FINAL SUBMISSION

PROJECT TITLE –

Inventory Management in Kirana Stores

By-

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EXECUTIVE SUMMARY –

India's retail market is the fourth biggest retail market in the world projected to increase to almost 1.3 trillion dollars by 2025. India's retail sector is highly unorganised with brick-and-mortar stores accounting for 88 % of the sector. It has more than thirteen million Kirana and neighbourhood stores. This sector has grown substantially over the years and currently accounts for almost 11% of India's GDP and 8% of its entire employment.

Retailing includes all the activities involved in selling goods or services to the final customers for personal, non-business use. The Indian retail is dotted by traditionally marketplaces called bazaars or haats comprises of numerous small and large shops, selling different or similar merchandise which together make up the unorganised retail sector.

Since the advent of E-commerce, the sector has become extremely competitive and Kirana businesses are losing customers as more and more are shifting to online shopping due to massive discounts given by e-commerce giants and legacy issues surrounding Kirana stores. Some of the major legacy challenges include inventory management, shop infrastructure and adoption to new technologies like digital payments etc.

However, during covid pandemic almost everybody relied on local Kirana stores which has brought out the hidden potential in them. They have proven to be extremely durable and have survived large retail chains, e-commerce, covid-19 and other challenges as well. They have shown increased flexibility since the pandemic welcoming technology such as digital payments suggesting their readiness to adapt to changing times.

DETAILED EXPLANATION OF ANALYSIS PROCESS –

The problem-solving approach involves first collecting the required monthly sales data, cleaning it, analysing the data to find average monthly sales per product, maintaining inventory ledger to keep track of stock held and daily depletions in stock. Possessing a high amount of inventory for a long time is usually not a good idea. That's because of the challenges it presents, including storage costs, spoilage costs, and the threat of obsolescence. we utilise the data to map an inventory management plan to help the Kirana owner purchase in bulk increasing purchasing power and reducing cost price to the Kirana owner.

- To achieve our task of calculating the average monthly sales per product we will first calculate the average daily sales of each product. To do so, we sum up all the sales over the time period of our data collection and divide it by the number of days for which our data was collected. This will give us the average daily sale for each product in our inventory. We can use the pivot table feature of MS Excel for this purpose. Then we simply multiply by the number of days in the month to get our average monthly sales per product.

- To achieve our task of calculating the average monthly sales per category we will use the concept of grouping and group products according to the sectors to which they belong and then find an average monthly sale of that group by following the same steps as we did while calculating the average monthly sales per product. Again, we can use pivot tables and mathematical functions available in MS Excel for our tasks.

- To achieve our task of finding the top 5 products according to sale volumes, we will sum over the sales of each product over the number of days for which we have collected our data and sort the summed sales in descending order and select the first 5 products. Both pivot tables and mathematical functions can be used for this task.

- To achieve our task of finding the top 5 products delivering maximum profits we will simply subtract the cost price from the selling price of the product to find out average profit per item sold and then multiply it with the monthly sales of that product to find out the total profit generated

