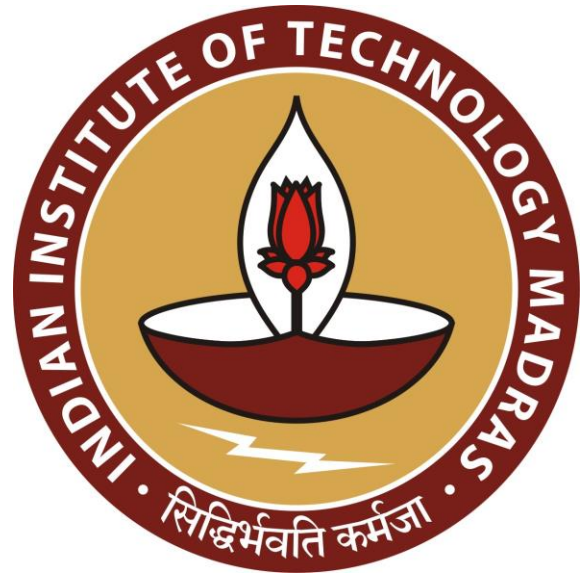


Business Data Management

Mid-Term Submission



Improving Performance at Apollo Pharmacy

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1) Executive Summary:

This project focuses on enhancing the performance of the Apollo Pharmacy located in Panchmukhi, Patna, which is a B2C business and deals in the segment of pharmaceuticals. Focus is on enhancing the performance by addressing challenges related to ineffective discount strategies and inventory management. These issues have led to reduced profitability and customer dissatisfaction, particularly due to the stiff competition from other pharmacies offering aggressive discounts.

The mid-term analysis will involve a data-driven approach, utilizing descriptive statistics and visualizations to find out key trends and patterns. We will examine the competitive outlook, analyse the relationship between discounts and sales, identify products with high demand or inventory issues, and forecast future demand and analyse competitor discount strategies to identify optimal pricing and inventory levels. By understanding the relationship between sales, discounts, and inventory turnover, Apollo Pharmacy can make calculated decisions to improve its overall performance.

The expected outcome is a series of measures to be taken by Apollo Pharmacy to implement. These recommendations will focus on improving discount strategies to attract and retain customers while maintaining profitability, as well as improving inventory management to minimize stockouts and overstocking. By addressing these key challenges, Apollo Pharmacy can enhance its operational efficiency, increase sales, and ultimately achieve higher customer satisfaction.

2) Proof of originality of the Data:

Details:

Shop Name: Apollo Pharmacy

Owner:

Address: Near Auto Stand, Panchmukhi, Patna – 800020

About:

Apollo Pharmacy is a leading retail pharmacy chain in India, operating under the umbrella of Apollo Hospitals Enterprise Limited. With a vast network of over 3,000 stores nationwide, Apollo Pharmacy caters to a diverse B2C clientele, offering a wide array of healthcare products and services. The Panchmukhi, Patna branch, operational for approximately 5 years, faces intense competition from other pharmacies and online platforms in the area.

The primary business challenge lies in optimizing discount strategies and inventory management to enhance profitability and customer satisfaction. The competitive landscape, particularly the aggressive discounts offered by rivals, has impacted Apollo Pharmacy's sales and customer retention. Internally, inefficient inventory management practices have resulted in stockouts and overstocking, further affecting profitability and customer experience.

Link to the Letter from Organization:

<https://drive.google.com/file/d/14Vk6TukoSYzDnaxisXo6Q4XfHNVMU1a5/view?usp=sharing>

Link to Video Interacting with the Manager:

<https://drive.google.com/file/d/1lcDV8Rpbwzp80L0k1hKJCx1TsnDywCaX/view?usp=sharing>

Images:

To substantiate my claims, I have included a visual documentation comprising images showcasing the establishment itself.



