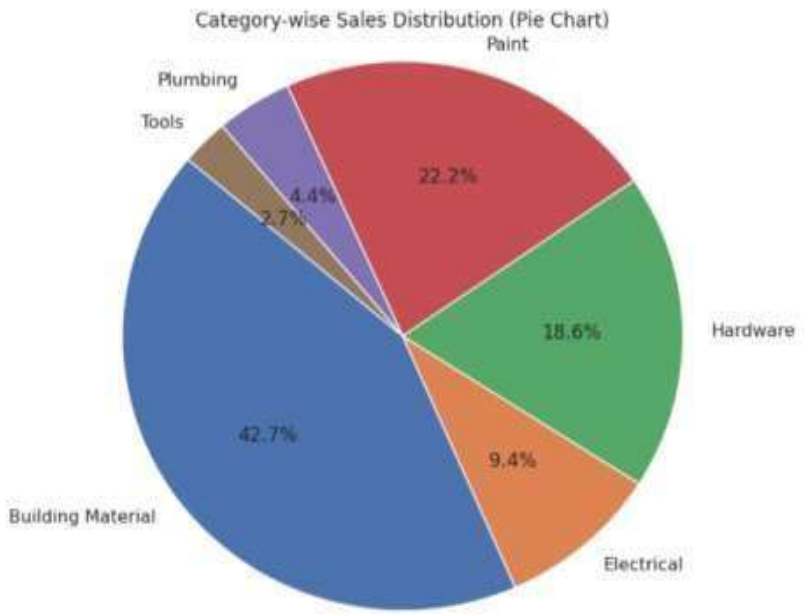


Fig 2.

1. Raw Category-Wise Revenue Distribution

Category	Quantity	Purchase Price	Selling Revenue	Profit	Profit Margin (%)
Building Material	405	140380	156166	15786	11.25
Paint	463	68916	81118	12202	17.71
Hardware	425	59601	68071	8470	14.21
Electrical	161	29600	34323	4723	15.96
Plumbing	134	13255	16057	2802	21.14
Tools	203	6949	10048	3099	44.60

Fig 3.