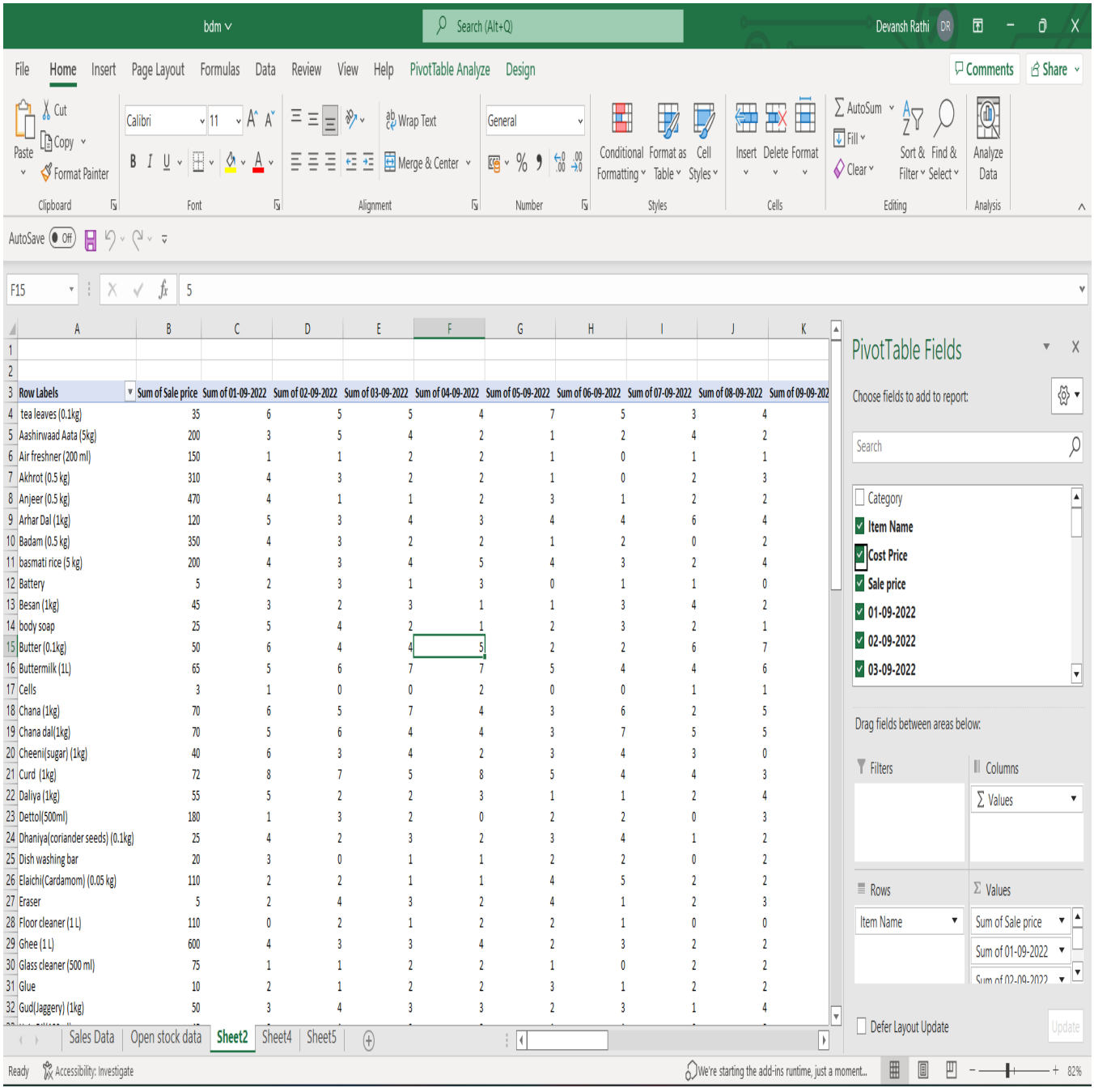
per month by each product and then sort these values in descending order to get our top 5 products delivering maximum profits. We will first use mathematical functions to create a profit per item sold column and then use pivot tables to get our top 5 products.

- The primary reason retailers carry excess inventory is because they do not accurately estimate customers' true demand for their products. To map out an efficient inventory management plan we will make use of the average monthly sales per product obtained from the data and opening stock for the month. The initial thing to do while maintaining Kirana store stocks is setting par levels of your products, which are the minimum quantity of goods that should be in the store at all times. By maintaining stocks at par level, we can better understand when to order more inventory when stock drops below that predetermined level, which will differ from product to product. This helps us always remain efficient with your stock ordering. Also, by keeping inventory at par levels, Kirana business owners can eliminate excess stock problems and prevent a lack of in-demand products.

- We can check if our kirana store sales follows 'Pareto Principle' and if the principle is followed then only 20% of our items will account for 80% of our profit. We can prioritise the inventory of our top profit generating SKUs. Reducing inventory of low priority products will help free up space and credit for our higher priority products.

RESULTS AND FINDINGS –

- **Pivot table for our sales data**
  The pivot table for our sales data contains items sold by our Kirana store and the daily sales data for the entire month. We use the pivot table to set filters and view selected items or sales over selected time and perform analysis on them.



