

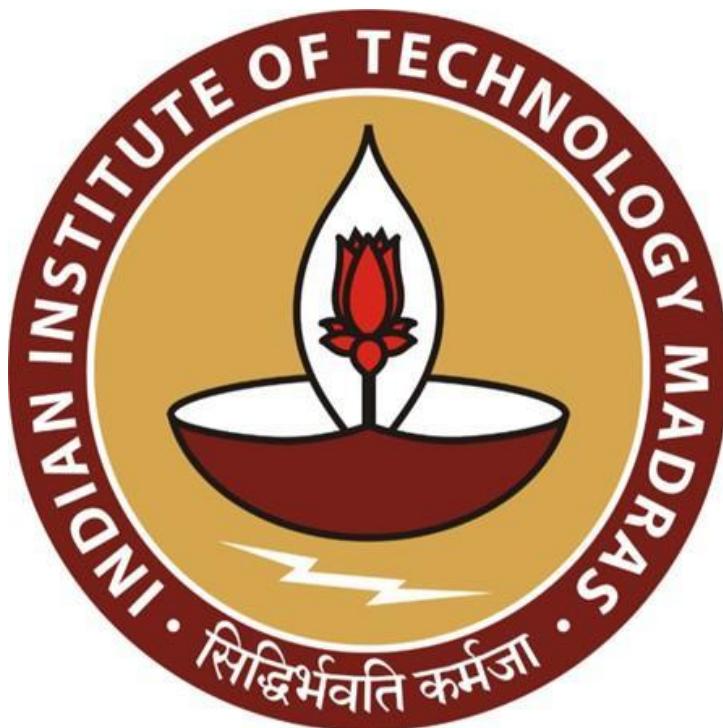
# **Boosting Sales and Profit Margins for a Pharmacy Store**

**A Mid-Term report for the BDM Capstone Project**

Submitted by

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## **1. Executive Summary**

Rudra Medical & General Stores is a retail pharmacy store at Nagarkurnool, India. It was started in 2021. It is associated with Shanvi Children's Hospital. The pharmacy operates out of rented accommodation and does turn profits. But then the primary problem faced by this pharmacy is that its profit margins are rather irregular, mainly due to some vendors charging high and ever-fluctuating purchase prices. This factor affects the revenue generated daily and thereby hinders the gradual and steady growth of the store.

To understand the business better, I collected Sales Data (10349 rows, 11 columns) and Purchases Data (410 rows, 14 columns) from billing records. The primary metadata includes drug name, batch number, expiry date, issued quantity, value, purchase rate, GST, net purchase rate, bill date, and some patient names. Using descriptive statistics, I organised and summarised this data to observe daily sales and purchase trends and categorised SKUs based on their characteristics.

I explored sales and purchase data by categorising SKUs based on their count to understand product variety. I conducted profit margin analysis by comparing selling and purchase rates. I analysed high-margin SKUs to see which products give better profits and identified SKUs sold in the highest quantities. I also checked supplier rates with the help of batch numbers to find the cheapest options for each drug. These methods helped me break down the data systematically for further analysis.

## **2. Proof of Originality of the Data**

Name of the Business: Rudra Medical & General Stores

Name of the Owner: Mrs. Macharla Shruthi

Address of the Business: H.No. 13-113/4/1, Snehapuri Colony, Nagarkurnool - 509209

### **2.1 Letter from the Firm**

**Letter:** [Letter from the Firm](#)

## 2.2 Images of the Business



Images: [Proof of Originality Folder](#)

## 2.3 Video Interaction



The pharmacy is owned by Mrs. Macharla Shruthi, a housewife with limited understanding of store operations, and is supervised by her friend Mr. Ashfaq Ahmed. To understand the store's functioning, I spoke with the owner, store operator, and pharmacist through Google Meet sessions. The interview video features me, Sai Mohith Bingi, and Mr. Ashfaq Ahmed.

