



# Business Data Management

## Final Report for the BDM Capstone Project



**TITLE:** Precision Enhancement of Customer Care Workflow in  
Pharmaceutical Setting & Leveraging Data-Driven Strategies.

**Preliminary information of the student:**

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# **Contents**

1. Executive Summary	4
2. Detailed Explanation of Analysis Process/Method	6
3. Results and Findings	12
4. Interpretation of Results and Recommendation	20
5. Conclusion	22

### **Declaration Statement**

I am working on a Project titled “**Precision Enhancement of Customer Care Workflow in Pharmaceutical setting**”. I extend my appreciation to “**LAXMI MEDICAL AGENCIES**”, 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.

D. Umesh manikanta

Signature of Candidate: (**Digital Signature**)

Name: DHULIPALLA UMESH MANIKANTA

Date: 15-07-2024

## **Executive Summary**

### ➤ ***Organization Overview***

I elected to collect the required information from **LAXMI GENERIC PHARMACY** located in Guntur, Andhra Pradesh. "This shop was established by Mr. Balu in the year 2019 with an initial investment of 10 Lakhs.

### ➤ ***Brief on Problems Faced by the Business:***

Key concerns are mismanaged inventory, losses due to expired medicines and stockouts, blockage of cash flow, inconsistent performance at different branches, and a lack of sales & profits and business extension. The focus is to be directed toward better sales and business extension.

### ➤ ***Observations from preprocessing and metadata:***

Data is provided in 3 excel sheets, they are:

1. Sales.
2. Purchases.
3. Stock maintenance.

After preprocessing the collected data and creating metadata, I obtained a brief overview of the business. The stock maintenance data is not kept properly, and it gives some discrepancies in some medicines where the levels of inventory do not match with the data of sales and purchase on a month-on-month basis.

### ➤ ***Brief on analysis process:***

I used Excel tools and python which help in creating good visualizations like heatmaps, line graphs, Gantt charts, waterfall charts, etc. Excel helps in creating Pivot tables. These Excel tools and Python provide graphical representation that further helped in the identification of trends, patterns, and key insights.

### ➤ ***Overview of Results and findings and recommendations:***

Based on the results, we assessed business performance and formulated recommendations, marketing strategies, and data-driven decisions to arrive at the best rules for the optimization of revenue generation.





## Detailed Explanation of Analysis Process/Method

Based on the results, we assessed business performance and formulated recommendations, marketing strategies, and data-driven decisions to arrive at the best rules for the optimization of revenue generation.

- **Mismanaged Inventory**

The owner of the business provided the data in 3 sheets, they are:

1. **Sales.**
2. **Purchases.**
3. **Stock maintenance.**

Stock maintenance data sheet stores the information about opening and closing stock of that particular month i.e. opening stock on 1<sup>st</sup> of that month and closing stock on end of that month.

The data for a particular medicine should obey the following condition:

$$\text{Closing stock} = \text{Opening stock} + \text{Purchase} - \text{Sales}$$

But some medicines are not obeying the condition. If there is No purchase or No sale for a medicine, then that medicine is not found in stock maintenance data. Which is not a good way of maintaining the data, this kind of medicine should also be stored in the data and their closing and opening stock will be same. These are two main reasons leading to inventory mismanagement.

Stock maintenance Data of the month September 2023

Product Name	Company	Opening Stock (Packs)	Purchase Qty (Packs)	Sale Qty (Packs)	Closing Stock (Packs)
Acemiz S Tab	Lupin	40	0	21	19

Sales Data of the month September 2023

Product Name	Company	HSN Code	Invoice No.	Month_of_Sale	Invoice Date	Sold Qty
ACEMIZ S TAB	LUPIN	3004	LMA-516	September 2023	28-Sep-2023	20

No Purchase happened in the month of September 2023.



The solution to this problem is, without directly updating or manipulating the Stock maintenance data, entering the data by referencing to other 2 data sheets. If there is an update in sale or purchase data for a particular medicine, that medicine will be searched in stock data if the medicine is found then the information will be updated accordingly, if that medicine is not found then we will create a new entry for that medicine. The Closing stock of previous month is considered as opening stock of the current month.

- **Blockage of cash flow**

Blockage of cash simply means tying up money and making it unavailable for immediate use. This can take several different forms, including the following:

**Accounts Receivable:** Delayed payments from customers mean the cash is tied up because it is currently outstanding.

**Inventory:** Keeping too much stock level ties up cash in unsold goods.

**Outstanding Debts:** Cash used up in paying off a long-term loan or debt restricts available cash flow

**Prepaid Expenses:** This occurs in a case where a business makes an advance payment for receipt of goods or services in advance. Cash gets blocked due to such payment.



The solution to this problem is, don't encourage customers to delay payments, and not buy excessive stock it may lead to loss due to either expiries or cash blockage. Don't give advance payments to the distributors very advance and try to maintain **Order and Receive** time difference short.

- **Inconsistent performance at different Branches**

Performance at the branch level would be in regard to the performance assessment of how well a particular business's branch is doing. This might involve several **key metrics** and **areas of assessment**, including:

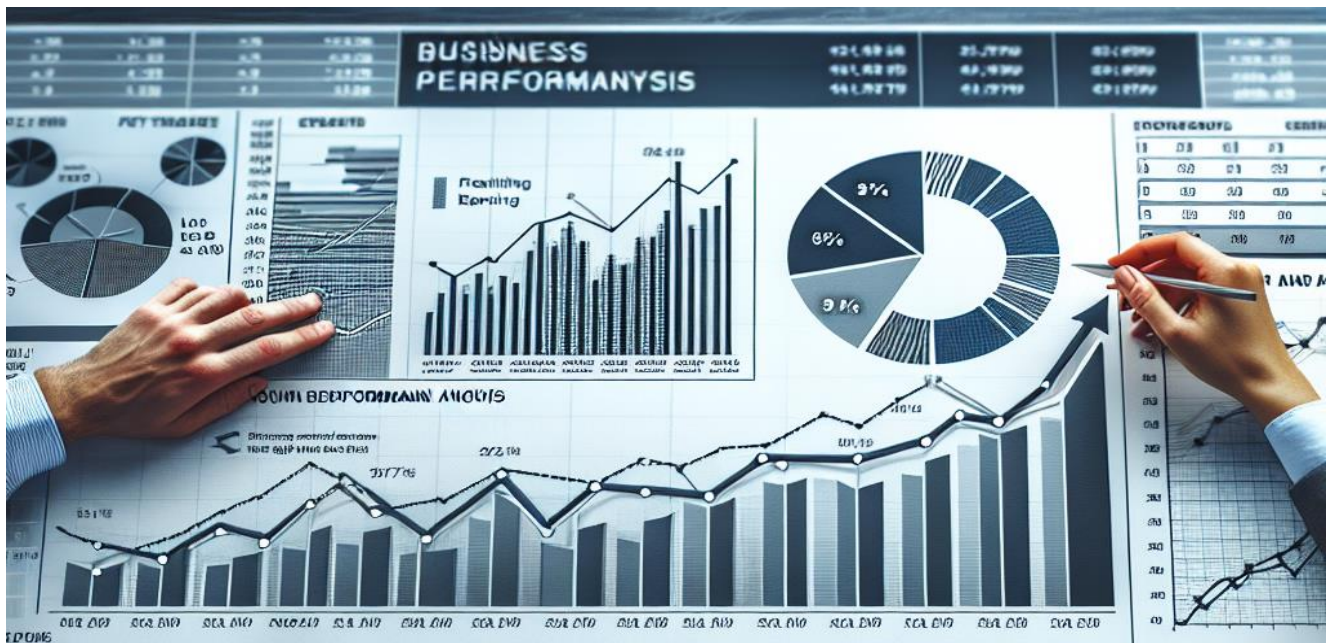
**Sales Revenue:** The total money the branch generates from selling goods or services.