Main shop area where all the transactions are done



Pic for reference of name and location

Since the shop primarily operates at a local level, it does not adhere to any formal data storage or collection methods that can be readily presented or obtained. Consequently, in order to capture a glimpse of the shop's sales records, snapshots of the informal bills have been collected. While the absence of official data storage may limit the availability of documentation, these captured snapshots provide valuable insights into the shop's transactional activities and contribute to the overall understanding of its operational practices.

3) Metadata and Descriptive Statistics:

I have thoroughly gathered an extensive 3 months dataset, commencing from the 1st of April and extending until the 30th of June 2024. Throughout this period, my data involves sales, inventory and competitor data for selected products from different product categories, allowing me to compile a comprehensive set of collective data surrounding the entire time span.

Date	Product	Category	MRP	Quantity Sold	Discount	Total Revenue	Selling Price
2024-04-01 00:00:00	Paracetamol	Pain Relief	10	15	15	127.5	8.5
2024-04-01 00:00:00	Ibuprofen	Pain Relief	15	13	15	165.75	12.75
2024-04-01 00:00:00	Aspirin	Pain Relief	12	12	15	122.4	10.2
2024-04-01 00:00:00	Diclofenac	Pain Relief	20	11	15	187	17
2024-04-01 00:00:00	Vicks VapoRub	Cold & Flu	30	13	12	343.2	26.4
2024-04-01 00:00:00	Benadryl	Cold & Flu	25	13	12	286	22
2024-04-01 00:00:00	Cetirizine	Cold & Flu	18	12	12	190.08	15.84
2024-04-01 00:00:00	Sinarest	Cold & Flu	22	13	12	251.68	19.36
2024-04-01 00:00:00	Vitamin C	Vitamins & Supplements	40	11	7	409.2	37.2
2024-04-01 00:00:00	Multivitamin	Vitamins & Supplements	50	11	7	511.5	46.5
2024-04-01 00:00:00	Calcium	Vitamins & Supplements	35	9	7	292.95	32.55
2024-04-01 00:00:00	Fish Oil	Vitamins & Supplements	60	12	7	669.6	55.8
2024-04-01 00:00:00	Band-Aid	First Aid	10	10	18	82	8.2
2024-04-01 00:00:00	Antiseptic Cream	First Aid	20	15	18	246	16.4
2024-04-01 00:00:00	Cotton Balls	First Aid	15	13	18	159.9	12.3
2024-04-01 00:00:00	Gauze	First Aid	12	14	18	137.76	9.84
2024-04-01 00:00:00	Antacids	Digestive Health	18	12	16	181.44	15.12
2024-04-01 00:00:00	Digene	Digestive Health	25	12	16	252	21
2024-04-01 00:00:00	Gelusil	Digestive Health	22	11	16	203.28	18.48
2024-04-01 00:00:00	Isabgol	Digestive Health	30	12	16	302.4	25.2
2024-04-02 00:00:00	Paracetamol	Pain Relief	10	13	15	110.5	8.5
2024-04-02 00:00:00	Ibuprofen	Pain Relief	15	10	15	127.5	12.75
2024-04-02 00:00:00	Aspirin	Pain Relief	12	12	15	122.4	10.2
2024-04-02 00:00:00	Diclofenac	Pain Relief	20	15	15	255	17
2024-04-02 00:00:00	Vicks VapoRub	Cold & Flu	30	13	12	343.2	26.4
2024-04-02 00:00:00	Benadryl	Cold & Flu	25	11	12	242	22

Variable Name	Description	Data Type	Measurement Unit (if applicable)	Range or Possible Values
Date	The date of the sales transaction.	datetime64[ns]		
Product	The name of the product sold.	object		Paracetamol, Ibuprofen, Aspirin, Diclofenac, Vicks VapoRub, Benadryl, Cetirizine, Sinarest, Vitamin C, Multi
Category	The category to which the product belongs.	object		Pain Relief, Cold & Flu, Vitamins & Supplements, First Aid, Digestive Health
MRP	The maximum retail price of the product.	int64	Rupees	10 - 60
Quantity Sold	The number of units sold.	int64		0 - 68
Discount	The discount percentage applied to the product.	int64		7 - 18
Total Revenue	The total revenue generated from the sale.	float64	Rupees	0.0 - 2994.380279683101
Selling Price	The price at which the product was sold after applying the discount.	float64	Rupees	8.200000000000001 - 55.8
Month	The month of the sales transaction.	period[M]		2024-04, 2024-05, 2024-06