Interview Video: [Proof of Originality Folder](#)

## 3. Metadata

The data for this project came from the shop's sales and purchase bills stored in their secure database, which doesn't allow direct export. Because of this, I manually entered all the data into Excel worksheets. The final Excel workbook has two sheets – one for sales data and one for purchase data - compiled from the raw records collected at the store. In total, the dataset

includes 2,246 sales bills and 102 purchase bills from the shop.

### **Raw Data: [Raw Data Workbook](#)**

## **3.1 Information about Sales Data**

The Sales Data dataset includes the following columns:

1. Drug Name Issued: The name of the medicine or drug sold
2. Batch No: The unique number assigned to a specific batch of the drug by the supplier
3. Exp. Dt: The expiry date of the drug mentioned
4. Issued Qty: The quantity of drug sold
5. Rate: The selling price per unit of the drug
6. Value: The total sales value of the drug for a given transaction, calculated as the product of the Rate and the Issued Qty
7. Date: The date on which the sales bill was issued
8. Bill No: A unique number assigned to each sales bill
9. Patient Name: The name of patient to whom the sales bill is issued
10. Doctor: The name of the doctor

### **Justification:**

- The selected variables address the pharmacy's issues with irregular profit margins caused by high and fluctuating purchase prices.
- Rate and Value are essential to monitor selling prices and total revenue to observe how variations in purchase prices affect profitability.
- Issued Quantity and Date provide insights into sales volume and temporal trends, helping identify periods of revenue instability.
- Batch Number and Expiry Date ensure inventory quality, minimising losses that worsen profit irregularities.
- Patient Name data is largely missing, restricting demand analysis.
- The consistent naming of Doctor suggests possible influence of a single prescriber, which can be leveraged to negotiate stable vendor pricing.
- Using these variables, the pharmacy can relate purchase price fluctuations with revenue changes to strategize for stabilising profit growth despite existing data limitations.

### **3.2 Information about Purchases Data**

The Purchases Data dataset includes the following columns:

1. Drug Name Issued: The name of the medicine or drug purchased
2. Pack: This column indicates the form or quantity of the drug in its packaging
3. Batch No: The unique number assigned to a specific batch of the drug by the supplier
4. Exp. Dt: The expiry date of the drug purchased
5. Quantity: The number of units of the drug purchased, excluding any free or promotional units
6. Free: The number of free units of the drug purchased
7. MRP: The Maximum Retail Price of the drug mentioned
8. Rate: The purchasing price per unit of the drug
9. GST: The Goods and Services Tax applied to the drug, expressed as a percentage of the purchase price per unit
10. Amount: The total purchase value of the drug for a given transaction, calculated as the product of the Rate and the Quantity
11. Net Purchase Rate: The final purchase price per unit of the drug, including the GST
12. Date: The date on which the purchase bill was issued
13. Bill No: A unique number assigned to each purchases bill

#### **Justification:**

- The direct measurement of Rate together with Net Purchase Rate and Amount demonstrates how cost changes impact both daily revenue and consistent growth patterns.
- The measurement of Quantity and Date enables the assessment of purchase volumes and purchase timing which connects sales revenue patterns to purchase costs.
- MRP serves as a fixed selling price which the firm must uphold for margin protection against cost fluctuations.
- The combination of Batch Number and Expiry Date helps maintain quality standards while controlling inventory flow so that losses which cause profit instability become reduced.
- Free Units and GST show both supplier incentives and tax effects that affect net cost values.
- Through analysis of these variables the pharmacy identifies vendors who overcharge which enables negotiation of better rates and pricing strategy adjustments for margin correction and gradual growth support.