2. Category-Wise Revenue per SKU (Sales Density)

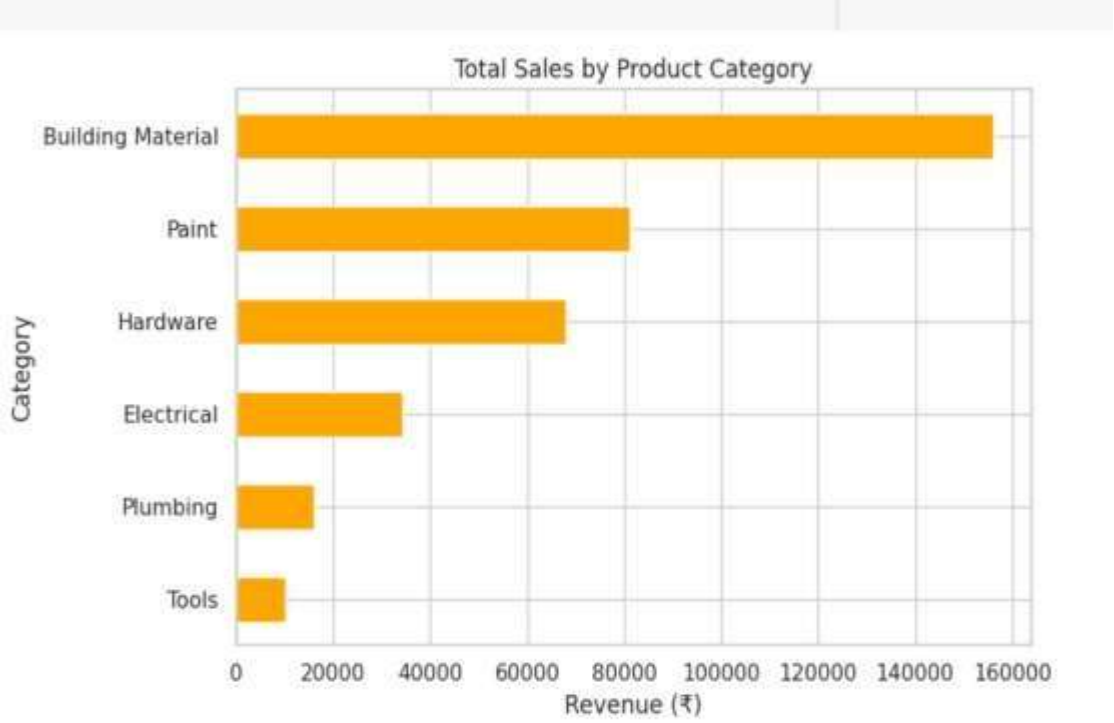


Fig 4.

Findings:

- **Building Materials** emerged as the most influential category. Despite having fewer SKUs compared to categories like Paint and Hardware, it consistently generated the highest total revenue and revenue per SKU.
- **Paint** and **Hardware** showed medium influence. Although Paint had more SKUs, its per-SKU revenue was slightly diluted.
- **Plumbing** and **Electrical** had low contributions in both metrics. These categories serve niche but important roles, often being bought in support of bigger purchases.

This analysis helped identify that focusing on the profitability of each SKU rather than the absolute number of SKUs is crucial. Building Materials proved to be the cornerstone of the business.

3.2 SKU Performance Classification (ABC Analysis)

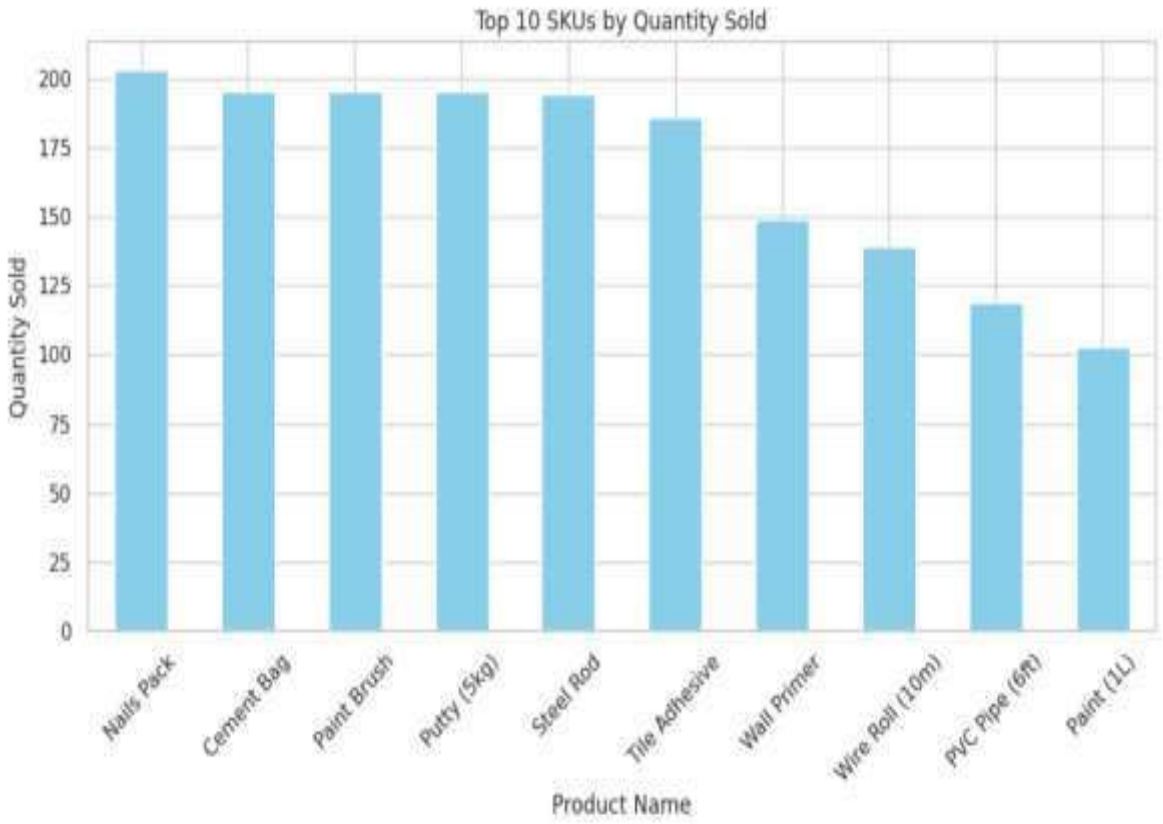


Fig 5.