**Profitability:** The ability of the branch to produce profit, normally measured with metrics like gross profit margin, net profit, and return on investment.

**Operational Efficiency:** How efficiently one uses available resources, which involves labour, inventory, and capital.

**Employee Performance:** This comprises the efficacy and output of the branch in terms of staff performance in the field under sales performance, customer service, and adherence to company standards.

**Cost Management:** The efficiency in managing operating expenses through effective control of overhead, labour costs, and other expenditures by the branch like rent of the shop, Electricity, transportation cost, etc...



The solution to this problem of inconsistent branch performance is, regular monitoring based on fixed time (weekly /Monthly) of the above metrics and comparing this info with previous data and finding abnormalities.



- **Loss due to Stockouts & Expired Medicines.**

The first problem is with **stockouts**, when discussed with owner, he said, they keep the record of the medicine when a customer asked for a medicine which is not available with them. To solve this, they purchased all the medicines in the list, after purchasing a very few medicines of that kind were sold, remaining got expired leading to loss.

The solution to this problem is maintaining the record of medicine name and how many customers asked for this medicine. Maintaining a threshold value like 10 or 15 for example, purchasing the medicines for which the number of customers asked that medicine is greater than the threshold. Vary the value of the threshold accordingly.

The second problem is with **Expired medicines**. The data provided is from June 2023 to Feb 2024, which is 9 months of data. Expiry Data is mentioned in Purchase Data. As the last date of the data with us is 29 Feb 2024, Analysis for Expiry of medicines is done with the date 1<sup>st</sup> March 2024 on the complete purchase data from June 2023 to Feb 2024.



#### **Analysis For Expiry losses:**

With the help of filters in excel I filtered the medicine which have expiry date below 1<sup>st</sup> Marc 2024, With the help VLOOKUP function I tried to find the Closing stock of the medicine before the month of expiry. If the closing stock is not zero, then the amount spent for purchasing that is counted in losses.

Product Name	Company	Invoice Amt (Rs)	Expiry	Landing Cost (Rs)	closing stock of the month	Expired/Not	Loss
AQUA 5ML EAR DROPS	Leeford	5041.96	45261	20.72	Nov	0	0
HISTONE B TAB	VALBHAV	3361.23	45261	40.32	Nov	0	0
PENTAB 40MG TAB	Alembic	14177.38	45323	37.52	Jan	1	37.52
DEXAVEE TAB	Vyali	5720.1	45261	1.57	Nov	0	0
LULIAC CREAM 10GM	Leeford	13003.2	45292	33.6	Dec	0	0
ECOBATH TOWEL	surgical	1423.74	45323	64.9	Jan	0	0
FESTIVE EYE 10ML DROP	Laborate	5407.29	45323	9.24	Jan	30	277.2
PENTAB 20MG TAB	Alembic	21670.44	45323	5.6	Jan	94	526.4
EPIFORD CR 500MG TAB	Leeford	15553.37	45323	39.2	Jan	0	0
ZINCOVIT 200ML SYP	Apex	13740.46	45323	106.71	Jan	0	0
TENOLIGLIPT 20	ORLLYFORD	46070.48	45261	8.7	Nov	80	696
GLIRUM MF TAB	Biochem	37544.16	45323	7.73	Jan	172	1329.56
TELMASET H TAB	Wallace	8461.15	45323	24.19	Jan	60	1451.4
TELMASET H TAB	Wallace	18522.76	45323	26.88	Jan	60	1612.8
MEGACLOX TAB	CIPLA	46070.48	45323	39.76	Jan	57	2266.32
						Total Loss	8197.2

After performing VLOOKUP for Comparison month in purchase data to stock data we got the above table. The total loss in the for this nine month is 8197.2 rupees.

- **Lack of Profits and improvements of sales:**

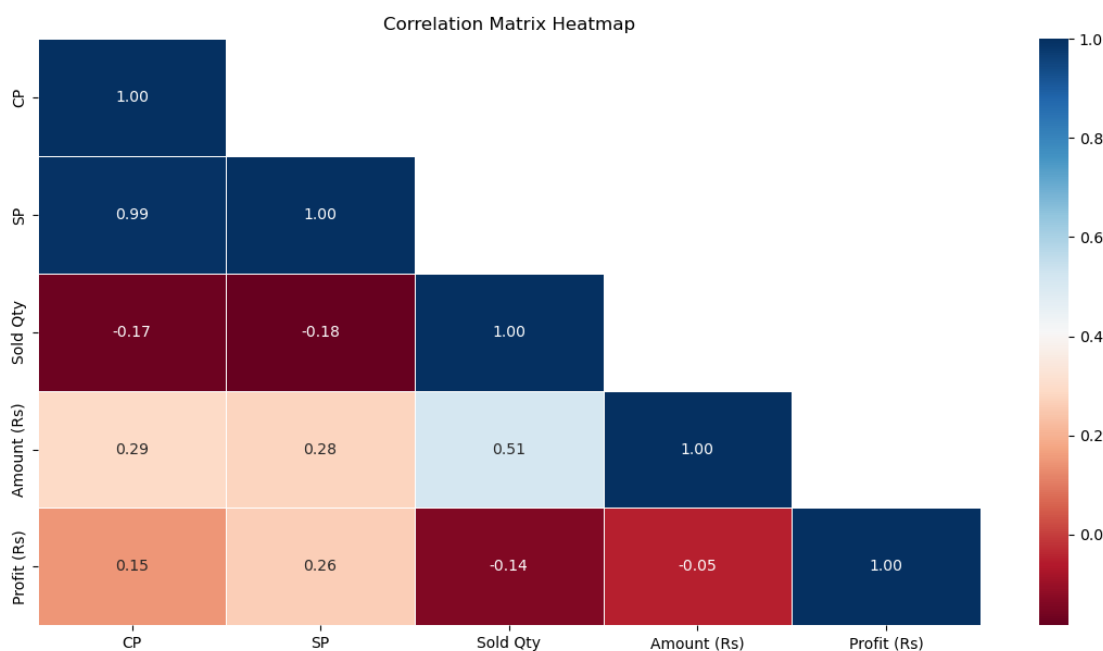
The solution to this problem is, without directly updating or manipulating the Stock maintenance  
As per the data provided the **total profit** from June 2023 to Feb 2024 is **₹95239.12** and **total revenue** is **₹49,87,750.94**,