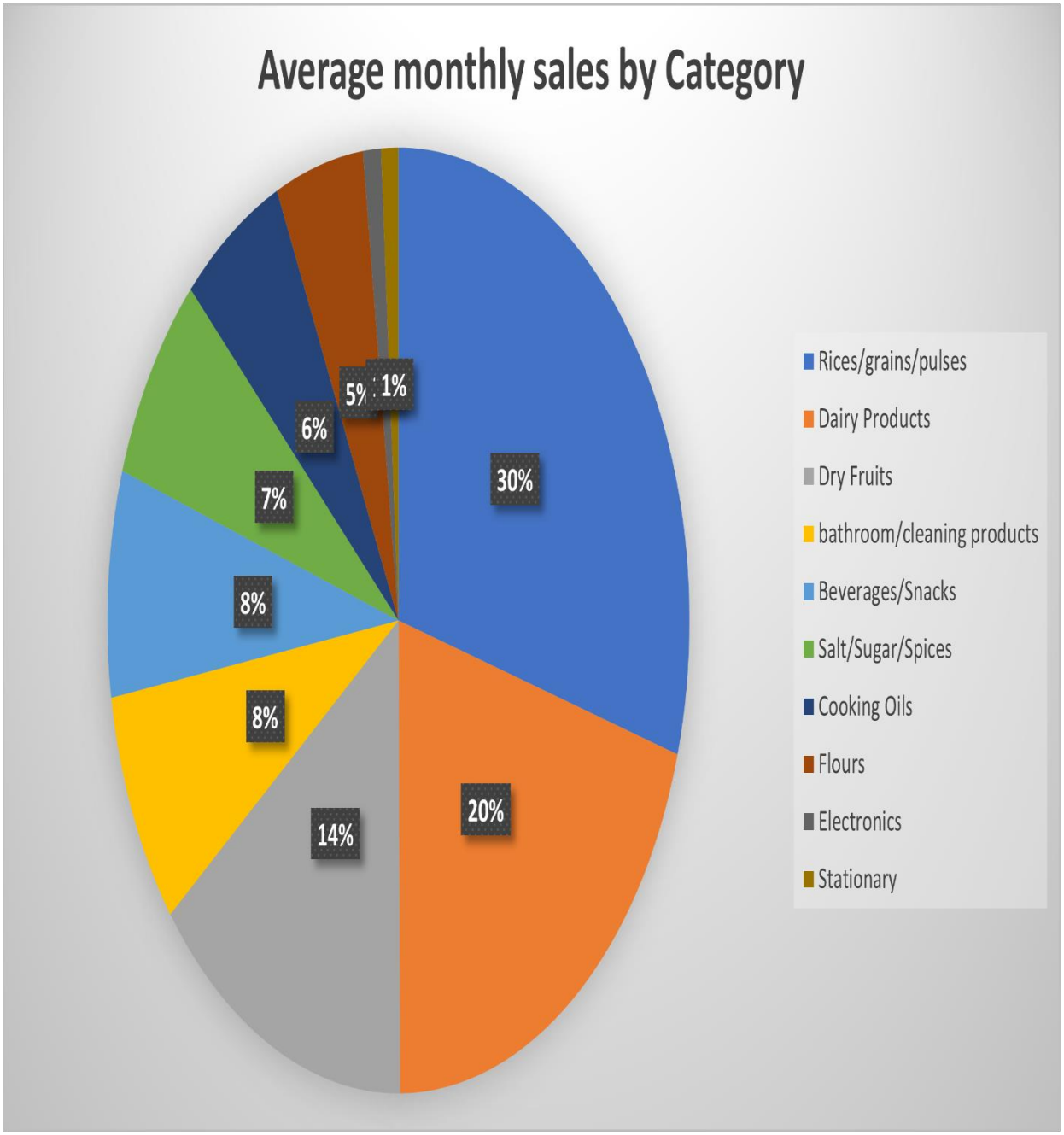
Row Labels	Sum of Sale price	Sum of 01-09-2022	Sum of 02-09-2022	Sum of 03-09-2022	Sum of 04-09-2022	Sum of 05-09-2022	Sum of 06-09-2022	Sum of 07-09-2022	Sum of 08-09-2022	Sum of 09-09-202
tea leaves (0.1kg)	35	6	5	5	4	7	5	3	4	
Aashirwaad Aata (5kg)	200	3	5	4	2	1	2	4	2	
Air freshner (200 ml)	150	1	1	2	2	1	0	1	1	
Akhrot (0.5 kg)	310	4	3	2	2	1	0	2	3	
Anjeer (0.5 kg)	470	4	1	1	2	3	1	2	2	
Arhar Dal (1kg)	120	5	3	4	3	4	4	6	4	
Badam (0.5 kg)	350	4	3	2	2	1	2	0	2	
basmati rice (5 kg)	200	4	3	4	5	4	3	2	4	
Battery	5	2	3	1	3	0	1	1	0	
Besan (1kg)	45	3	2	3	1	1	3	4	2	
body soap	25	5	4	2	1	2	3	2	1	
