BDM CAPSTONE PROJECT

भारतीय प्रौद्योगिकी संस्थान मद्रास

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ASSESSMENT OF "Modern Pipe & Sanitation" DIFFICULTIES AND SOLUTIONS TO THEM USING DATA ANALYSIS.

CONTENT

Final submission for BDM Capstone Project

The offered drive connection contains all the important documents and multimedia. It includes the excel workbook as well as some intriguing insights.

https://drive.google.com/drive/u/2/folders/161vasjOOKOHRl4UwhUW3ANLrwjBL8Q0x?us%20p=sharing

EXECUTIVE SUMMARY AND TITLE

TITLE: ASSESSMENT OF “Modern Pipe & Sanitation” DIFFICULTIES AND SOLUTIONS TO THEM USING DATA ANALYSIS.

Initially, I started with gathering of data and contacted “Modern Pipe and Sanitation”. I imported the data into my Excel spreadsheet because it was in "csv" format. Then I started learning terminology. I began by cleaning the data and discovered that the company had over 1500 SKUs. I ran many operations, beginning with basic statistics and then using various filters, methodologies, and procedures to generate appropriate charts and graphs.

Certain conclusions were reached after obtaining the necessary charts and graphs. The graphs depicted the top product and margin analysis. The pie chart provided us with a clear view of our spending. The bar graph assisted us in obtaining product which has fair demand and contribute to high revenue.

The interpretation and recommendation are critical components of such a study.

By drawing conclusions, all the preceding processes and discoveries are made helpful to the firm. Trending and useful products, margin analysis and other vital facts were told to venture. Finally, the venture receives recommendations.

Detailed Explanation and Analysis:

In this section, we will go over the Analysis process and methodologies that were used on the data in depth.

When I first received the data, I inquired about each attribute with the owner. I attempted to comprehend the attributes so that I could proceed with the assignment. I began the procedure by cleaning up the data. I made different copies of the original data in other sheets, which allowed me to keep one original copy of the main data while performing different procedures on the other sheets.

Original copy has following column:

- Item Details: The "Item Details" column in Busy accounting software typically contains information related to the items or products being sold or purchased.

- Unit: In the "Unit" column, the unit of measurement for the item is typically mentioned. The unit column specifies the unit in which the item is sold or purchased.
  For example, if the item is a quantity of a product, the unit column may mention.

  "pieces" or "units."

- Opening Qty: "Opening Quantity" column typically contains the quantity of the items or products that were available in stock at the beginning of a financial year or at the start of the accounting period. This column is used in inventory management and is particularly helpful in keeping track of the stock level of items. By entering the opening quantity of each item, the software can calculate the closing stock of the items based on the quantity sold or purchased during the

accounting period. This information is important for businesses to manage their inventory effectively and make informed decisions about restocking, pricing, and promotions.

- Avg. Price: The average price is calculated by dividing the total cost of the item by the total quantity of the item sold or purchased. This calculation considers the cost of all the items purchased or sold, including any taxes, discounts, or other charges. The "Avg. Price" column is important in inventory management because it helps businesses to calculate the cost of goods sold (COGS) and the value of the closing stock.

- Opening Amount: “Opening Amount" column typically contains the total value or amount of the items or products that were available in stock at the beginning of a financial year or at the start of the accounting period. This column is used in inventory management and is particularly helpful in keeping track of the value of the opening stock of items.

- Closing Quantity:” Closing Quantity" column typically contains the quantity of the items or products that are available in stock at the end of a financial year or at the end of the accounting period.

- Price: The price column usually includes the cost per unit of a product or service. This column is used to record the unit price at which a customer or client purchases a product or service. The price column can appear in a variety of transaction entries, including sales invoices, purchase invoices, debit notes, credit notes, and so on.

- Closing Amt: "Closing Amount" column typically contains the total value or amount of the items or

products that are available in stock at the end of a financial year or at the end of the accounting period. This column is used in inventory management and is particularly helpful in keeping track of the value of the closing stock of items.

The following image depicts the attributes and sheets obtained from the main data.