In 9 months period the business has created a revenue of 50 lakhs approximately, Profit is **1.9%** of the revenue. Assuming the same sale trend we can state that the business is having a revenue of **66-67 Lakhs** per annum and a **profit of 1.3 - 1.4 Lakhs** per annum.

**Invoice Number** is used to find number of sales happened. **Number of Sales in 9 months is 6633.** Assuming all branches have equal sales, **737 Customers per day in all branches and each branching is serving 184 customers per day**, which is not a small number. Though we are having good sales in terms of number of customers we are not having good profits. They can be many reasons for this, few are which I have noticed after going through data:

- ❖ Medicines with negative margins.
- ❖ Improperly determining the selling price of a medicine
- ❖ More Sales for medicines which have low margins.
- ❖ Profits is zero for most of the medicines.
- ❖ High Purchase costs.



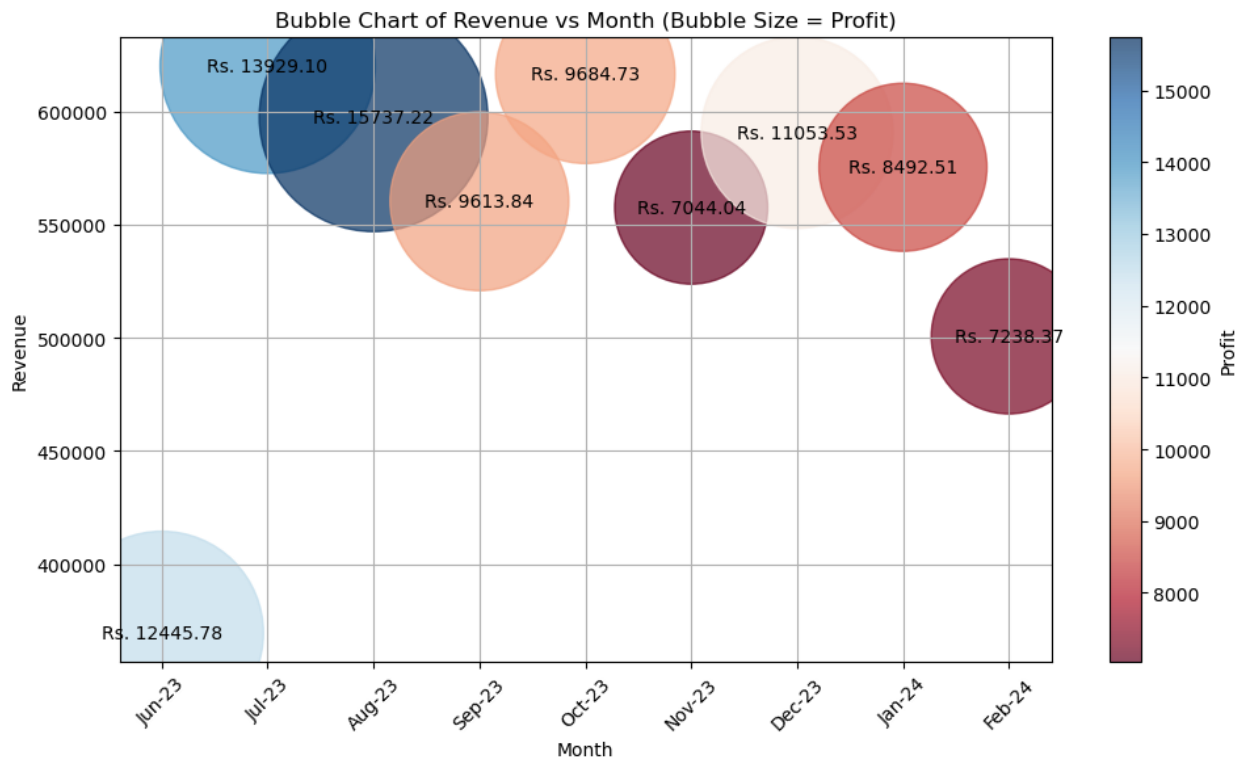
From the correlation matrix, we can infer that profit is not related with any other variable and there is moderate relation between total amount and sold quantity.



