Improving Operations & Suggesting Business Growth Strategy at Shanvi General Store & Dairy Products

Mid-Term Submission for the BDM capstone Project

Submitted by

Name: PREM KUMAR

Roll number: 21F1000531

IITM Online BS Degree Program,

Indian Institute of Technology, Madras, Chennai

Tamil Nadu, India, 600036

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Declaration Statement

I am working on a Project titled **"Improving Operations & Suggesting Business Growth Strategy at Shanvi General Store & Dairy Products".** I extend my appreciation to **Shanvi General Store & Dairy Products**, 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.

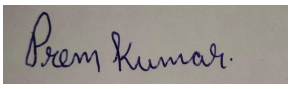
Additionally, I affirm that all procedures employed for the purpose of data collection and analysis have been duly explained in this report. The outcomes and inferences derived from the data are an accurate depiction of the findings acquired through thorough analytical procedures.

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:



Name: Prem Kumar

Date: 05-12-2023

Executive Summary and Title:

Shanvi General Store & Dairy Products is a small grocery and dairy shop situated in Saketpuri, Patna, India. It caters to both B2B and B2C customers, serving as a vital resource within the local community.

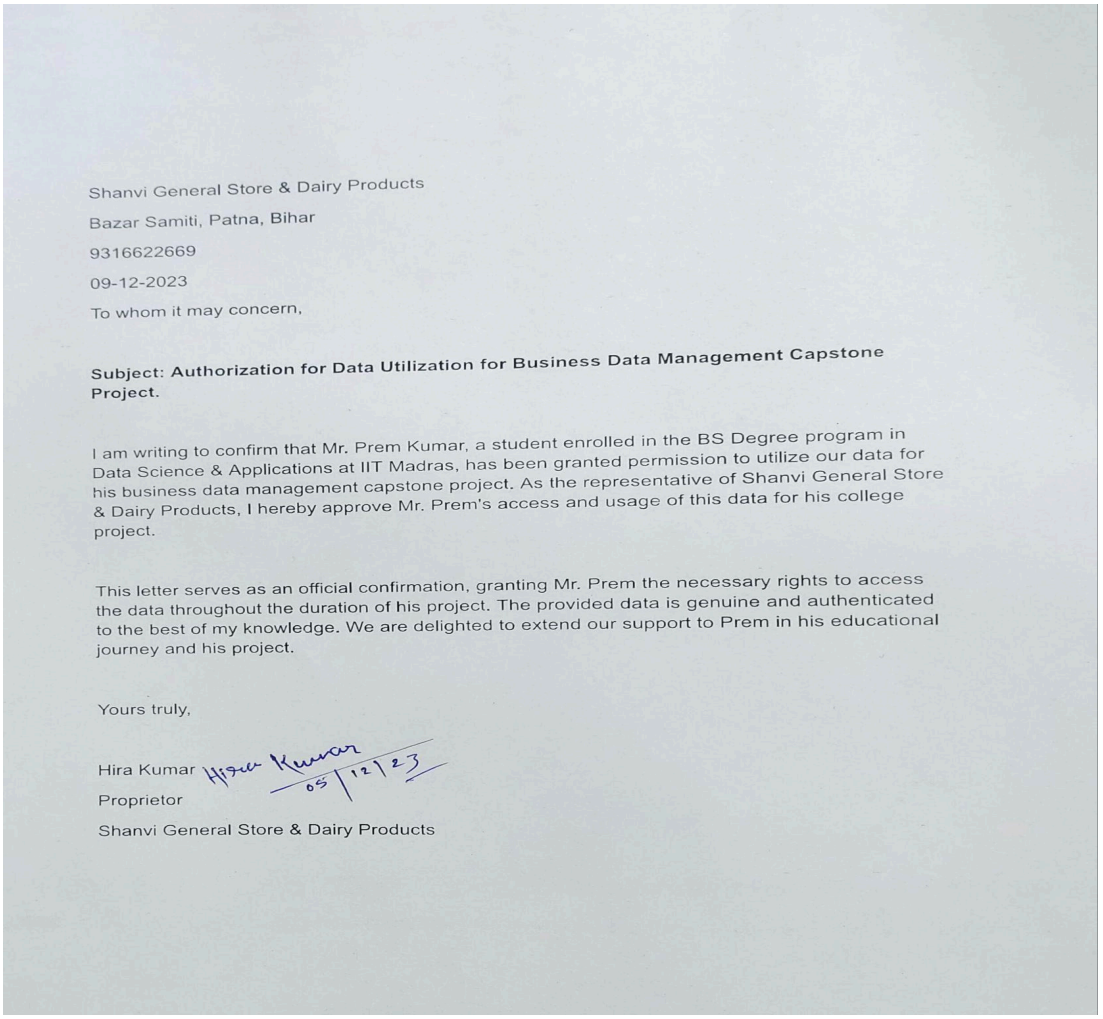
The primary challenge confronting Shanvi General Store pertains to profitability. The store grapples with substantial inventory management issues, particularly in the realm of dairy products. These challenges create financial bottlenecks, hindering the store's ability to meet customer demands efficiently, especially during periods of high demand due to the dense local population. This issue significantly impacts the overall profitability of the business.