Butter (0.1kg)	50	6	4	4	5	2	2	6	7	
Buttermilk (1L)	65	5	6	7	7	5	4	4	6	
Cells	3	1	0	0	2	0	0	1	1	
Chana (1kg)	70	6	5	7	4	3	6	2	5	
Chana dal(1kg)	70	5	6	4	4	3	7	5	5	
Cheeni(sugar) (1kg)	40	6	3	4	2	3	4	3	0	
Curd (1kg)	72	8	7	5	8	5	4	4	3	
Daliya (1kg)	55	5	2	2	3	1	1	2	4	
Dettol(500ml)	180	1	3	2	0	2	2	0	3	
Dhaniya(coriander seeds) (0.1kg)	25	4	2	3	2	3	4	1	2	
Dish washing bar	20	3	0	1	1	2	2	0	2	
Elaichi(Cardamom) (0.05 kg)	110	2	2	1	1	4	5	2	2	
Eraser	5	2	4	3	2	4	1	2	3	
Floor cleaner (1 L)	110	0	2	1	2	2	1	0	0	
Ghee (1 L)	600	4	3	3	4	2	3	2	2	
Glass cleaner (500 ml)	75	1	1	2	2	1	0	2	2	
Glue	10	2	1	2	2	3	1	2	2	
Gud(Jaggery) (1kg)	50	3	4	3	3	2	3	1	4	