	Item Details	Unit	Op.Qty	Avg.Price	Op.Amt.	Cl. Qty	Price	Cl. Amt.
4	Waterwell Wonder 2000LTR T/L White	Pcs.	1	6,812.33	6,812.33	0	0	0
5	VECTUS ISI D/L BLACK 1000 LTR	Pcs.	0	0	0	-9	5,070.62	-45,635.58
6	Waterwell Wonder 1000 LTR 3 L white	Pcs.	-12	3,783.76	-45,405.08	-13	3,791.92	-49,294.92
7	Zoloto Multi Br.check Valve 15mm	Pcs.	3	218.7	656.1	3	218.7	656.1
8	Zoloto Gm Check Valve [H] 20MM	Pcs.	2	355.17	710.34	2	355.17	710.34
9	Zoloto Br.multi Check Valve 50 mm	Pcs.	1	1,287.00	1,287.00	1	1,287.00	1,287.00
10	Zoloto BR. C / Ball Valve Multi 25mm	Pcs.	22	449.98	9,899.50	22	449.98	9,899.50
11	Zoloto Br Check Valve 40mm	Pcs.	4	829.26	3,317.02	4	829.26	3,317.02
12	Y54007-4" PART CIRCLE 5004	Pcs.	0	0	0	0	0	0
13	Wire Rope 6 Mm	Metre	0	0	0	0	0	0
14	White Standard Seat Cover	Pcs.	10	368.77	3,687.74	10	368.77	3,687.74
15	White Sealant 500 g	Pcs.	0	0	0	0	0	0
16	White Magnum Urinal (P)	Pcs.	0	0	0	0	0	0
17	WB "CADDIE"20X16	Pcs.	5	615	3,075.00	5	615	3,075.00
18	Waterwell Wonder 500 Ltr T/ L White	Pcs.	4	1,693.16	6,772.66	4	1,693.16	6,772.66
19	Waterwell Wonder 4 Layer	Ltr	0	0	0	0	0	0
20	Waterwell Wonder 3/L White 750ltr	Pcs.	-3	2,841.10	-8,523.30	-3	2,841.10	-8,523.30
21	Waterwell Wonder 1000 Ltr T/L yellow	Pcs.	-3	3,850.00	-11,550.00	-3	3,850.00	-11,550.00

Figure 1

All entries that were regarding inactive SKUs or had other difficulties were eliminated using an excel filter.
In the original data, there were over 1500 entries. After deleting the inactive SKUs, the entries amounted to roughly 300. For a better image, I later created a new column and put the formula.

	A	B	C	D	E	F	G	H	I	J	K
1	*Item Details*	*Unit*	*Op.Qty*	*Avg.Price*	*Op.Amt.*	*SALES QTY*	*Cl. Qty*	*Cl. Amt.*	*TOTAL SALE*	*AVERAGE SALE PRICE*	*Margin percent*
2	R/Fit Coupler 110mm	Pcs.	-43	79.57	-3,421.68	2530	-2,573.00	-237,072.60	233,650.92	92.35214229	16.06402198
3	R/Fit Plain Bend 87.5* 110mm	Pcs.	-431	109.05	-46,999.90	1915	-2,346.00	-260,516.02	213,516.12	111.4966684	2.243620731
4	R/Fit Plain Tee 110mm	Pcs.	-911	133.06	-121,221.69	985	-1,896.00	-280,740.13	159,518.44	161.9476548	21.71024712
5	R/Fit P Trap 110 X 110 mm	Pcs.	-153	188.24	-28,801.45	564	-717	-144,012.02	115,210.57	204.2740603	8.517881579
6	R/fit Bend 45.0* 110mm	Pcs.	77	58.08	4,472.52	1070	-993	-94,385.21	98,857.73	92.39040187	59.07438338
7	Plasto Tank 3 L 1000 Ltr	Pcs.	24	3,591.55	86,197.24	27	-3	-10,774.65	96,971.89	3591.551481	0.000041249084
8	G.I. Pipe 6" 150mm	Feet	-526.93	281.56	-148,360.06	120	-646.93	-198,190.56	49,830.50	415.2541667	47.48336648
9	Astm Elbow 90* 1.1/2" .	Pcs.	190	24.86	4,722.92	1244	-1,054.00	-44,791.35	49,514.27	39.80246785	60.1064676
10	Astm Brass Elbow 1/2" .	Pcs.	1,405.00	44.67	62,757.84	1100	305	13,623.59	49,134.25	44.6675	-0.005596597269
11	R/Fit Nahani Trap 110 X 75 mm	Pcs.	-713	54.18	-38,631.08	549	-1,262.00	-83,751.46	45,120.38	82.18648452	51.69155503
12	Astm Tee 1".	Pcs.	74	17.51	1,295.60	1292	-1,218.00	-40,801.09	42,096.69	32.5825774	86.07982524
13	R/Fit Door Tee 110mm	Pcs.	-335	123.5	-41,372.64	191	-526	-80,120.40	38,747.76	202.8678534	64.26546834
14	Hand Pump With Handle India Mark 2	Pcs.	-4	7,981.02	-31,924.09	4	-8	-68,495.53	36,571.44	9142.86	14.55753776
15	Vectus 4/L White 1000LTR	Pcs.	8	3,569.60	28,556.76	10	-2	-7,139.19	35,695.95	3569.595	-0.000140071716
16	R/Fit Door Bend 87.5* 110mm	Pcs.	-401	101.25	-40,602.56	262	-663	-76,101.60	35,499.04	135.4925191	33.81977193
17	CPVC Elbow 90* 1.1/2"	Pcs.	-65	107.98	-7,018.64	359	-424	-41,902.36	34,883.72	97.16913649	-10.01191286
18	Astm Coupler 1.1/2" .	Pcs.	-245	18.88	-4,626.66	1166	-1,411.00	-35,990.24	31,363.58	26.89843911	42.47054612
19	Astm Brass F.T.A. 1/2" .	Pcs.	-40	74.85	-2,993.96	363	-403	-33,986.78	30,992.82	85.37966942	14.06769462
20	Astm Elbow 90* 2" .	Pcs.	-67	52.59	-3,523.29	474	-541	-33,386.00	29,862.71	63.00149789	19.79748601
21	CPVC Ball Valve 1 1/2"	Pcs.	22	324.52	7,139.37	65	-43	-22,316.06	29,455.43	453.1604615	39.64022604

