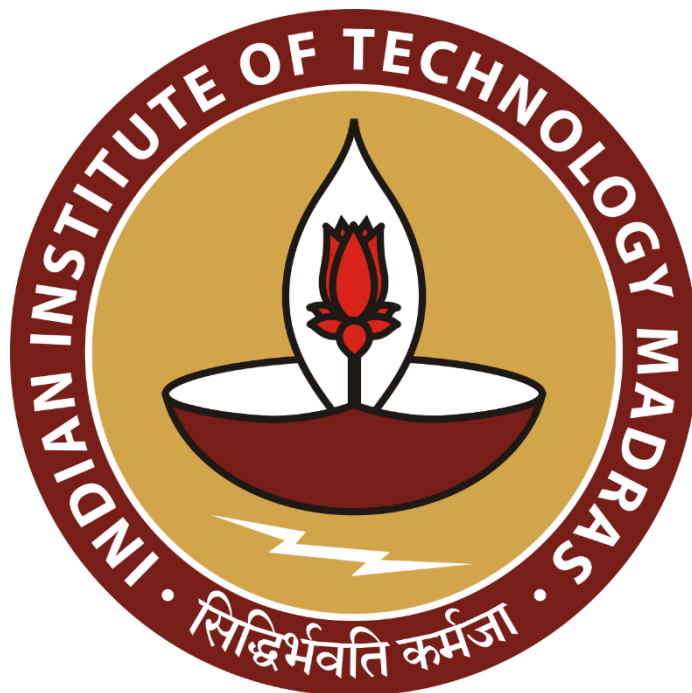# OPTIMIZING INVENTORY AT EFFICIENT LEVEL

FOR SMALL KIRANA STORE

A Final report for the BDM capstone Project

Submitted by

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OPTIMIZING INVENTORY AT EFFICIENT LEVEL FOR SMALL KIRANA STORE

1 Executive Summary

Ajay Kirana Store has started their operation in 2005. It is local convenience Kirana store located Near Court, Jail Road Masaurhi, (Patna). Serving the local communities with range of product Like Snacks, Rice, flour, lentils and household items.

Before Covid their business was running well. But in present time due to limited capital the business is struggling a lot. Which cause huge problem in managing their inventory. Also, their customer is facing lot of Stock up. They are not able to maintain stock at right level. Which is affecting their revenue and also their growth is declining.

The issue will be addressed by analyzing the different type of data like with the help of sales data we can forecast the future demand of SKU. Which will help to maintain the SKU at right level. Also, with the help of sales data of SKU and total SKU present at start date and stock fill up data for the next six weeks. We can calculate the average inventory days which will help to invest capital in inventory efficiently.

This will help the business to run efficiently with the limited available capital. And also, customer will not face stock up. And also, business can focus more on SKU which is generating high revenue than SKU generating very little revenue.

2 Organization Background

Ajay Kirana store run by Ajay Prasad is B2C business. Started their operation in 2005. It is a local Kirana store located at Masaurhi, Patna. It serves the local communities with range of product like Snacks, Household items, Cereals etc. In past time there was only few Kirana store nearby so there was no competition and business were running well. It is one of the oldest Kirana store in that location.

3 Background of the Problem

Ajay Kirana Store run by Sri Ajay Prasad. As this Kirana Store is one of the oldest Kirana store in that locality. It was running so efficiently. He used to fill up inventories once in every two days by doing shopping from nearby wholesale market. To meet customer demand so that customer never faces Stock up. There is not any record keeping method to know about inventory, he used to see SKU whatever he finds that is getting Stockout he writes it and order next day from wholesale. This conventional method of running shop need more capital as there is not any demand forecast or he is not completely aware of the inventory days of SKU. Also, there is a lot of hard work needed as he is getting older, he can't do that much work as he used

to do it earlier. Also, working capital of his business reduces due to loss incurred in covid times. That's where the problem arises of stock out. And also, revenue is declining. He is also not able to refill the stock at right level at right time.

As per the consumer behavior, consumer usually preferred to shop from the store where they get all the things at one place whenever they require.

4 Proof of originality of the Data

After discussing about the problem with the shop owner. I have noted almost 50 SKU and in day first I have noted their initial stock which was present in the shop. After that I prepared a notebook and noted all the SKU with the price and noted the date. And after that every day I have either a phone call or in person meet and collected 30 days sales data.