(3.1) Snapshot of Sales Data & its Metadata

Date	Product	Category	Opening Stock	Quantity Received	In Stock	Quantity Sold	Closing Stock
2024-04-01 00:00:00	Paracetamol	Pain Relief	54	20	74	15	59
2024-04-01 00:00:00	Ibuprofen	Pain Relief	64	20	84	13	71
2024-04-01 00:00:00	Aspirin	Pain Relief	56	20	76	12	64
2024-04-01 00:00:00	Diclofenac	Pain Relief	84	20	104	11	93
2024-04-01 00:00:00	Vicks VapoRub	Cold & Flu	56	15	71	13	58
2024-04-01 00:00:00	Benadryl	Cold & Flu	89	15	104	13	91
2024-04-01 00:00:00	Cetirizine	Cold & Flu	74	15	89	12	77
2024-04-01 00:00:00	Sinarest	Cold & Flu	71	15	86	13	73
2024-04-01 00:00:00	Vitamin C	Vitamins & Supplements	68	10	78	11	67
2024-04-01 00:00:00	Multivitamin	Vitamins & Supplements	52	10	62	11	51
2024-04-01 00:00:00	Calcium	Vitamins & Supplements	68	10	78	9	69
2024-04-01 00:00:00	Fish Oil	Vitamins & Supplements	89	10	99	12	87
2024-04-01 00:00:00	Band-Aid	First Aid	90	25	115	10	105
2024-04-01 00:00:00	Antiseptic Cream	First Aid	89	25	114	15	99
2024-04-01 00:00:00	Cotton Balls	First Aid	77	25	102	13	89
2024-04-01 00:00:00	Gauze	First Aid	95	25	120	14	106
2024-04-01 00:00:00	Antacids	Digestive Health	61	12	73	12	61
2024-04-01 00:00:00	Digene	Digestive Health	92	12	104	12	92
2024-04-01 00:00:00	Gelusil	Digestive Health	66	12	78	11	67
2024-04-01 00:00:00	Isabgol	Digestive Health	95	12	107	12	95
2024-04-02 00:00:00	Paracetamol	Pain Relief	1	20	21	13	8
2024-04-02 00:00:00	Ibuprofen	Pain Relief	35	20	55	10	45
2024-04-02 00:00:00	Aspirin	Pain Relief	47	20	67	12	55
2024-04-02 00:00:00	Diclofenac	Pain Relief	35	20	55	15	40
2024-04-02 00:00:00	Vicks VapoRub	Cold & Flu	18	15	33	13	20
2024-04-02 00:00:00	Benadryl	Cold & Flu	53	15	68	11	57

Variable Name	Description	Data Type	Measurement Unit (if applicable)	Range or Possible Values
Date	The date of the inventory record.	datetime64[ns]		2024-04-01 - 2024-06-30
Product	The name of the product in inventory.	object		Paracetamol, Ibuprofen, Aspirin, Diclofenac, Vicks VapoRub, Benadryl, Cetirizine, Sinarest, Vitamin C, Multivitamins, Fish Oil, Band-Aid, Antiseptic Cream, Cotton Balls, Gauze, Antacids, Gelusil, Isabgol
Category	The category to which the product belongs.	object		Pain Relief, Cold & Flu, Vitamins & Supplements, First Aid, Digestive Health
Opening Stock	The quantity of the product in stock at the beginning of the period.	int64		0 - 837
Quantity Received	The quantity of the product received during the period.	int64		10 - 25
Quantity Sold	The quantity of the product sold during the period.	int64		0 - 68
Closing Stock	The quantity of the product in stock at the end of the period.	int64		0 - 863
Month	The month of the inventory record.	period[M]		2024-04, 2024-05, 2024-06