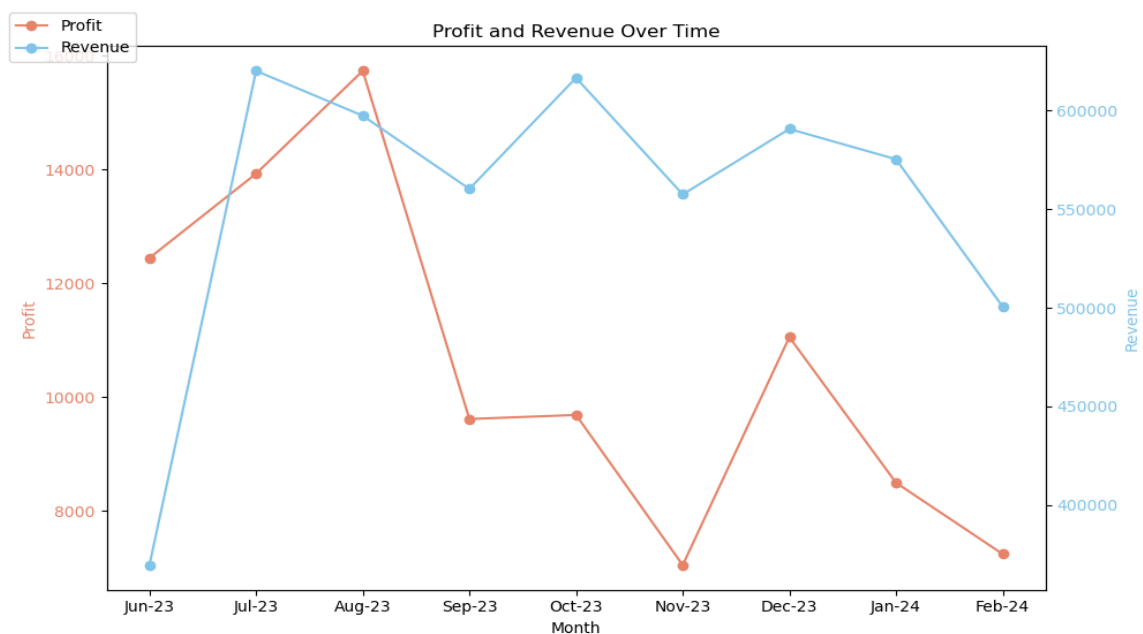
# Results and Findings

## 1. Revenue and Profit Analysis

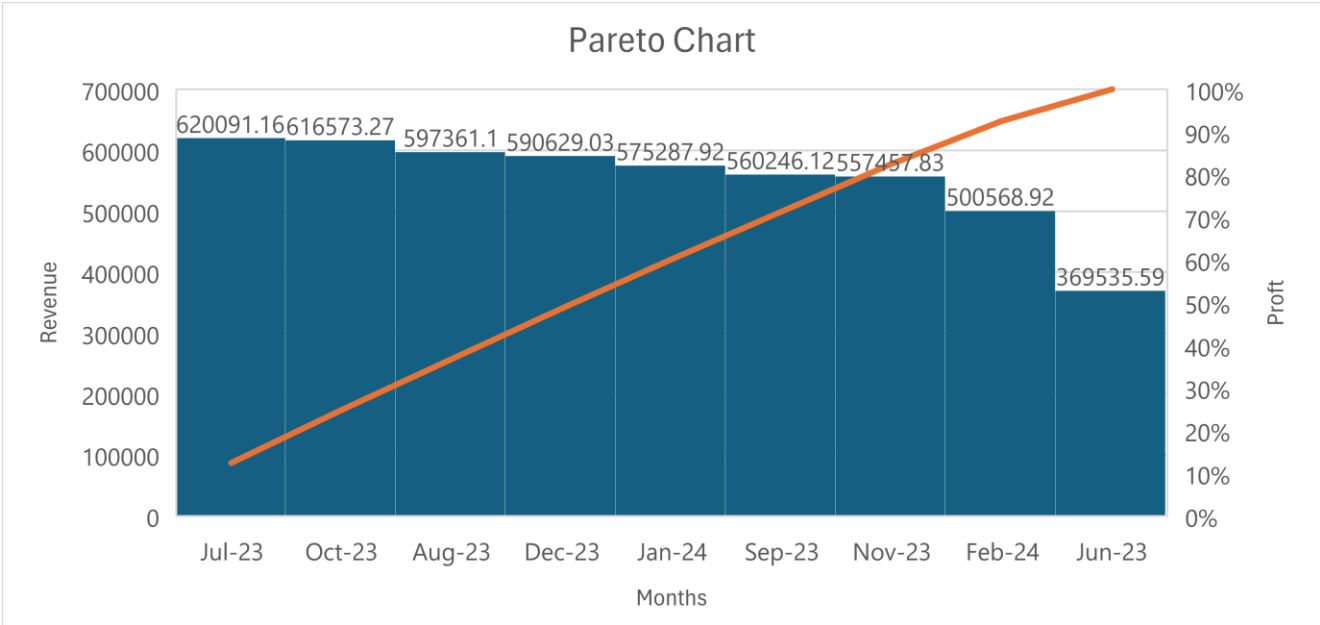
The following Bubble chart shows revenue and profit of the business across the months.



From the above graph we can infer that August has the maximum profit and November is low profit. On average owner is earning 9 – 10 thousand rupees per month.



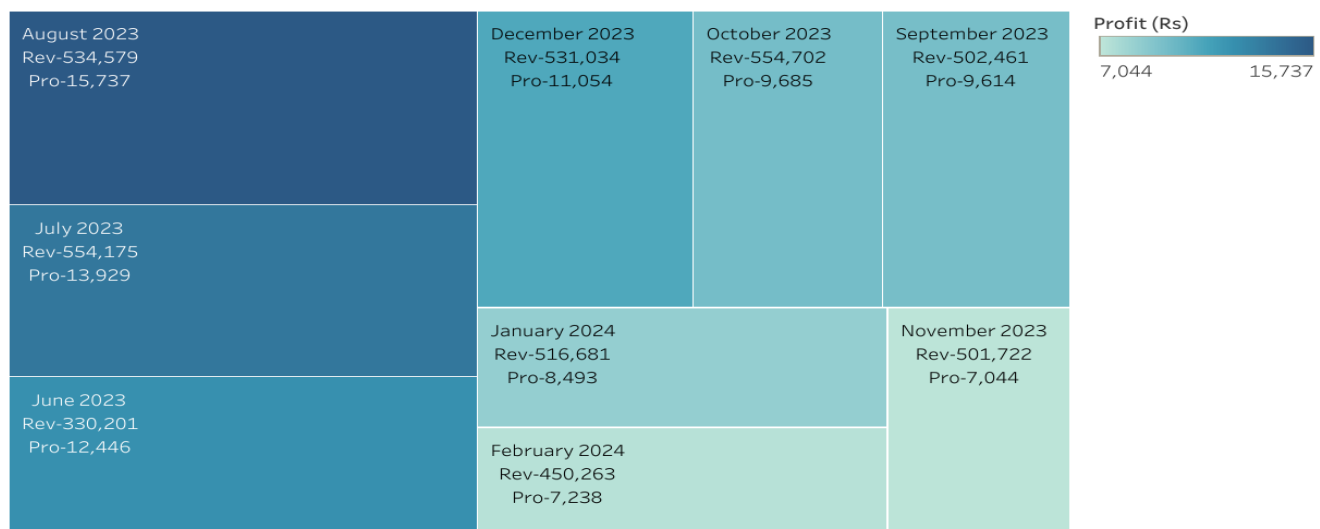
Above Graph shows the pattern of how profit and revenue are varying across the months. From this we can infer that August 2023 is the month where both revenue and profit are at good level and Feb 2024 is the month low profit and revenue.



