

Project Dissertation
On
Superstore Analysis and Inventory
Management

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CERTIFICATE

This is to certify that the project dissertation titled “**Superstore Analysis and Inventory Management**” is a bonafide work carried out by **Ms. Mitanshi** of **MBA Business Analytics 2018-20** and submitted to University School of Management & Entrepreneurship, Delhi Technological University, Bawana Road, Delhi in the partial fulfillment of the requirement for the award of the Degree of Masters of Business Administration.

Signature of Head (USME)

Place:

Seal Head

Date:

DECLARATION

This to certify that I have completed the project titled **“Superstore Analysis and Inventory Management”** under the guidance of **“Mr. Anurag Chaturvedi”** in the partial fulfillment of the requirement for the award of the degree of **“Master in Business Administration”** in Business Analytics from University School of Management & Entrepreneurship, Delhi Technological University, Delhi. This is my original work and I have not submitted it earlier elsewhere.

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ABSTRACT

Business Analytics has come up strongly and become an important area of interest not only in the corporate world but also in major areas driving basic needs of society. It comprises of so many more types of analytics. Large amount of investments are being made in business analytics to make better and improved business decisions from the historical data.

From small to medium to large businesses, every business needs analysis to be done to perform better by understanding the customer's perspective and sales purchase patterns. It is also very essential to understand the importance of inventory management in business. All this requires one to analyze the data and pick out the faults.

Moving through this project, it will be seen that a huge amount of capital gets stuck at the end of the period as a result of poor inventory management. The presence of excess inventory was due to poor management of inventory and lack of supervision in different areas.

In order to make the organization profitable, it is important to understand the various factors linked with all the activities going on in a superstore and also realize that inventory management plays a huge role. Hence, it is important to coordinate the all of them in the stores.

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CHAPTER – 1

INTRODUCTION

1.1 Industry Profile

Inventory Management is very important and necessary for any industry be it small, medium or large. It is a very vast topic but it concerns management of inventory by planning and controlling its level.

Supply Chain Management (SCM) is known to include a lot of important operations that needs to be carried on for the transformation of raw materials into finished goods that reaches the consumers. These operations include planning, controlling, and executing activities that will aid in transformation in the most efficient and effective manner.

SCM takes into account the coordination of activities that look after the arrangement and execution of methods that are required to carry on the work of materials, information and the land in the manner that includes planning and forecasting demand and supply of goods, acquisition, manufacturing, inventory management and logistics. The organizations whether small or large utilize both business methods and particular programming procedures in these undertakings to acquire an upper say.

SCM offers many perks or benefits such as increased efficiency, effectiveness, lower cost involved, and so on. SCM helps organizations to see the patterns of demand and supply in the market and respond accordingly to attain maximum customer satisfaction in the most efficient manner.

Inventory Management is all about managing the inventory or the stock level effectively. As a part of SCM, it takes care of flow of finished goods to wholesaler and then to the retailer to make it available to the consumer. It is important to keep a record of every activity in the stock room that is return or exchange, sale and purchase of goods.

Associations from little to huge organizations can utilize Inventory Management to deal with their progression of products.

Inventory Management is one of the most important things to be taken care of in any industry be it small, large or medium.

Inventory Management includes the following:

- Purchasing Department: This department stocks in all the materials needed.
- Raw Materials: It consists of the materials that are required in the manufacturing of a product.
- Components: These are additional things needed along with raw materials
- Production Department: All the purchased material is sent to this department.
- Finished Product: It is the end product of the production department.
- Sales Department: It is the department receiving the finished products for making it available to the customers.

Present day super markets are huge extension retailing associations with particularly wide and significant thing assortment. These stores are bit by bit displacing the standard constrained show little extension retail shops. The central spotlight in these stores is on the course of action of a wide bunch of customer benefits instead of battling dependent on cost. The mix of unquestionable, connecting with item and customer organizations are the essential qualities that attract buyer towards superstores. It is imperative to contemplate the attributes of a client and comprehend his conduct so as to more readily comprehend what he needs. Thus, in superstore investigation it is important to look upon most noteworthy deals dependent on branch, most elevated deals dependent on client, most elevated deals dependent on item types, etc.

1.2 Organization Profile

A supermarket is a very huge retailer shop that offers a wide range of products that is health, household, daily needs, lifestyle etc. placed in an attractive manner. It is smaller than a hypermarket but it offers all sort of products needed that too in a much sorted manner.

While on looks at different ways of displaying things in a superstore, one can notice that fruits and vegetables are found in baskets, clothes are hung on hangers, and kitchenware or food items are kept in shelves. So, it is important to understand what visual suits what product.

While marking and store promoting will contrast from organization to organization, the design of a grocery store remains for all intents and purposes unaltered. Albeit huge organizations invest energy giving buyers a wonderful

shopping experience, the structure of a grocery store is legitimately associated with the in-store showcasing that superstore must lead to get customers to go through more cash while there.

These store need to lay great emphasis on visual merchandising and managing the store layout. They can accommodate the customer's views while placing the products. Then again, they can improve the store's atmospherics through visual correspondences (signs and designs), lighting, hues, and even aromas.

The qualities, shortcomings, openings and dangers for every contender inside general store industry can be recognized precisely, and the procedures utilized by each organization can be chosen as needs be. The principal thing should be considered by new contestants is that on the off chance that they have made adequate arrangements to passage, these arrangements here allude to both money related and mental sides. That is on the grounds that, on one hand, the underlying speculation is enormous to work a store; then again, it sets aside effort for new contestants to assemble their own brands and client reliability, along these lines the new participants should show restraint. Another counsel is that the new participants should finish in the market depend on non-value rivalry systems like offer exceptional items or administrations, as opposed to completing value war with the current monsters, as they unquestionably have no preferred position now contrasted and the main stores.

Individuals in this cutting edge society prefer a good and simplified. From the part of wellbeing, heftiness issue which is straightforwardly connected to awful nourishment decisions as profoundly refined starches and sugars has got consideration by individuals, hence a great demand is seen for good healthy and green stuff in these stores. With the expanding expectation for everyday comforts, individuals request accommodation in shopping, subsequently, markets not just offer an advantageous and happy with shopping condition in stores, yet in addition offer types of assistance like free conveyance or internet shopping to improve consumer loyalty.

1.3 Objective of the study

The motive to carry out this study is to understand various factors that influences the decision of decision makers in a supermarket in order to increase the footfall

and profit of the supermarket. It is very important to understand how different factors overtake a key agenda in analyzing the present scenario of supermarket and hence help in making decisions that will improve its current status.

One of the major concerns of a store is to have a good inventory management and control system. We will see how ABC analysis, VED analysis and Moving Average Price will aid in inventory management.

CHAPTER 2

LITERATURE REVIEW

The study talks about the changes in retail industry in Pakistan as in western countries. It entails the adoption of new modernized method of retail incorporating a good ambience and convenient buying. The aim was to identify the driving factors in superstore shopping. This involved gathering feedbacks from customers and getting surveys filled by customers to identify them. These customers were approached as soon as they were done with their shopping and were heading to go out of the store. Some of these factors included variety of products, their quality, quantity, visual appeal, and location of these superstores. Some of the characteristics that were customer based were their income, family size, education, distance from the store etc. The data analysis was done using SPSS. The data also emphasized the presence of fresh fruits and vegetable in grocery segment and good variety of food and beverages. (Mozzam & Badar). “The idea of a retail location fluctuates enormously. For some it may be a store giving help and for other people, it may be a spot with great feel. The article centers on direct cooperation with the clients to distinguish the new patterns and existing issues. They attempt to discover the distinction between a superstore and a conventional retail location. They gather information by legitimately collaborating with the clients with the assistance of input forms and surveys. They find that store dedication relies upon the superstore's plan, air, item assortment and quality. Individuals like getting the things they need all alone as opposed to requesting that a business person find and put the thing in the truck. They additionally report that store format configuration is one of the more significant determinants of store reliability” (Merilees & Miller). “It presents an examination structure superstore dataset done on scene, just spellbinding measurements are looked upon. The information may be gathered basically from a store. They start by discovering deals dependent on locale dependent on clients' requests. They continue by doing an examination among deals and benefit by the Product names, finding the most beneficial classification, discovering relationship amongst Sales and benefit, arranging the clients as best clients, purchased as of late, purchase frequently and spend the most. In the wake of discovering answers to these measurements, they presently choose to rethink their procedure, and improve item collection, get more client inclusion, present compensations for clients, etc.”

(Aliady). “A System used for managing stock keeps a check on sales and purchase of items. It helps the retailer or seller to know when to reorder and in what quantity. We can keep up the unobtrusive components of receipt with the objective that we can sort out data in a single table course of action. Along these lines, all the solicitations of a store including both store and client bills are placed in a database. It includes placing the stock data in a work area application to give continuous outcomes” (Khobragade, Selokar, Maraskolhe, & Talmale). “Managing the stock is a very difficult task and needs to be done correctly. It is important to understand that inventory level should be such that no customer goes empty handed because of stock out or there should not be too much of inventory as holding the inventory has a lot of cost involved with it. This study is done on stock management for a small industry producing steel paper. For this purpose they used ABC analysis for putting stock in 3 different categories according to their importance” (Sheakh). “In everyday administration of the firm, it is basic to deal with the stock in order to keep up legitimate stockpile of merchandise at appropriate time. To an extreme and too low inventories cut down the degree of benefit of an association. In this way, regardless of whether it is an assembling or merchandized association, the objective ought to consistently be a similar that is, to guarantee the stock is prepared and simultaneously stock is at a low level. The decrease in 'unreasonable' inventories conveys a good effect on an organization's profitability. The information utilized is auxiliary information. What's more, the device utilized is - Statistical device – MS Excel. The different measurements determined are EOQ, Reorder Level, and Minimum stock level to get results” (Gokhale). “Capable materials organization accept a key part in the powerful fulfillment of the errand inside assessed cost and time. Thus, tries should be done taken to reduce material expense. In genuine practice most effort are accomplished to reduce work cost. So, the incurred cost, used quality and elapsed time are basic objective of material organization. Stock organization incorporates limit, recognizing verification, recuperation, securing, and transport and advancement strategies. Each is for all time associated with prosperity, productivity and schedule execution. Impel material acquisition or conceded both can impact cost, quality and time. So it is basic to get material at right expense, at right quality and perfect time. This can be practiced by using material organization techniques, for instance, ABC, Factor analysis. The information was gathered by utilizing poll overview. Survey study was guided among improvement specialists to recognize their inclination towards stock

organization system in their affiliation. The got data is analyzed to find the repeat of response for various components. The outcomes were dissected on SPSS” (Jayanth & V.Sampathkumar). “This is done to know the impact of stock management on an organization’s profit and position. Data for this was taken from 188 SSE and MSE. It shows how an effective stock management can facilitate a company’s position in the market. Hence, this upper hand can help it gain an overall positive impact on its business. Authoritative Performance (Profitability, Market Share, Level of Output, Cost Efficiency), Competitive Advantage (Price, Quality, Delivery) are its outcomes” (Atnafu & Balda). “Inventory Management has been a quite hideous and difficult issue in an organization. It is necessary to know that inventory level should be such that no customer goes empty handed because of stock out of any product that is proper stock is maintained or there should not be too much of inventory as holding the inventory has a lot of cost involved with it. It is advisable to keep a balance between overloads and stock out of inventory. Stock management can help in controlling stock and decreasing the expenses involved with its overload” (Plinere & Borisov). “Each and every organization requires inventory for carrying out its daily operations. Along these lines, it is important to have good control and inventories. The need for stock management is to ensure good availability of materials in appropriate amount according to when required and to constraint the inventories. In this study various stock control methods are being talked about after utilizing essential information. EOQ, security stocks, ABC analysis are being used in the paper.” (Jose, Jayakumar, & T). “In any industry today stock streamlining is such a fundamental capacity. Overabundance and Shortage of stock in all degrees of the inventory network can influence the accessibility of items and additionally administrations to purchasers. A few observing frameworks and procedures can be utilized to check stock lopsided characteristics to limit the market interest elements. To just these observing frameworks and procedure things/materials/items are ordered into various gatherings. A few such classification of things/materials/items depend on 1. Value 2. Worth 3. Criticality 4. Accessibility 5. Development 6. Consistency 7. Weight. ABC Analysis relies upon Pareto Analysis which preaches that 20% of the products add to 80% of the total deals. It implies that a minute section of products in Inventory management adds to most of the deals. So, 20% of things belong to class A, which contributed to 80% of the revenue. The next 15% are class B items. The last 5 % is generated by items of class C’. This methodology is Proportional Value

Analysis” (PVA) (Dhoka & Choudary). “Inventories includes raw materials, work-in-process items and finished products that are ready to be sold to the consumer. Managing and controlling stock is a major task that needs full attention and accuracy. In cases where deciding on when to reorder and what quantity, fluffy models of stock management acquires a significant position. This study breaks down potential measures of existing models of stock control” (ZIUKOV).

CHAPTER 3

RESEARCH METHODOLOGY

Business and the board investigate not exclusively ought to give discoveries that advance information and comprehension, it additionally should address business issues and viable administrative issues.

The exploration procedure for the most part incorporates figuring and explaining a theme, checking on the writing, picking a methodology, gathering information, examining information and reviewing. The examination procedure isn't carefully consecutive as a general rule; the specialist frequently needs to return to each stage commonly so as to refine the thoughts.

3.1 Research Topic

- **Superstore Analysis and Inventory Management**

Choosing an appropriate topic of research is a difficult task. It is important to relate it with what is happening in the environment. Present day super stores are enormous scope retailing organizations with exceptionally wide and profound item collection. These stores are step by step supplanting the customary limited show little scope retail shops. The fundamental spotlight in these stores is on the arrangement of a wide cluster of client benefits as opposed to contending based on cost. The blend of unmistakable, engaging product and client administrations are the primary traits that draw in purchaser towards superstores.

It is important to study the characteristics of a customer and understand his behavior in order to better understand what he wants.

Hence, in superstore analysis we will look on highest sales based on branch, highest sales based on customer, highest sales based on product types and so on.

In case of inventory management we will deal with a store having branches selling 5 mobile models which is currently facing a crisis related to Inventory management. It is noticed that the warehouses are bloated with either extra or unwanted inventory, which is resulting in huge capital getting stuck in inventory and affecting the profitability of the overall company.

3.2 Data Collection Methods

Data collection is a major task and involves a lot of different methods like interviews, feedbacks, research questions etc. All of this is categorized into primary and secondary data. It depends on who collected this information. The data that is collected or retrieved by an agent having an underlying agenda is the former. For example: the one collected by an understudy for carrying out a research work.

The data retrieved or collected by another individual for some other purpose is the latter.

For example: Census information being used for finding out the impact of instruction on decision and gaining.

The data that is used here is a secondary data that is extracted from kaggle for superstore analysis. The data used to show inventory management is primary data of a store nearby.

3.3 Research Data

Data 1

The data has 17 attributes listed. It have 1000 rows. Each attribute has some values.

Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Tax 5%
Total	Date	Time	Payment	cogs	gross margin %	gross income	Rating	

Details of attributes:

- Invoice id: This is a unique number corresponding to each invoice.
- Branch: This store has 3 branches namely A, B, C.
- City: These 3 branches are located in 3 different locations.
- Customer type: The two types of customers are: Member and Normal.
- Gender: This includes “Men (M)” and “Female (F)”.
- Product line: General categories are – “Electronic accessories, Fashion accessories, Food and beverages, Health and beauty, Home and lifestyle, Sports and travel”.
- Unit price: Price of the products is in \$.