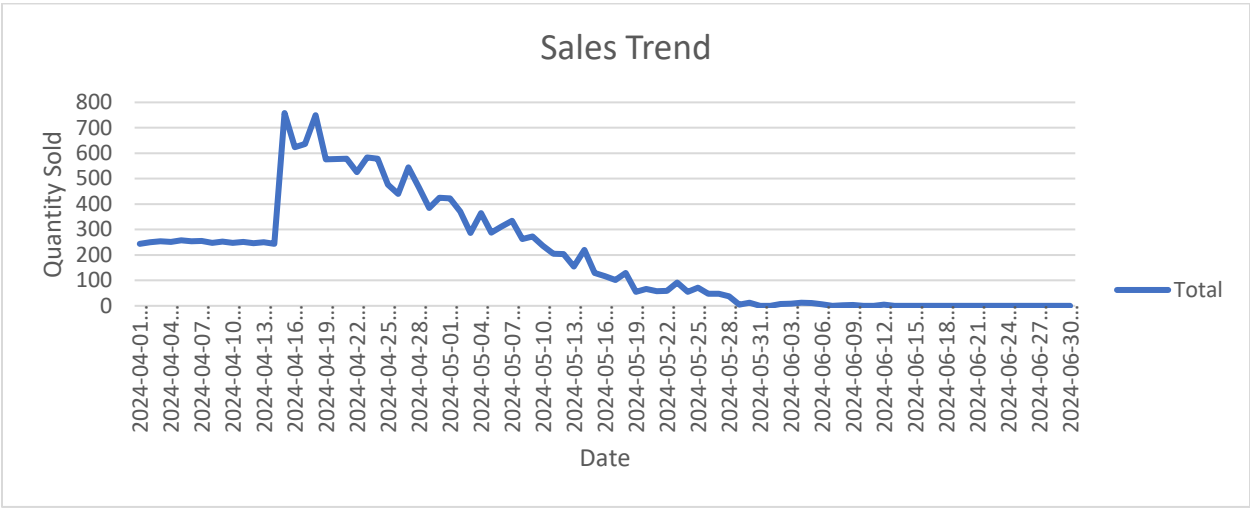
(3.2) Snapshot of Inventory & its Metadata