Figure 2

I started looking at the characteristics of the data mentioned below. Furthermore, I added the following columns using standard statistics and maths, such as:

• TOTAL SALES: This is the total amount generated by all products combined. Data was also sorted from descending to ascending order to show which goods contribute the most to income generating.

• AVERAGE SALE PRICE: This is calculated by dividing total sales by total sales quantity.

• MARGIN PERCENT: It refers to the profit on a specific product calculated using the formula-
Margin percent = ((Average sales price- Average price)/Average price) *100.

• SALES QUANTITY: The "Sale" column normally includes the total number of sales for each item or product within a given time. Sales are calculated by subtracting the opening quantity from the closing quantity.
Sales = closing quantity- Opening quantity

This addition provided some valuable insights into the data. I acquired the data overview given below. I made use of the count function.

Table 1

Categories	Count (rows)
Original data	1537
Cleaned data.	315

Then I began the process of extracting fundamental statistics from the data. I utilised the previously described filtered data. To obtain information, I use the Excel function feature, which is not confined to built-in functions. Here Count was used along with SUM and AVERAGE function. (Refer table 3)

Table 2

Particulars	Values
Count	315
Total units order	42471.92
Average ordered units	135
Total Sales (Main)	Rs. 26,07,318.19

I then started gathering details regarding the owner's inquiries. After that, the issue of demonstrating conclusions based on business issues was addressed.

I picked a few popular SKUs that had a high average selling price for the time. Additionally, I conducted expense analyses, which are typically not attractive to businessmen. Saving is, after all, also earning. Additionally, a rapid margin analysis is carried out, which can be further investigated to uncover any intriguing patterns that may contribute to the most effective capital investment.

Additionally, comparing total sales to sales volume revealed some insightful data. Some products have a high sales volume and make a significant contribution to overall sales revenue. This indicates that they have a reasonable demand that also helps to generate revenue.

RESULTS AND FINDINGS:

All the outcomes from the procedure are collected in this section. The outcomes (along with charts and graphs) of several processes, including using fundamental statistics to finding solutions to significant questions, are presented here in a thorough manner.
I'll go through each result in the data one by one. The following are the many procedures I carried out:

1.Basic Statistics:

Overview:

Categories	Count (rows)
Original data	1537
Cleaned data.	315

Table 3

Total sales quantity	2607318.19
Total sales	42471.92
Average margin percent	19.363
Average ordered units	135
Count of product	315

2.Expenditure analysis

I intended to conduct the study of the company's monthly expenditures, as stated in the proposal. It has two main benefits: first, it provides a clear image of how the company spends its money, allowing for future reductions or improvements; second, it offers “overhead percentage" advantage when pricing the product. The results are shown in the pie chart below.

Results are first given as a table, followed by a pie chart. Here, we discover that the pay category had the highest spending.

Table 4

CATEGORY	EXPENSE
Rent	50000
Salary	100000
Electricity	50000
Miscellaneous	70000
CCTV	10000
TOTAL	280000

Total Monthly Expenditure = Two Lakh and Eighty Thousand.
To assess the data, we will now create a pie chart.