- Quantity: It is the count of goods bought by customers.
- Tax: It is the extra amount charged to the customer that is 5%.
- Total: It is the total amount to be paid including the taxes.
- Date: It is the date of making a purchase by the customer.
- Time: It is the time of purchase.
- Payment: Payment mode that is used by customer at the time of purchase. The methods available are – “Cash”, “Credit card” and “Ewallet”.
- COGS: It is cost price.
- Gross margin percentage: Percentage of margin that is profit margin.
- Gross income: Profit that is earned.
- Rating: Satisfaction score given by customer on a scale of 1 – 10.

Data 2

The data used for inventory management consists of three tables namely – Sales Table (2000 values), Stock Table (20 values), Purchase Table (60 values).

SALES TABLE							
Invoice Number	Invoice Date	Stores	Emp. code	Model	Qty.	CP	SP

STOCK TABLE		
Stores	Model	Stock Qty.

PURCHASE TABLE				
Stores	Brand	Purchase Date	Purchase Qty.	CP per unit

The details of the data are-

- Invoice Number: This is a unique number corresponding to each invoice.
- Invoice Date: It is the data of billing.(here it can be any day between January, 2019 to March, 2019)
- Stores: This store has four branches namely A, B, C, D.

- Model: The store has 5 Models namely – Apple, Lenovo, Micromax, Nokia, Samsung
- Purchase Date: It is the data of purchase of stock by the seller.(here it is first day of every month i.e. 01-01-2019, 01-02-2019, 01-03-2019)

3.4 Reliability of Data

The secondary data (data 1) is taken from kaggle where it was uploaded by Aung Pyae, who is a researcher and has known to publish more than 40 papers in international journals. This data of a superstore provided by him has a usability of 8.8 on kaggle and is used by many other people also. Talking of the primary data (data 2) being used, then it is also appropriate as it is from one of the store that has a personal acquaintance of mine.

3.5 Some Important Questions to Be Answered by the analysis

Data 1

- What are the overall Sales, COGS, Quantity sold and profit?
- What are the Branch – wise overall Sales, COGS and profit?
- What is the customer type impact on Sales, COGS and profit?
- What are the Product Line – wise overall Sales, COGS and profit?
- What are the Month wise – wise overall Sales, COGS and profit?
- Which Payment mode was used more and how much was overall Sales, COGS and profit?
- What is the effect of gender on overall Sales, COGS and profit?
- What average rating was given to different branches, product lines, payment mode by customer?
- What is the correlation score of attributes?
- Who are the best 3 customers, who spent the most, who spent the least, rating given by them?
- Who are the most recent customers, how to attract them?
- How dynamic dashboards can be of great help?
- What is branch wise, Product wise sales and Quantity?
- Which branch has which product their best seller or vice – versa?

- How ABC analysis would help in inventory management?
- How VED analysis would help in inventory management?

Data 2

- What are the overall Sales, COGS and % profitability?
- What are region - wise Sales, COGS and % profitability?
- What is the current inventory level - quantity and values? Also what is the region - wise break - up?
- What is the region-wise, brand-wise Sales velocity (Sales per day – unit/value) Assuming the Inventory norm of 10 days – Which region/brand combination has the most excess inventory – volume/value?
- What is the extra inventory value and see if there is deficit inventory?
- What is the total amount of stuck inventory?
- How Moving average price can help in inventory control
-

3.6 Methodology

It is important to understand how these questions will be answered. The focal point was to distinguish superstore which includes seeing it as seen by the clients and the genuine drivers of super store shopping conduct in the advancing retail business. To start with, (data 1) Superstore is a big store and the data we have is a big dataset so we need to apply filters to play with data easily. Next, it is crucial to understand the various attributes in the data, and know what they are telling us. Finding sales, Cost of goods sold and profit for individual category be it branches, product lines, customer types and gender, months, payment modes etc.

It is important to know best 3 customers, who spent the most, who spent the least, rating given by them , who are the most recent customers, how to attract them and evaluate what these findings tell us.

It is important to know how dynamic dashboards can make visualization much easier and conclusive. So, it is a task to understand how these dashboards work and how they function.

In order to look at inventory management, VED analysis can also help in segregating the products in different categories according to their relevance and importance.

Moving forward towards the inventory management using MAP technique on data 2, it is important to know how we can make use of this data to evaluate the value and volume of inventory at the end of period. It helps to know the stuck up inventory and the total value that is linked to it. It also describes the days of inventory means for how many more days we need the inventory to be in stock. All of this is used to establish the concept of MAP in carrying forward the left over inventory and its value to the next month and average it out with the next month till the end of cycle which further helps in knowing the excess inventory volume and its value.

3.7 Platforms Used

- **Microsoft Excel –**

It is one of the oldest platform that is used for analysis. It stores the data in spreadsheet format that in the form of rows and columns. It allows to apply various inbuilt mathematical formulas easily on data. It gives the option of data analysis tool pack, solver, pivot tables, charts etc.

- **MySQL Workbench –**

SQL is a structured query language that helps create a database. It takes only structured data as an input. It allows querying easy with help of simpler queries and serves as a backend language in many applications.

CHAPTER 4

Data Analysis and Interpretation

4.1 Analysis on Microsoft Excel

4.1.1 Sales, COGS and Profit (in dollars) statistics –

Let us understand how sales patterns and its dependence on attributes affects the business. It is important to keep in mind that sales and profit have a perfect positive correlation here and we will look at sales at a wider picture. All these sales, COGS and profit is in dollars (\$).

- Overall Sales, COGS, Profit (in dollars) summary of superstore.

Table 4.1 Overall summary

	COGS	SALES	PROFIT
TOTAL	307587.38	322966.749	15379.369

- Branch Wise Sales, COGS, Profit (in dollars) summary of superstore.

Table 4.2 Branch Wise summary

Branch	Quantity	Sales	COGS	Profit
A	340	106200.3705	101143.21	5057.1605
B	332	106197.672	101140.64	5057.032
C	328	110568.7065	105303.53	5265.1765
Total	1000	322966.749	307587.38	15379.369

Looking at this table, it is evident that branch C earned maximum Profit and then branch A then branch B.

Let's see a visual representation of the above for easy interpretation.

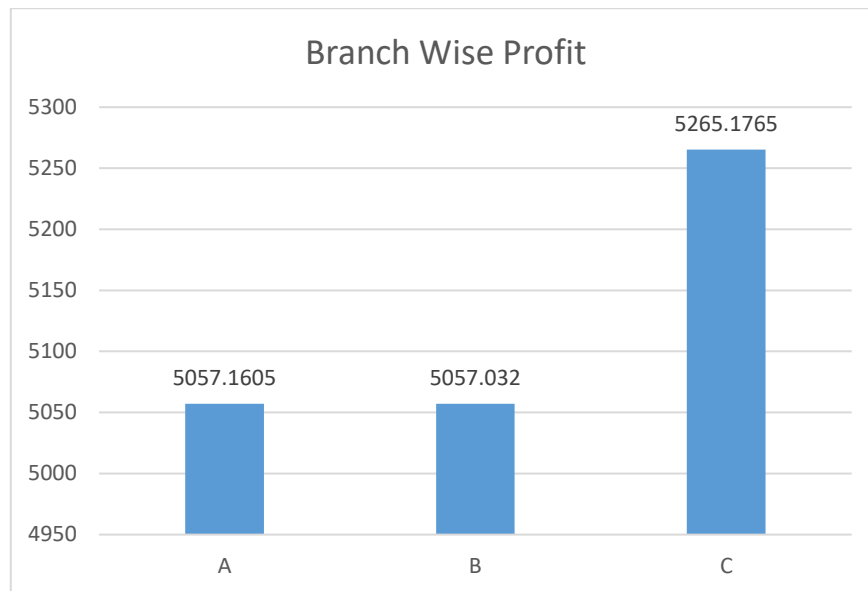


Fig. 4.1 Branch Wise Profit

This chart gives a clear picture of branch wise profit and help visualize the differences better.

- Product Line Wise Sales, COGS, Profit (in dollars) summary of superstore.

Table 4.3 Product Line Wise summary

Product Line	Quantity	Sales	COGS	Profit
Electronic accessories	170	54337.53	51750.03	2587.50
Fashion accessories	178	54305.90	51719.90	2586.00
Food and beverages	174	56144.84	53471.28	2673.56
Health and beauty	152	49193.74	46851.18	2342.56
Home and lifestyle	160	53861.91	51297.06	2564.85
Sports and travel	166	55122.83	52497.93	2624.90
Total	1000	322966.75	307587.38	15379.37

Here, Food and beverages has the maximum sales and hence, maximum profit. The minimum sales is by Health and Beauty section. Hence, health and beauty section needs extra attention.

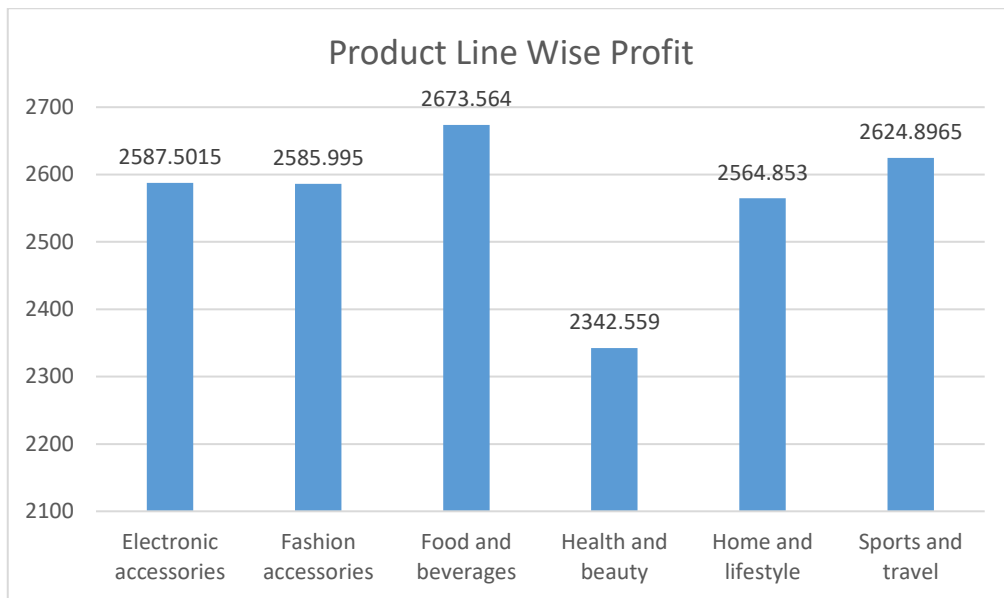


Figure 4.2 Product Line Wise Profit

This chart helps understand the scenario with different product lines better.

- Customer type Wise Sales, COGS, Profit (in dollars) summary of superstore.

Table 4.4 Customer Wise summary

Customer type	Quantity	Sales	COGS	Profit
Member	501	164223.44	156403.28	7820.16
Normal	499	158743.31	151184.10	7559.21
Total	1000	322966.75	307587.38	15379.37

Here, the customers who are members of the superstore have contributed to the maximum sales.

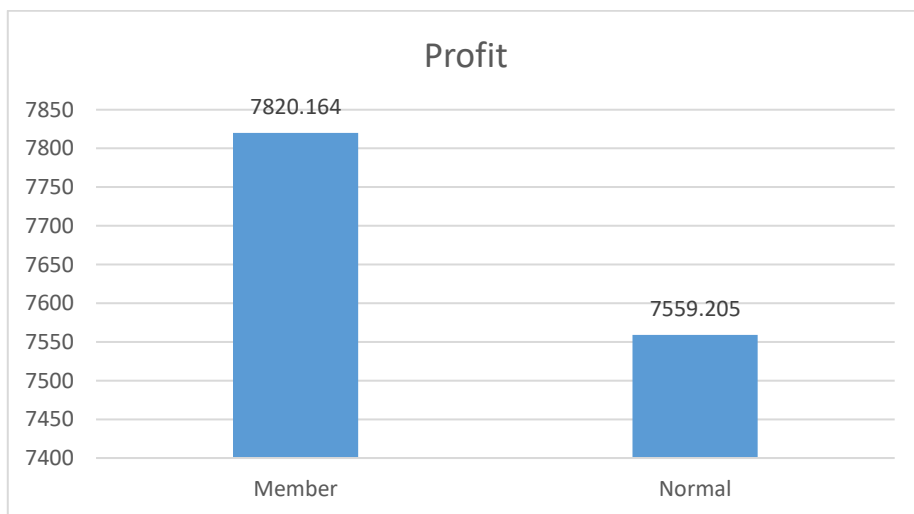


Figure 4.3 Customer wise Profit

This chart help understand the difference better between member customers and normal customers.

- Gender Wise Sales, COGS, Profit (in dollars) summary of superstore.

Table 4.5 Gender Wise summary

Gender	Quantity	Sales	COGS	Profit
Male	499	155083.82	147698.88	7384.94
Female	501	167882.93	159888.50	7994.43
Total	1000	322966.75	307587.38	15379.37

Females shop more than men according to this analysis. So, more focus should be on females and strategies to attract them.

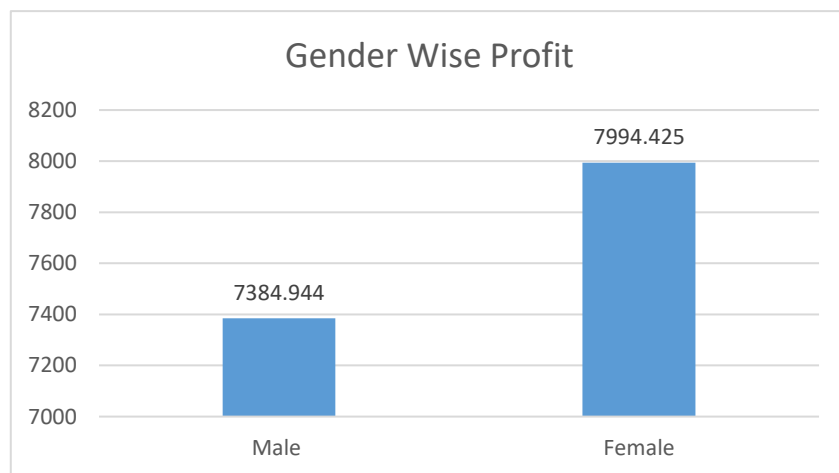


Figure 4.4 Gender wise Profit

This chart gives a clear representation of who shops more and which gender should be in more focus.

- Monthly Sales, COGS, Profit (in dollars) summary of superstore.

Table 4.6 Monthly summary

Month	Quantity	Sales	COGS	Profit
Januray	262	86562.567	82440.54	4122.027
Feburary	201	63169.743	60161.66	3008.083
March	228	72749.25	69285	3464.25
April	29	7957.6245	7578.69	378.9345
May	41	12798.6915	12189.23	609.4615
June	33	9612.225	9154.5	457.725
July	38	11500.713	10953.06	547.653
August	41	13503.777	12860.74	643.037
September	37	13767.285	13111.7	655.585
October	32	9865.2015	9395.43	469.7715
November	27	9618.3675	9160.35	458.0175
December	31	11861.304	11296.48	564.824
Total	1000	322966.749	307587.38	15379.369

It is important to find out which is month of peak sales and which one experiences less sale to introduce discounts and benefits in those months which experience lower sales.