Competitor Name	Product	Category	Discount Amount	Promotion Period	Quantity Sold	Total Revenue	Date
Competitor A	Sinarest	Cold & Flu	17	2024-04-03 to 2024-05-25	12	219.12	2024-04-03 00:00:00
Competitor B	Digene	Digestive Health	22	2024-04-11 to 2024-05-07	14	273	2024-04-11 00:00:00
Competitor A	Isabgol	Digestive Health	20	2024-04-01 to 2024-04-18	15	360	2024-04-01 00:00:00
Competitor C	Cetirizine	Cold & Flu	20.12459612	2024-04-14 to 2024-04-18	14	201.2860178	2024-04-14 00:00:00
Competitor A	Paracetamol	Pain Relief	17	2024-04-01 to 2024-04-02	15	124.5	2024-04-01 00:00:00
Competitor B	Ibuprofen	Pain Relief	20	2024-04-01 to 2024-04-06	15	180	2024-04-01 00:00:00
Competitor C	Aspirin	Pain Relief	23.64277757	2024-04-01 to 2024-04-07	14	128.2801337	2024-04-01 00:00:00
Competitor B	Diclofenac	Pain Relief	21	2024-04-01 to 2024-04-03	13	205.4	2024-04-01 00:00:00
Competitor A	Vicks VapoRub	Cold & Flu	16	2024-04-01 to 2024-04-02	15	378	2024-04-01 00:00:00
Competitor A	Benadryl	Cold & Flu	16	2024-04-01 to 2024-04-05	15	315	2024-04-01 00:00:00
Competitor A	Cetirizine	Cold & Flu	17	2024-04-01 to 2024-04-03	14	209.16	2024-04-01 00:00:00
Competitor A	Sinarest	Cold & Flu	15	2024-04-01 to 2024-04-03	15	280.5	2024-04-01 00:00:00
Competitor A	Vitamin C	Vitamins & Supplements	11	2024-04-01 to 2024-04-02	13	462.8	2024-04-01 00:00:00
Competitor C	Multivitamin	Vitamins & Supplements	15.28750571	2024-04-01 to 2024-04-04	13	550.6312129	2024-04-01 00:00:00
Competitor A	Calcium	Vitamins & Supplements	12	2024-04-01 to 2024-04-06	10	308	2024-04-01 00:00:00
Competitor C	Fish Oil	Vitamins & Supplements	14.90603378	2024-04-01 to 2024-04-02	14	714.7893162	2024-04-01 00:00:00
Competitor A	Band-Aid	First Aid	20	2024-04-01 to 2024-04-07	12	96	2024-04-01 00:00:00
Competitor C	Antiseptic Cream	First Aid	27.9747254	2024-04-01 to 2024-04-06	15	216.0758238	2024-04-01 00:00:00
Competitor A	Cotton Balls	First Aid	22	2024-04-01 to 2024-04-06	15	175.5	2024-04-01 00:00:00
Competitor A	Gauze	First Aid	23	2024-04-01 to 2024-04-04	16	147.84	2024-04-01 00:00:00
Competitor A	Antacids	Digestive Health	20	2024-04-01 to 2024-04-04	12	172.8	2024-04-01 00:00:00
Competitor A	Digene	Digestive Health	21	2024-04-01 to 2024-04-03	14	276.5	2024-04-01 00:00:00
Competitor B	Gelusil	Digestive Health	21	2024-04-01 to 2024-04-07	13	225.94	2024-04-01 00:00:00
Competitor B	Isabgol	Digestive Health	21	2024-04-01 to 2024-04-07	13	308.1	2024-04-01 00:00:00
Competitor A	Paracetamol	Pain Relief	20	2024-04-02 to 2024-04-07	15	120	2024-04-02 00:00:00
Competitor C	Ibuprofen	Pain Relief	24.33545174	2024-04-02 to 2024-04-03	12	136.1961869	2024-04-02 00:00:00