## 4.Descriptive Statistics

### 4.1 Dataset Overview

No. of SKUs	166
Time Frame	June 2024 to Aug 2024
No. of Transactions	2246
Total Revenue	₹ 10,43,252.66
Avg Transaction Value	₹ 464.49

**Figure 1:** Sales Data dataset breakdown

No. of SKUs	179
Time Frame	June 2024 to Aug 2024
No. of Transactions	102
Total Cost	₹ 16,03,542
Avg Transaction Value	₹ 15,721

**Figure 2:** Purchases Data dataset breakdown

### 4.2 Central Tendency and Distribution

#### Sales Data:

	Unit Price	Std Qnt.	Total Price
Mean	74.99	2	464.49
Min	0.62	1	1.00
25%	13.69	1	192.97
50%	47	1	350.11
75%	99	2	603.22
Max	5490	198	9412.29
Std. Dev	137.08	4.28	505.69

**Figure 3:** Sales Data distribution

## Purchases Data:

	Unit Price	Std Qnt.	Total Price
Mean	176.88	351	15721
Min	0	1	56
25%	15.12	12	4334.54
50%	42.78	48	9096.63
75%	106.20	101	15806.13
Max	13500	20000	433172.82
Std. Dev	324.89	2083.25	42849.60

Figure 4: Purchases Data distribution

### Justification:

- Figure 3 utilizes the mean value as an excellent measure of central tendency which calculates average total value or quantity sold across all transactions thus presenting a general observation of sales performance.
- The daily sales distribution uses variance or standard deviation to quantify how daily sales per bill vary while showing revenue consistency or inconsistency because the pharmacy operates on unpredictable profit margins.
- Figure 4 shows the mean value functions well as a central tendency measure for purchases data by calculating the average purchase price or amount thus revealing typical procurement costs.
- Standard deviation provides a useful measurement of purchase price variance because it shows how variable costs affect profit margins thus supporting strategic purchasing decisions.

## 4.3 SKUs Classification

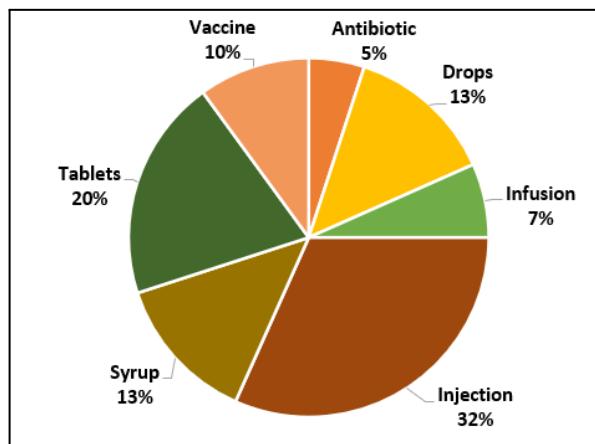
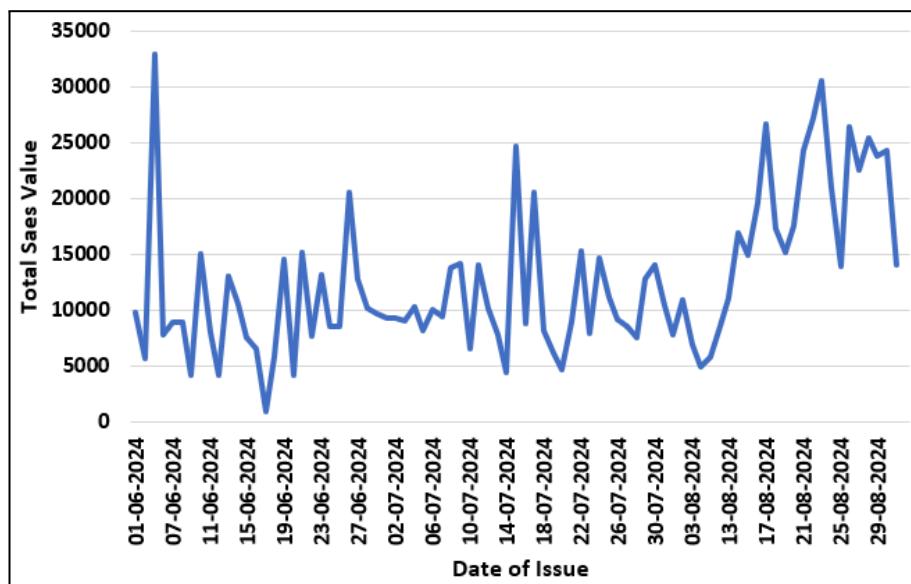