I have also collected all the receipt of the stock data which he used to shop to stock up the inventory.

I have attached the Google drive Link Below which contain some photograph of me and the shop owner also the video of me with the shop owner.

Link - https://drive.google.com/drive/folders/1DTU3HWqqgwrOjmWIX1S-CmEgVhhoohPY?usp=share_link

5. Meta Data

The data was collected for one month from 1st march to 30th march. There are three type of data table.

1. Main SKU
   This table contains five Column.
   - S.no (Unique Integer Number also used as primary key).
   - SKU (Unique code given to each item of stock to identify uniquely data type is Alphanumeric).
   - Name (Name of each item of type String).
   - Type (Type of each item like biscuit, detergent etc. Its data type is String).
   - Price (It contains selling price of each stock items. Its data type is Integer).

S.N	SKU	NAME	Type		Price
1	B01	Parley G	Biscuit	₹	5.00
2	B02	Happy Happy	Biscuit	₹	5.00
3	B03	Good Day	Biscuit	₹	10.00
4	B04	Marie Gold	Biscuit	₹	40.00
5	B05	Cream	Biscuit	₹	5.00
6	D01	Guide	Detergent	₹	40.00
7	D01	Guide	Detergent	₹	65.00
8	D01	Surf Excel	Detergent	₹	10.00
9	T01	Closeup	Tooth Paste	₹	20.00
10	T02	Colgate	Tooth Paste	₹	65.00
11	SH01	Clinic Plus	Shampoo	₹	1.00
12	SH02	San Slik	Shampoo	₹	1.00
13	S01	Life buoy	Soap	₹	10.00

2. Sales Data
   This table contains 32 Columns.
   - SKU (It contains unique Identification code of each item and also this is primary key of data type Alphanumeric).
   - Sales Quantity (It contains the type of quantity in which sales data recorded like rice, sales is recorded in kg, packet product in pieces etc. It is of data type String).
   - Dates from 1st March to 30th march (It contains the quantity of particular item sold in numeric, its data type is Integer).

SKU	Sales Quantity	1st March	2nd March	3rd March	4th March	5th March	6th March	7th I
B01	per piece	5	5	3	4	2	7	
B02	Per piece	4	3	3	8	4	4	
B03	Per piece	1	2	1	0	0	2	
B04	per piece	0	1	0	0	1	1	
B05	Per piece	6	2	4	6	5	8	
D01	500gm	2	1	2	1	2	1	
D01	1kg	4	1	3	5	1	0	
D01	pouch	2	2	3	6	4	2	
T01	per piece	1	0	0	2	0	3	

3. Stock Up Data
   This table contains 7 Columns.
   - SKU (It contains unique Identification code of each item and also this is primary key of data type Alphanumeric).
   - Sales Quantity (It contains the type of quantity in which sales data recorded like rice, sales is recorded in kg, packet product in pieces etc. It is of data type String).
   - And five different dates in which the shop owner purchased the different SKU's (It is of data type Integer).

6. Descriptive Statistics:

I have used the google Collaboratory to know the descriptive statistics about the sales data. From there I got the descriptive statistics for each column (from date 1st March to 30th March when sales data recorded).