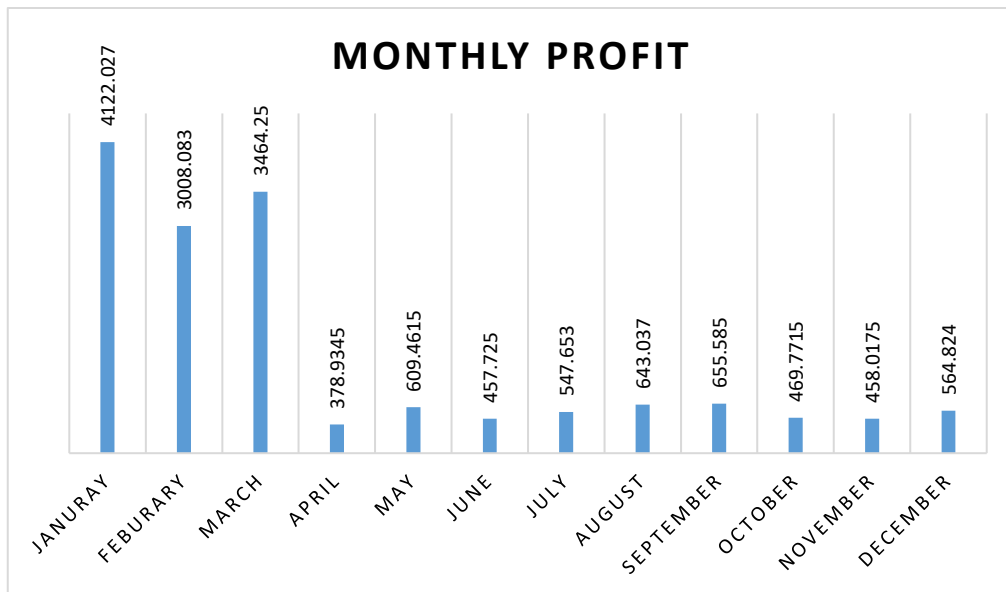


Figure 4.5 Monthly Profit

January experiences the maximum sales. It is also seen that January, February, March has comparatively higher sales than the other months. However, April, June, October, November experiences sales less than 500\$.

- Sales, COGS, Profit (in dollars) summary of superstore

Table 4.7 Payment Mode wise summary

Payment Mode	Quantity	Sales	COGS	Profit
Cash	344	112206.57	106863.4	5343.17
Credit card	311	100767.072	95968.64	4798.432
Ewallet	345	109993.107	104755.34	5237.767
	1000	322966.749	307587.38	15379.369

It shows by which payment mode most of the bills are paid by the customer or say which payment mode is more used by the customer.

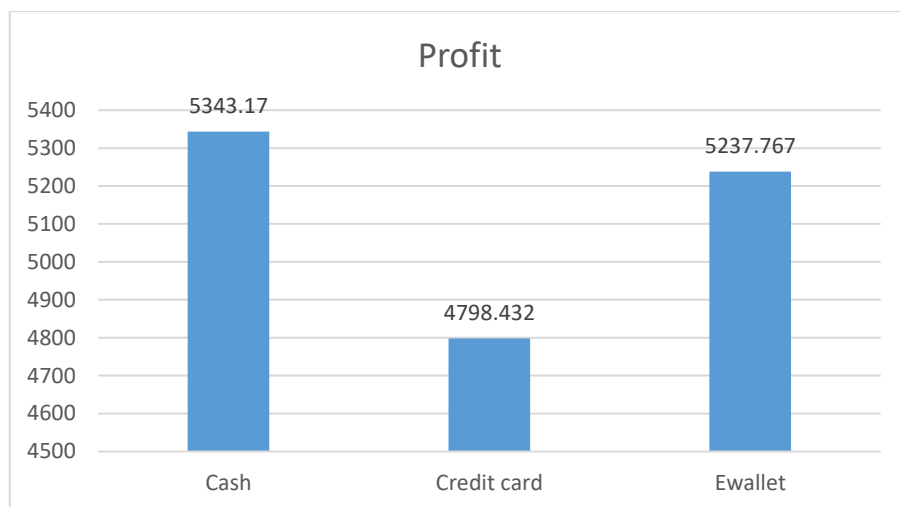


Figure 4.6 Payment Mode wise Profit

Customer's first preference is cash, then Ewallet and the last is credit card.

4.1.2 Rating Statistics

Customer's experience is of great importance to the store. It is important to understand the rating pattern and improvise accordingly.

- Average rating given by customers to each of the branches.

Table 4.8 Branch Wise average rating

Branch	Quantity	Sum	Average
A	340	2389.2	7.03
B	332	2263.6	6.82
C	328	2319.9	7.07

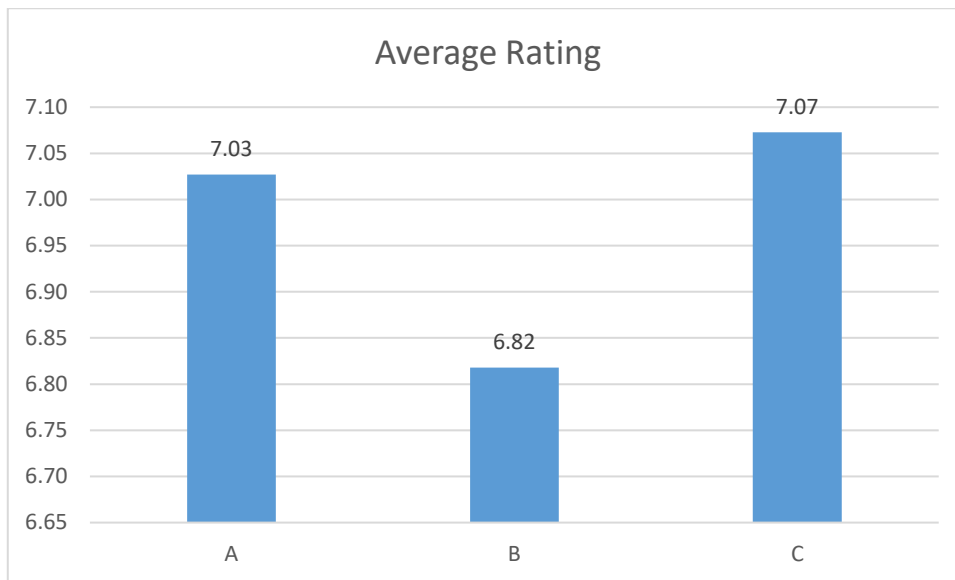


Figure 4.7 Branch Wise average rating

Branch C has received the highest rating followed by A and B respectively. So, Branch A need attention to figure out what is the issue. Earlier we saw that Branch C experienced maximum sales also hence we can see that higher ranking has led to higher sales.

- Average rating given to different product lines.

Table 4.9 Product Line Wise average rating

Product Line	Quantity	Sum	Average
Electronic accessories	170	1177.2	6.92
Fashion accessories	178	1251.2	7.03
Food and beverages	174	1237.7	7.11
Health and beauty	152	1064.5	7.00
Home and lifestyle	160	1094	6.84
Sports and travel	166	1148.1	6.92

Food and beverages has received the highest ranking among all. Fashion accessories and Health and beauty have also received fairly higher rankings but Home and lifestyle needs attention as it has received the lowest ranking. There might be some issues with Home and lifestyle line which needs care.

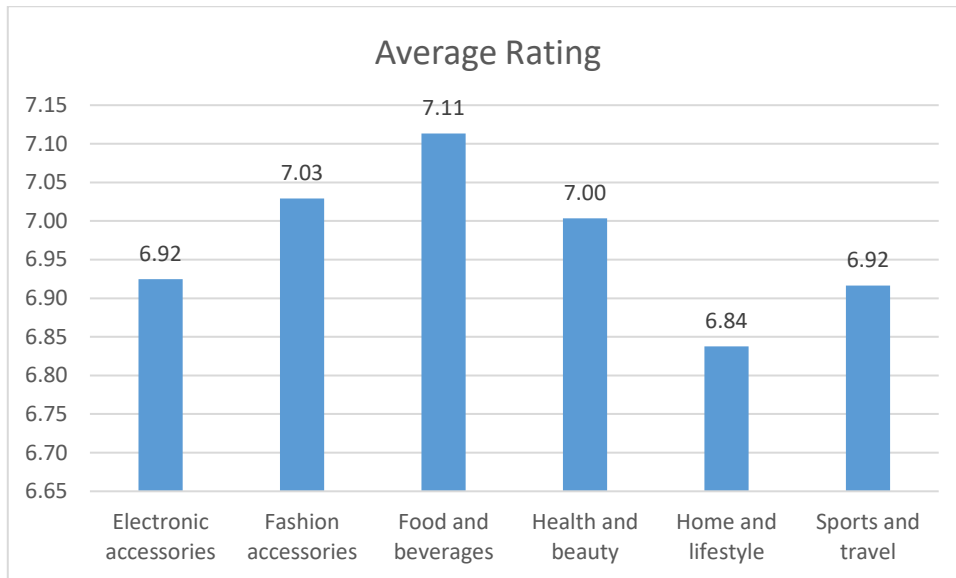


Figure 4.8 Product Line Wise average rating

This gives a much clear picture of highest and lowest ranking as explained above. While talking of sales above, Food and beverages line made the maximum sales as in the case of ranking but minimum sales were made by Health and Beauty not by Home and Lifestyle. Hence we cannot say that product line's sales and ranking have a strong connection.

- Monthly Average rating given to different product lines.

Table 4.10 Monthly average rating

Month	Quantity	Sum	Average
Januray	262	1836.1	7.01
Feburary	201	1377.9	6.86
March	228	1557.9	6.83
April	29	218.2	7.52
May	41	296.2	7.22
June	33	244.1	7.40
July	38	283	7.45
August	41	293.8	7.17
September	37	242.4	6.55
October	32	218.1	6.82
November	27	182.6	6.76
December	31	222.4	7.17

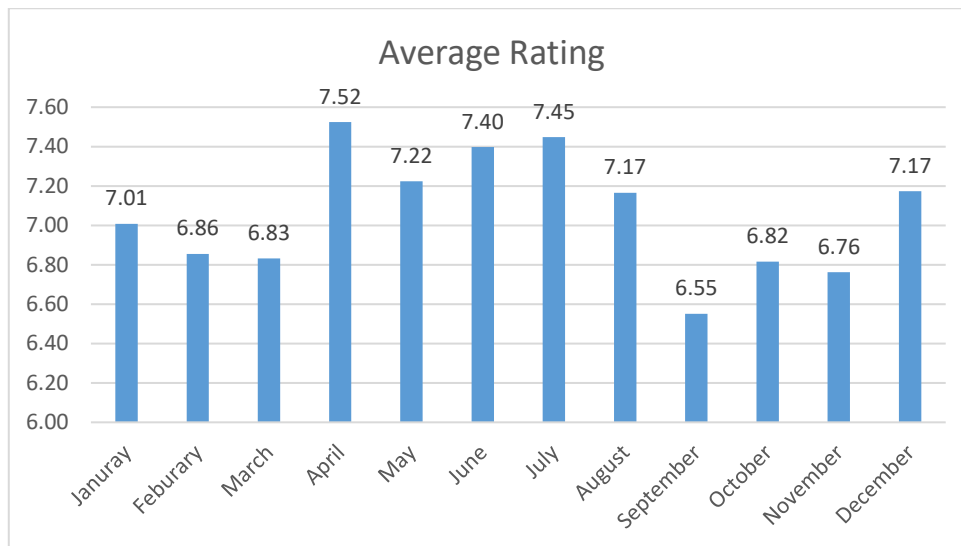


Figure 4.9 Monthly average rating

The number of ratings received in April are the highest whereas the lowest are in September but this does not imply that these are only positive reviews or only negative reviews, they can be any. We need to figure out that and work accordingly. April is also the month that received the least sales, so it is important to find out that whether these ratings say anything about the less sales.

- Average ratings given by customers to the payment mode.

Table 4.11 Payment mode wise average rating

Payment Mode	Quantity	Sum	Average
Cash	344	2397.7	6.97
Credit card	311	2178	7.00
Ewallet	345	2397	6.95

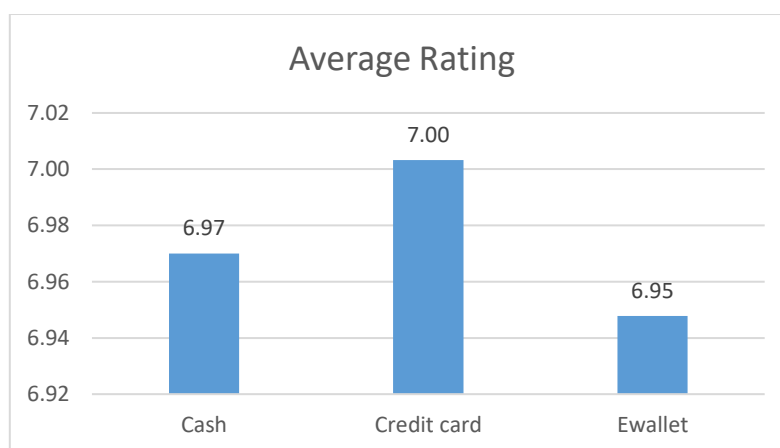


Figure Payment mode wise average rating

The mode of payment that received the highest rating is credit card then cash and then Ewallet. Again this rating needs to be evaluated in order to know whether it has positive implications or negative implications. However, credit card was used minimally to make payments in terms of sales linked to credit card.

4.1.3 CORRELATION MATRIX

It is a matrix that is used to show the correlation coefficients of each of the variable or attribute with other variable or attribute. It helps know whether there is some kind of relationship or trend between the 2 attributes or not.

It is also important to understand that:

+1 – Perfect positive correlation.

-1 – Perfect negative correlation.

0 – No correlation.

Here, all the coefficients greater than 0.50 and less than 1 come under positive strong correlation and all the coefficients less than 0 come under negative correlation and all the coefficients equal to 1 other than self-relationship come under perfect positive correlation.

- Correlation matrix of 12 variables shown below.

To make a correlation matrix, one can make use of data analysis tool pack kit In data tab. But one has to make sure that the data is in numeric form. If the data is in literal form then one has to change it into numeric data by assigning them numerals.

Table 4.12 Correlation Matrix

CORRELATION MATRIX	Branch	Customer type	Product line	Unit price	Quantity	CP	Tax 5%	SP	Pur Month	Payment	gross margin %	gross income	Rating
Branch	1												
Customer type	-0.0196	1											
Product line	-0.0539	-0.0368	1										
Unit price	0.0282	-0.0202	0.0193	1									
Quantity	0.0160	-0.0168	0.0203	0.0108	1								
CP	0.0410	-0.0197	0.0316	0.6340	0.7055	1							
Tax 5%	0.0410	-0.0197	0.0316	0.6340	0.7055	1.0000	1						
SP	0.0410	-0.0197	0.0316	0.6340	0.7055	1.0000	1.0000	1					
Pur Month	0.0005	-0.0208	0.0247	-0.0262	0.0362	0.0286	0.0286	0.0286	1				
Payment	-0.0501	0.0181	0.0299	-0.0159	-0.0039	-0.0124	-0.0124	-0.0124	0.0319	1			
gross margin %	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1		
gross income	0.0410	-0.0197	0.0316	0.6340	0.7055	1.0000	1.0000	1.0000	0.0286	-0.0124	0.0000	1	
Rating	0.0102	0.0189	-0.0205	-0.0088	-0.0158	-0.0364	-0.0364	-0.0364	0.0144	-0.0054	0.0000	-0.0364	1

It is difficult to look at the above matrix and jump into conclusions. So, for better visualization and ease conditional formatting can be done to highlight the needed data.

- Correlation matrix highlighting coefficients greater than 0.50.