To tackle these multifaceted issues, the project will employ various data analytics approaches. These methodologies encompass real-time inventory tracking, demand forecasting, and the implementation of efficient inventory replenishment strategies. By implementing these measures, the project aims to mitigate the financial blockage caused by excessive inventory and better handle surges in customer demand driven by the densely populated area. The envisioned outcome of this project is a more streamlined and profitable operation, positioning the store as a dependable and efficient supplier of grocery and dairy products within Saketpuri, Patna. This transformation will enhance customer satisfaction and strengthen the store's reputation as a trusted local source for daily essentials.

Proof of Originality of Data:

Video

VideoProof



Shanvi General Store & Dairy Products

Bazar Samiti, Patna, Bihar

9316622669

09-12-2023

To whom it may concern,

Subject: Authorization for Data Utilization for Business Data Management Capstone Project.

I am writing to confirm that Mr. Prem Kumar, a student enrolled in the BS Degree program in Data Science & Applications at IIT Madras, has been granted permission to utilize our data for his business data management capstone project. As the representative of Shanvi General Store & Dairy Products, I hereby approve Mr. Prem's access and usage of this data for his college project.

This letter serves as an official confirmation, granting Mr. Prem the necessary rights to access the data throughout the duration of his project. The provided data is genuine and authenticated to the best of my knowledge. We are delighted to extend our support to Prem in his educational journey and his project.

Yours truly,

Hira Kumar Hira Kumar 05/12/23

Proprietor

Shanvi General Store & Dairy Products

METADATA

The collected data includes Stock Data and Stock-Sales Summary data for Shanvi General Store. Metadata refers to descriptive details about this data. The product data comprises three columns:

1. Item Name: This column lists all SKUs (Stock Keeping Units), representing different products.

2. Purchase Rate: It contains the buying price for each SKU, indicating the rate at which the store purchases the product.

3. Sales Rate: This column displays the selling price for each SKU, showing the rate at which the store sells the product to customers.

ITEM_NAME	Purchase_Rate	Sales_Rate
DOODH	48	52
LASSI	10	12
ICE-CREAME	15	18
BISCUIT	9	12
CHOCOLATE	23.5	27
COLD-DRINKS	45	53.25
SOAP	24	28
SAMPOO	20	23
SOYABEAN OIL	105	130
AATA	28	33

The Stock Data includes monthly information categorized by company and contains five columns:

1. Company: This column lists various stationery companies.

2. No of Items and Variety: It represents the total count of different types or variations of items offered by each company (e.g., CADBURY might offer various types of chocolates in different ranges).

3. Amount of Monthly Stock: This column indicates the total capital value of the stock available for each company in a given month.

4. Amount of Monthly Sales: It displays the overall sales amount for each company within the month.

5. Company Wise Profit: This column shows the gross profit gained by each company, calculated based on their sales and stock data.