Explanation: The ABC Analysis classified SKUs based on their contribution to cumulative revenue:

- **Class A:** Top 70% of revenue
- **Class B:** Next 20%
- **Class C:** Bottom 10%

A Pareto chart and a cumulative revenue line graph supported this classification.

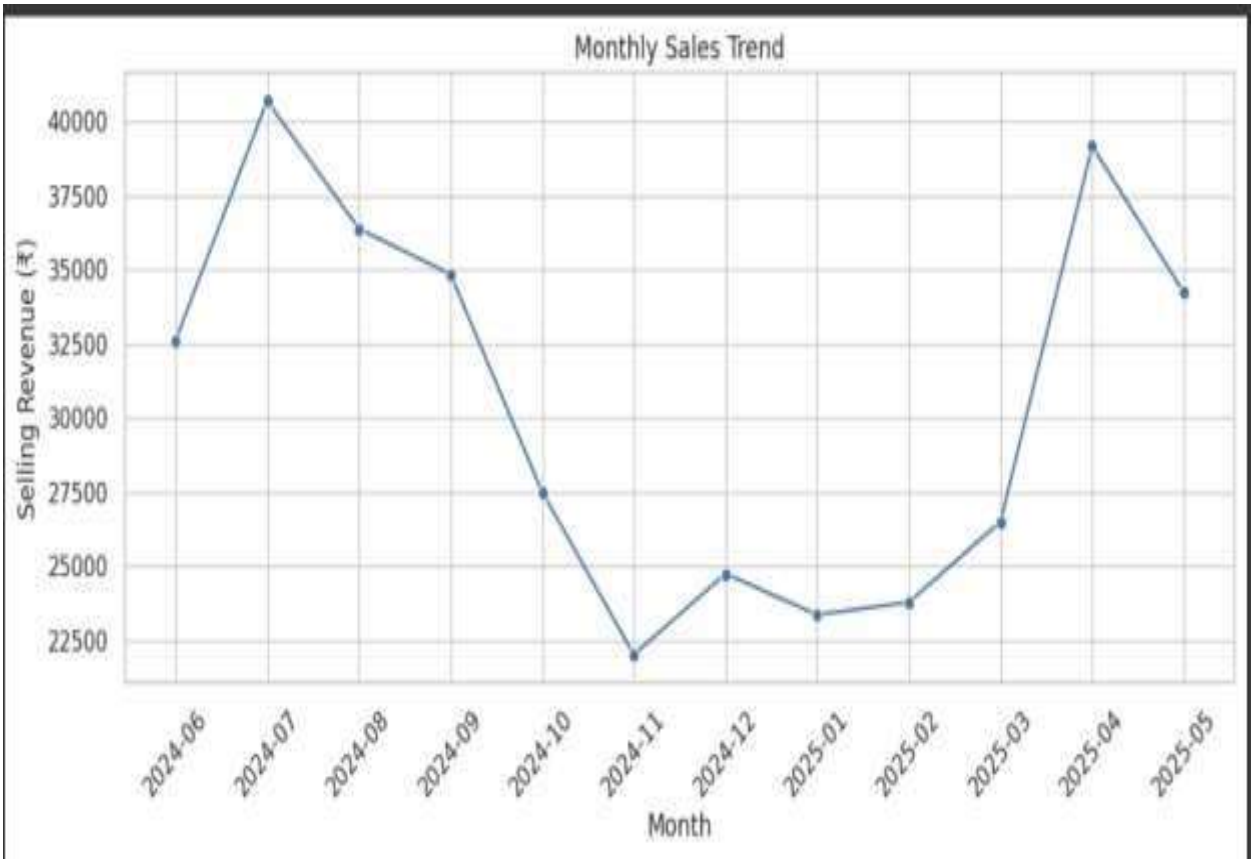


Fig 6.