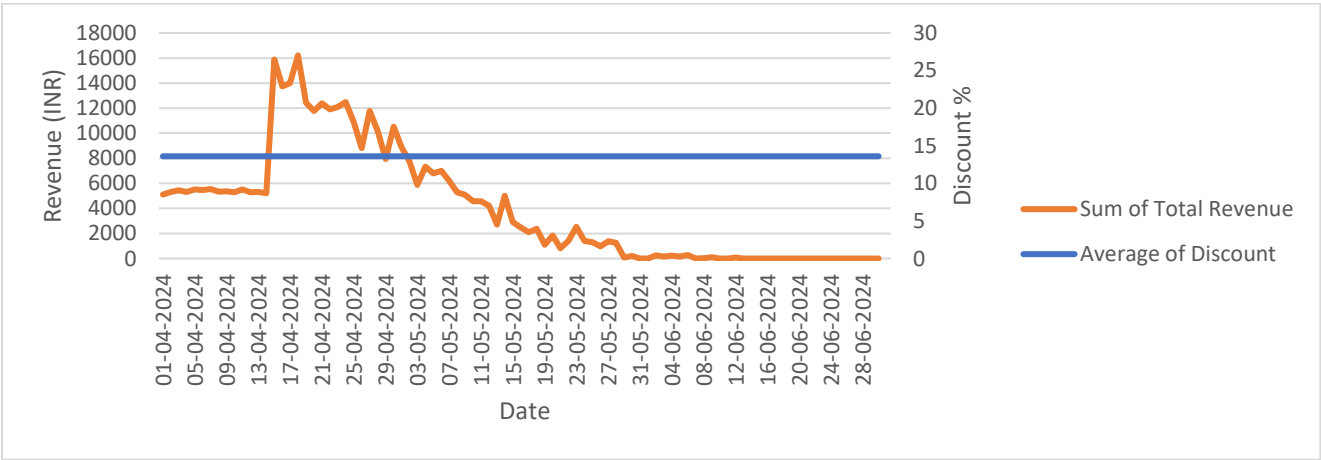
Variable Name	Description	Data Type	Measurement Unit (if applicable)	Range or Possible Values
Competitor Name	The name of the competitor.	object		Competitor A, Competitor B, Competitor C
Product	The name of the product offered by the competitor.	object		Fish Oil, Calcium, Sinarest, Isabgol, Multivitamin, Antiseptic Cream, Ibuprofen, Aspirin, Benadryl, Cetirizine, Paracetamol, Ibuprofen, Aspirin, Diclofenac, Vicks VapoRub, Benadryl, Cetirizine, Sinarest, Vitamin C, Multivitamins, Fish Oil, Band-Aid, Antiseptic Cream, Cotton Balls, Gauze, Antacids, Gelusil, Isabgol
Category	The category to which the competitor's product belongs.	object		Vitamins & Supplements, Cold & Flu, Digestive Health, Pain Relief, First Aid
Discount Amount	The discount amount offered by the competitor.	int64		8 - 23
Promotion Period	The period during which the competitor's discount is valid.	datetime64[ns]		2024-04-01 - 2024-06-30

(3.3) Snapshot of Competitor Data & its Metadata

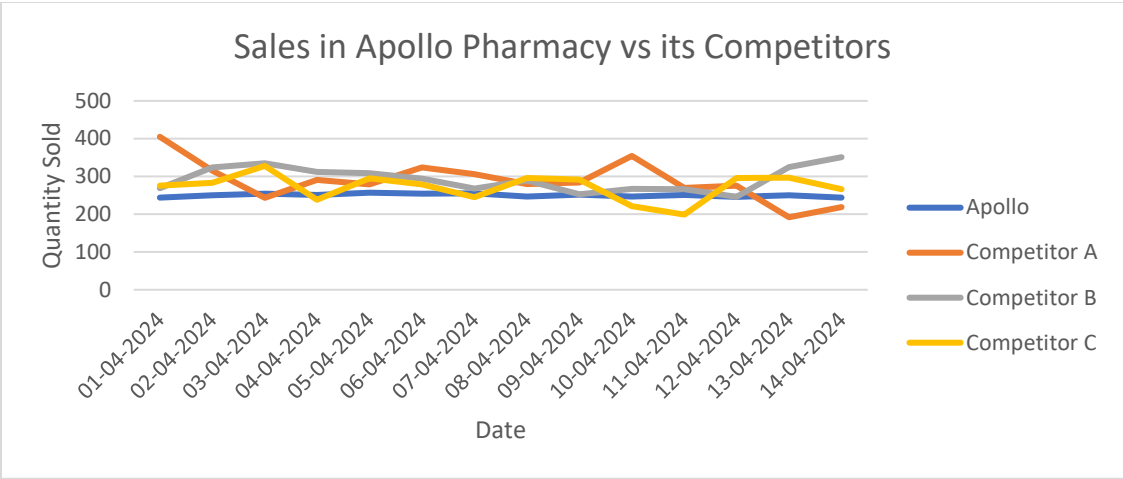
Here is the descriptive statistics analysis conducted based on the collected data.