Table 4.13 Correlation Matrix (coefficients greater than 0.50)

CORRELATION MATRIX	Branch	Customer type	Product line	Unit price	Quantity	CP	Tax 5%	SP	Pur Month	Payment	gross margin %	gross income	Rating
Branch	1												
Customer type	-0.0196	1											
Product line	-0.0539	-0.0368	1										
Unit price	0.0282	-0.0202	0.0193	1									
Quantity	0.0160	-0.0168	0.0203	0.0108	1								
CP	0.0410	-0.0197	0.0316	0.6340	0.7055	1							
Tax 5%	0.0410	-0.0197	0.0316	0.6340	0.7055	1.0000	1						
SP	0.0410	-0.0197	0.0316	0.6340	0.7055	1.0000	1.0000	1					
Pur Month	0.0005	-0.0208	0.0247	-0.0262	0.0362	0.0286	0.0286	0.0286	1				
Payment	-0.0501	0.0181	0.0299	-0.0159	-0.0039	-0.0124	-0.0124	-0.0124	0.0319	1			
gross margin %	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1		
gross income	0.0410	-0.0197	0.0316	0.6340	0.7055	1.0000	1.0000	1.0000	0.0286	-0.0124	0.0000	1	
Rating	0.0102	0.0189	-0.0205	-0.0088	-0.0158	-0.0364	-0.0364	-0.0364	0.0144	-0.0054	0.0000	-0.0364	1

Ignore the self-relationship coefficients and focus on the other highlighted ones to gather insights. All of them have strong positive correlation and the ones that are equal to 1 have perfect positive correlation.

- Correlation matrix highlighting coefficients less than 0.

Table 4.14 Correlation Matrix (coefficients less than 0)

CORRELATION MATRIX	Branch	Customer type	Product line	Unit price	Quantity	CP	Tax 5%	SP	Pur Month	Payment	gross margin %	gross income	Rating
Branch	1												
Customer type	-0.0196	1											
Product line	-0.0539	-0.0368	1										
Unit price	0.0282	-0.0202	0.0193	1									
Quantity	0.0160	-0.0168	0.0203	0.0108	1								
CP	0.0410	-0.0197	0.0316	0.6340	0.7055	1							
Tax 5%	0.0410	-0.0197	0.0316	0.6340	0.7055	1.0000	1						
SP	0.0410	-0.0197	0.0316	0.6340	0.7055	1.0000	1.0000	1					
Pur Month	0.0005	-0.0208	0.0247	-0.0262	0.0362	0.0286	0.0286	0.0286	1				
Payment	-0.0501	0.0181	0.0299	-0.0159	-0.0039	-0.0124	-0.0124	-0.0124	0.0319	1			
gross margin %	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1		
gross income	0.0410	-0.0197	0.0316	0.6340	0.7055	1.0000	1.0000	1.0000	0.0286	-0.0124	0.0000	1	
Rating	0.0102	0.0189	-0.0205	-0.0088	-0.0158	-0.0364	-0.0364	-0.0364	0.0144	-0.0054	0.0000	-0.0364	1

This matrix highlights the attributes where there is negative correlation that is no significant relationship is present.

4.1.4 Recency of Customers and Expenditure By Customers

This is how a store finds its loyal and royal customers. It helps a lot in targeted marketing or customizing the offers for customers. As customers make a list of favorite stores in mind likewise a store also remembers its loyal customers and keeps working on expanding the loyal customer base.

- Customers who spent above 1000\$

Table 4.15 Customers who spent > 1000\$

Invoice ID	Branch	Customer type	Gender	Product line	Quantity	Unit price	CP(COGS)	Tax 5%	Pur Month	Payment	Sales
234-65-2137	C	Normal	Male	Home and lifestyle	10	95.58	955.8	47.79	1	Cash	1003.59
687-47-8271	A	Normal	Male	Fashion accessories	10	98.98	989.8	49.49	8	Credit card	1039.29
860-79-0874	C	Member	Female	Fashion accessories	10	99.3	993	49.65	2	Credit card	1042.65
554-42-2417	C	Normal	Female	Sports and travel	10	95.44	954.4	47.72	9	Cash	1002.12
271-88-8734	C	Member	Female	Fashion accessories	10	97.21	972.1	48.605	8	Credit card	1020.705
283-26-5248	C	Member	Female	Food and beverages	10	98.52	985.2	49.26	1	Ewallet	1034.46
751-41-9720	C	Normal	Male	Home and lifestyle	10	97.5	975	48.75	12	Ewallet	1023.75
744-16-7898	B	Normal	Female	Home and lifestyle	10	97.37	973.7	48.685	1	Credit card	1022.385
303-96-2227	B	Normal	Female	Home and lifestyle	10	97.38	973.8	48.69	2	Ewallet	1022.49

These are the ones who spend a lot on shopping hence they are the store's profit makers. They need to be approached quite often via customized offers, benefits, products etc. It is important to retain them and keep an eye on their buying pattern and their perception of store experience. Engaging them is of great benefit.

- Spent less than 20\$

Table 4.16 Customers who spent < 20\$

Invoice ID	Branch	Customer type	Gender	Product line	Quantity	Unit price	CP(COGS)	Tax 5%	Pur Month	Payment	Sales
778-71-5554	C	Member	Male	Fashion accessories	1	15.43	15.43	0.7715	1	Credit card	16.2015
382-03-4532	A	Member	Female	Health and beauty	1	18.33	18.33	0.9165	2	Cash	19.2465
802-43-8934	A	Normal	Male	Home and lifestyle	1	18.28	18.28	0.914	3	Credit card	19.194
279-62-1445	C	Member	Female	Fashion accessories	1	12.54	12.54	0.627	2	Cash	13.167
490-29-1201	A	Normal	Female	Sports and travel	1	15.34	15.34	0.767	6	Cash	16.107
236-86-3015	C	Member	Male	Home and lifestyle	1	13.98	13.98	0.699	4	Ewallet	14.679
489-64-4354	C	Normal	Male	Fashion accessories	1	16.28	16.28	0.814	9	Cash	17.094
192-98-7397	C	Normal	Male	Fashion accessories	1	12.78	12.78	0.639	8	Ewallet	13.419
308-39-1707	A	Normal	Female	Fashion accessories	1	12.09	12.09	0.6045	1	Credit card	12.6945
559-61-5987	B	Normal	Female	Health and beauty	1	17.75	17.75	0.8875	1	Cash	18.6375
784-21-9238	C	Member	Male	Sports and travel	1	10.17	10.17	0.5085	7	Cash	10.6785
593-08-5916	A	Normal	Female	Fashion accessories	1	15.5	15.5	0.775	3	Credit card	16.275

They are the ones who are loyal to some other store because they like something else more than we are providing. So, it is really important to know

what they are missing and not liking in the store. Their feedback is of huge priority to the store. They need to be communicated with best offer and discounts frequently in order to attract them.

- Bought recently

Table 4.17 Customers who bought recently

Invoice ID	Branch	City	Customer ty	Gen	Product line	Unit pri	Quanti	CP(COGS)	Tax 5%	SP	Pur Date
120-06-4233	C	Naypyitaw	Normal	Male	Electronic accessories	30.61	6	183.66	9.183	192.843	03 December 2019
152-08-9985	B	Mandalay	Member	Male	Health and beauty	64.36	9	579.24	28.962	608.202	03 December 2019
699-01-4164	C	Naypyitaw	Normal	Male	Health and beauty	41.5	4	166	8.3	174.3	03 December 2019
545-46-3100	B	Mandalay	Member	Female	Electronic accessories	10.59	3	31.77	1.5885	33.3585	03 December 2019
253-12-6086	A	Yangon	Member	Female	Sports and travel	98.4	7	688.8	34.44	723.24	03 December 2019
565-17-3836	A	Yangon	Member	Female	Health and beauty	47.67	4	190.68	9.534	200.214	03 December 2019
573-10-3877	B	Mandalay	Member	Male	Health and beauty	39.01	1	39.01	1.9505	40.9605	03 December 2019
276-54-0879	B	Mandalay	Normal	Male	Sports and travel	97.74	4	390.96	19.548	410.508	03 December 2019
719-76-3868	C	Naypyitaw	Member	Male	Food and beverages	94.26	4	377.04	18.852	395.892	03 December 2019
651-61-0874	C	Naypyitaw	Normal	Male	Home and lifestyle	46.22	4	184.88	9.244	194.124	03 December 2019
266-20-6657	C	Naypyitaw	Member	Male	Food and beverages	55.04	7	385.28	19.264	404.544	03 December 2019
427-45-9297	B	Mandalay	Member	Female	Home and lifestyle	40.73	7	285.11	14.2555	299.3655	03 December 2019

These are those customers who have made the purchase most recently. So, we are fresh in their minds and we need to keep this freshness alive by engaging with them via mails, social media. It would be a great idea to convince them for opting for loyalty cards and joining in as a member of the store.

4.1.5 Dashboards

Dashboards are visual information management tools that are very helpful in displaying various key performance indicators, their calculations and their results in a much sorted manner. They help in attaching visual figures like charts to data and provide better insights on data.

➤ Simple dashboards

- Branch, Product Line, Customer Type, Gender wise Sales (in dollars)

Let us see how they actually work.

Table 4.18 Branch, Product, Customer, Gender wise Sales Dashboard

Branch	Product Line	Customer Type	Gender	Sales
C	Electronic accessories	Member	Male	4127.162

In order to get a drop down in each of these attributes, data validation needs to be done in excel.

So, in the drop downs linked with Branch, Product Line, Customer Type, Gender, there are values for each of them. It is shown in the following pictures.

	Branch	Product Line	Customer Type	Gender	Sales
	C	Electronic accessories	Member	Female	3800.79
A					
B					
C					

Here, we can see different values for branch.

Branch	Product Line	Customer Type	Gender	Sales
C	Electronic accessories	Member	Male	4127.16
	Electronic accessories			
	Fashion accessories			
	Food and beverages			
	Health and beauty			
	Home and lifestyle			
	Sports and travel			
Branch	Product Line	Customer Type	Gender	Sales
A	Electronic accessories			4469.66

Here, we can see different values for Product Line.

Branch	Product Line	Customer Type	Gender	Sales
C	Electronic accessories	Normal	Female	5168.43
		Member		
		Normal		

Here, we can see different values for Customer Type.

Branch	Product Line	Customer Type	Gender	Sales
C	Electronic accessories	Normal	Male	5872.6
			Male	
			Female	

Here, we can see different values for Gender.

Upon selecting one value for each of the attribute, we get the sales for selected attributes.

- Branch, Month, Product Line wise Sales (in dollars)

Here also, we can see that we have different values for all three attributes in their respective drop downs and on selecting one from each we get the sales for the selected one.

Table 4.19 Branch, Month, Product wise Sales Dashboard

Branch	Month	Product Line	Sales
A	1	electronic accessories	4469.66

- Customer Type, Gender, Product Line wise Average Rating

We can get the average rating linked to a particular customer type, gender and product line.

Table 4.20 Customer, Gender, Product wise Sales Dashboard

Customer Type	Gender	Product Line	Sum	Count	Avg. Rating
Member	Male	prime and lifestyle	238.6	36	6.6277778

- Customer Type, Branch wise Sales and profit (both in dollars)

We can see the sales and profit (both in dollars) of a particular customer type and branch.

Table 4.21 Customer, Branch wise Sales and profit Dashboard

Customer Type	Branch	Sales	Profit
Normal	C	53687.424	2556.54

- Branch, Product Line wise Quantity

We can know the quantity sold for a particular branch and product type.

Table 4.22 Branch, Product Line wise Quantity Dashboard

Branch	Product Type	Quantity
B	Food and beverages	270

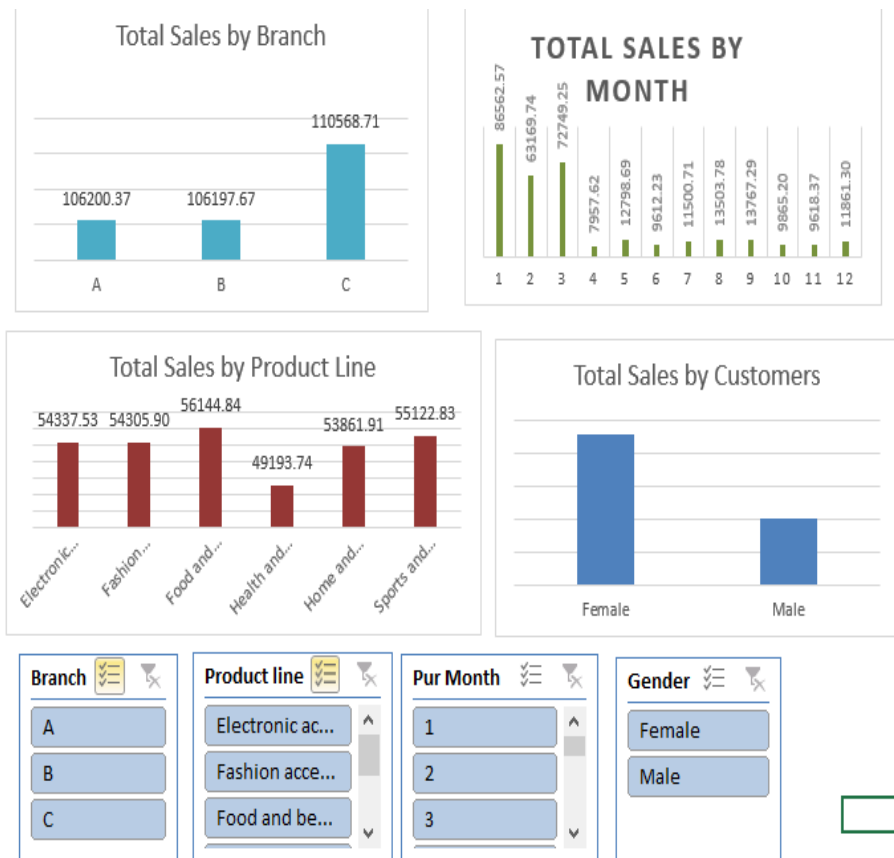
➤ Dynamic graphical dashboards

For this, pivot tables are created for all the attributes we need to work with as KPI's and then slicers are used to control the visualization and the connection of one chart with the other.

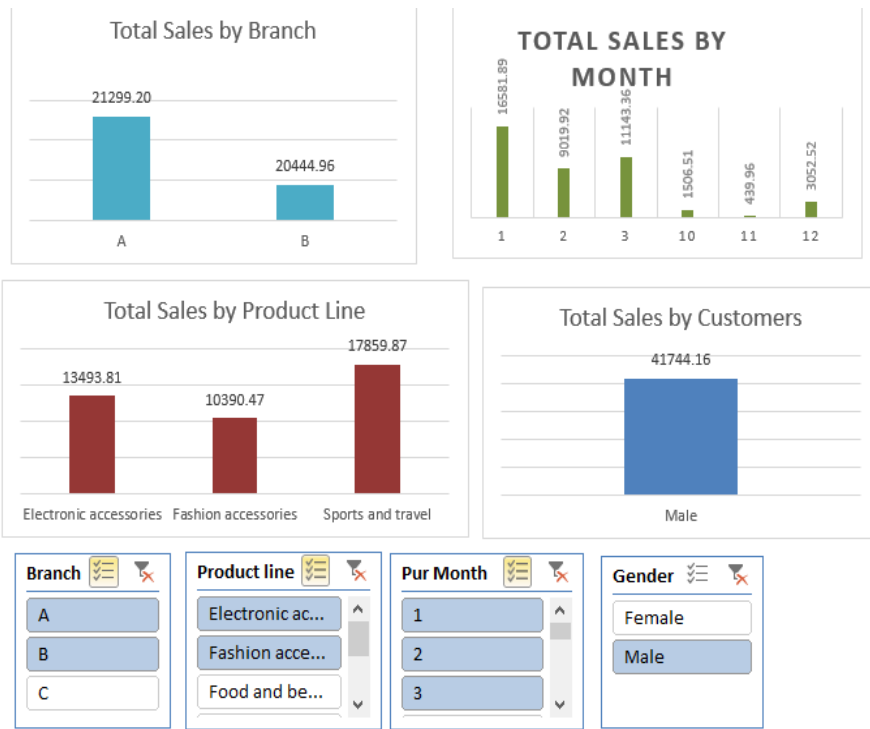
- Total Sales by branch, Product Line, Month, Customer

Four charts of Sales by Branch, Product Line, Month and Customer can be seen and in the extreme bottom, 4 slicers are there to control these charts. These slicers give the option to select the options we want on the chart to be seen, it also allows multi selection of the options.