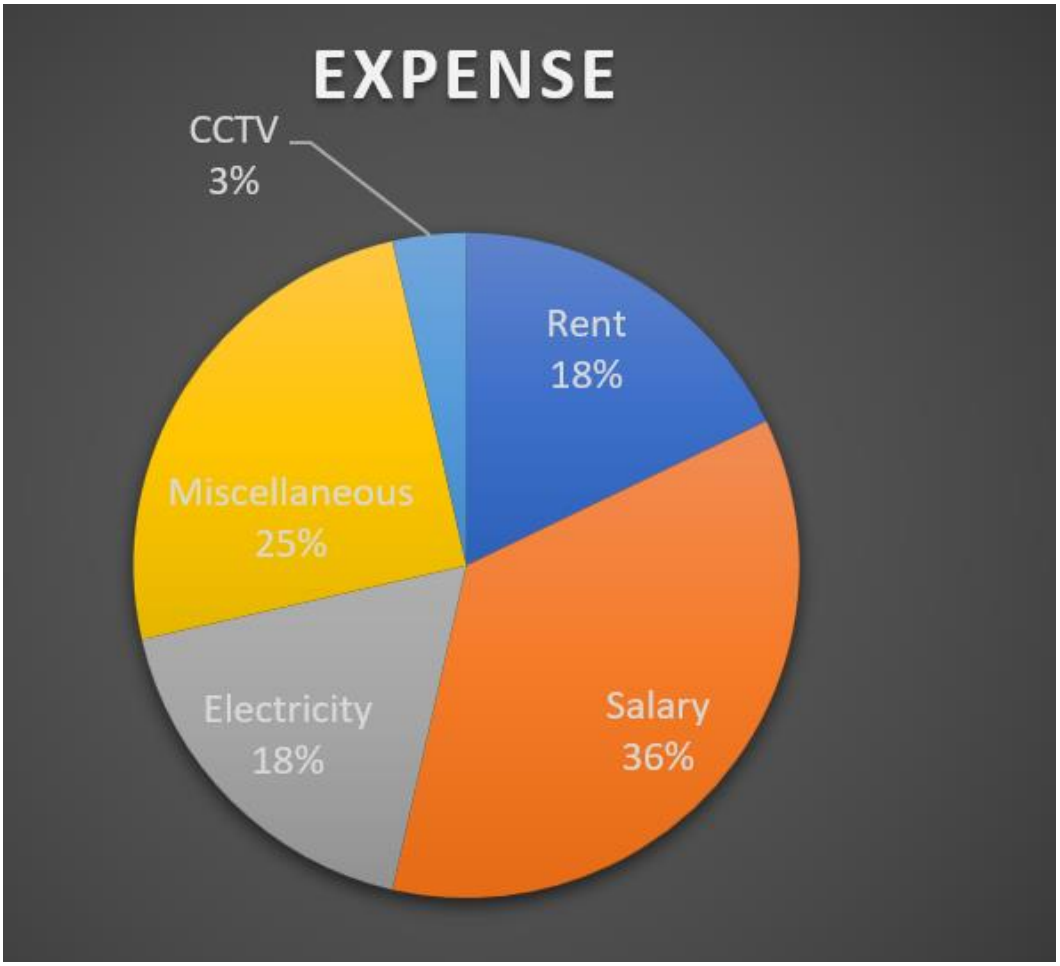

Figure 3

Findings:

a. The largest share of expenses is accounted for by salaries.

b. The largest share of expenses is accounted for by rent.

3.Top SKUs

PARETO PRINCIPLE

A Pareto chart is a visual representation of the proportional size or frequency of distinct data categories. It is founded on the Pareto principle, which posits that roughly 20% of causes account for 80% of effects. We can use this rule by identifying the 20% of the product that accounts for 80% of sales. Even though I had sorted the data according to sales. The top 12 items, which account for about 63 percent of sales overall, are listed below.

Table 5

Products	Percentage in total sales
R/Fit Coupler 110mm	13
R/Fit Plain Bend 87.5* 110mm	12
R/Fit Plain Tee 110mm	9
R/Fit P Trap 110 X 110 mm	6
R/fit Bend 45.0* 110mm	5
Plasto Tank 3 L 1000 Litre	5
G.I. Pipe 6" 150mm	3
Astm Elbow 90* 1.1/2”.	3
Astm Brass Elbow 1/2”. V	3

R/Fit Nahani Trap 110 X 75 mm	2
Astm Tee 1".	2

4.Margin analysis

As we can see, even though some cases, like Astm Tee 1"(P_ID=11), Astm Brass Elbow 1/2” (P_ID=8) have very high profit margins. The average price and average sales price do not differ significantly. This is because average sales price—which is calculated by dividing total sales by the number of items sold—depends on the quantity of each item sold.