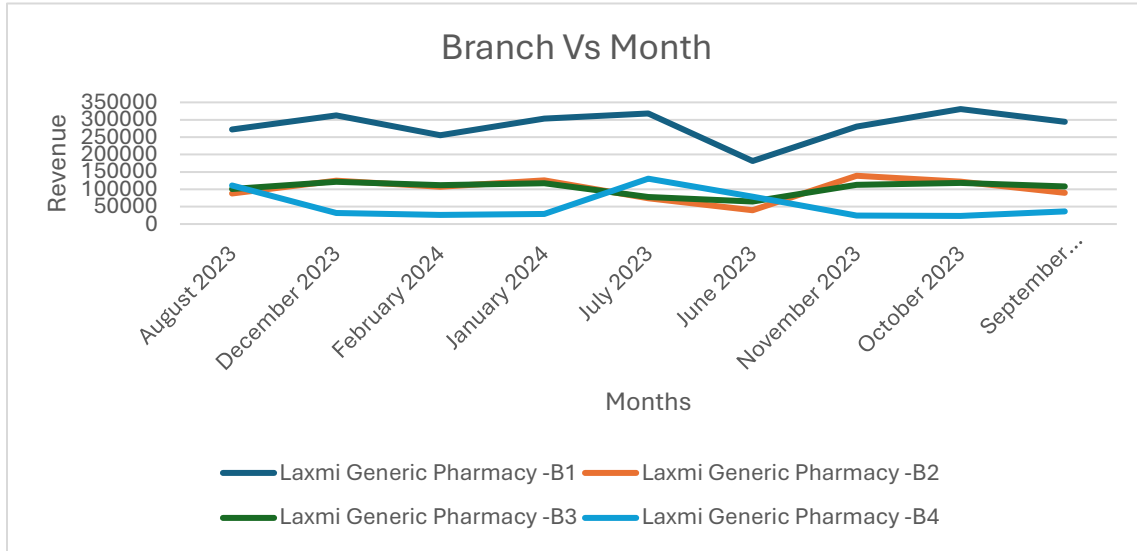
low profit and revenue. The above pareto shows distribution of revenue and cumulative profit. From the above graph we can infer that cumulative profit is distributed linearly, but the revenue is decreasing month by month.

The below **tree chart** shows how profit and revenue is distributed across 9 months from June 2023 to February 2024. Size of the box and colour thickness will indicate the profit. Higher the size and dark the colour higher the profit.

<Tree Chart of Revenue and Profit across months>

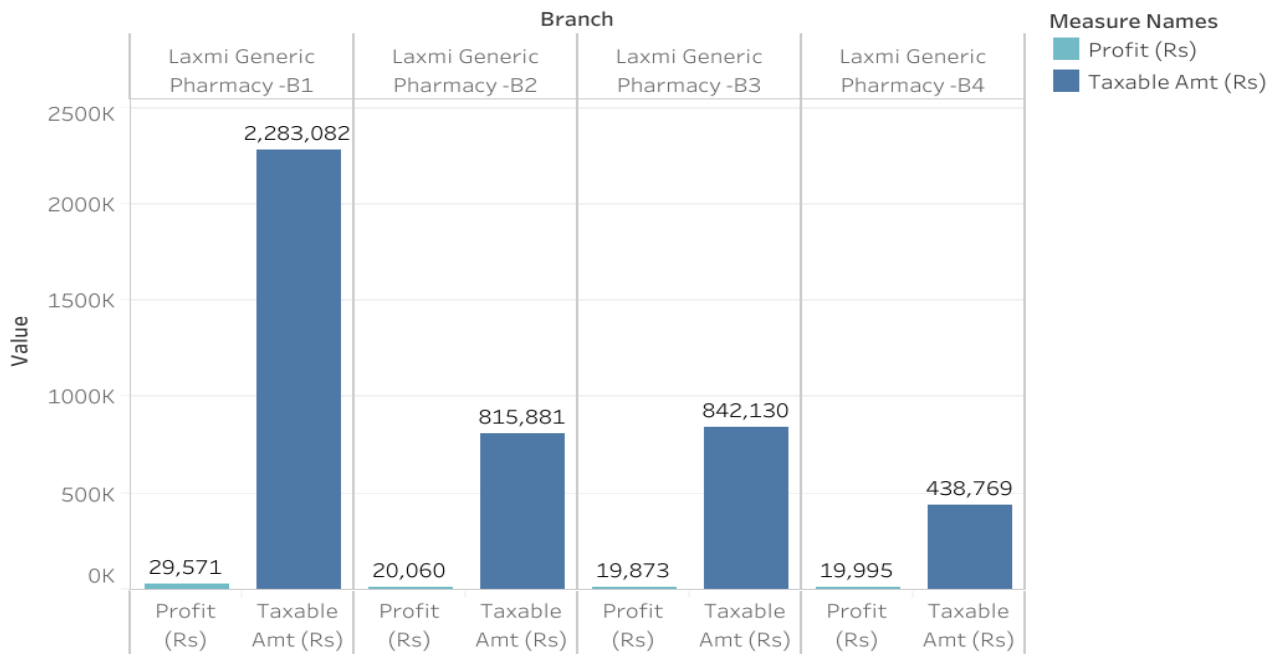


## 2. Branch- wise Analysis



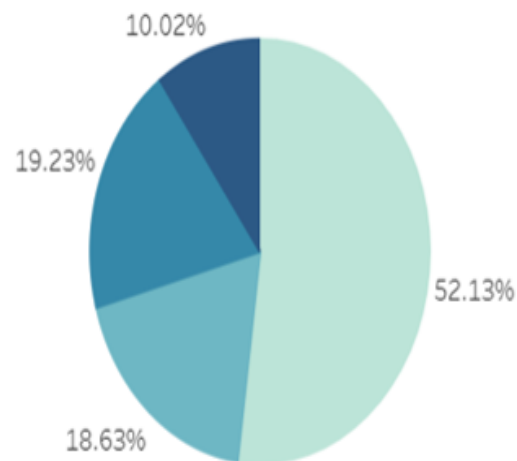
The above graph shows revenue generated by each branch across the months. This graph shows B1 is performing well compared to the remaining ones. Remaining 3 branches are performing somewhat similar in terms of revenue.