SHANVI GENERAL STORE & DAIRY PRODUCTS, SAKETPURI, PATNA				
COMPANY WISE MONTHLY STOCK AND SALES AMOUNT				
COMPANY	NO_ITEMS_VARIE	MONTH_STOCK_AMT	MONTH_SALE_AMT	PROFIT
SUDHA	10	227000	212750	34040
AMUL	4	132000	124356	19896.96
BRITANIA	40	64345	60346	9655.36
PARLE	32	57869	55436	8869.76
CADBURY	24	43650	40456	6472.96
COCA-COLA	16	12435	10975	1756
PATANJALI	43	76456	49765	7962.4
AASHIRWAD	26	14653	13098	2095.68

The data concerns the monthly stock of base products, including variations, and includes four columns:

1. Item Name: This column lists the name of the product.

2. Quantity: It indicates the quantity of the item available in stock for that month.

3. Rate: This column displays the purchase rate of the item.

4. Amount: It represents the total value of the stock for that particular item, calculated by multiplying the quantity by the purchase rate.

BASE PRODUCT(INCLUDING VARIETY) MONTHLY STOCK			
ITEM_NAME	QUANTITY	RATE	AMOUNT
DOODH	4500	48	216000
LASSI	1400	10	14000
ICE-CREAME	3000	15	45000
BISCUIT	1200	9	10800
CHOCOLATE	2200	23.5	51700
COLD-DRINKS	650	45	29250
SOAP	800	24	19200
SAMPOO	600	20	12000
SOYABEAN OIL	200	130	26000
AATA	600	28	16800

The monthly sales dataset includes three columns:

1. Months: This column specifies the particular month of sales.

2. Duration: It indicates the time span covered within that specific month.

3. Sales Amount: This column displays the amount of sales for each month.

		overall monthly sales
Months	Duaration	SALES_AMOUNT
August	1/8/2023-31/06/23	705324
September	1/9/2023-30/09/23	732500
October	1/10/2023-31/06/23	843695

The data underwent cleaning and preparation to align with the project objectives. Specifically, for the base product's monthly stock table:

- The Base Product_Data Excel sheet was imported and transformed into a DataFrame using the pandas library, utilizing the read_excel() function.
- The resulting DataFrame consisted of 25 rows and 4 columns after the import process was completed.

```
[3] import numpy as np
    import pandas as pd
    df=pd.read_excel('/content/BDM Project Data (2).xlsx',sheet_name='Sheet5')
```

```
df.head
```

```
<bound method NDFrame.head of   Lenov        ITEM_NAME  QUANTITY   RATE  AMOUNT
0                  DOODH      4500   48.0  216000
1                  LASSI      1400   10.0   14000
2             ICE-CREAME      3000   15.0   45000
3                BISCUIT      1200    9.0   10800
4              CHOCOLATE      2200   23.5   51700
5            COLD-DRINKS       650   45.0   29250
6                   SOAP       800   24.0   19200
7                 SAMPOO       600   20.0   12000
8           SOYABEAN OIL       200  130.0   26000
9                   AATA       600   28.0   16800
```

The steps taken for cleaning the **overall monthly sales** data were as follows:

1. The data from the **overall monthly sales** Summary Excel sheet was imported and transformed into a DataFrame using pandas' read_excel() function. The sales quantity for each company was derived from the in-stock and outward stock figures.

2. Upon completion of these steps, the resulting DataFrame comprised a total of 25 rows and 5 columns.

```
0s
import numpy as np
import pandas as pd
df=pd.read_excel('/content/BDM Project Data (1).xlsx',sheet_name='Sheet4')
df.head
```

```
<bound method NDFrame.head of       Months           Duaration  SALES_AMOUNT  GROSS_PROFIT  NET_PROFIT
0     August   1/8/2023-31/06/23        705324     176331.00    84638.88
1  September   1/9/2023-30/09/23        732500     183125.00    87900.00
2    October  1/10/2023-31/06/23        843695     210923.75   101243.40>
```

Descriptive Statistics

Once the DataFrame is created in Python, the `df.describe()` function is used to obtain the relevant statistics for the dataset.