Table 4.23 Sales by branch, Product Line, Month, Customer Dashboard



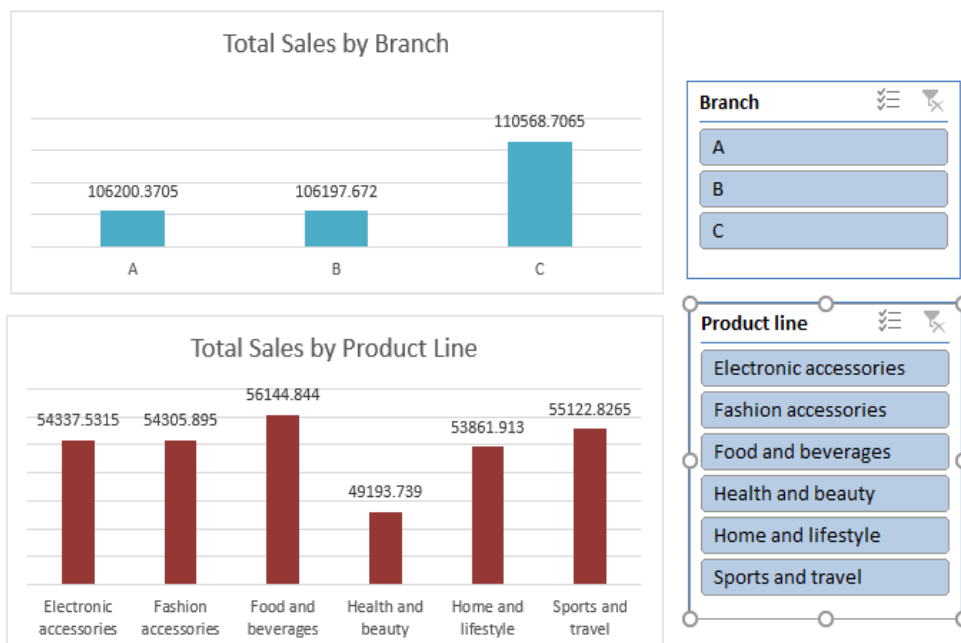
The above figure shows all the data as we have not selected any option.

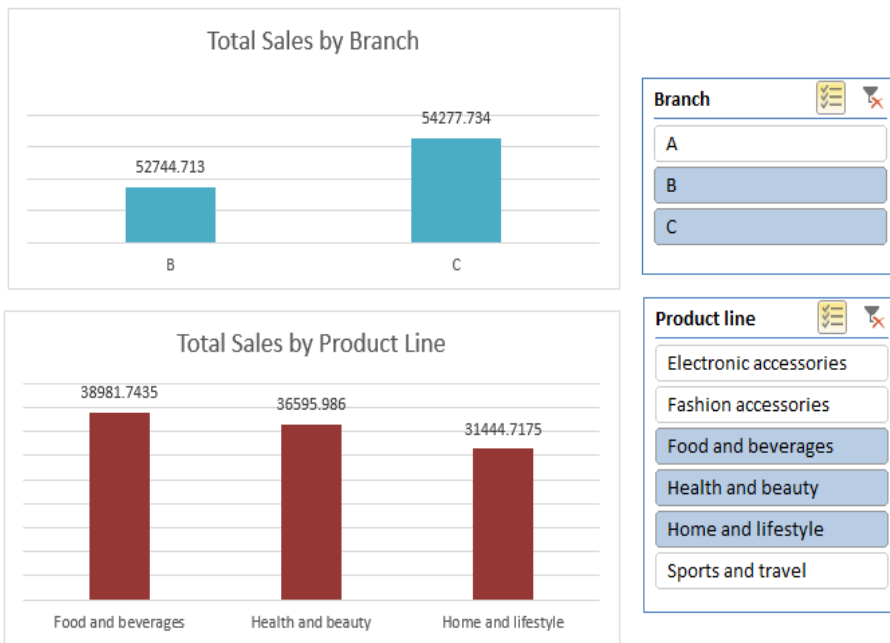


In the above figure, A and B are selected from the branches, Electronic accessories, Fashion accessories and Sports & travel from the product lines, Month 1, 2, 3, 10, 11, 12 i.e. January, February, March, October, November and December from Purchase Month, Male from gender. We get the sales based on selected options.

- Total Sales by Branch and Product Line

Table 4.24 Sales by branch, Product Line Dashboard

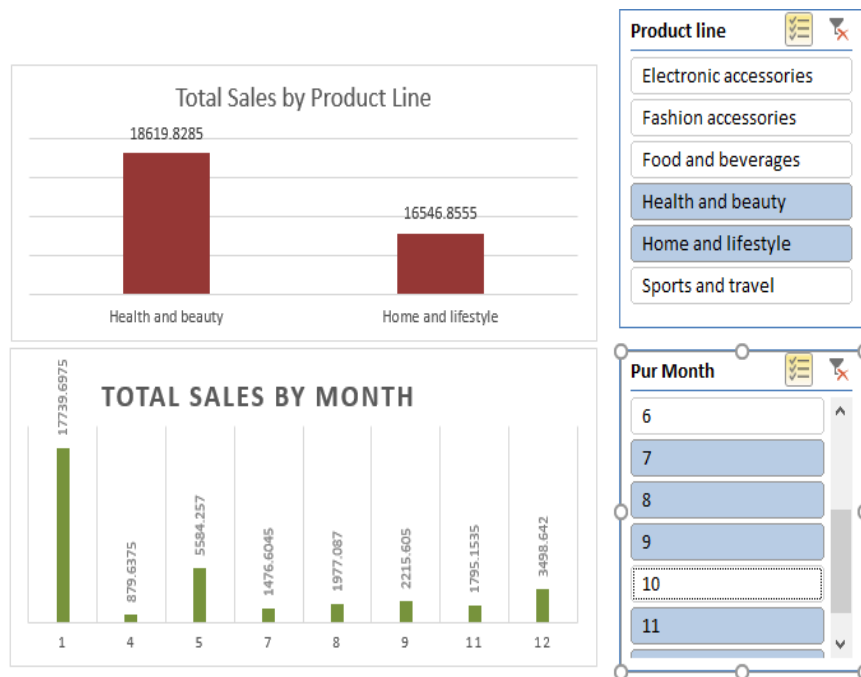




Here also, results are filtered according to the selection of the branches and product lines.

- Total Sales by Product Line and Month

Table 4.25 Sales by Product Line, Month Dashboard



Again, results can be seen according to the selection of the month of purchase and product lines.

4.1.6 Pivot tables

These tables are in the form of matrix that get the value corresponding to the row and column. It allows to get the sum, count, average etc. to better understand and analyze the data. They are really helpful in summarization of data.

- Total quantity corresponding to Product Line and Branches

Table 4.26 Pivot table 1

Sum of Quantity	Branches				
Product Line	A	B	C	Grand Total	
Electronic accessories		322	316	333	971
Fashion accessories		263	297	342	902
Food and beverages		313	270	369	952
Health and beauty		257	320	277	854
Home and lifestyle		371	295	245	911
Sports and travel		333	322	265	920
Grand Total		1859	1820	1831	5510

Here, we can see that maximum quantity of Electronic accessories were ordered at branch C, Fashion accessories at branch C, Food and beverages at branch C, Health and beauty at branch B, Home and lifestyle at branch A, Sports and travel at branch A. This is how we can read the data and make analysis.

Table 4.27 Pivot table 2

Sum of Quantity	Branches				
Product Line	A	B	C	Grand Total	
Electronic accessories		322	316	333	971
Fashion accessories		263	297	342	902
Food and beverages		313	270	369	952
Health and beauty		257	320	277	854
Home and lifestyle		371	295	245	911
Sports and travel		333	322	265	920
Grand Total		1859	1820	1831	5510

In the above figure, we can see that at branch A maximum quantity sold was of Home and lifestyle products, at branch B maximum quantity sold was of Sports and travel products, at branch C maximum quantity sold was of Food and beverages products.

- Total Sales (in dollars) corresponding to Product Line and Branches

Table 4.28 Pivot table 3

Sum of Sales	Branches			
Product Line	A	B	C	Grand Total
Electronic accessories	18317.1135	17051.4435	18968.9745	54337.5315
Fashion accessories	16332.5085	16413.3165	21560.07	54305.895
Food and beverages	17163.1005	15214.8885	23766.855	56144.844
Health and beauty	12597.753	19980.66	16615.326	49193.739
Home and lifestyle	22417.1955	17549.1645	13895.553	53861.913
Sports and travel	19372.6995	19988.199	15761.928	55122.8265
Grand Total	106200.3705	106197.672	110568.7065	322966.749

In the figure above, we can see that Electronic accessories had maximum sale at branch C, Fashion accessories products at branch C, Food and beverages products at branch C, Health and beauty products at branch B, Home and lifestyle products at branch A, Sports and travel products at branch B.

Table 4.29 Pivot table 4

Sum of Sales	Branches			
Product Line	A	B	C	Grand Total
Electronic accessories	18317.1135	17051.4435	18968.9745	54337.5315
Fashion accessories	16332.5085	16413.3165	21560.07	54305.895
Food and beverages	17163.1005	15214.8885	23766.855	56144.844
Health and beauty	12597.753	19980.66	16615.326	49193.739
Home and lifestyle	22417.1955	17549.1645	13895.553	53861.913
Sports and travel	19372.6995	19988.199	15761.928	55122.8265
Grand Total	106200.3705	106197.672	110568.7065	322966.749

Here, we can see that at branch A maximum sales was associated with Home and lifestyle products, at branch B maximum sales was associated with Sports and travel products, at branch C maximum sales was associated with Food and beverages products.

- Total Sales (in dollars) corresponding to Customer Type and Branches

Table 4.30 Pivot table 5

Sum of Sales	Branches			
Customer Type	A	B	C	Grand Total
Member	53637.4755	53704.686	56881.2825	164223.444
Normal	52562.895	52492.986	53687.424	158743.305
Grand Total	106200.3705	106197.672	110568.7065	322966.749

It can be seen that Members shop more than Normal customers in all the 3 branches, hence the store should try converting normal customers to members.

- Total Quantity corresponding to Customer Type and Gender

Table 4.31 Pivot table 6

Count of Quantity	Gender		
Customer Type	Female	Male	Grand Total
Member	261	240	501
Normal	240	259	499
Grand Total	501	499	1000

It can be noticed that Females does more shopping than males overall but normal male customers shopped more than normal female customers that says a lot about the fact that females are more loyal customers than men as in case of member's shopping, female members are more than male members.

- Total Sales (in dollars) corresponding to Customer Type and Gender

Table 4.32 Pivot table 7

Sum of Sales	Gender		
Customer Type	Female	Male	Grand Total
Member	88146.9435	76076.5005	164223.444
Normal	79735.9815	79007.3235	158743.305
Grand Total	167882.925	155083.824	322966.749

It can be noticed that Females purchased more than males.

- Total Sales (in dollars) corresponding to Product Line and Customer

Table 4.33 Pivot table 8

Sum of Sales	Customer Type		
Product Line	Member	Normal	Grand Total
Electronic accessories	24498.495	29839.0365	54337.5315
Fashion accessories	26323.962	27981.933	54305.895
Food and beverages	31357.62	24787.224	56144.844
Health and beauty	25831.0395	23362.6995	49193.739
Home and lifestyle	27978.027	25883.886	53861.913
Sports and travel	28234.3005	26888.526	55122.8265
Grand Total	164223.444	158743.305	322966.749

Members purchased more than normal customers overall but Electronic accessories were purchased more by normal customers, Fashion accessories products by normal customers, Food and beverages products by members, Health and beauty products by members, Home and lifestyle by members, Sports and travel products by members.

Members purchased maximum of Food and beverages products and normal customers purchased maximum of Electronic accessories products.

This says that Members liked Food and beverages products the most of the store and normal customers liked Electronic accessories products the most of the store while Members purchased Electronic accessories products the least from the store.

4.1.7 ABC ANALYSIS

It is inventory control method that is used to classify the items into most important, important and least important.

The ones in category A are most valuable, in B are valuable and in C are least valuable. Here, ABC analysis is done by assigning 50% to A, 30% to B and 20% to C. It is performed by sales volume as well as by sales quantity and then the results are combined by assigning weights by making an assumption that the sales volume is 4 times more important than sales quantity. This assumption can vary from store to store and the percentages assigned to A, B, C can also be varied.

ABC ANALYSIS				
By Sales Volume				
Product Line	Sales	Ratio	Cummulative Ratio	Category
Food and beverages	56144.84	0.174	0.174	A
Sports and travel	55122.83	0.171	0.345	A
Electronic accessories	54337.53	0.168	0.513	B
Fashion accessories	54305.90	0.168	0.681	B
Home and lifestyle	53861.91	0.167	0.848	C
Health and beauty	49193.74	0.152	1.000	C
Total	322966.75			
By Sales Quantity				
Product Line	Sales Quantity	Ratio	Cummulative Ratio	Category
Fashion accessories	178	0.178	0.178	A
Food and beverages	174	0.174	0.352	A
Electronic accessories	170	0.170	0.522	B
Sports and travel	166	0.166	0.688	B
Home and lifestyle	160	0.160	0.848	C
Health and beauty	152	0.152	1.000	C
Total	1000			

ABC Analysis done by sales volume and sales quantity produce the above results where ratios and cumulative ratios are found and then the data is sorted in descending order.

Combining Both				
Product Line	Sales	Quantity		
Electronic accessories	B	B	A	5
Fashion accessories	B	A	B	3
Food and beverages	A	A	C	2
Health and beauty	C	C		
Home and lifestyle	C	C		
Sports and travel	A	B		
weight	0.8	0.2	Total Weights	
Electronic accessories	3	3	3.0	
Fashion accessories	3	5	3.4	
Food and beverages	5	5	5.0	
Health and beauty	2	2	2.0	
Home and lifestyle	2	2	2.0	
Sports and travel	5	3	4.6	

Combining them both makes us realize that both of them give different category assignment to different product lines. So, weights are assigned to each category as shown.

weight	0.8	0.2	Total Weights		
Electronic accessories	3	3	3.0		
Fashion accessories	3	5	3.4		
Food and beverages	5	5	5.0		
Health and beauty	2	2	2.0		
Home and lifestyle	2	2	2.0		
Sports and travel	5	3	4.6		
Result					
Product Line	Total Weights	Ratios	Cummulative Ratio	Category	
Food and beverages	5.0	0.25	0.25	A	
Sports and travel	4.6	0.23	0.48	A	
Fashion accessories	3.4	0.17	0.65	B	
Electronic accessories	3.0	0.15	0.80	B	
Health and beauty	2.0	0.10	0.90	C	
Home and lifestyle	2.0	0.10	1.00	C	
	20.0				

Figure 4.10 ABC Analysis

After getting the total weights it is now time to again repeat the process of finding ratios and cumulative ratios and reassigning the final categories.

So the final categories are as shown.

Category A – Food and beverages, Sports and travel.

These are the most valuable and their inventory should be maintained every time. Avoiding stock out of these items is avoidable.

Category B – Electronic accessories, Fashion accessories

These are of intermediate value and we need to order them accordingly.

Category C – Health and beauty, Home and lifestyle

These are least valuable items.

Now, one can easily decide on placing what amount of orders for which product looking at this classification.

4.1.8 VED ANALYSIS

It is based on perception and behavior of buyers. V stands for vital, E stands for essential, D stands for desirable. Vital products are the ones which consumers want

without any wait. Essential products are the ones for which customers can wait but for very little time and Desirable products are the ones without which customers won't mind.