### Profit & Revenue across Branches

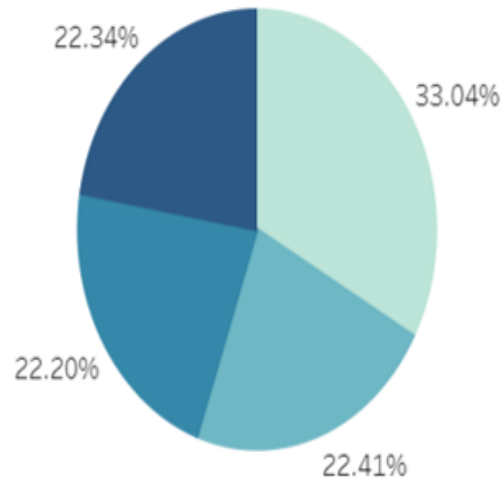




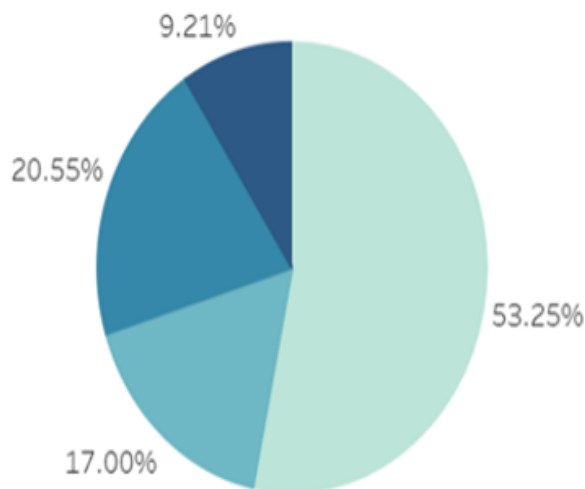
The above Graph depicts that the profit from each branch is 1.2 – 2.5 % of branch’s revenue. Major Contribution to revenue is from Branch B1. Next to that B2, B3 are performing somewhat similar. Though branch B4 is contributing less to revenue but it is giving profit similar to B2, B3.



**Branch Vs Revenue**



**Branch Vs Profit**



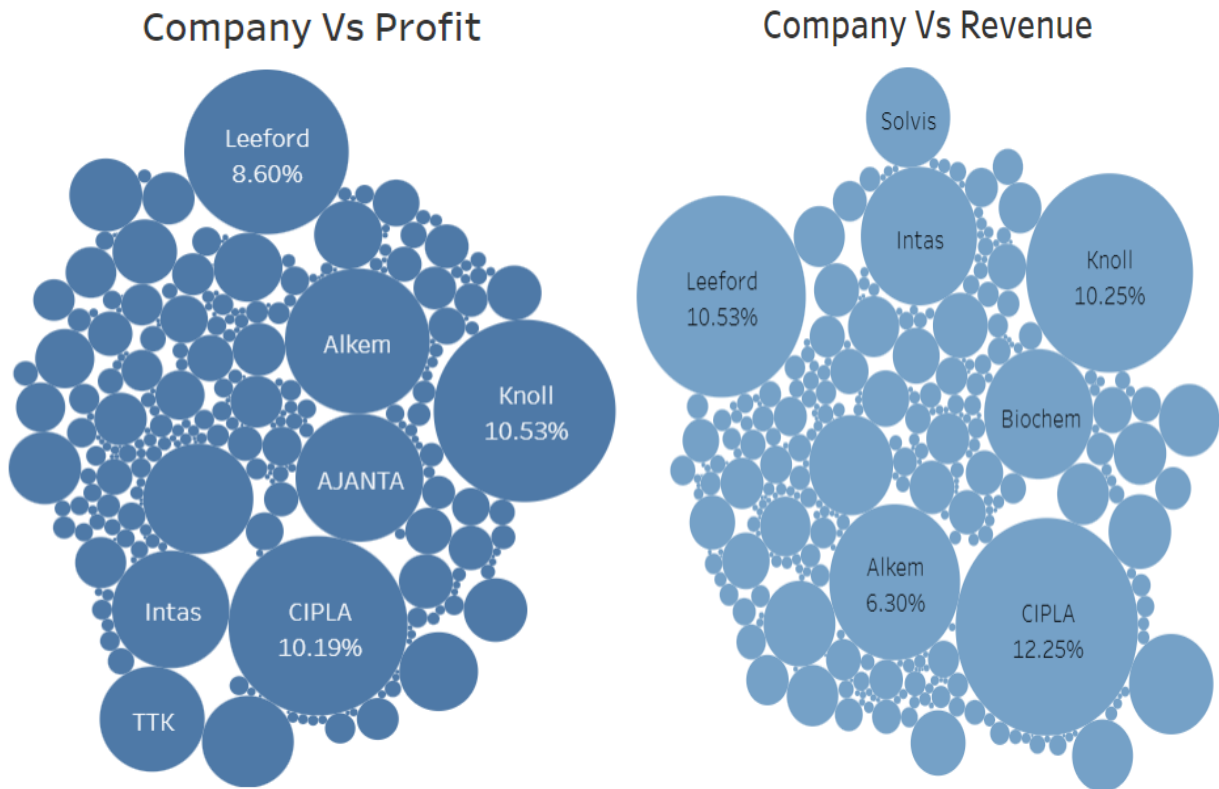
**Branch Vs Sales**



From the above graph we can conclude that B1 is contributing the highest share of the profit, revenue and sales. The remaining 3 branches are contributing almost the same share of the profit, revenue and Sales.

Though there is only 11% difference between branch B1 and remaining branches in terms of profit but there is huge difference which is 35% in terms of revenue and Sales.

### 3. Manufacturing Company of the Medicine



In the above graphs each bubble represents a manufacturing company of a medicine. We will mainly focus on top three companies which are giving high profits and high revenue.