> Descriptive Statistics of the base product (including variety) monthly stock:

```
import numpy as np
import pandas as pd
df=pd.read_excel('/content/BDM Project Data (1).xlsx',sheet_name='Sheet3')
df.describe()
```

	DOODH	LASSI	ICE-CREAME	BISCUIT	CHOCOLATE	COLD-DRINKS	SOAP	SAMPOO	SOYABEAN OIL	AATA	...	CASHEW
count	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	3.000000	...	3.000000
mean	73516.000000	5136.666667	16005.000000	4003.000000	17974.500000	9981.666667	6674.666667	4206.666667	8776.666667	5809.333333	...	1785.666667
std	123414.840145	7707.271458	25154.722718	5916.420117	29227.406672	16689.607794	10854.193905	6755.452119	14915.885268	9522.492391	...	2963.885344
min	48.000000	10.000000	15.000000	9.000000	23.500000	45.000000	24.000000	20.000000	130.000000	28.000000	...	56.000000
25%	2274.000000	705.000000	1507.500000	604.500000	1111.750000	347.500000	412.000000	310.000000	165.000000	314.000000	...	74.500000
50%	4500.000000	1400.000000	3000.000000	1200.000000	2200.000000	650.000000	800.000000	600.000000	200.000000	600.000000	...	93.000000
75%	110250.000000	7700.000000	24000.000000	6000.000000	26950.000000	14950.000000	10000.000000	6300.000000	13100.000000	8700.000000	...	2650.500000
max	216000.000000	14000.000000	45000.000000	10800.000000	51700.000000	29250.000000	19200.000000	12000.000000	26000.000000	16800.000000	...	5208.000000

8 rows × 25 columns

Upon analyzing the statistics, it was observed that the item 'DOODH' has the highest mean, while 'WASHING BARS' exhibits the lowest mean.

->Descriptive Statistics of Sales and stock by Amount of each company:

```
df.describe()
```

	NO_ITEMS_VARIETY	MONTH_STOCK_AMT	MONTH_SALE_AMT	PROFIT
count	16.000000	16.000000	16.000000	16.000000
mean	18.562500	48701.375000	44082.750000	7053.240000
std	14.170245	59227.691386	55218.769147	8835.003063
min	2.000000	2080.000000	1834.000000	293.440000
25%	4.000000	5094.750000	4849.500000	775.920000
50%	19.000000	39658.000000	37375.000000	5980.000000
75%	27.500000	59488.000000	51182.750000	8189.240000
max	43.000000	227000.000000	212750.000000	34040.000000

After analyzing the statistics, it was determined that the company 'PATANJALI' has the maximum variety with a value of 43, while 'NESTLE' has the minimum variety with a value of 2.

->Descriptive Statistics of **purchase and sales rate of each product:**

```
import numpy as np
import pandas as pd
df=pd.read_excel('/content/BDM Project Data (1).xlsx',sheet_name='Sheet7')
df.describe()
```

	Purchase_Rate	Sales_Rate
count	25.000000	25.000000
mean	68.820000	78.970000
std	79.799342	91.152811
min	9.000000	12.000000
25%	15.000000	18.000000
50%	33.000000	37.000000
75%	95.000000	105.000000
max	290.000000	320.000000

Upon analysis of the statistics, it was revealed that the products 'BISCUIT' and 'WASHING BARS' have the lowest sale rate valued at Rs 12, while the product 'DATES' holds the highest sale rate of Rs 320. Similarly, regarding the purchase rates, 'BISCUIT' and 'WASHING BARS' have the minimum rate of Rs 9, whereas 'DATES' boasts the maximum rate of 290.

->Descriptive Statistics of **Sales by Amount of three month (August, September, October):**

```
df.describe()
```

	SALES_AMOUNT	GROSS_PROFIT	NET_PROFIT
count	3.000000	3.000000	3.000000
mean	760506.333333	190126.583333	91260.760000
std	73313.705679	18328.426420	8797.644681
min	705324.000000	176331.000000	84638.880000
25%	718912.000000	179728.000000	86269.440000
50%	732500.000000	183125.000000	87900.000000
75%	788097.500000	197024.375000	94571.700000
max	843695.000000	210923.750000	101243.400000

Upon analysis, it was discovered that the average sales value across months amounted to 760,506.33. Notably, in three months, the maximum sales amount, reaching 843,695, occurred specifically in October.