Overall Classification (June 2024 – May 2025):

- **Class A (Core SKUs):** Cement Bag, Tile Adhesive, Steel Rod, Wire Roll (10m)
- **Class B (Moderate):** Wall Primer, Putty (5kg), Paint (1L), PVC Pipe (6ft)
- **Class C (Low Performers):** Paint Brush, Nail Pack

Class A SKUs not only brought the highest revenue but also showed higher frequency and quantity of purchases. Their consistent presence in sales across months confirmed their status as evergreen products.

Class C SKUs were sold sporadically and in small quantities, often bundled with other products.

Monthly Analysis: Class A products like Cement and Tile Adhesive were present in almost every month's top performers list. Some products such as Paint showed occasional Class A or B performance, likely due to festive or seasonal demand.

3.3 Market Basket Analysis using Apriori Probability

Explanation: A network graph was generated to show relationships between products often purchased together. Using Python's mlxtend library, Apriori algorithm with minimum support of 2% and confidence >0.2 was used.

Findings:

- **Cement + Putty:** Strong association, indicating frequent joint purchases in construction-related transactions.
- **Paint + Brush:** An expected but strong combination; likely driven by home renovations and festival seasons.
- **Sand + Cement + Nails:** High lift value; suggests these are bought in bulk by contractors.
- **PVC Pipe + Wall Primer:** Unexpected link, possibly indicating DIY customers buying both for maintenance work.

The insights were visualized using a network map in Kumu, showcasing central and peripheral nodes to understand bundle strength.

3.4 Customer Insights

Explanation: The customer field included occupation types (e.g., contractors, farmers, homeowners) and payment methods (Cash, UPI, Khata/Credit).

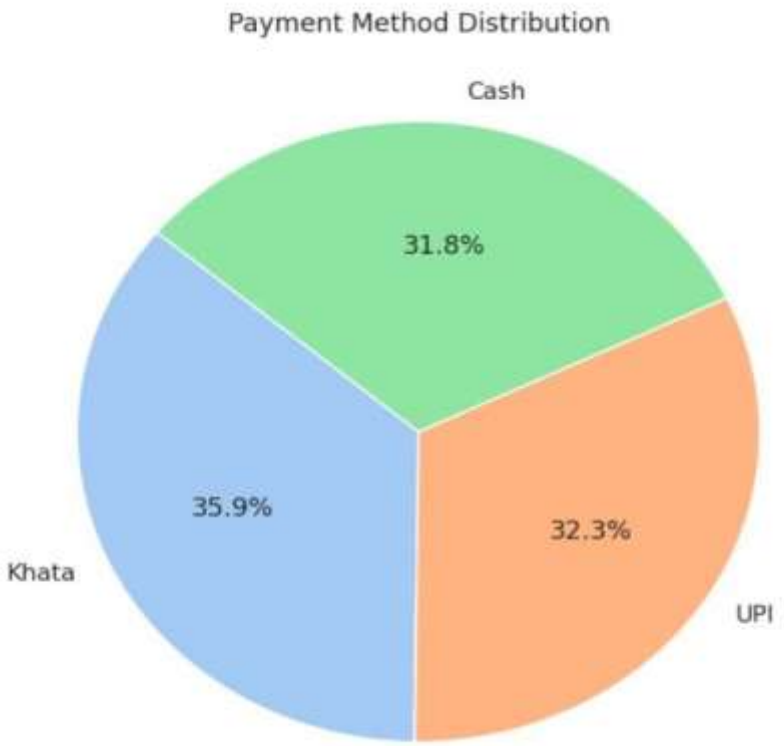


Fig 7.

Findings:

- **Regular customers (contractors)** contributed over 55% of total revenue with repeat purchases of cement, steel rods, and adhesives.
- **Walk-in customers** typically made smaller purchases and preferred UPI and cash payments.
- **Credit (Khata)** was used in ~36% of transactions. These were usually bulk purchases by contractors, often paid later.
- **Customer loyalty potential:** Many repeat buyers were observed across 4+ months, suggesting feasibility of introducing a loyalty program.