- **Average Monthly sales by category**

  Vlookup helps us search for items belonging to a particular category in the alphabetically ordered pivot table. Then we use sum function to sum over the monthly sales of items in a category to get the average monthly sales of that category.

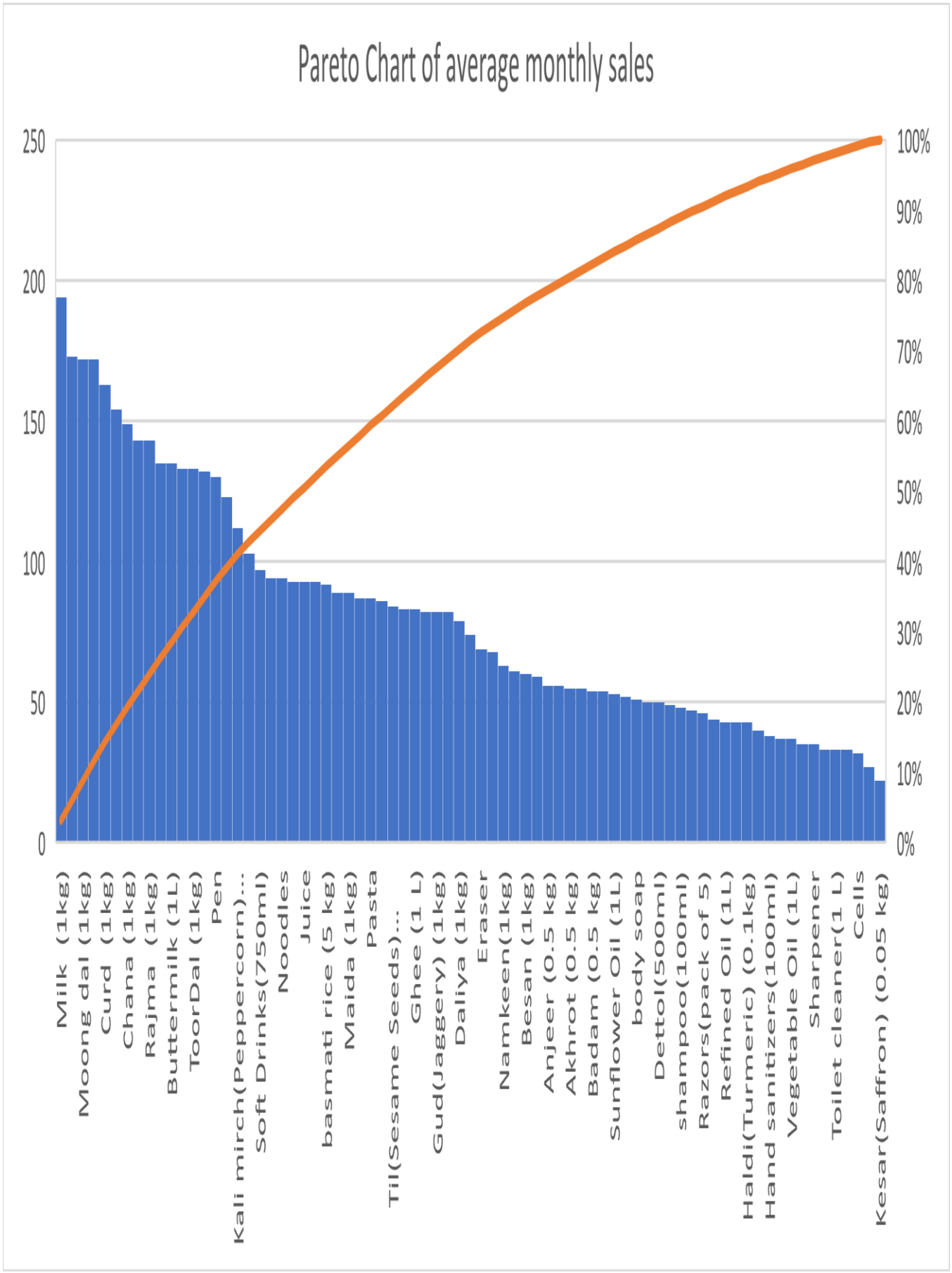
Category	avg monthly sales
Rices/grains/pulses	184420
Flours	30605
Salt/Sugar/Spices	45038
Dairy Products	126787
Dry Fruits	89955
Cooking Oils	36192
Stationary	5925
Electronics	6201
Beverages/Snacks	48246
bathroom/cleaning products	50240