- Count: Number of not null Integers.
- Mean: Mean value of the sales quantity of all SKU in that date.
- Std: Standard Deviation of the Sales quantity of all SKU in the respective dates.
- Min: Minimum quantity of the any SKU Sold on that date.
- 25%: 25th percentile of the SKU quantity sold in that date.
- 50%: It is the median number of quantities sold in that date.
- 75%: It is the 75th percentile of the quantity of SKU sold on that date.
- Max: Maximum quantity of the any SKU's sold on that particular date.

```
       1st March  2nd March  3rd March  4th March  5th March  6th March  \
count  48.000000  48.000000  48.000000  48.000000  48.000000  48.000000
mean    3.979167   4.145833   4.291667   4.562500   3.187500   2.854167
std     3.232084   3.596627   3.584591   3.648994   3.146469   2.609227
min     0.000000   0.000000   0.000000   0.000000   0.000000   0.000000
25%     2.000000   1.750000   2.000000   2.000000   1.000000   1.000000
50%     3.000000   3.000000   3.000000   4.000000   2.000000   2.000000
75%     5.250000   6.000000   5.250000   6.000000   4.000000   4.000000
max    16.000000  16.000000  18.000000  20.000000  18.000000  12.000000

       7th March  8th March  9th March  10th March  ...   21st March  \
count  48.000000  48.000000  48.000000   48.000000  ...    48.000000
mean    3.437500   2.458333   2.479167    2.375000  ...     3.166667