Figure 5: SKU Categorisation

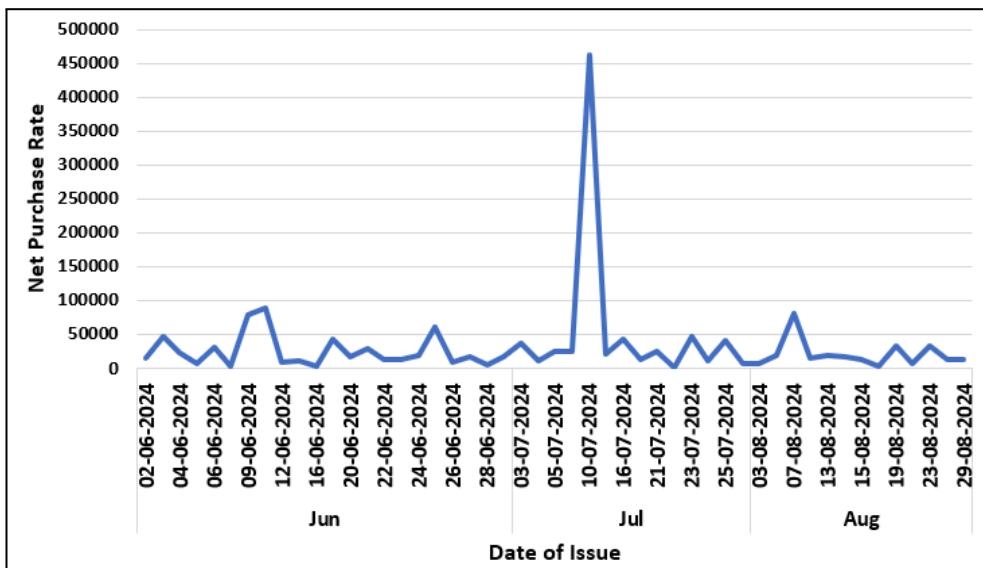
### **Justification:**

- The Figure 5 (SKU classification pie chart) visually displays the representation of unique SKUs classified by medication type, emphasizing product diversity.
- The pharmacy's position beneath a children's hospital leads to injections making up 32% of unique SKUs since this location creates high demand from patients who need injectable medications such as children and babies who cannot use oral drugs.
- Tablets represent 20%, indicating a substantial role for common oral medications.
- Syrup and Drops each comprise 13%, likely targeting pediatric needs or specific therapies.

### **4.4 Sales and Purchases Trends**



**Figure 6:** Daily Total Sales Value (June - August 2024)



**Figure 7:** Total Net Purchase Value by Date (June - August 2024)

**Justification:**

- The Figure 6 (daily sales graph) shows unusual patterns due to changing prescription loads, hospital needs, and seasonal demand.
- Sales naturally fluctuate since the pharmacy mainly handles urgent medical cases and pediatric patients.
- From Figure 7, it can be noted that on July 10, purchases peaked at ₹462,350.60 because they bought a large stock of cold and fever medicines at once.
- Buying in bulk ensures popular medicines are always available, supporting the owner and operator's focus on quality care and steady supply.

## 5. Detailed Explanation of Analysis Process

### 5.1 Data Cleaning and Preprocessing

**Explanation:**

- The initial data gathering process required manual input of pharmacy purchase and sales bills into Sales Data and Purchases Data sheets.
- The dataset includes 10,349 sales records and 410 purchase records, representing 166 and 179 unique SKUs respectively, with 82 SKUs common to both.
- OpenRefine has been used for its clustering capabilities to perform data cleaning by standardizing drug names while fixing spelling errors and eliminating rows with zero values.
- The cleaned data contains 10,250 sales records and 410 purchase records.
- The number of unique bill numbers revealed 2,246 sales transactions and 102 purchase transactions which resulted in 24 sales bills per day on average.
- The preprocessing phase calculated statistical parameters including mean and quartiles along with minimum values and maximum values and standard deviation for both datasets to generate statistical summary.
- The Sales Data fields include Drug Name Issued, Type, Issued Qty, Rate, Value, Date.
- The Purchases Data fields contain Quantity, MRP, Rate, Net Purchase Rate, Date.
- The implemented steps created a perfect analysis foundation which matched the pediatric services offered by the store.