A pie chart depicting the average monthly sales by categories shows that almost 50 percent of monthly sales come from only two categories namely Rices/grains/pulses and dairy products.

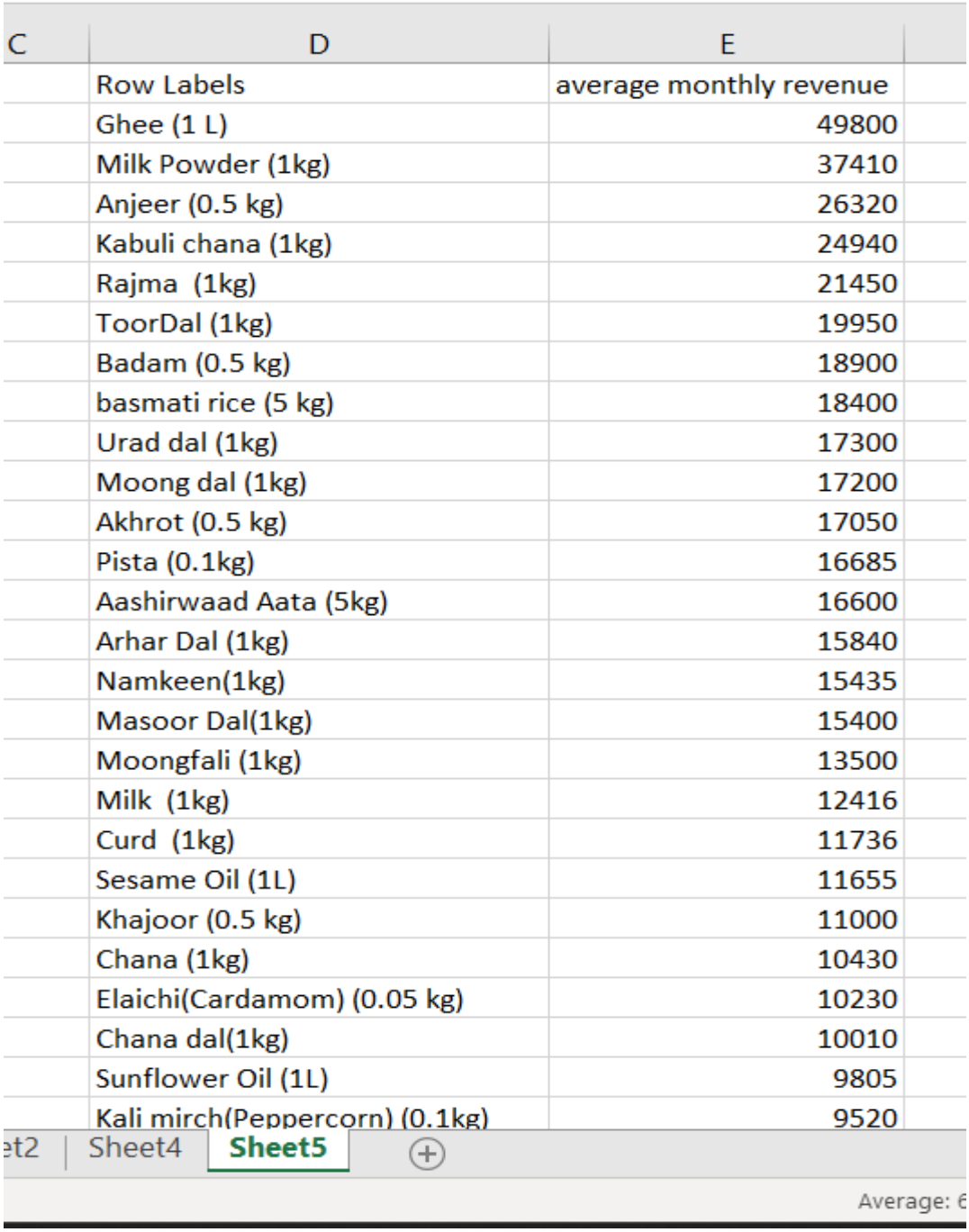


- **Top 5 products according to sales volume**
  Pictorial representation of our average monthly sales data tells us that the top 5 products according to sales volume are:
  Milk
  Moong Dal
  Curd
  Chana Dal
  Rajma

Row Labels	avg monthly sales
Milk (1kg)	194
Urad dal (1kg)	173
Kabuli chana (1kg)	172
Moong dal (1kg)	172
Curd (1kg)	163
Masoor Dal(1kg)	154
Chana (1kg)	149
Chana dal(1kg)	143
Rajma (1kg)	143
Buttermilk (1L)	135
Moongfali (1kg)	135
Butter (0.1kg)	133
ToorDal (1kg)	133
Arhar Dal (1kg)	132
Pen	130
tea leaves (0.1kg)	123
Kali mirch(Peppercorn) (0.1kg)	112
Jeera(cumin) (0.1kg)	103
Soft Drinks(750ml)	97
Dhaniya(coriander seeds) (0.1kg)	94
Noodles	94
Elaichi(Cardamom) (0.05 kg)	93
Juice	93
Methi(Fenugreek Seeds) (0.1kg)	93
basmati rice (5 kg)	92
Maida (1kg)	89


Pareto Chart of average monthly sales
250
200
150
100
50
0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Milk (1kg)
Moong dal (1kg)
Curd (1kg)
Chana (1kg)
Rajma (1kg)
Buttermilk (1L)
ToorDal (1kg)
Pen
Kali mirch(Peppercorn)...
Soft Drinks(750ml)
Noodles
Juice
basmati rice (5 kg)
Maida (1kg)
Pasta
Til(Sesame Seeds)...
Ghee (1 L)
Gud(Jaggery) (1kg)
Daliya (1kg)
Eraser
Namkeen(1kg)
Besan (1kg)
Anjeer (0.5 kg)
Akhrot (0.5 kg)
Badam (0.5 kg)
Sunflower Oil (1L)
body soap
Dettol(500ml)
shampoo(100ml)
Razors(pack of 5)
Refined Oil (1L)
Haldi(Turmeric) (0.1kg)
Hand sanitizers(100ml)
Vegetable Oil (1L)
Sharpener
Toilet cleaner(1 L)
Cells
Kesar(Saffron) (0.05 kg)