3.5 ARIMA Sales Forecasting

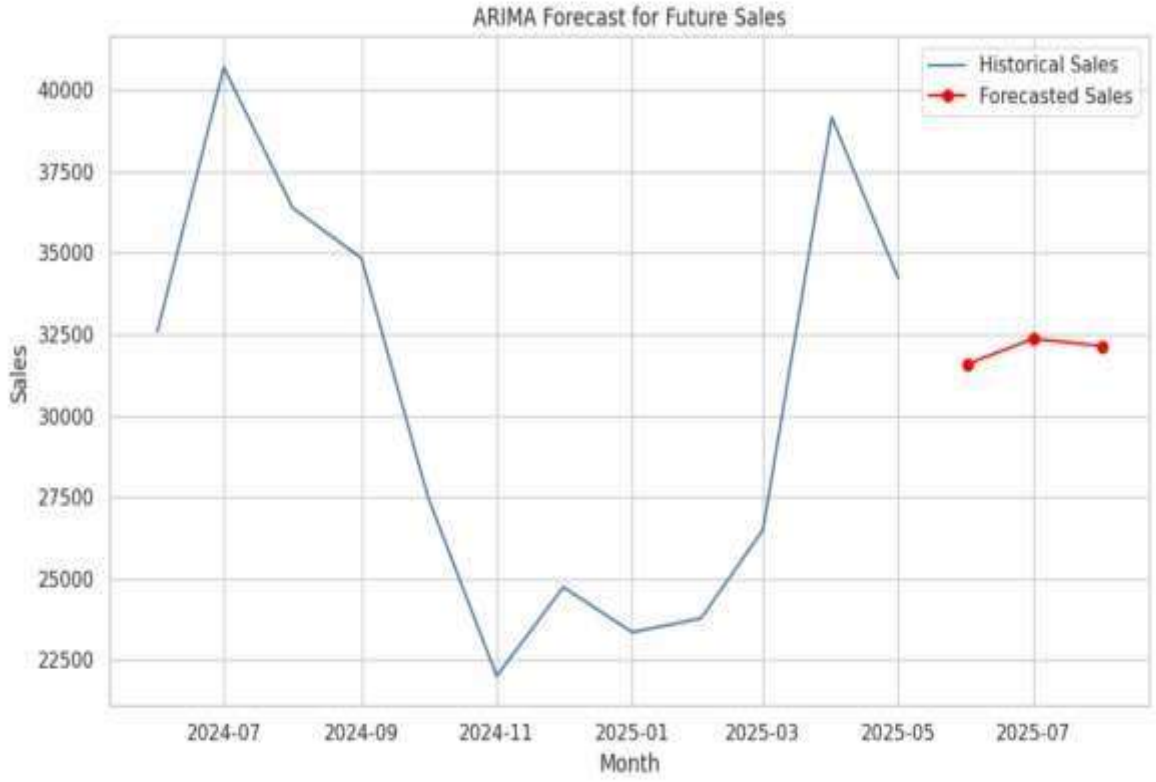


Fig 8.

Explanation: An ARIMA(1,1,1) model was applied on monthly sales totals after converting data into a time series format. Interpolation was used to fill gaps on days with no transactions.

Stationarity Check:

- ADF Statistic = -4.32
- p-value < 0.01 → Data is stationary post differencing.

Findings:

- Forecasts indicate stable revenues (~₹28,000–₹32,000/month).

- February and March show projected dips in revenue, likely due to off-season periods.
- August to October is expected to be the peak season due to monsoon construction and festival shopping.

4. Interpretation of Results and Recommendations

This section brings together all the major insights uncovered during the analysis and translates them into meaningful, actionable business strategies. The purpose is to offer clear direction to the business owner based on factual data, helping optimize both operational efficiency and customer satisfaction.

4.1 Categorical Influence on Sales

Key Insight: The Building Materials category outperformed all others both in terms of total revenue and revenue per SKU, despite having fewer items.

Interpretation: This means that although categories like Paint and Hardware have more products, they don't contribute as significantly to revenue. The shop's core strength lies in a narrow but powerful selection of construction-related products.

Recommendations:

- Maintain high inventory levels of top-selling SKUs from the Building Materials category.
- Expand within the category—explore variations of cement, tile adhesives, and other related materials.
- Promote these items as flagship products in local marketing (e.g., flyers, posters, digital banners).