std     6.872412   2.600805   2.475321    2.662785  ...     3.466148
min     0.000000   0.000000   0.000000    0.000000  ...     0.000000
25%     1.000000   0.000000   0.000000    0.000000  ...     0.000000
50%     2.000000   2.000000   2.000000    1.000000  ...     2.000000
75%     3.250000   4.000000   4.000000    4.000000  ...     5.250000
max    44.000000   8.000000   8.000000   10.000000  ...    16.000000

       22nd March  23rd March  24th March  25th March  26th March  27th March  \
count   48.000000   48.000000   48.000000   48.000000   48.000000   48.000000
mean     2.729167    2.770833    2.812500    1.437500    1.666667    1.937500
std      3.180657    3.340529    2.810741    1.878277    2.300170    2.755314
min      0.000000    0.000000    0.000000    0.000000    0.000000    0.000000
25%      0.000000    0.000000    0.000000    0.000000    0.000000    0.000000
50%      2.000000    2.000000    2.000000    0.000000    1.000000    0.000000
75%      4.000000    4.000000    4.250000    3.000000    2.250000    3.000000
max     16.000000   12.000000   10.000000    6.000000    8.000000   10.000000

       28th March  29th March  30th March
count   48.000000   48.000000   48.000000
mean     1.520833    2.187500    2.958333
std      2.306232    2.411464    3.432996
min      0.000000    0.000000    0.000000
25%      0.000000    0.000000    0.000000
50%      1.000000    2.000000    2.000000
75%      2.000000    4.000000    4.250000