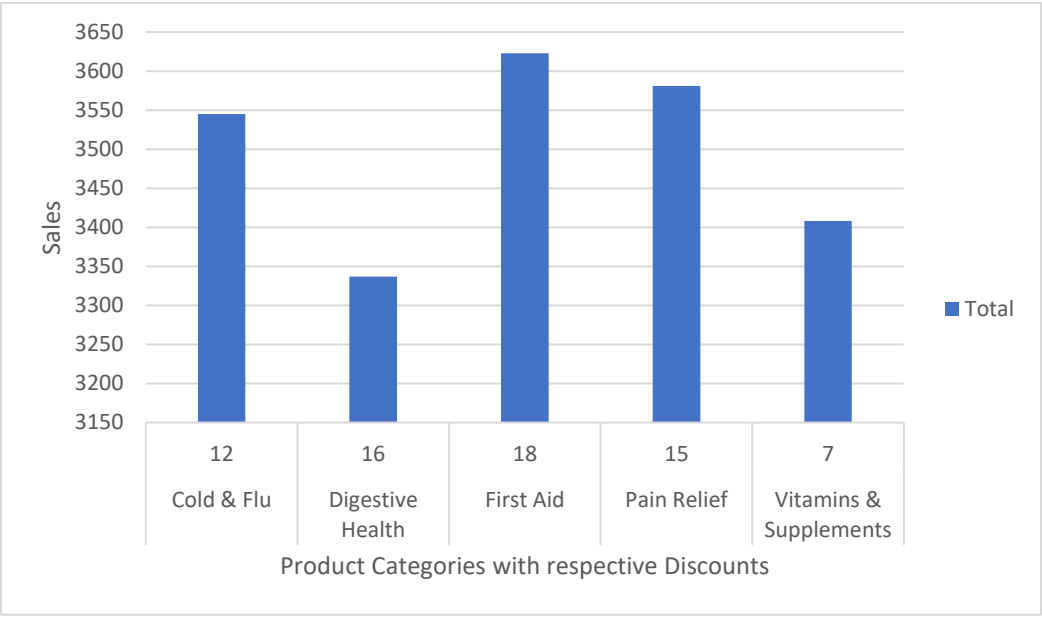
(3.4) Total Sales Trend observed over a period of 3 months



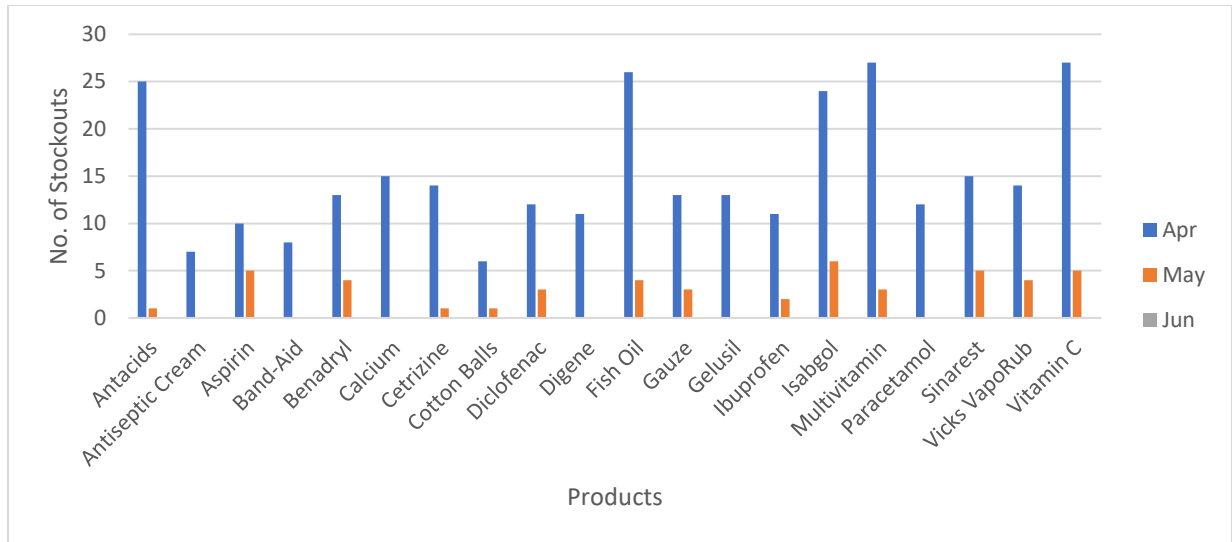
(3.5) Revenue vs Constant Discount over a period of time