## **Importance:**

- Cleaning and preprocessing ensure data validity by removing errors that could distort analysis results.
- Drug name normalization and elimination of incorrect entries improve dataset usability.
- Statistical calculations establish fundamental sales and purchase trends for the store.
- Separation of unique transactions enables accurate monitoring of daily activities.
- The processed data becomes ready for advanced analyses like inventory control, sales pattern analysis, and profit evaluation.
- These analyses specifically address the store's pediatric care requirements effectively.

## **5.2 Analysis Process/Methods**

- **Actual Quantity Calculation**

**Explanation:** Calculated true quantity by combining pack size, purchased quantity, and free units using: Actual Qty = (Purchased Qty × Pack Size) + Free Units.

**Justification:** Ensures precise stock and cost tracking compared to using purchase quantity alone.

**Rationale:** Directly links to inventory valuation accuracy, crucial for analysing profit margins.

- **Per Unit Rates**

**Explanation:** Derived per unit purchase and sale rates by dividing total amount by actual quantity.

**Justification:** Provides exact cost and revenue per unit, essential for margin calculations.

**Rationale:** Supports understanding of profit irregularities due to cost fluctuations.

- **Unique Bill Numbers**

**Explanation:** Extracted using pivot tables for dataset integrity and transaction overview.

**Justification:** Confirms data coverage, unlike raw counts which may double-count entries.

**Rationale:** Ensures correct dataset scope for margin analysis.

- **Weighted Averages**

**Explanation:** Calculated weighted average purchase and sale prices to account for quantity influence using: Weighted Avg =  $\Sigma(P \times Q)/\Sigma Q$ .