Therefore, by examining this, we can adjust our margin to boost overall profit and revenue. Use figure no 4 Excel sheet for the product ID reference.

name	avg sale price	margin	P_id
R/Fit Coupler 110mm	92.35214229	16.06402198	1
R/Fit Plain Bend 87.5* 110mm	111.4966684	2.243620731	2
R/Fit Plain Tee 110mm	161.9476548	21.71024712	3
R/Fit P Trap 110 X 110 mm	204.2740603	8.517881579	4
R/fit Bend 45.0* 110mm	92.39040187	59.07438338	5
Plasto Tank 3 L 1000 Ltr	3591.551481	4.12491E-05	6
G.I. Pipe 6" 150mm	415.2541667	47.48336648	7
Astm Elbow 90* 1.1/2" .	39.80246785	60.1064676	8
Astm Brass Elbow 1/2" .	44.6675	-0.005596597	9
R/Fit Nahani Trap 110 X 75 mm	82.18648452	51.69155503	10
Astm Tee 1".	32.5825774	86.07982524	11
R/Fit Door Tee 110mm	202.8678534	64.26546834	12
Hand Pump With Handle India Mark	9142.86	14.55753776	13
Vectus 4/L White 1000LTR	3569.595	-0.000140072	14
R/Fit Door Bend 87.5* 110mm	135.4925191	33.81977193	15
CPVC Elbow 90* 1.1/2"	97.16913649	-10.01191286	16
Astm Coupler 1.1/2" .	26.89843911	42.47054612	17

Figure 4

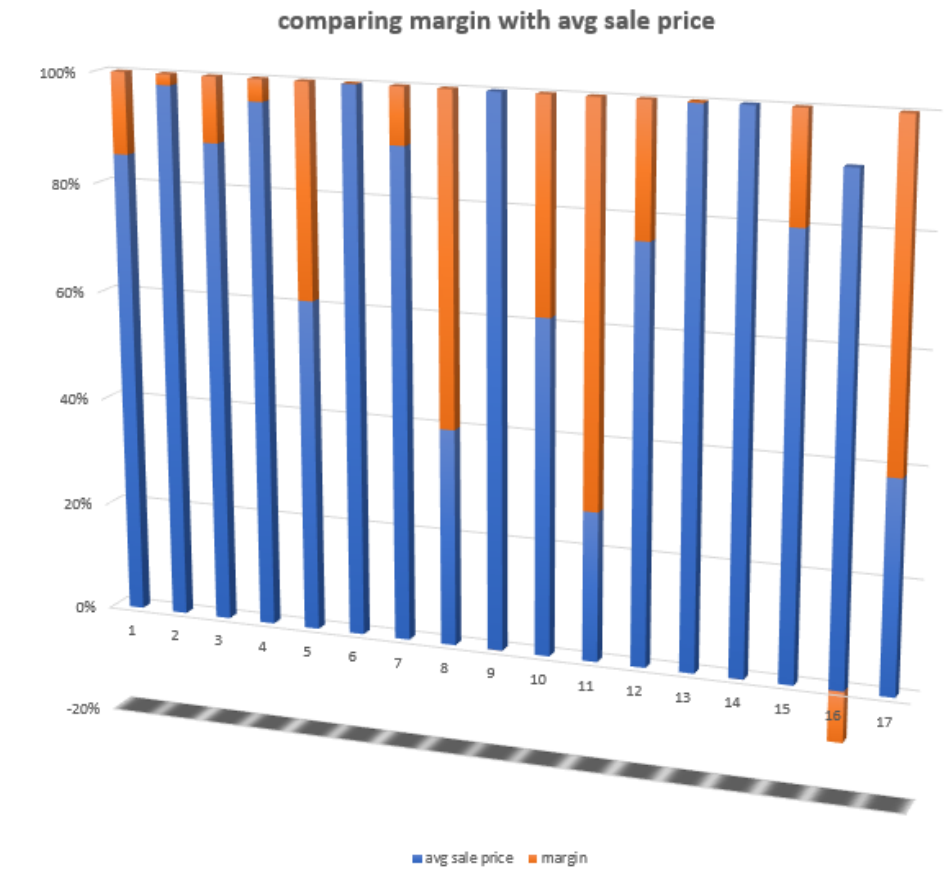

Figure 5

5.Key Product

The owner's demand was the main product. I questioned his criterion for selecting the key product. He claimed that his primary product will be one with significant sales volume, even if it doesn't have significant sales volume. I therefore built a graph of sales value vs. sales quantity using the clean data. I choose top 10 products based on the revenue generation. (Refer to table 5)