VED Analysis	
Electronic accessories	E
Fashion accessories	D
Food and beverages	V
Health and beauty	V
Home and lifestyle	E
Sports and travel	D

Figure 4.11 VED Analysis

Vital Products are “Food and Beverages” and “Health and Beauty”. These products are very important for customers and for store’s profit. Hence, the store should never run out of them.

Essential Products are “Electronic accessories” and “Home and Lifestyle”. These are not very important but they are important hence keeping a minimal stock of them is also a good option.

Desirable products are “Fashion accessories” and “Sports and travel”. These are the ones which are optional that means if they are present then its good and if not present then also no problem.

4.2 Analysis done on MySQL

4.2.1 Overall Sales, COGS and % profitability

```
select SUM(qty) as Total_Quantity,round(SUM(qty*sp)/10000000,2) as Overall_sales_inCr,
round(SUM(qty*cp)/10000000,2) as Overall_cogs_inCr,
Round((((SUM(qty*sp) - SUM(qty*cp))/ SUM(qty*sp)*100),2) as Overall_Profitability from new.Sales1;
```

Table 4.34 Overall Summary in MySQL

Total_Quantity	Overall_sales_inCr	Overall_cogs_inCr	Overall_Profitability
50166	24.11	14.89	38.25

Analysis – 38.25% of the revenue is generated by the company after paying all the expenses incurred in the business.

4.2.2 Store- wise Sales, COGS and % profitability

```
select stores, SUM(qty) as QTY , Round(SUM(qty*sp)/10000000,2) as SALES_in_Cr ,
round((SUM(qty*cp)/10000000,2) as COGS_in_Cr ,
round(((SUM(sp*qty) - SUM(cp*qty))/ SUM(sp*qty)*100),2) as PROFITABILITY
from new.Sales1 group by Stores order by PROFITABILITY DESC ;
```

Table 4.35 Store wise Summary in MySQL

stores	QTY	SALES_in_Cr	COGS_in_Cr	PROFITABILITY
D	12323	6.16	3.66	40.62
A	13061	6.32	3.88	38.60
B	11516	5.56	3.43	38.34
C	13266	6.07	3.92	35.40

Analysis – Among all the four regions, D is the most profitable region and C is the least profitable region.

4.2.3 Model - wise Sales, COGS and % profitability

```
Select model, sum(qty),round(sum(qty*sp)/10000000,2) as Sales_in_Cr,
round(((SUM(sp*qty) - SUM(cp*qty))/ SUM(sp*qty)*100),2) as Profitability
from new.Sales1 group by model order by Profitability DESC;
```

Table 4.36 Model wise Summary in MySQL

model	sum(qty)	Sales_in_Cr	Profitability
Samsung	10451	5.22	41.80
Nokia	10028	4.92	40.39
MicroMax	10111	4.73	38.92
Apple	10532	5.05	35.84
Lenovo	9044	4.19	33.47

Analysis – Among all the five models, Samsung has the highest profitability and Lenovo has the least profitability.

4.2.4 Month - wise Sales, COGS and % profitability

```
insert into new.month Select DATE_FORMAT("2017-01-01", "%M") , sum(qty),sum(qty*sp)/10000000,
((SUM(sp*qty) - SUM(cp*qty))/ SUM(sp*qty)*100) from new.Sales1 where Invoice_date like '%Jan%';
insert into new.month Select DATE_FORMAT("2017-02-01", "%M") , sum(qty),sum(qty*sp)/10000000,
((SUM(sp*qty) - SUM(cp*qty))/ SUM(sp*qty)*100) from new.Sales1 where Invoice_date like '%Feb%';
insert into new.month Select DATE_FORMAT("2017-03-01", "%M") , sum(qty),sum(qty*sp)/10000000,
((SUM(sp*qty) - SUM(cp*qty))/ SUM(sp*qty)*100) from new.Sales1 where Invoice_date like '%Mar%';
select * from new.month ;
```

Table 4.37 Monthly Summary in MySQL

Month_	Qty	Sales	Profitability
January	17720	8.43	36.46
February	15971	7.52	37.26
March	16475	8.15	41.01

Analysis – Among all three months, highest profitability was experienced in March and the least in January.

4.2.5 Current inventory level value. Also store - wise break – up

```

INSERT INTO new.inventory_records SELECT s.stores, s.model,
CASE when s.stock_qty<p.purchase_qty and p.pur_date='01-03-2017' THEN s.stock_qty*p.cp_per_unit
when s.stores='South' and s.model='MicroMax' and p.pur_date='01-03-2017' then ((p.purchase_qty*p.cp_per_unit)+
(s.stock_qty-p.purchase_qty)*(p.cp_per_unit - 200))
WHEN s.stock_qty>p.purchase_qty and p.pur_date='01-03-2017' THEN (p.purchase_qty*p.cp_per_unit)+
(s.stock_qty-p.purchase_qty)*(p.cp_per_unit - 400)

Else null
END as Inventory
from new.purchase1 p join new.stock1 s on s.stores=p.stores and s.model=p.brand;
select distinct * from new.inventory_records where inventory is not null order by Inventory DESC;

```

Table 4.38 Current inventory level in MySQL

Stores	Model	Inventory
A	Samsung	4174800
B	MicroMax	4107400
D	Apple	3977400
D	MicroMax	3708600
C	MicroMax	3679200
D	Lenovo	3674400
C	Apple	3570000
B	Lenovo	3070600
B	Nokia	3032000
A	Apple	2944200
B	Apple	2742600
D	Samsung	2739600
C	Nokia	2650200
C	Lenovo	2382400
A	Lenovo	2205000
C	Samsung	2192400
A	Nokia	2179800
B	Samsung	1902600
D	Nokia	1465800
A	MicroMax	1272600

Analysis – Among all the store-model combinations, model Samsung in the store A has the highest inventory value whereas model Micromax in the store A has the least inventory value.

Store wise inventory –

Table 4.39 Store wise inventory level in MySQL

stores	SOI
B	14855200
C	14474200
D	15565800
A	12776400

Analysis – Among all the four stores, D has the highest inventory.

4.2.6 Store-wise, brand-wise Sales velocity

Sales velocity - Sales per day – unit/value

That is sales divided by 90 (days are 90 as data is for 3 months)

```

/*Region Sales Velocity*/
select stores, Sum(qty) as Quantity,sum(qty*sp) as Sales ,
round(sum((qty*sp)/90),0) as Sales_Velocity from new.sales1 group by stores;
/*BRand Sales Velocity*/
select model, Sum(qty) as Quantity,sum(qty*sp) as Sales ,
round(sum((qty*sp)/90),0) as Sales_Velocity from new.sales1 group by model;
/*Brand Region Sales Velocity*/
select stores,model, Sum(qty) as Quantity,sum(qty*sp) as Sales ,
round(sum((qty*sp)/90),0) as Sales_Velocity from new.sales1 group by stores,model;

```

Store-wise Sales velocity:-

Table 4.40 Store wise sales velocity in MySQL

stores	Quantity	Sales	Sales_Velocity
C	13266	60739057	674878
A	13061	63187045	702078
B	11516	55588726	617653
D	12323	61601129	684457

Analysis – Among all the four stores, A has the highest sales velocity.

Brand- wise Sales Velocity:-

Table 4.41 Model wise sales velocity in MySQL

model	Quantity	Sales	Sales_Velocity
Apple	10532	50498486	561094
Lenovo	9044	41916719	465741
MicroMax	10111	47294708	525497
Nokia	10028	49208151	546757
Samsung	10451	52197893	579977

Analysis – Among all the five models, Samsung has the highest sales velocity.

4.2.7 Brand wise Store wise Sales Velocity:-

Table 4.42 Model - Store wise sales velocity in MySQL

stores	model	Quantity	Sales	Sales_Velocity
C	Apple	2602	12030761	133675
C	Lenovo	2229	9202728	102253
C	MicroMax	2884	12818350	142426
C	Nokia	2888	13749396	152771
C	Samsung	2663	12937822	143754
A	Apple	2805	13426663	149185
A	Lenovo	2625	12203039	135589
A	MicroMax	2308	11144766	123831
A	Nokia	2507	12876167	143069
A	Samsung	2816	13536410	150405
B	Apple	2735	12406833	137854
B	Lenovo	1923	9248027	102756
B	MicroMax	2184	10311405	114571
B	Nokia	1879	9029311	100326
B	Samsung	2795	14593150	162146
D	Apple	2390	12634229	140380
D	Lenovo	2267	11262925	125144
D	MicroMax	2735	13020187	144669
D	Nokia	2754	13553277	150592
D	Samsung	2177	11130511	123672

Analysis – Among all the store-model combinations, Samsung in B has the highest sales velocity and Nokia in B has the least sales velocity.

4.2.8 Store-wise, Brand-wise Days of Inventory:-

Here, it is assumed that the Inventory norm is of 10 days.

So, identify the store-brand combination having the most excess inventory.

```

/*DOI*/
insert into new.store_brand_sv select model,stores, Sum(qty) as Quantity,sum(qty*sp) as Sales ,
round(sum((qty*sp)/90),0) as Sales_Velocity from new.sales1 group by stores,model;
select * from new.store_brand_sv;
insert into new.doi_data select r.stores,r.model,r.quantity,r.sales,r.sales_velocity, (s.inventory/r.sales_velocity)
from new.store_brand_sv r join new.inventory_records s on r.stores=s.stores and r.model = s.model ;
select * from new.doi_data where DOI is not null order by DOI DESC ;

```

Table 4.43 Model - Store wise DOI in MySQL

Stores	Model	Quantity	Sales	Sales_vel	DOI
B	MicroMax	2184	10311405	114571	36
B	Lenovo	1923	9248027	102756	30
B	Nokia	1879	9029311	100326	30
D	Lenovo	2267	11262925	125144	29
D	Apple	2390	12634229	140380	28
A	Samsung	2816	13536410	150405	28
C	Apple	2602	12030761	133675	27
C	MicroMax	2884	12818350	142426	26
D	MicroMax	2735	13020187	144669	26
C	Lenovo	2229	9202728	102253	23
D	Samsung	2177	11130511	123672	22
B	Apple	2735	12406833	137854	20
A	Apple	2805	13426663	149185	20
C	Nokia	2888	13749396	152771	17
A	Lenovo	2625	12203039	135589	16
C	Samsung	2663	12937822	143754	15
A	Nokia	2507	12876167	143069	15
B	Samsung	2795	14593150	162146	12
D	Nokia	2754	13553277	150592	10
A	MicroMax	2308	11144766	123831	10

Analysis – Among all the store-model combinations, except Nokia in D and Micromax in A all others have DOI greater than 10 hence having excess inventory.

4.2.9 Moving Average Price Method for inventory management

It is crucial to know the concept of MAP in inventory costing because whenever we buy new stock it comes at a different price and the old inventory that is left in stock had a different purchase value and this will go

on. Hence, it is important to average out this price and get a particular selling price as it will be cumbersome to segregate them and sell the old ones at a different price than the new ones.

MAP JAN

```
Insert into new.map_jan select p.stores,p.model,p.purchase_qty,
qs.quantity,p.cp_per_unit, p.purchase_qty-qs.quantity, p.cp_per_unit
from new.purchase1 p join new.qty_sum qs on p.stores=qs.stores
and p.model=qs.model and p.pur_date=qs.pur_date where p.pur_date like '%-01-2017' ;
select * from new.map_jan;
```

Table 4.44 MAP JAN in MySQL

Stores	Model	Jan_purch	Jan_sold	Jan_purch	Jan_remai	MAP_JAN
A	Apple	1300	1023	4000	277	4000
A	Lenovo	1300	1031	4000	269	4000
A	Samsung	1300	715	4000	585	4000
A	Nokia	1300	838	4000	462	4000
A	MicroMax	1300	661	3500	639	3500
B	Apple	1300	1065	4000	235	4000
B	Lenovo	1300	538	4000	762	4000
B	Samsung	1300	837	4000	463	4000
B	Nokia	1300	699	4000	601	4000
B	MicroMax	1300	806	3500	494	3500
C	Apple	1300	936	4000	364	4000
C	Lenovo	1300	998	4000	302	4000
C	Samsung	1300	726	4000	574	4000
C	Nokia	1300	1114	4000	186	4000
C	MicroMax	1300	912	3500	388	3500
D	Apple	1300	994	4000	306	4000
D	Lenovo	1300	933	4000	367	4000
D	Samsung	1300	868	4000	432	4000
D	Nokia	1200	970	4000	230	4000
D	MicroMax	1300	1056	3500	244	3500

Column 3 represents purchased quantity and column 4 represents purchased value for the month of January.

MAP for January remains the same as its purchase price as it is the first month so there is no left inventory.

MAP FEB

```

Insert into new.map_f select p.stores,p.model,p.purchase_qty,
qs.quantity,p.cp_per_unit, p.purchase_qty-qs.quantity
from new.purchase1 p join new.qty_sum qs on p.stores=qs.stores
and p.model=qs.model and p.pur_date=qs.pur_date where p.pur_date like '%-02-2017' ;
select * from new.map_f;
truncate new.map_feb;
insert into new.map_feb select f.stores,f.model,f.Purchase,f.Sale,f.CP,f.Remaining,j.Jan_Remaining,j.Map_JAN,
((j.Jan_Remaining*j.Map_JAN)+ (f.Purchase*f.CP))/(j.Jan_Remaining+ f.Purchase)
from new.map_f f join new.map_jan j on f.stores=j.stores and f.model=j.model ;
select * from new.map_feb;

```

Table 4.45 MAP FEB in MySQL

Stores	Model	Feb_purch	Feb_sales	Feb_purchase_value	Feb_remaining	Jan_remaining	JAN_MAP	FEB_MAP
A	Apple	1000	942	3800	58	277	4000	3843
A	Lenovo	1000	911	3800	89	269	4000	3842
A	Samsung	1000	925	3800	75	585	4000	3874
A	Nokia	1000	909	3800	91	462	4000	3863
A	MicroMax	1000	679	4000	321	639	3500	3805
B	Apple	1000	781	3800	219	235	4000	3838
B	Lenovo	1000	593	3800	407	762	4000	3886
B	Samsung	1000	1038	3800	-38	463	4000	3863
B	Nokia	1000	494	3800	506	601	4000	3875
B	MicroMax	1000	645	4000	355	494	3500	3835
C	Apple	1000	831	3800	169	364	4000	3853
C	Lenovo	1000	674	3800	326	302	4000	3846
C	Samsung	1000	1090	3800	-90	574	4000	3873
C	Nokia	1000	759	3800	241	186	4000	3831
C	MicroMax	1000	925	4000	75	388	3500	3860
D	Apple	1000	664	3800	336	306	4000	3847
D	Lenovo	1000	664	3800	336	367	4000	3854
D	Samsung	1000	786	3800	214	432	4000	3860
D	Nokia	1000	937	3800	63	230	4000	3837
D	MicroMax	1000	724	4000	276	244	3500	3902

MAP for February is found out by multiplying the remaining pieces of January with MAP of January and adding it to the product of purchased quantity of February and its purchase value. This sum is then divided by sum of remaining quantity of January and purchased pieces of February.