max     10.000000   10.000000   15.000000

[8 rows x 30 columns]
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7. Analysis Process and Method

For the data analysis I have used excel Software.

I have done sales analysis with the sales data which I have collected and updated everything on excel sheet manually over the 30 days period of time. First, I have cleaned the data, And The process involved in cleaning was.

- Removed the SKU which was sold in very less quantity or not sold over this time period.
- Updated all the blank space with Zero.

After that I have done exploratory data analysis and things, I observed was the quantity of sales range for all SKU's was [0 to 16], Both inclusive.

After cleaning process, and EDA I have Calculated the Total Revenue with different SKU's and took the percentage contribution in total revenue of each SKU's. And plotted Revenue Pareto to know the top performing SKU's, in terms of revenue generation in total.
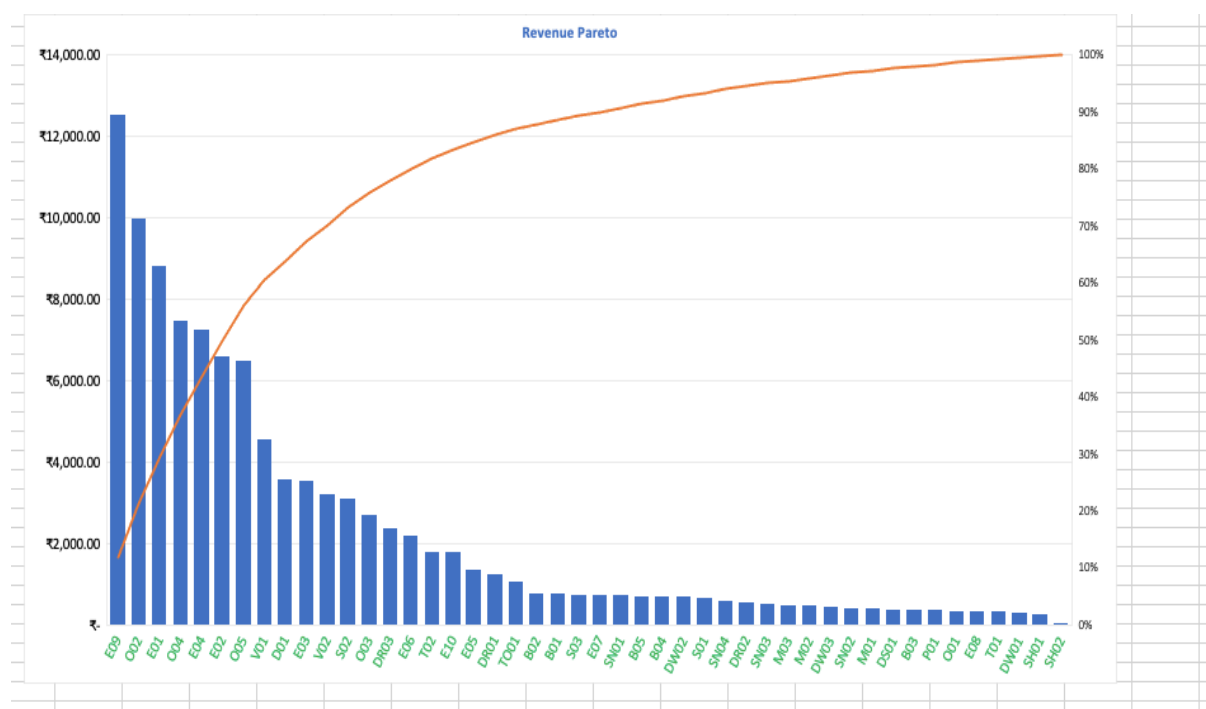

After Analyzing this pareto I got to know that only 7 SKU among 49 SKU's are contributing in more than 60 % of the revenue in total. And the main SKU among this 7 are of E09, E04, E01, E02, O02, O04 and O05 where 'E' is of type Essentials (where I have added items like sugar, Flour, rice, besan and salts) and O is of type Oil (where I have added product like Refine, Mustard oil). So, the main revenue is generated through Essentials and Oil category.