Detailed Explanation of Analysis Process

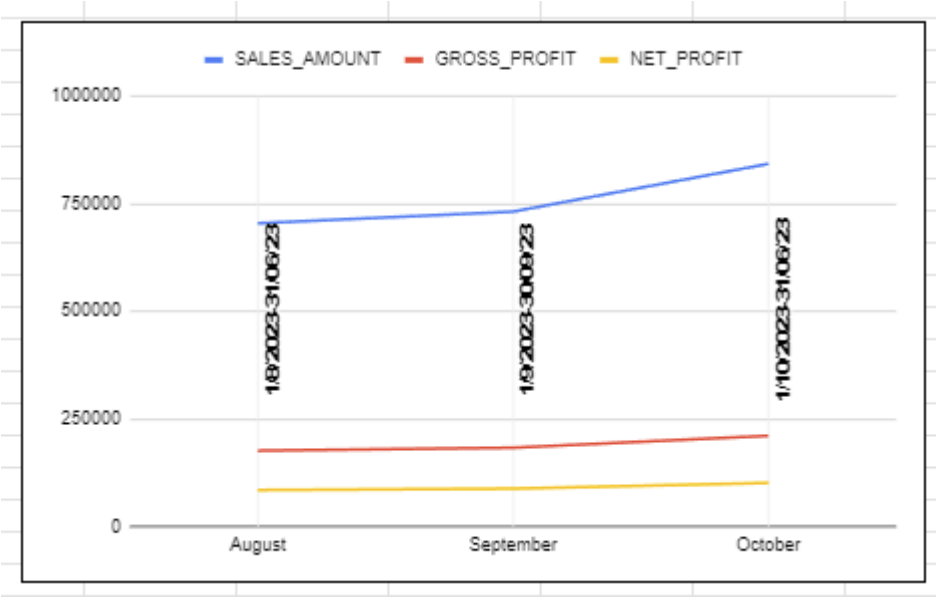
1. Inventory and Sales Analysis for Dairy & Grocery Products: Collect monthly stock quantities for each Dairy & Grocery item using Excel's Sum function. Then, extract the monthly sold quantities for these items from the stock-sales summary sheet. Visualize this data using a Clustered Column chart to compare stock and sales quantities monthly. Additionally, create an Amount Quantity Pareto chart to spot items following the Pareto Principle.

2. Product Preferences Analysis for Dairy & Grocery Products: Gather monthly sold quantities for each Dairy & Grocery item and calculate the total sales amount per month. Use Clustered Column and Clustered Bar charts to display Sales Quantity and Sales Amount, respectively, highlighting top-selling products and customer preferences.

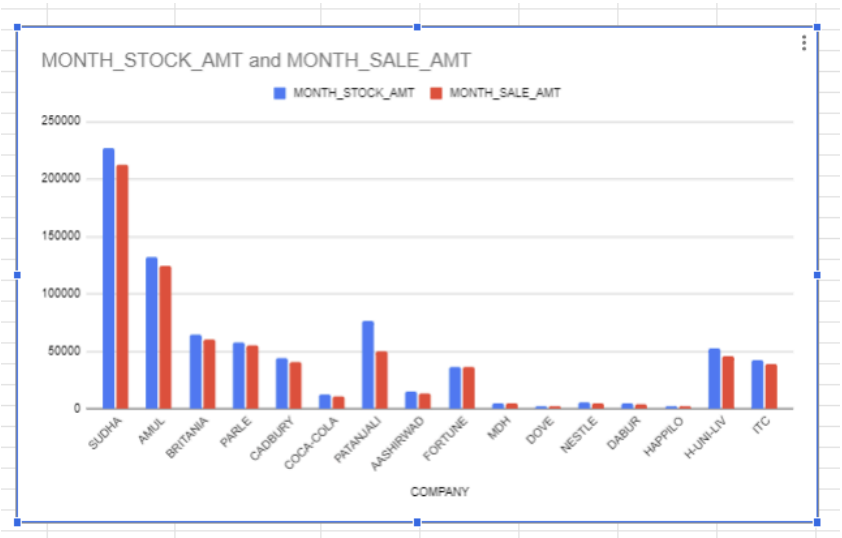
3. Monthly Sales Data Collection for Dairy & Grocery Products: Sum up daily sales to obtain monthly sales data. Visualize this by plotting a scatter plot in Excel to showcase overall performance and trends in Dairy & Grocery sales.