4.2 SKU Performance Classification

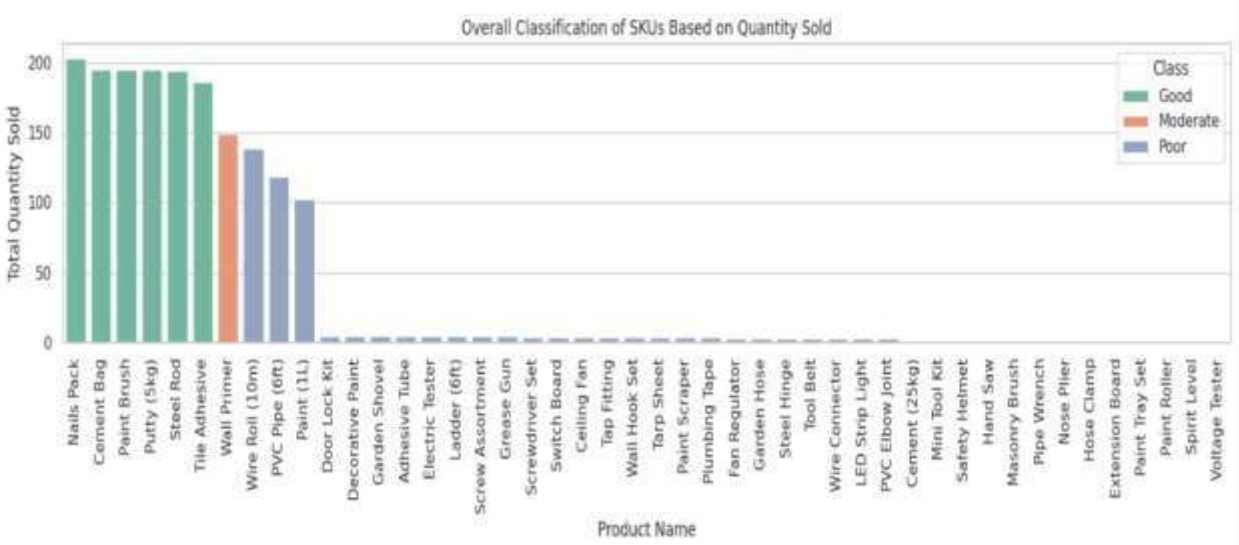


Fig 9.

Key Insight: A small number of SKUs (Class A) contribute to the majority of revenue, while a larger number (Class C) add little value.

Interpretation: This aligns with the 80/20 rule—most of the shop's earnings come from a few essential products. Class C products take up shelf space but rarely sell.

Recommendations:

- Automate reordering for Class A SKUs to ensure they never go out of stock.
- Evaluate Class B SKUs regularly—some might be promoted through offers to increase demand.
- Consider bundling Class C items or discontinuing them if they don't improve in performance.

4.3 Market Basket Analysis

Key Insight: Several product pairs were frequently bought together—e.g., Cement + Putty, Paint + Brush.

Interpretation: These combinations reflect customer needs. For example, buyers starting a construction task often pick up all essential materials in one visit.

Recommendations:

- Create combo deals around frequently bought pairs. For instance:
    - **Contractor Pack:** Cement + Putty
    - **Home Renovation Kit:** Paint + Brush
    - **Construction Bundle:** Cement + Nails + Sand
- Place these items next to each other on shelves for convenience.

4.4 Customer Insights

Key Insight: Regular customers like contractors generated the most revenue. However, a large proportion of their purchases were on credit.

Interpretation: These are high-value customers but present a risk to cash flow due to delayed payments.

Recommendations:

- Introduce a **contractor loyalty program** with discounts or free delivery.
- Encourage digital payments by offering 1-2% discounts on UPI or instant cash.
- Identify and prioritize frequent buyers for premium service (e.g., advance booking, pre-packed orders).

4.5 ARIMA Sales Forecasting

Key Insight: Revenue dips are expected in February and March, while peaks are forecasted during the monsoon and festive seasons.

Interpretation: This pattern is in line with regional and seasonal trends—construction slows in summer and resumes heavily during monsoon.