To know more about the revenue generated through different type of SKU, I have plotted the bar chart with the help of pivot table for each type of product to know their contribution in total Revenue.
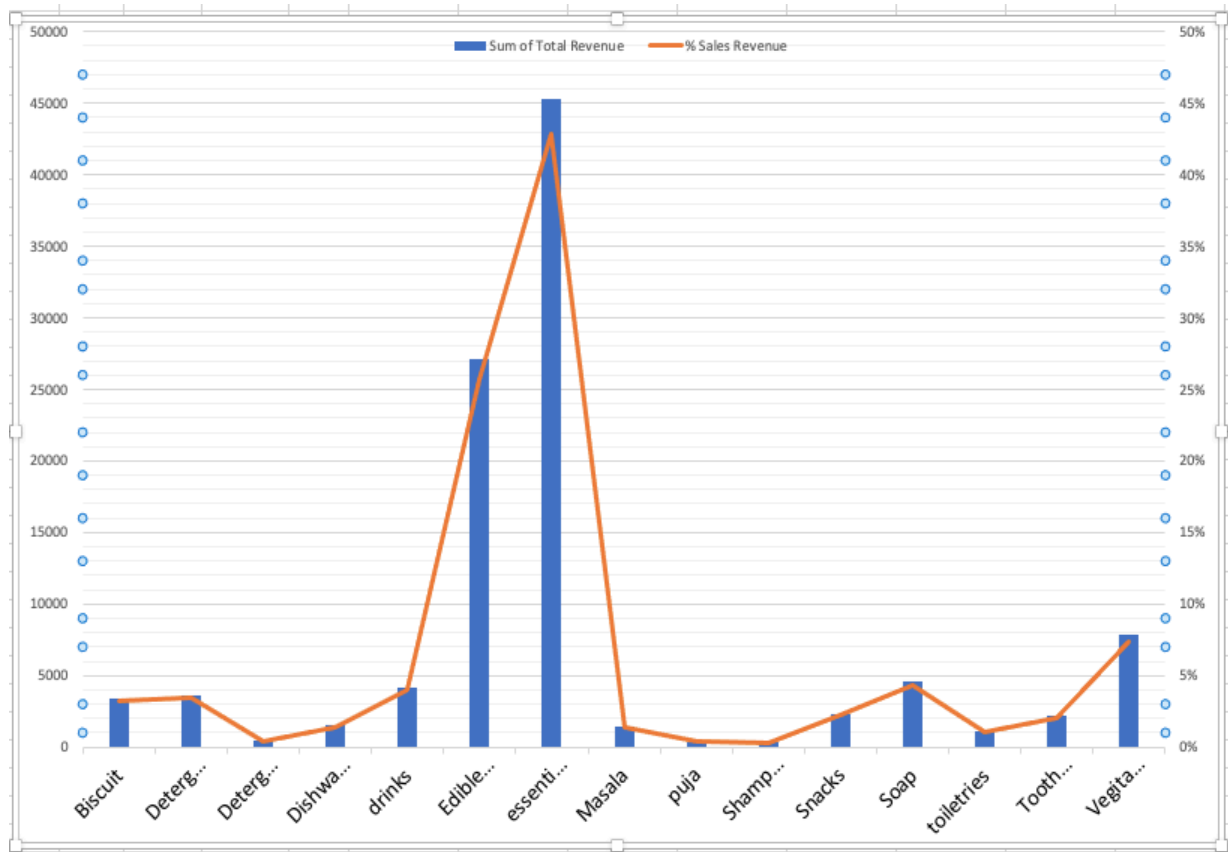
From this Chart it got cleared that the main Revenue is generated through Essentials and Edible Oil categories. Also, vegetables are contributing in good amount all though in this category only onion and Potato are there.

To know the distribution of the Revenue of different types of products among different period of time in a month by analyzing weekly total sales Revenue. I have plotted bar chart for 4 weeks of month to know revenue of the different types of product.
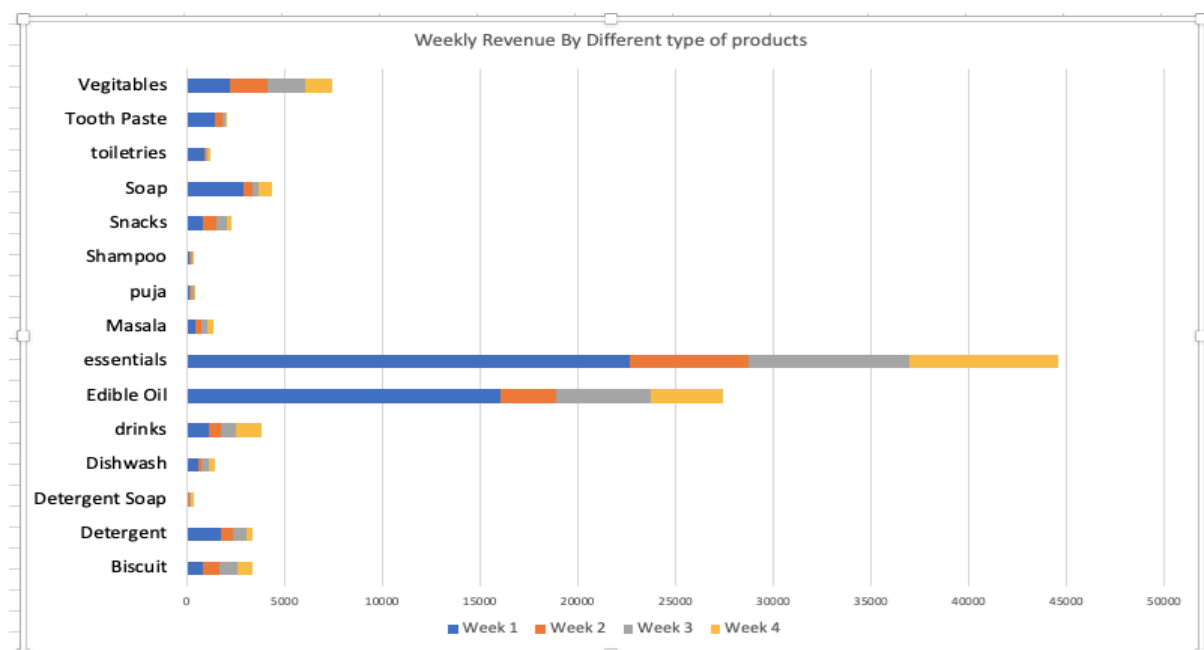
I got the wonderful result that the SKU's of type essentials are sold mainly on first week from this chart I got to know about consumer, as consumer usually preferred to buy all Groceries during 1st week of the month and after that the sales are usually somewhat distributed. Vegetable is usually distributed as consumer buy it over all period it can't be kept for more than 3 days.

From this chart what we can do about inventory management is we need to stock up the data for the first week or say 1st to 10th day of the month efficiently to meet all the demands and also keep less quantity after that period so that, can focus on the other product which is growing.