**Justification:** Better reflects true average costs than simple means.

**Rationale:** Aligns with problems that focus on cost fluctuations and profits.

- **Profitability Charts**

**Explanation:** Created pivot tables and charts for high quantity and high margin SKUs.

**Justification:** Identifies priority drugs for pricing and procurement strategies.

**Rationale:** Guides interventions to stabilise margins

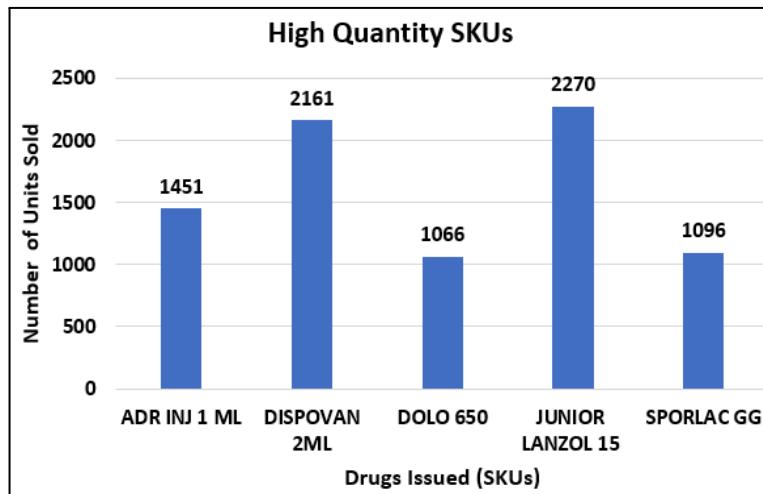
- **Best Batch Table**

**Explanation:** Designed table of lowest purchase price batch per drug using pivot tables.

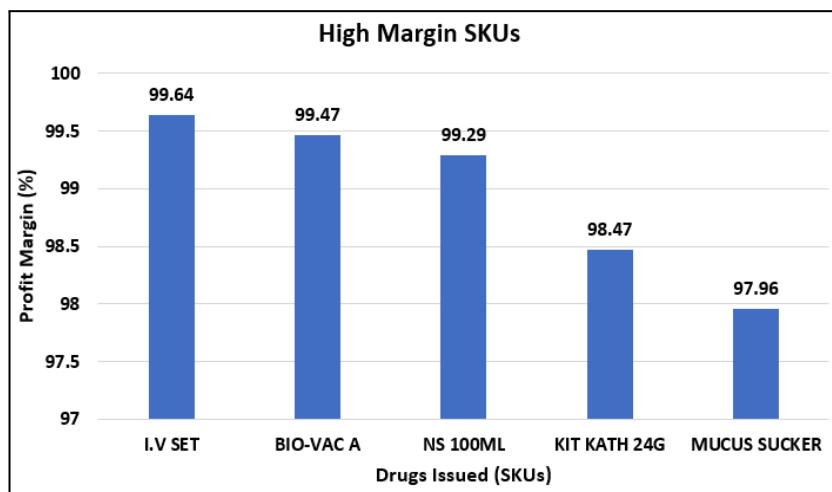
**Justification:** Supports cost-saving decisions compared to using random batches.

**Rationale:** Directly reduces purchase costs and enhances profits.

## 6. Results and Findings



**Figure 8:** Top 5 SKUs by Sales Quantity (Issued Qty)



**Figure 9:** Top 5 SKUs by Profit Margin (%)

- The top 5 SKUs by volume are ADR INJ 1 ML, DISPOVAN 2ML, DOLO 650, JUNIOR LANZOL 15, and SPORLAC GG, driven by high demand for pediatric fever and cold treatments in summer.

- Steady replenishment and strong supply chain management are needed to avoid stock-outs and maintain revenue.
- I.V. SET, BIOVAC A, NS 100ML, KIT KATH 24G, and MUCUS SUCKER, though lower in volume, achieve high profit margins up to 99.64%.
- Bundling these high-margin SKUs with prescriptions can maximise profitability and simplify operations.
- Corporate pharmacies like Apollo tend to maximise profits per display area by having access to multiple suppliers for each drug. Rudra Medical can try to improve profitability by securing suppliers with competitive rates.

Drug Name	Batch No	Per Unit Purchase Rate
<b>5D ACULIFE</b>		<b>30.80</b>
1G24873		30.80
<b>ACECLOSEREA</b>		<b>9.10</b>
SPB240299		9.10
<b>ACTIBILE 50</b>		<b>19.94</b>
BRA1178		19.94
<b>ADR INJ 1ML</b>		<b>44.80</b>
AD411		44.80
<b>AMOKAV DUO DRY</b>		<b>83.87</b>
CAAH5001		83.87
<b>ATARAX-25</b>		<b>5.51</b>
E2401658		5.51
E2401939		5.51
<b>ATARAX-SYR</b>		<b>106.60</b>
ZP40056		106.60
<b>ATOCOR</b>		<b>6.28</b>
E2401491		6.28

**Figure 10:** Best Batch Numbers (Lowest Purchase Rate) for Each Drug

**Table:** [Best Suppliers \(Batch Numbers\)](#)

- The table identifies the best batch numbers with the lowest per-unit purchase rates (INR) for various drugs, analyzed with June-August 2025 data from the pharmacy.
- The respective batch numbers can be matched back to their respective suppliers from the database for cheap procurement of drugs to stock up inventory. These optimal batches in procurement strategies, combined with supplier negotiations, will enhance profitability and improve inventory operations.

For the given data from June - Aug 2024, there were no expiry date related issues. The final analysis report would include Pareto analysis and inventory turnover rate to help derive key insights and actionable recommendations to the business to enhance their cash flow and profitability in a growing town and an emerging market like Nagarkurnool.