Table 6

	A	B	C	D	E
1	***Item Details***			***SALES QTY***	***TOTAL SALE***
2	R/Fit Coupler 110mm			2530	₹ 2,33,650.92
3	R/Fit Plain Bend 87.5* 110mm			1915	₹ 2,13,516.12
4	R/Fit Plain Tee 110mm			985	₹ 1,59,518.44
5	R/Fit P Trap 110 X 110 mm			564	₹ 1,15,210.57
6	R/fit Bend 45.0* 110mm			1070	₹ 98,857.73
7	Plasto Tank 3 L 1000 Ltr			27	₹ 96,971.89
8	G.I. Pipe 6" 150mm			120	₹ 49,830.50
9	Astm Elbow 90* 1.1/2" .			1244	₹ 49,514.27
10	Astm Brass Elbow 1/2" .			1100	₹ 49,134.25
11					
12					

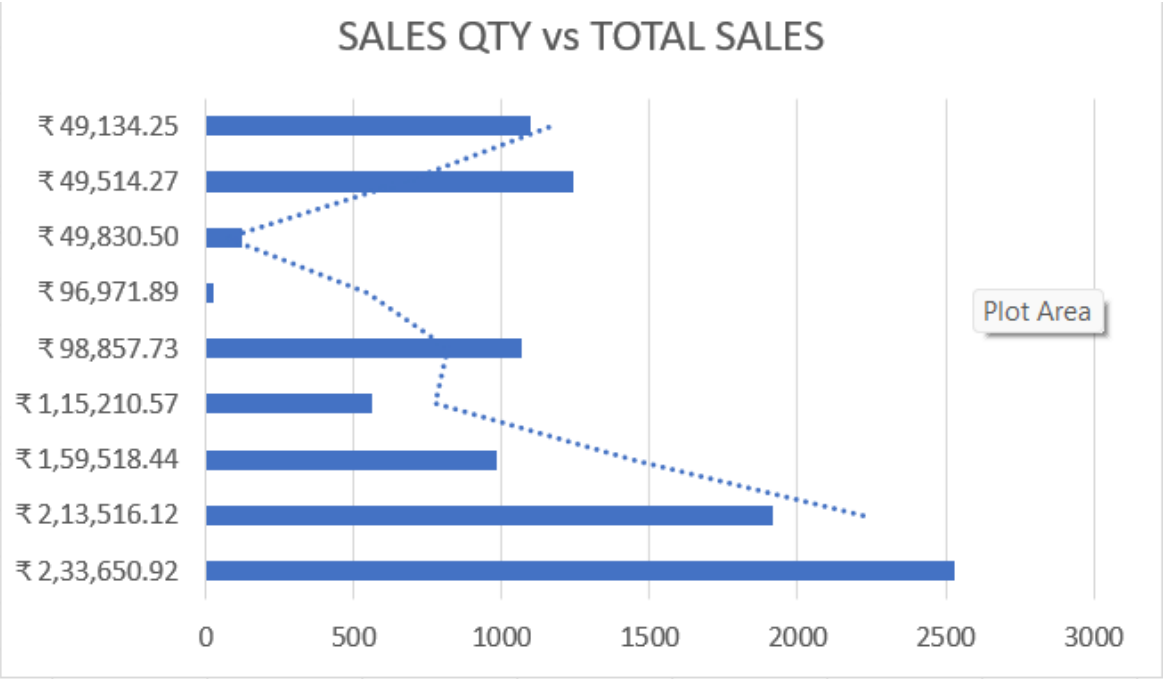

Figure 6

Findings:

a. A total of Rs. 233,650 in sales were attributed to the top SKU.

b. There are two products with above-average prices and fair sales volumes but large sales values. These may be considered for key products.

I also used moving average to further improve the data, allowing us to obtain the MA line.

This assisted us in locating the product that had an impact (the key product), which was in accordance with the owners' specifications.

Interpretation of Result and Recommendations:

The recommendations resulting from the above-mentioned investigation are presented in this section. Each study will be examined, and its conclusions and suggestions will be made one at a time.