#### ❖ High Profit generating companies

1. Knoll
2. CILPA
3. Leeford

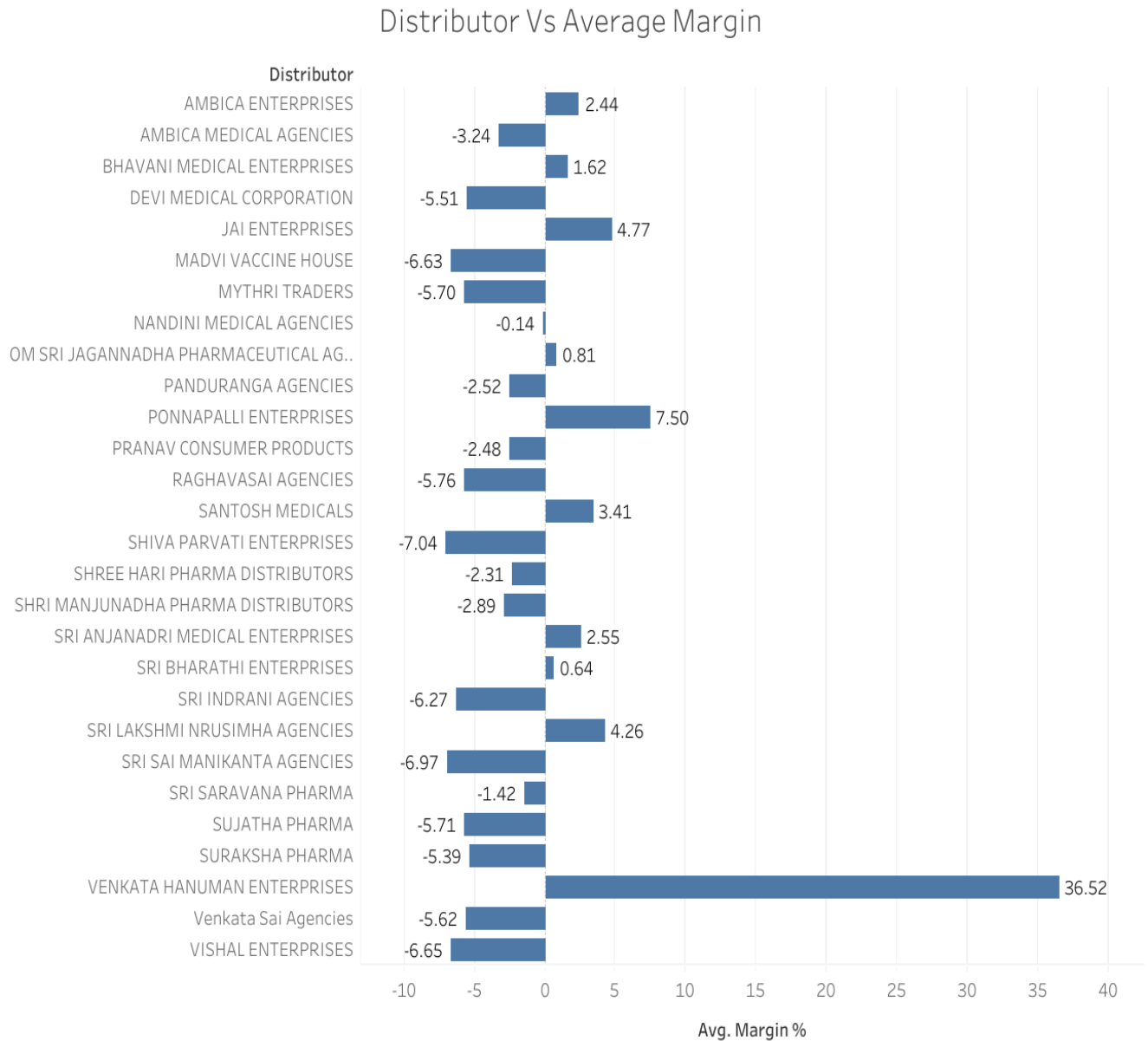
#### ❖ High Revenue generating companies

1. CILPA
2. Leeford
3. Knoll

The medicines of the following three Companies **Cilpa, Leeford and knoll** are generating more in terms of both profit and revenue. These 3 companies medicines are contributing to nearly 30% of the Profit. And revenue generated by same 3 companies is 33% of the total revenue. By these statements we can say that **Cilpa, Leeford and knoll** are playing a very important role in the business.

## 4. Distributor Analysis

❖ Graph between Distributor and Average Margin of medicines Purchased from that distributor.



Venkata Hanuman Enterprises is the one from whom the business is getting more margin on medicines. And next to this Ponnepalli Enterprises and Jai Enterprises are also providing good margins. There are some distributors from whom the business is negative margins and leading to losses. By purchasing more from these distributors the business can get more profits.



❖ Graph between Distributor and purchased Quantity from that distributor in a particular Month.