MAP MAR

Formula-

$$\frac{((\text{Remaining pieces of February} * \text{MAP of February}) + (\text{Purchased quantity of March} * \text{Purchased value of March}))}{(\text{Remaining pieces of February} + \text{purchased quantity of March})}$$

```

Insert into new.map_m select p.stores,p.model,p.purchase_qty,
qs.quantity,p.cp_per_unit, p.purchase_qty-qs.quantity
from new.purchase1 p join new.qty_sum qs on p.stores=qs.stores
and p.model=qs.model and p.pur_date=qs.pur_date where p.pur_date like '%-03-2017';
select * from new.map_m;
truncate new.map_march;
insert into new.map_march select m.stores,m.model,m.Purchase_qty,m.Sales_qty,m.CP,m.Remaining,f.Feb_Remaining,f.Feb_MAP,
(((f.Jan_remaining+f.Feb_Remaining)*f.Feb_MAP)+(m.Purchase_qty*m.CP))/(f.Jan_remaining+f.Feb_Remaining+m.Purchase_qty)
from new.map_m m join new.map_feb f on m.stores=f.stores and m.model=f.model;
select * from new.map_march;

```

Table 4.46 MAP MAR in MySQL

Stores	Model	Mar_purc hase	Mar_sales	Mar_purchase _value	Mar_rem aining	Feb_rem aining	FEB_MAP	MAP_MAR
A	Apple	1206	840	4200	366	58	3843	4122.39
A	Lenovo	850	683	4200	167	89	3842	4093.9
A	Samsung	1510	1176	4200	334	75	3874	4100.85
A	Nokia	726	760	4200	-34	91	3863	4054.29
A	MicroMax	311	968	4200	-657	321	3805	3901.65
B	Apple	1088	889	4200	199	219	3838	4093.42
B	Lenovo	390	792	4200	-402	407	3886	3964.55
B	Samsung	948	920	4200	28	-38	3863	4095.68
B	Nokia	341	686	4200	-345	506	3875	3951.54
B	MicroMax	873	733	4200	140	355	3835	4020.04
C	Apple	1152	835	4200	317	169	3853	4090.24
C	Lenovo	503	557	4200	-54	326	3846	4003.44
C	Samsung	885	847	4200	38	-90	3873	4084.39
C	Nokia	1219	1015	4200	204	241	3831	4104.28
C	MicroMax	1460	1047	4200	413	75	3860	4118.14
D	Apple	1037	732	4200	305	336	3847	4065.02
D	Lenovo	845	670	4200	175	336	3854	4042.87
D	Samsung	541	523	4200	18	214	3860	4014.96
D	Nokia	903	847	4200	56	63	3837	4111.07
D	MicroMax	1318	955	4200	363	276	3902	4115.69

Same way MAP for March is calculated.

4.2.10 Overall, in terms of Value, how much capital is stuck up in extra inventory?

```

insert into new.final select a.stores,a.model,d.Sales/10000000, a.profitability,s.stock_qty,(s.stock_qty*m.MAP_MAR)/10000000,
d.Sales_velocity/100000,10,(d.Sales_velocity*10)/10000000
from new.profitability a join new.doi_data d on a.stores=d.stores and a.Model=d.Model
join new.stock1 s on s.stores=d.stores and s.Model=d.Model
join new.map_march m on m.stores=s.stores and m.Model=s.Model;
select distinct * from new.final;

insert into new.final_result select distinct *, Net_stock_inCr-Ideal_Inventory_inCr as ExcessOrDeficit from new.final;
insert into new.final_result select 'Total',sum(Total_sales_inCr),round(avg(Percent_profit),1),sum(Net_stock_qty),sum(Net_stock_inCr),
sum(Sales_Velocity_Lakhs),sum(DOI),sum(Ideal_Inventory_inCr),sum(ExcessOrDeficit_inCr) from new.final_result;
select * from new.final_result;

```

Table 4.47 Final Stuck Up Inventory in MySQL

Stores	Model	Total_Sales	Percent_profit	Net_stoc k_qty	Net_stoc k_inCr	Sales_Veloc ity_Lakhs	DOI	Ideal_inven tory_inCr	Excess_Or_D eficit_inCr
B	Apple	1.24	35.15	653	0.27	1.38	10	0.14	0.13
B	Lenovo	0.92	36.96	767	0.3	1.03	10	0.1	0.2
B	Samsung	1.46	43.89	453	0.19	1.62	10	0.16	0.03
B	Nokia	0.9	39.46	762	0.3	1	10	0.1	0.2
B	MicroMax	1.03	34.57	989	0.4	1.15	10	0.11	0.29
C	Apple	1.2	33.01	850	0.35	1.34	10	0.13	0.22
C	Lenovo	0.92	24.62	574	0.23	1.02	10	0.1	0.13
C	Samsung	1.29	41.05	522	0.21	1.44	10	0.14	0.07
C	Nokia	1.37	40.89	631	0.26	1.53	10	0.15	0.11
C	MicroMax	1.28	33.8	876	0.36	1.42	10	0.14	0.22
D	Apple	1.26	38.93	947	0.38	1.4	10	0.14	0.24
D	Lenovo	1.13	39.16	878	0.35	1.25	10	0.13	0.22
D	Samsung	1.11	42.08	664	0.27	1.24	10	0.12	0.15
D	Nokia	1.36	38.28	349	0.14	1.51	10	0.15	-0.01
D	MicroMax	1.3	44.69	883	0.36	1.45	10	0.14	0.22
A	Apple	1.34	36.1	701	0.29	1.49	10	0.15	0.14
A	Lenovo	1.22	32.25	525	0.21	1.36	10	0.14	0.07
A	Samsung	1.35	40.03	994	0.41	1.5	10	0.15	0.26
A	Nokia	1.29	42.72	519	0.21	1.43	10	0.14	0.07
A	MicroMax	1.11	42.09	303	0.12	1.24	10	0.12	0
Total		24.08	38	13840	5.61	26.8	200	2.65	2.96

To evaluate Net Stock in the store MAP for March is multiplied by net quantity in stock to get. Then to get Ideal Inventory value, Sales velocity is multiplied by 10 and divided by 1 crore to get the value in crores. Then we subtract Ideal Inventory value from Net Stock in the store.

Analysis –

For all the stores and models we have the excess or deficit inventory value stuck up. All of them have excess of it except for model Nokia in store D.

Considering all the store-model combinations, total capital stuck in extra inventory is 2.96Cr. Hence. We need to empty this tuck up inventory fast to have a good inventory management.

Some matrix representation using SQL for better interpretation of results-

- **Store – Wise Brand – Wise Profitability.**

Table 4.48 Matrix 1

Region	Samsung	Nokia	Apple	Lenovo	MicroMax	Total
D	41.05	40.89	33.01	24.62	33.8	35.4
C	42.08	38.28	38.93	39.16	44.69	40.62
A	40.03	42.72	36.1	32.25	42.09	38.6
B	43.89	39.46	35.15	36.96	34.57	38.34
Total	41.8	40.39	35.84	33.47	38.92	38.25

- **Store - Wise Brand – Wise Sales.**

Table 4.49 Matrix 2

Region	Samsung	Nokia	Apple	Lenovo	MicroMax	Total
C	1.29	1.37	1.2	0.92	1.28	6.07
D	1.11	1.36	1.26	1.13	1.3	6.16
A	1.35	1.29	1.34	1.22	1.11	6.32
B	1.46	0.9	1.24	0.92	1.03	5.56
Total	5.22	4.92	5.05	4.19	4.73	24.11

- **Employee - wise Model – wise Sales.**

Table 4.50 Matrix 2

Emp_Code	Samsung	Nokia	Apple	Lenovo	MicroMax	Total
101	0.43	0.49	0.46	0.36	0.47	2.21
102	0.51	0.61	0.46	0.42	0.34	2.33
103	0.52	0.36	0.55	0.52	0.46	2.41
104	0.72	0.41	0.35	0.33	0.31	2.12
105	0.49	0.43	0.58	0.36	0.81	2.67
106	0.44	0.36	0.54	0.57	0.50	2.40
107	0.46	0.48	0.40	0.44	0.48	2.25
108	0.56	0.67	0.47	0.36	0.52	2.59
109	0.79	0.61	0.71	0.44	0.42	2.97
110	0.32	0.50	0.52	0.39	0.42	2.15
Total	5.22	4.92	5.05	4.19	4.73	24.11

- **Employee - wise Model – wise Profitability.**

Table 4.51 Matrix 4

Emp_Code	Samsung	Nokia	Apple	Lenovo	MicroMax	Total
101	40.13	42.83	36.73	36.99	43.60	40.24
102	46.97	34.53	15.24	33.09	44.25	34.54
103	43.17	31.65	43.16	41.50	35.94	39.71
104	51.55	41.35	32.62	19.36	23.83	37.37
105	36.03	44.87	41.41	34.68	43.85	40.80
106	30.33	45.77	40.26	43.06	31.37	38.12
107	38.74	32.96	38.37	37.47	44.21	38.35
108	37.07	37.56	37.01	7.60	38.20	33.35
109	46.26	46.75	33.91	31.94	34.40	39.62
110	37.81	46.15	36.68	37.49	42.60	40.35
Total	41.80	40.39	35.84	33.47	38.92	38.25

- **Month – wise Model – wise Profitability.**

Table 4.52 Matrix 5

Month	Samsung	Nokia	Apple	Lenovo	MicroMax	Total
January	34.75	40.46	33.57	33.10	40.11	36.46
February	41.07	35.38	36.12	35.31	37.20	37.26
March	48.06	44.45	38.16	31.91	39.07	41.01
Total	41.80	40.39	35.84	33.47	38.92	38.25

- **Month – wise Model – wise Sales.**

Table 4.53 Matrix 6

Month	Samsung	Nokia	Apple	Lenovo	MicroMax	Total
January	34.75	40.46	33.57	33.10	40.11	36.46
February	1.88	1.42	1.55	1.36	1.32	7.52
March	1.87	1.71	1.64	1.22	1.71	8.15
Total	5.22	4.92	5.05	4.19	4.73	24.11

- **In store C, Samsung is highly profitable whereas Lenovo is lagging behind of all.**

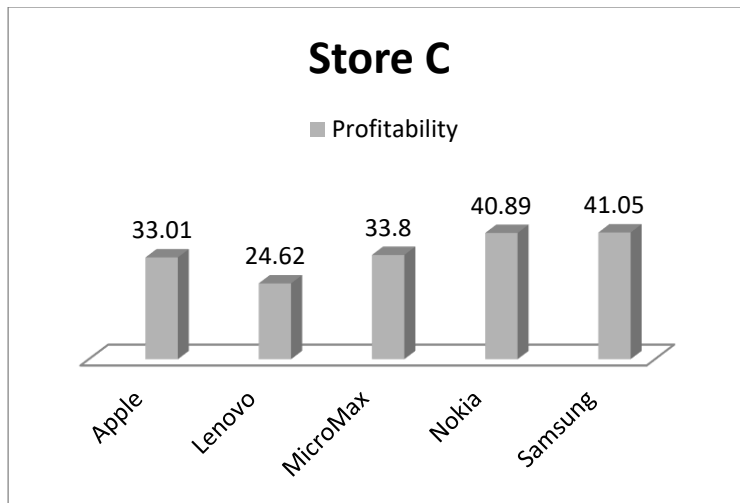


Figure 4.12 Different model's profitability in store C

Samsung should not get out of stock here. One should either work on increasing the sales by different strategies or keep less stock of Lenovo here.

- **In store D, Micromax is highly profitable whereas Nokia is lagging behind of all.**

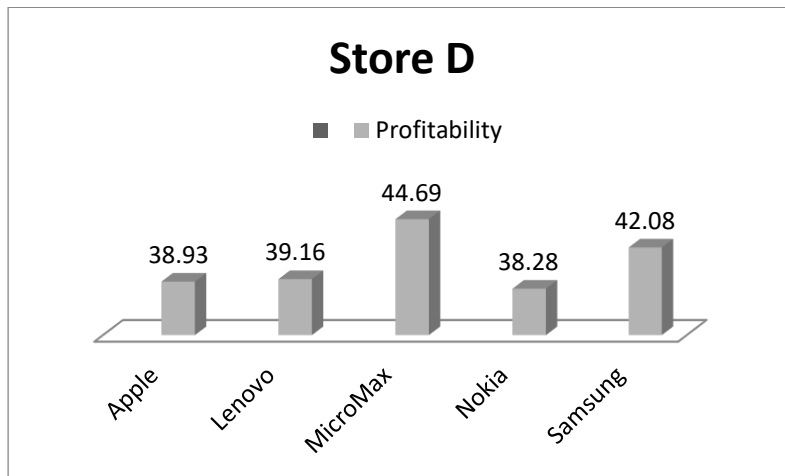


Figure 4.13 Different model's profitability in store D

- **In store A, Nokia is highly profitable whereas Lenovo is lagging behind of all.**



Figure 4.14 Different model's profitability in store A

- **In store B, Samsung is highly profitable whereas Micromax is lagging behind of all.**

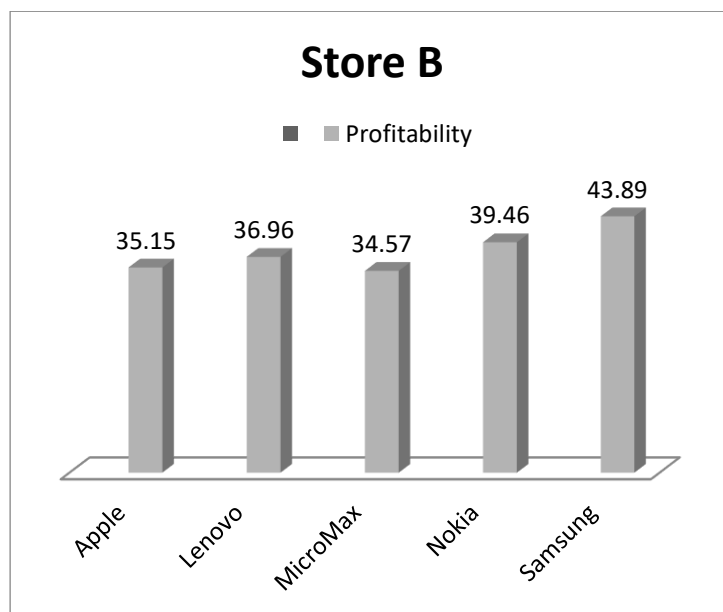


Figure 4.15 Different model's profitability in store B

- **Store D is experiencing highest profits.**

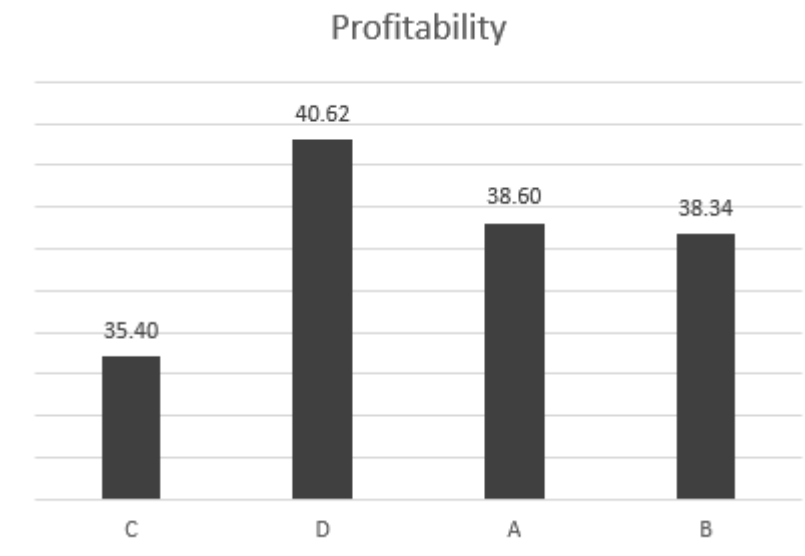


Figure 4.16 Store wise Profitability (%)

- **Store A is ahead of all in selling the models.**



Figure 4.17 Store wise Sales

Talking of all the stores, store A is selling the maximum and store D has the maximum profits. That means, Store D is managing to sell at higher prices and more of luxury products whereas store A is selling out the maximum pieces but not at maximum prices or luxury products.