Recommendations:

- Prepare for off-season (Feb–Mar) with clearance sales, discount combos, or stock rotation.
- Increase inventory before high-demand months (Aug–Oct) to avoid stockouts.
- Use the forecast as a planning guide for cash flow, staff hours, and promotional campaigns.

5. Conclusion

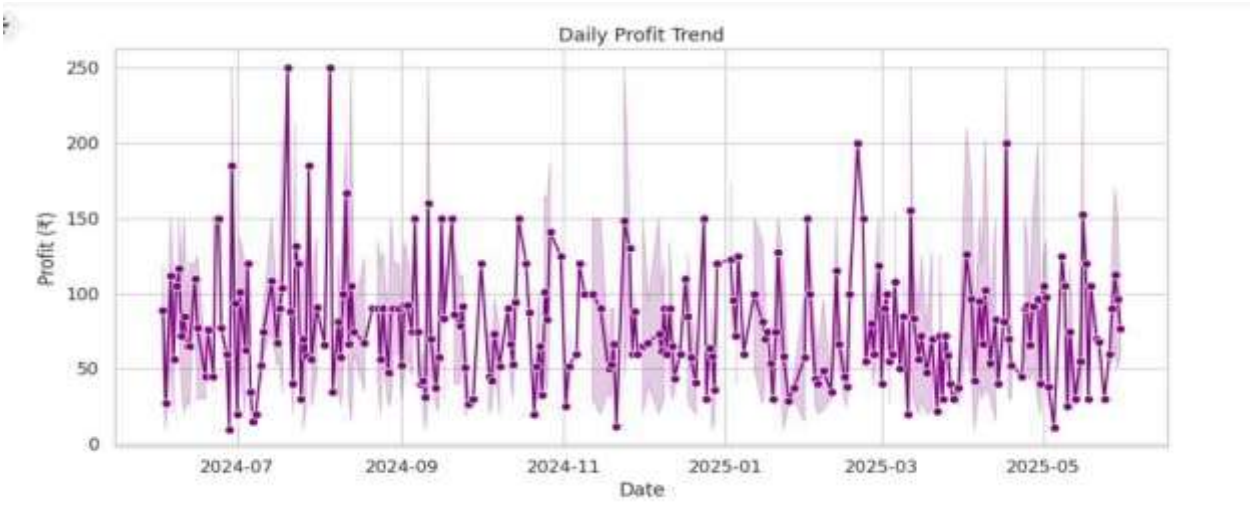


Fig 10.

This capstone project aimed to assist Shri Dattakrupa Traders, a local hardware store, by uncovering patterns in sales data and turning them into useful insights for real business decisions. Through structured data cleaning, exploratory analysis, and advanced techniques like ABC classification, Market Basket Analysis, and ARIMA forecasting, the study provided a holistic view of the store's operations.

The analysis showed that Building Materials dominate sales and should remain the primary focus of inventory and marketing strategies. ABC classification revealed that a small group of products consistently drive revenue, while others may need reevaluation. Market Basket rules showed how customers tend to buy certain items together, which can be used to create attractive bundles. Customer analysis showed high reliance on credit among bulk buyers, while sales forecasting highlighted the store’s seasonal patterns.

These insights were not just theoretical—they were shared with the shop owner, who appreciated the actionable recommendations such as launching combo packs, promoting UPI payments, and preparing inventory based on seasonal demand.

In conclusion, this project demonstrated how even a small business in a rural setting can benefit from data-driven decision-making. With minimal resources but a focused strategy, Shri Dattakrupa Traders can improve profitability, reduce wastage, and better serve its loyal customer base. This project also helped me gain real-world experience in applying data analysis tools to solve meaningful problems—a valuable learning journey in itself.

This project transformed raw sales data into actionable intelligence. The hardware store now has a clear view of its product performance, customer behavior, and seasonal patterns.

By aligning inventory and marketing strategy with data-backed insights:

- Sales and profits can be maximized

- Overstocking and dead inventory will reduce
- Customer retention and satisfaction can grow

A data-driven approach will position Shri Dattakrupa Traders as a smarter, leaner, and more resilient retail business in the local hardware sector.