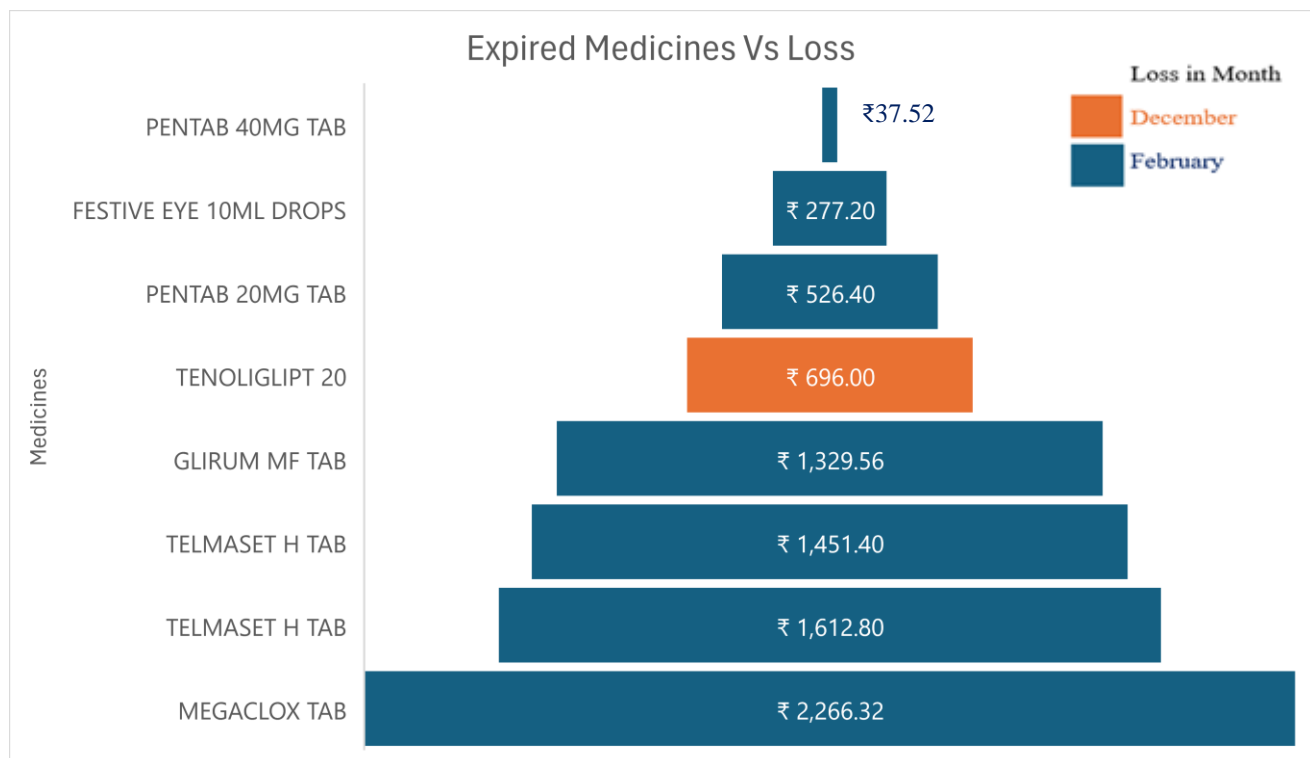
## Distributor Vs Purchased Quantity

Distributor	Month of Purchase										Qty	
	June 2023	July 2023	August 2023	September 2023	October 2023	November 2023	December 2023	January 2024	February 2024			
AMBICA ENTERPRISES			657	302	842	579	1,197	630	661	27	12,860	
AMBICA MEDICAL AGENCIES	5,707	3,760	1,118									
BHAVANI MEDICAL ENTERPRISES	1,544											
DEVI MEDICAL CORPORATION		3,259	9,782	1,591	7,463	4,387						
JAI ENTERPRISES								368				
MADVI VACCINE HOUSE										27		
MYTHRI TRADERS	360		600		1,200							
NANDINI MEDICAL AGENCIES	4,213	2,586										
OM SRI JAGANNADHA PHARMACEUTICAL AGENCIES							2,200					
PANDURANGA AGENCIES	3,140	1,205		1,505	1,230	3,140	1,880	1,900	2,372			
PONNAPALLI ENTERPRISES	200					60			105			
PRANAV CONSUMER PRODUCTS		122		39	55	114	71	61	94			
RAGHAVASAI AGENCIES	155	252		230	300		162		167			
SANTOSH MEDICALS		128	150		165	274	65					
SHIVA PARVATI ENTERPRISES		46										
SHREE HARI PHARMA DISTRIBUTORS	9,390		1,702	1,275		5,121		2,784				
SHRI MANJUNADHA PHARMA DISTRIBUTORS	600	2,814	2,673	4,990		801	7,760	6,966	12,860			
SRI ANJANADRI MEDICAL ENTERPRISES					3,641	4,203						
SRI BHARATHI ENTERPRISES					77	105		75	68			
SRI INDRANI AGENCIES					595	701	1,079	1,186	4,419			
SRI LAKSHMI NRUSIMHA AGENCIES	1,064		1,104				1,641					
SRI SAI MANIKANTA AGENCIES	124		47	91		52	147		138			
SRI SARAVANA PHARMA	2,100	2,440		4,521	3,785	1,475	3,014	12,000				
SUJATHA PHARMA	7,469	4,894	4,406	8,149	3,128	8,804	3,705	5,394	7,489			
SURAKSHA PHARMA	860	130	2,672	2,035		625						
VENKATA HANUMAN ENTERPRISES				576								
Venkata Sai Agencies		636		336	936							
VISHAL ENTERPRISES					2,400	2,200		300	500			
Grand Total	36,926	22,272	24,911	25,640	25,817	32,641	22,921	31,664	28,900			

Above Table shows how much quantity of medicines are purchased from different distributors across different months. The blank cells show that there is no purchase from that distributor. The Darkness of the cell indicates higher values in the cell. We can infer from the table that the business is not purchasing evenly from distributors, it is varying across the months.

From Distributor and margin graph we find that Venkata Hanuman Enterprises is giving good margins, but the owner purchased from them only once. If the business purchases from this distributor it will help in gaining more profits.

## 5. Expired Medicine Analysis



The above **funnel chart** describes the loss due to expired medicines from June 2023 to Feb 2024. From the above chart we can say that there is loss due to expired medicines in December 2023 and February 2024. The total loss due to expired medicines is ₹8197.2, out of this 92% loss is in the month of February 2024.

## Interpretation of Results and Recommendation

- **Profits**

After exploring and performing analysis on the data, we came to know that there is no variable having strong correlation with profit. From this we can understand that selling is decided randomly without referring to any other variables like cost price, MRP, etc. For increasing profits selling price should be decided properly. One more thing that should also be considered while deciding the selling price is landing cost. Buying medicines from the distributors by which we are getting good margins. If we observe the distributor table and distributor margin graph, business owner bought only once from the distributor by which he got good margins. If the business owner starts purchasing from that distributor, the business will see profits. For increasing profits, we need to reduce the counts of stockouts and loss from expired medicines, this can be achieved by managing inventory properly.



- **Inventory Management**

Data is mainly maintained in 3 data sheets, they are sales, purchase, stock data. Changes and updates in sales data and purchase data in a month should match stock data for the month. But this is not the case with business, this is leading to inconsistent data maintenance, which is leading to improper analysis of sales, purchases, expired medicines. The solution to this problem is updating the stock data should be done by giving references to sales and purchase data sheets. If the inventory data is managed properly, we can come to know when to order the stock, which will help in avoiding cash blockages.



- **Expiry**

Amount gain in 9 months by sales is **₹95239.12** and loss due to expired medicines is **₹8197.2**, month the overall profit is **87,041.92**, assuming loss evenly then there is a loss of **₹910** monthly. **8.6%** of gain from sales is lost in the form of expired medicines. 8.6% is not a small share in terms of loss. We need to reduce this percentage by maintaining inventory properly by avoiding purchase of medicine in huge quantity, purchasing medicines which are having long use period.

- **Branch Analysis**

We need to do basic level analysis in business to identify the mistakes which lead to the downfall of the whole business. So, branch level analysis plays a major role in improving profits. By analyzing branch performance based on fixed time intervals (weekly or monthly) and comparing with previous data and identifying abnormalities and try to identify reasons for that abnormalities and identify how external factors like electricity cost, transportation cost, employee cost, shop rent, etc. affecting the business.

- **Business Expansion**

As the profits are low, opening a new branch at the current stage is not advisable. In terms of location, staff, inventory, and marketing, any new branch requires a large capital investment, which would create growth and apparent enhanced financial risks that might stretch the available resources, causing cash flow problems.

The performance of the existing branches must first be stabilized and improved; this will form a better base for future growth. Also, low profits indicate poor market conditions and difficulty in expanding in the market, and it is near non-profitable. So, increasing profitability in existing locations seems more sensible than thinking of any expansion.

## **Links related:**

Link to data and python codes: [Data](#)

Link to Sales dashboards: [Sales](#)

Link to Purchase dashboards: [Purchase](#)

## Conclusion

This work thus laid emphasis on the enhancements to be brought about in the customer care operations and the infusion of data-driven strategies within a pharmaceutical setting, the Laxmi Generic Pharmacy based in Guntur, Andhra Pradesh. A few major problems that were unravelled included mismanagement in inventory, blockage in cash flows, and inconsistency in the performance of various branches. Systematic replenishment of information on stocks and prevention of overstocking must be implemented in order to enhance inventory accuracy as well as safeguard against cash flow related challenges. Periodic appraisals of performance in each branch can help reveal anomalies and help promote a more consistent performance amongst individual branch partners.

It also enabled the learning of how to maximize profits through proper pricing for selling, avoidance of losses from expired drugs, and increasing the inventory of supplies for which distributors give better profit margins. With the current low profit, opening new branches is unadvised. Improving the performance of existing branches will give a sound foundation for later expansion. In general, strategies to be adopted will be directed towards the increase of the inflow of revenues, improvements pertaining to the operations, and the assurance of sustainability of the business in the long run.



**THANK YOU!**