- **Employee 109 is doing the best sales.**

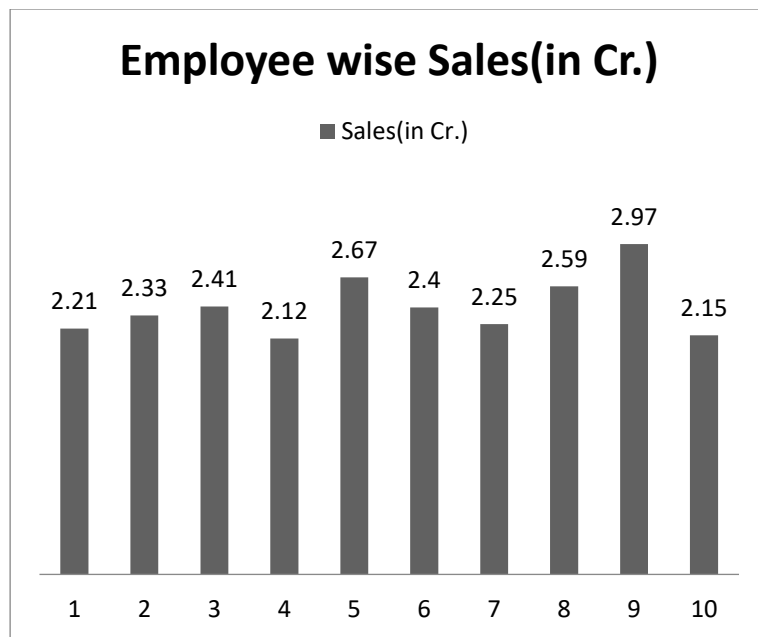


Figure 4.18 Employee wise Sales

- **Employee 105 is giving the highest profitability.**

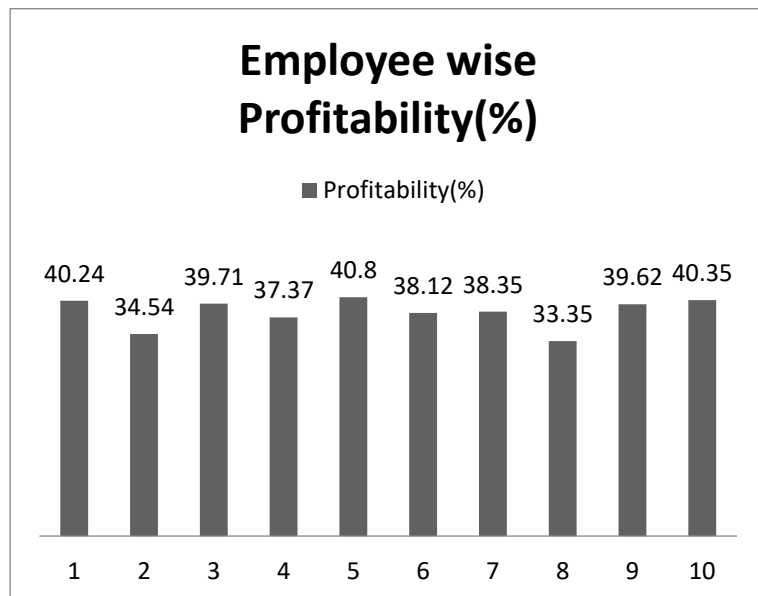


Figure 4.19 Employee wise Profitability (%)

Employee 105 is the most profit making employee whereas 109 is doing maximum sales that means 105 is convincing the customers to buy at higher prices while 109 is just selling the items and not convincing them to buy at higher prices.

- **March has the highest profitability.**

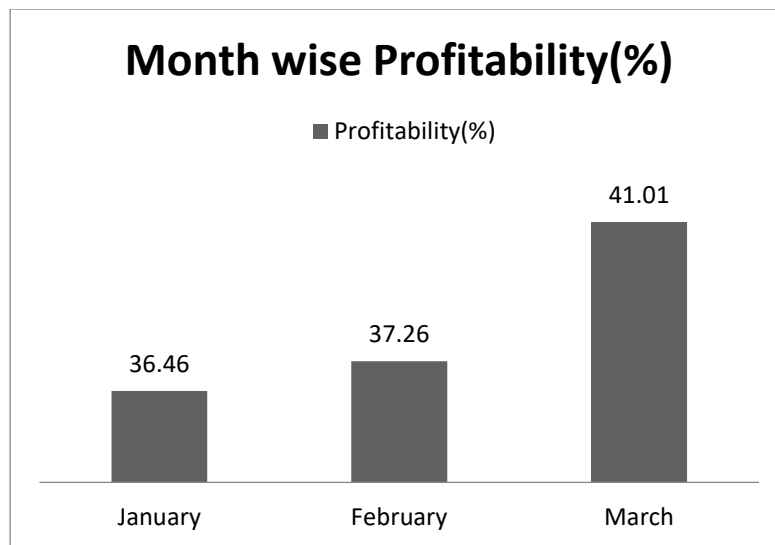


Figure 4.20 Month wise Profitability (%)

- **The largest number of sales is made in the month of January.**

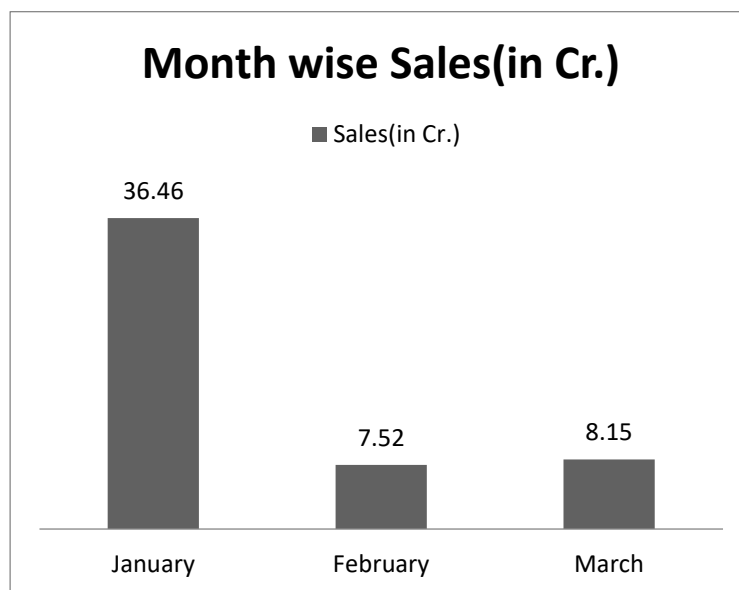


Figure 4.21 Month wise Sales

- **Samsung has the highest profitability.**

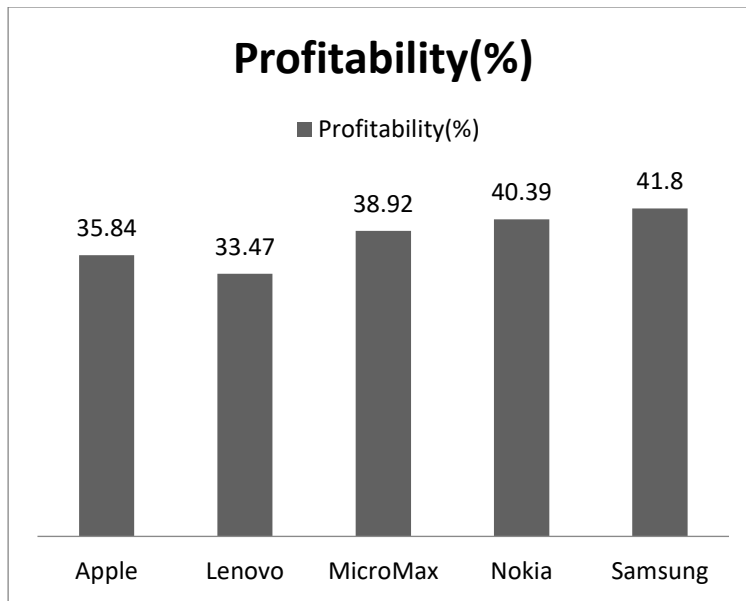


Figure 4.22 Model wise Profitability (%)

- **Samsung has the highest sale in the market.**

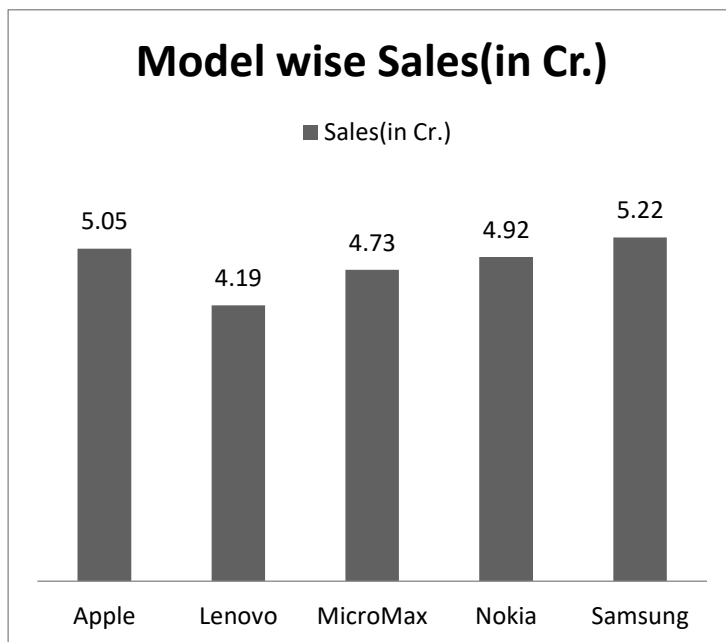


Figure 4.23 Model wise Sales

Samsung is the brand that is profitable as well as making the maximum sales. So the store needs to keep Samsung in stock always as it is its first priority.

CHAPTER 5

FINDINGS

5.1 Findings

After performing the analysis, following observations were made using Excel:-

- Branch wise profit analysis showed that branch C earned maximum Profit followed by branch A then branch B.
- Product Line wise sales analysis confirmed that Food and beverages made the maximum sales and hence, maximum profit.
- Customer wise sales analysis showed that the customers who are members of the superstore have contributed to the sales more than normal customers.
- Females shop more than males here according to the analysis. So, more focus should be laid on getting more female oriented products and strategies to attract them.
- According to the monthly sales analysis it was found that January experiences the maximum sales. It is also seen that January, February, March has comparatively higher sales than the other nine months and April, June, October, November experiences sales less than even 500\$.
- Talking about the average rating given by the customers, Branch C has received the highest rating followed by branch A and branch B respectively. So, Branch A needs more attention to figure out what is the prevailing issue.
- Rating given to product lines showed that Food and beverages has received the highest ranking among all of them. Fashion accessories and Health and beauty have also received fairly higher rankings but Home and lifestyle needs more attention as it has received the lowest ranking among all.
- Correlation matrix of 12 variables was also found out with some having positive, negative and zero correlations.
- On finding customers who spent above 1000\$ it was interpreted that they are the ones who spend a lot on shopping hence they can be called as the store's profit makers. They need to be attracted and approached quite often via customized offers, benefits, products etc.

- On analyzing customers who spent less than 20\$ made us think that they are the ones who are loyal to some other store or brand because they like something more than we are providing. So, it is really important to know what they are missing or disliking in the store.
- On analyzing the pivot tables, we can see that maximum quantity of Electronic accessories were ordered at branch C, Fashion accessories at branch C, Food and beverages at branch C, Health and beauty at branch B, Home and lifestyle at branch A, Sports and travel at branch A respectively.
- On analyzing branch and product wise sales, we can see that at branch A maximum sales was associated with Home and lifestyle products, at branch B maximum sales was associated with Sports and travel products, at branch C maximum sales was associated with Food and beverages products.
- On closely watching the shopping pattern of male and female sorted by member and normal customers, it can be noticed that Females does more shopping than males overall but normal male customers shopped more than normal female customers that says that females are more loyal customers than men as in case of member's shopping, female members are more than male members. Hence, focus should on attracting loyal customers.
- Members liked Food and beverages products more than the other and normal customers liked Electronic accessories products more while Members purchased Electronic accessories products the least from the store. So it is important to know the reason behind this indifferent behavior.
- On doing ABC analysis it was found that Category A comprises of "Food & beverages", "Sports & travel". Category B includes "Electronic accessories", "Fashion accessories". Category C has "Health & beauty", "Home & lifestyle".
- On performing VED Analysis it was found that Vital Products are "Food & Beverages" and "Health & Beauty". Essential Products are "Electronic accessories" and "Home & Lifestyle". Desirable products are "Fashion accessories" and "Sports & travel".

After performing the analysis on MySQL, following observations were:-

- Overall profitability of the store is 38.25% that is the revenue generated by the company after paying all the expenses incurred in the business.
- While looking at the profitability store wise, D is the most profitable store and C is the least profitable store.
- On analyzing profitability models wise, Samsung has the highest profitability and Lenovo has the least profitability.
- Looking at the store-model combinations, model Samsung in the store A has the highest inventory value in Crores whereas model Micromax in the store A has the least inventory value in Crores.
- Analyzing store-model combinations, Samsung in store B has the highest sales velocity and Nokia in store B has the least sales velocity.
- For all the stores and models we have either excess or deficit inventory value that stuck up. All of them have excess of inventory stuck up except for model Nokia in store D that is having deficit inventory.
- Concluding after considering all the store-model combinations, total capital stuck in extra inventory is 2.96Cr. Hence. We need to empty this stuck up inventory fast to have a good inventory management and reduce the cost of inventory maintenance.
- Talking of all the stores, store A is selling the maximum models and store D has the maximum profits that is the actual income earned. That means, Store D is managing to manipulate and sell at higher prices and more of luxury products or higher price products whereas store A is selling out the maximum pieces but not at maximum prices or higher price products.
- Talking of employees performance, Employee 105 is the most profit making employee whereas 109 is doing maximum sales that means 105 is convincing the customers to buy premium products while 109 is just selling the items and not convincing them to buy premium products.
- Samsung is the only brand that is both profitable as well as making the maximum sales. So the store needs to keep Samsung in stock always as it is its first priority.

5.2 Limitation of the study

Some of the limitations are –

- It only covers some parts of inventory management that were in reach with the data available and knowledge accumulates.
- There were some assumptions made based on estimations during analysis which can be an issue in judging the credibility of the study.
- While studying the details of superstore purchase and sale patterns, it is important to not get the details of customers leaked to prevent any kind of misuse.
- It is important to understand the responsibility of keeping the customer details safe.
- In the scenario of feeding these details in a DBMS system or online system, any kind of virus attack, corrupted hard drive, power cuts and other technical issues can result into the loss of important data.
- Hackers are always trying to peak into systems to get important details and in case of inventory data which is extremely confidential is at risk.
- In case a company is using an online system to store the inventory information and the customer details then it reduces the human effort to maintain the records. However, it is necessary to keep manual checks to ensure no leakage and spoilage.

CHAPTER 6

CONCLUSION

Supermarket is a huge market to attract customers, make profits, create a brand image but only if done correctly. Nothing comes without analyzing various trends in the market, various patterns of sales and purchase, variety demanded by customers, understanding needs and wants of the customer etc. Likewise, it is very essential to understand the importance of inventory management and control in terms of quantity and volume, the order of inventory management. The very first task to be done is to analyze the data and pick out the prevailing issues. In the analysis done here, we saw variety of factors influencing profits of a supermarket. It was also seen that a huge amount of capital was stuck at the end of the quarter due to presence of excess inventory. The presence of excess inventory was because of the improper management of inventory & supervision. In order to make the organization profitable, it is important to understand that inventory management plays a huge role. To empty the excess inventory, the organization now needs to increase the sales velocity of different models in different regions accordingly to empty the excess inventory and release the capital stuck. The other matters that needs attention is different types of customers, their perceptions, their priorities, their loyalty etc.

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