After this, I also plot the bar chart for the volume data among this period to know about the quantity of sales distribution among different week of the month, among different categories of product, to know more about sales quantity.
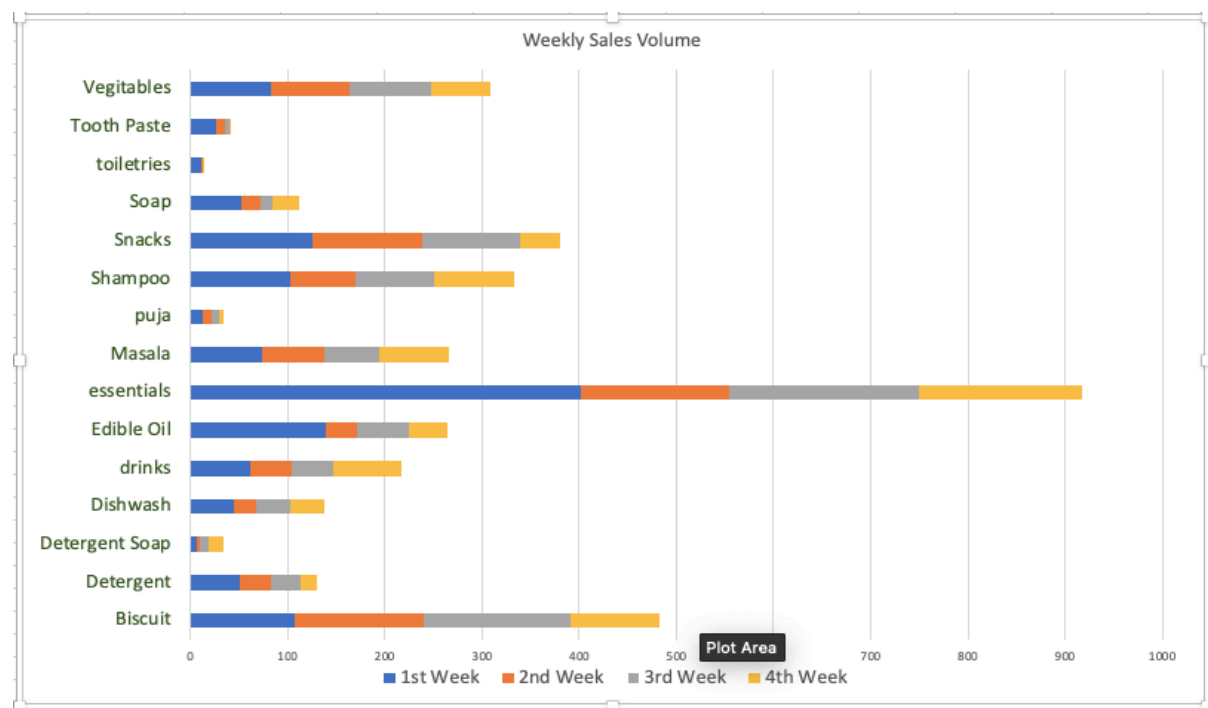

From this bar chart I got to know that volume of quantity sold of type essentials and edible oils are more on the first week of the month and for the rest week its somewhat constant does not varying much. But rest of the SKU sales are somewhat same on all week of the month.

8. Way Forward

I need to update and clean data of the stock up. And also analyze it to know more about stock and about inventory days. Also, with help of both sales and inventory analysis can inferred many useful patterns and also know about how much stock need to maintain for efficient inventory management.

9. Results and Finding

- By analyzing Sales data, I got many insights like top performing SKU which is yielding more than 60% of Revenue. That is of type essentials, edible oil, and vegetables. Now after getting that result, to know more about sales pattern, I plot line graph for the 3 top performing categories of total weekly sales.
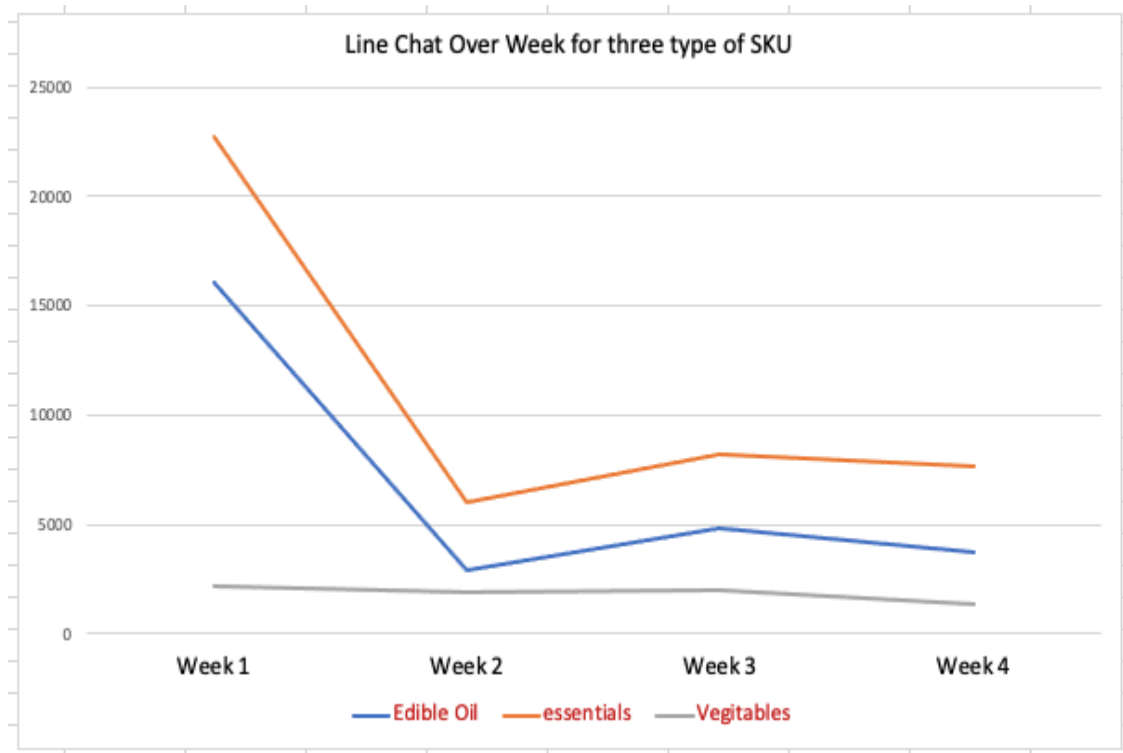