RESULTS:

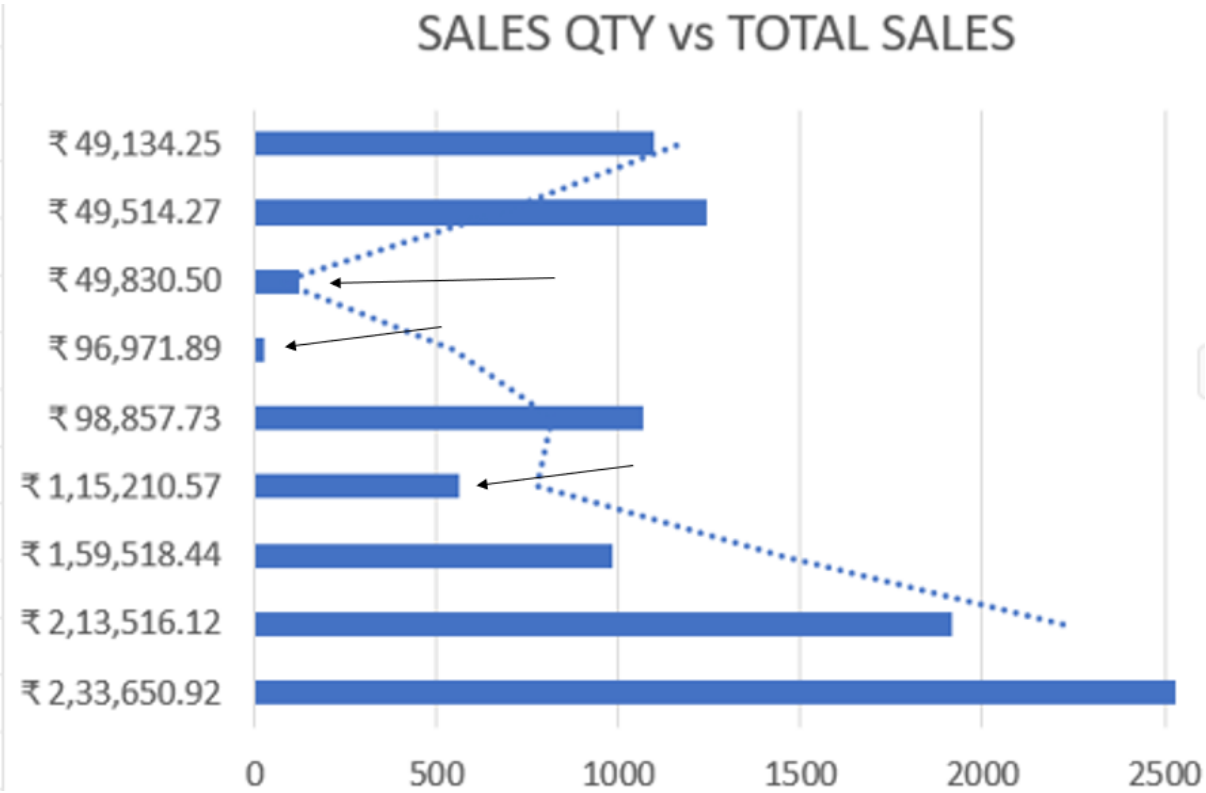

Figure 7

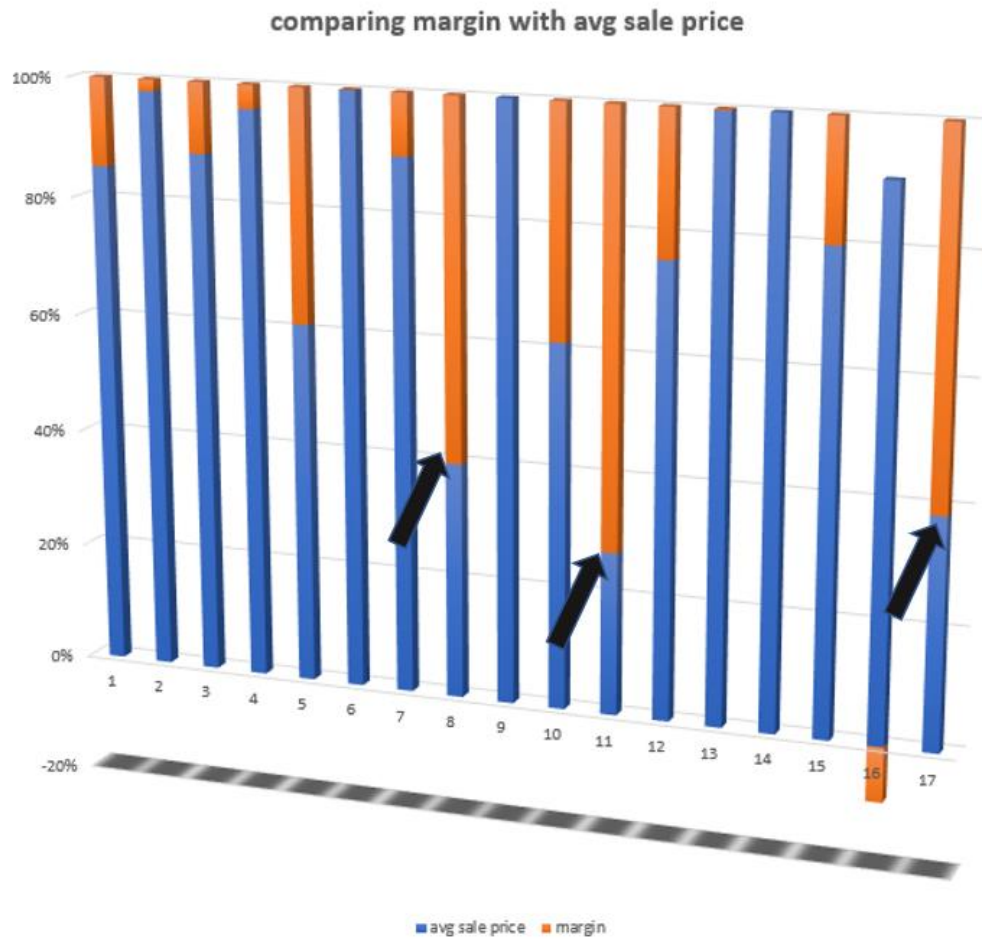

Figure 8

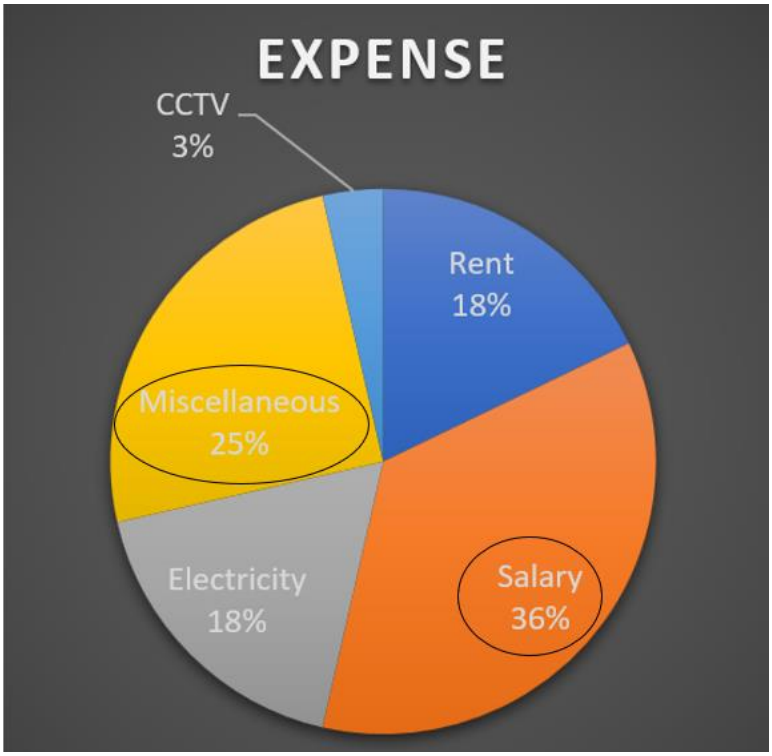

Figure 9

RESULTS	RECOMMENDATION
1.Expenditure analysis: Most expense on salary and miscellaneous stuff	We need to monitor expense and find cheaper workforce. Also, analysis is required regarding small expenditure which is at last contributing to miscellaneous stuff and has no record. (Refer figure 9)
2.Top SKUs Contribute over 63 percent of total revenue generation.	We should always know which products contribute most to revenue generation and they should always be available in stock. (Refer table 5)
3.Key Product Sales Qty vs total sales analysis bar graph depicts how 2 products have made an impact	Plasto Tank 3 L 1000 Ltr, G.I. Pipe 6" 150mm and R/Fit P Trap 110 X 110 mm have fair demand and they also contribute hugely to revenue. These products are basically very important product for shop. (Refer figure 7)
4. Margin Analysis	Astm Tee 1”,Astm Brass Elbow 1/2” and Astm Coupler 1.1/2" have very high profit margins. We can adjust our margin for such products to boost overall profit and revenue.(Refer figure 8)