4. Monthly Stock Analysis for Dairy & Grocery Products: Sum up the total stock for each Dairy & Grocery item monthly. Create a column plot in Excel to illustrate these total monthly stock levels and variations. Also, use another column plot to represent the total variety of products per specific company.

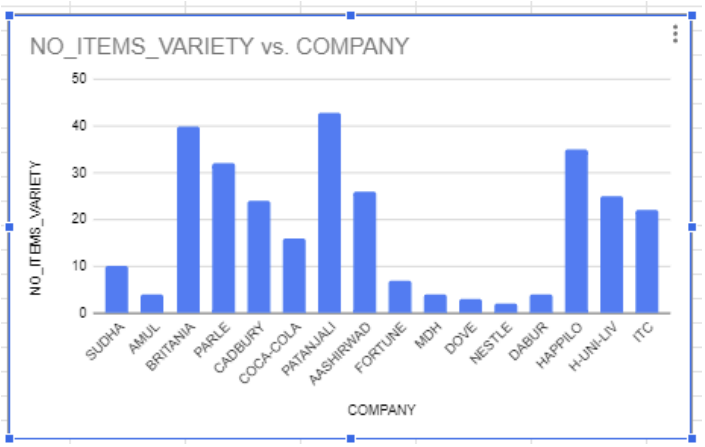
Results and Findings



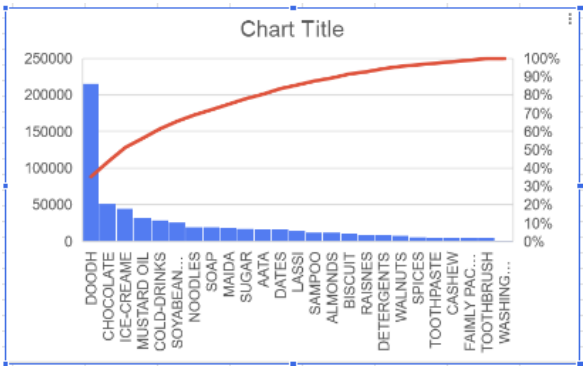
Upon analyzing the Scatter plot depicting Total Monthly Sales and Total Monthly Stock, it's noticeable that compared to the sales in August, the total sales during that month were lower.



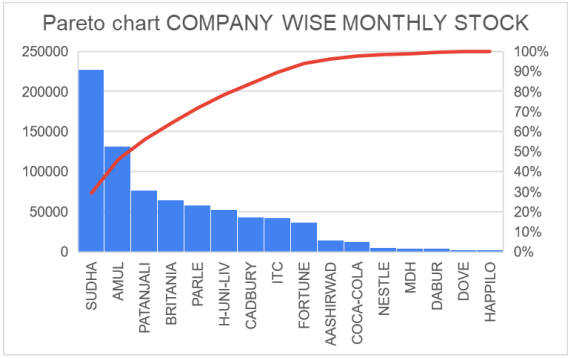
Upon analyzing the Clustered Column Chart depicting Stock Quantity and Sales Quantity, it's evident that Sudha Company's products dominate both sales and stock quantities, comprising the majority of both metrics.



After analyzing the Clustered Column Chart based on the number of varieties, it's apparent that Patanjali Company offers the maximum variety in products, whereas Nestle Company offers the minimum variety in their product range.



The Pareto chart representing product stock amounts does not fully adhere to the Pareto Principle. Approximately 70% of the items sold originate from only four specific products: Doodh, Chocolates, Ice-Cream, and Mustard Oil.



The Pareto chart illustrating company stock amounts does not completely align with the Pareto Principle. Roughly 70% of the items sold originate from only four specific companies: Sudha, Amul, Patanjali, and Britannia.

->Customer Preference- Analyzing the Sales Quantity and Sales Amount chart it is clear that customers prefer to buy Sudha company products. Customers like to prefer to buy Amul and Patanjali products. Patanjali offers a range of variety but Sudha contributes the most with less variety.