This graph shows that mainly consumer buying the grocery items on first week that's why sales of these items is very high. But on the same side vegetables are somewhat constant throughout the week. So, for the inventory planning we stock more items of essentials, edible oil categories during first week of the month and for the remaining week we can reduce that so as to efficient manage working capital and can also stock newer household items which consumer tends to buy during their monthly grocery buying. This will attract customer and can also keep some offers like if consumer buy product worth more that Rs 1000 during 1 to 5th day of the month, will get some free items which is newly added so as to introduce it to customers.

- While doing Exploratory Data Analysis I noticed that the newly added items like Bislery bottle sales are increasing.

10
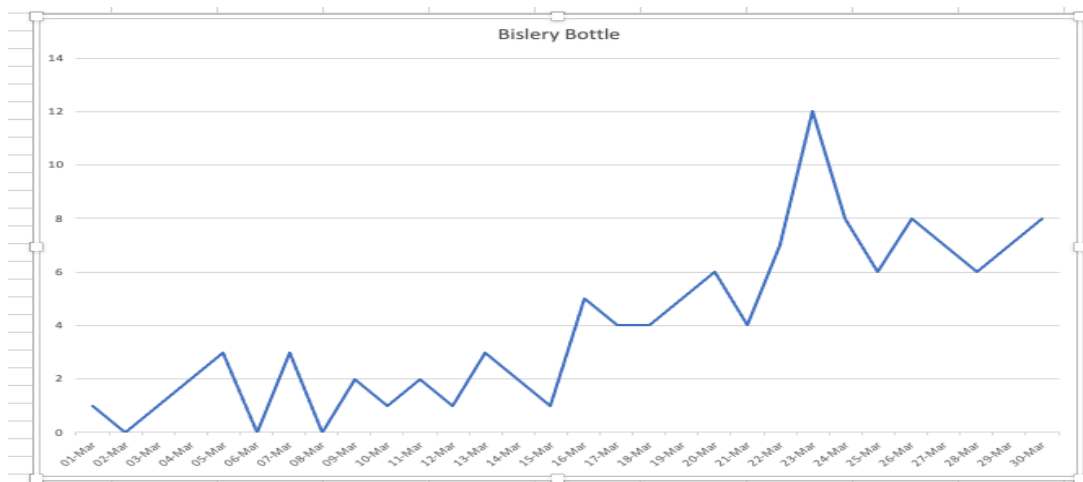
As summer season is coming product like water, cold drink sales will increase so he can invest working capital on these product and stock it well so that it doesn't get stockout.

- Also, I have done 5 Day average Total sales analysis to know about the future demand based on past 5 days total sales data of all SKU and the result I got was somewhat satisfying. It is somewhat very close to the actual sales.
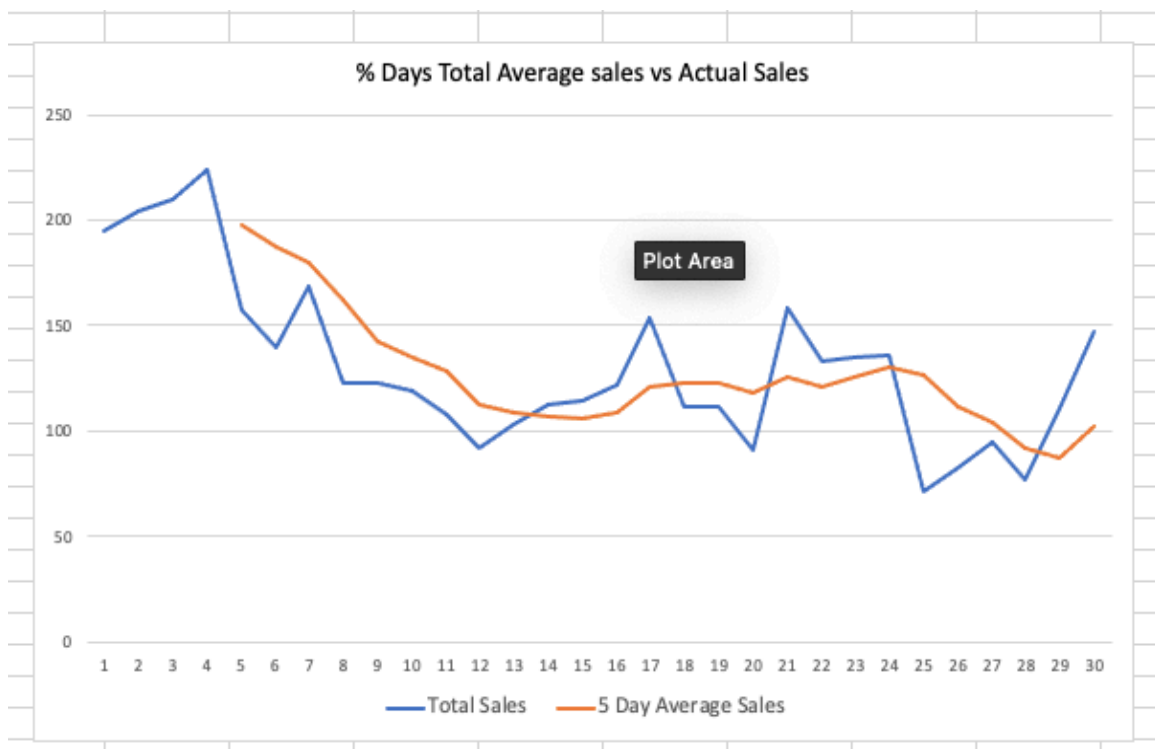
Way forward will forecast the demand of the SKU which is getting Stock Out frequently so as to manage inventory well and efficiently. And make sure no stock out occurs.