(3.6) Comparing sales of all the competitors over a period of 14 days



(3.7) Sales effect on Products with Higher Discounts



(3.8) Product wise Stockout Trend

4) Detailed Explanation of Analysis Process/Method:

1) Data Preparation and Cleaning:

I collected 3 months data in Excel. This data was then cleaned, organized and analysed. The dataset comprises of 'Sales data', 'Inventory Data', and 'Competitor Data' over a period of 3 months.

2) Data Transformation:

First of all, the data was thoroughly reviewed to ensure its structure and format were organized for effective analysis. This step involved checking for inconsistencies, missing values, and outliers that could impact the results.

3) Descriptive Statistics:

Afterwards, a variety of descriptive statistical methods were used to summarize and explore the data. This included calculation of different measures such as sums,

average, stockouts and inventory stocks to gain perceptions into the overall dynamics of the shop. Column, line and bar charts were used to visually represent revenue, sales, discounts, stocks and their respective proportions. These charts provide an evident way to understand the operation and allocation of various measures within the business. They help in identifying trends, patterns, and areas of focus for decision-making. By applying these descriptive statistics and visualizations, we gain an extensive understanding of the data and its consequences for the business. This analysis will allow us to make wise decisions and optimize business strategies for improved performance and profitability.

4) Visualization and Comparative Analysis:

Sales Trend Analysis: To present the overall sales trend a line chart is used. Line charts were used to visualize the trend in Total Sales for Apollo Pharmacy and its competitors over the three-month period. This will help in identifying any seasonal patterns, fluctuations, or the impact of competitor discounts on Apollo's sales.

Discount Impact Analysis: Again, a line chart was used to study the relationship between Discount and Quantity Sold for Apollo Pharmacy. This will show the effectiveness of different discount levels in driving sales.

Competitor Benchmarking: Compared the Discount Amount offered by Apollo Pharmacy with those of its competitors, using column charts (sales) embedded with line charts (discounts). This highlights areas where Apollo might need to adjust its discount strategies to remain competitive.

Inventory Analysis: We will visualize the Closing Stock for different products over time to identify potential stockouts or overstocking situations. This will inform recommendations for inventory optimization.

5) Results and Findings:

Based on the analysis performed using the graphs and charts, various key findings have appeared:

1. In the Sales Trend analysis, a drop in the sales has been seen which shows that how the older discount strategies of Apollo Pharmacy are failing in today's competitive market and need to be revised.
2. Comparing Apollo Pharmacy with its competitors, it's clear that Apollo's market is lower as compared to other pharmacy shops in the area which provide more discounts and have better inventory management overall resulting in better customer retention.
3. By comparing the discounts of different product categories (all products in a category have same discount) with their sales it can clearly be seen how more discounts result in more sales, there is an exception for DIGESTIVE HEALTH category which in spite of a good discount has lower sales, maybe due to other factors which can be better dealt at other shops or inventory.
4. When analysing the Product Category wise discount – sales trend of Apollo Pharmacy and its competitors it was very clear that there is a relationship between the discounts provided for different product categories and their sales. So, Apollo Pharmacy must focus on its discount strategies.
5. While visualizing inventory it was noticed that how there is a frequent number of stockouts of some products such as ANTACIDS, FISH OIL, ISABGOL, MULTIVITAMIN, VITAMIN C etc. These products require more Quantity received as stocks. Also, the trend shows how there is a drastic overstock in the month of June which was due to the reduced sales.

In summary, the analysis highlights the importance of discounts, and focusing on customer satisfaction for exceptional cases in lower sales, and the significant contributions inventory management for overall growth.