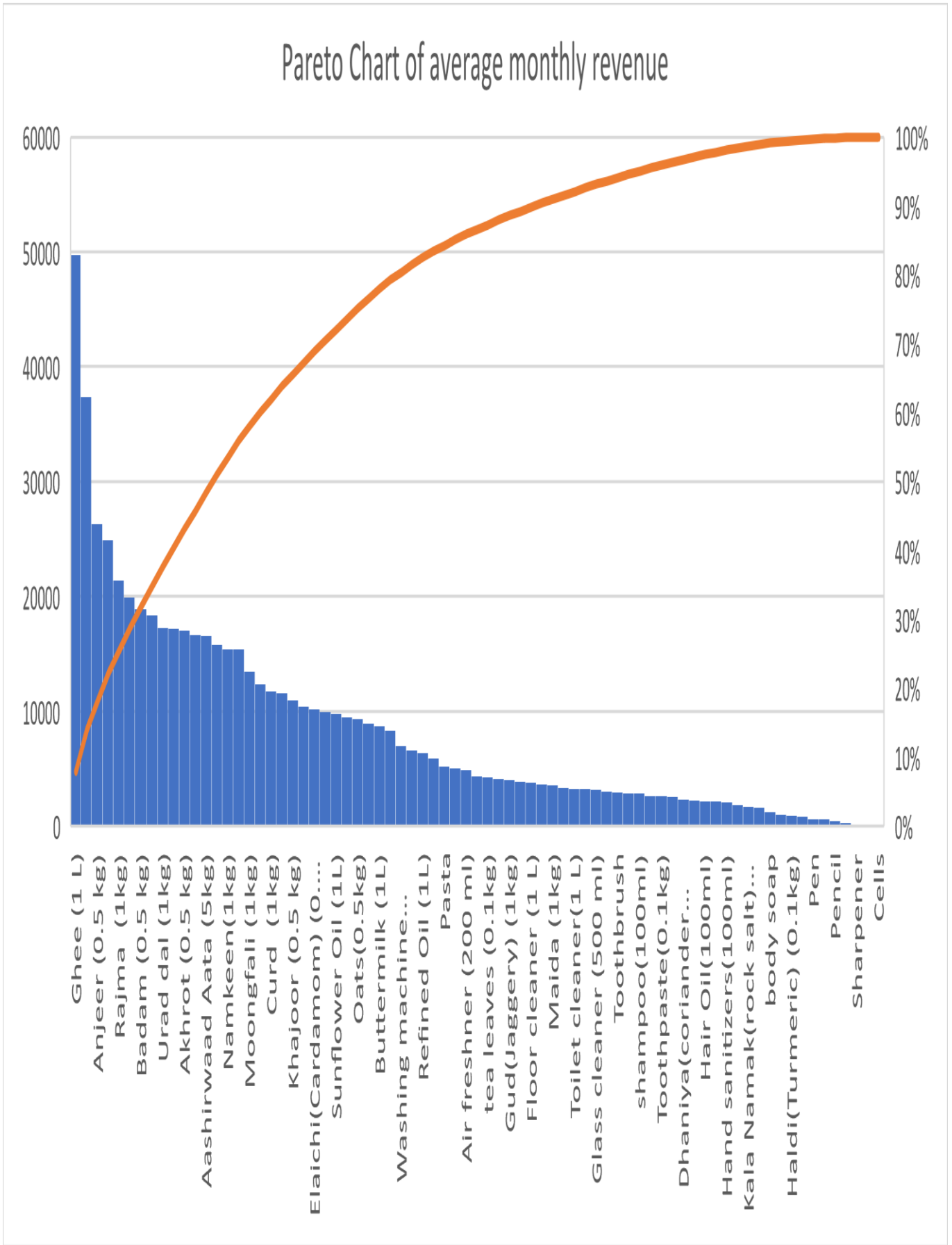
- **Top 5 products according to monthly revenue**
  Pictorial representation of our average monthly revenue data tells us that the top 5 products according to monthly revenue are:
  Ghee
  Anjeer
  Rajma
  Badam
  Urad Dal



C	D	E
	Row Labels	average monthly revenue
	Ghee (1 L)	49800
	Milk Powder (1kg)	37410
	Anjeer (0.5 kg)	26320
	Kabuli chana (1kg)	24940
	Rajma (1kg)	21450
	ToorDal (1kg)	19950
	Badam (0.5 kg)	18900
	basmati rice (5 kg)	18400
	Urad dal (1kg)	17300
	Moong dal (1kg)	17200
	Akhrot (0.5 kg)	17050
	Pista (0.1kg)	16685
	Aashirwaad Aata (5kg)	16600
	Arhar Dal (1kg)	15840
	Namkeen(1kg)	15435
	Masoor Dal(1kg)	15400
	Moongfali (1kg)	13500
	Milk (1kg)	12416
	Curd (1kg)	11736
	Sesame Oil (1L)	11655
	Khajoor (0.5 kg)	11000
	Chana (1kg)	10430
	Elaichi(Cardamom) (0.05 kg)	10230
	Chana dal(1kg)	10010
	Sunflower Oil (1L)	9805
	Kali mirch(Peppercorn) (0.1kg)	9520

et2 | Sheet4 | Sheet5 ⊕

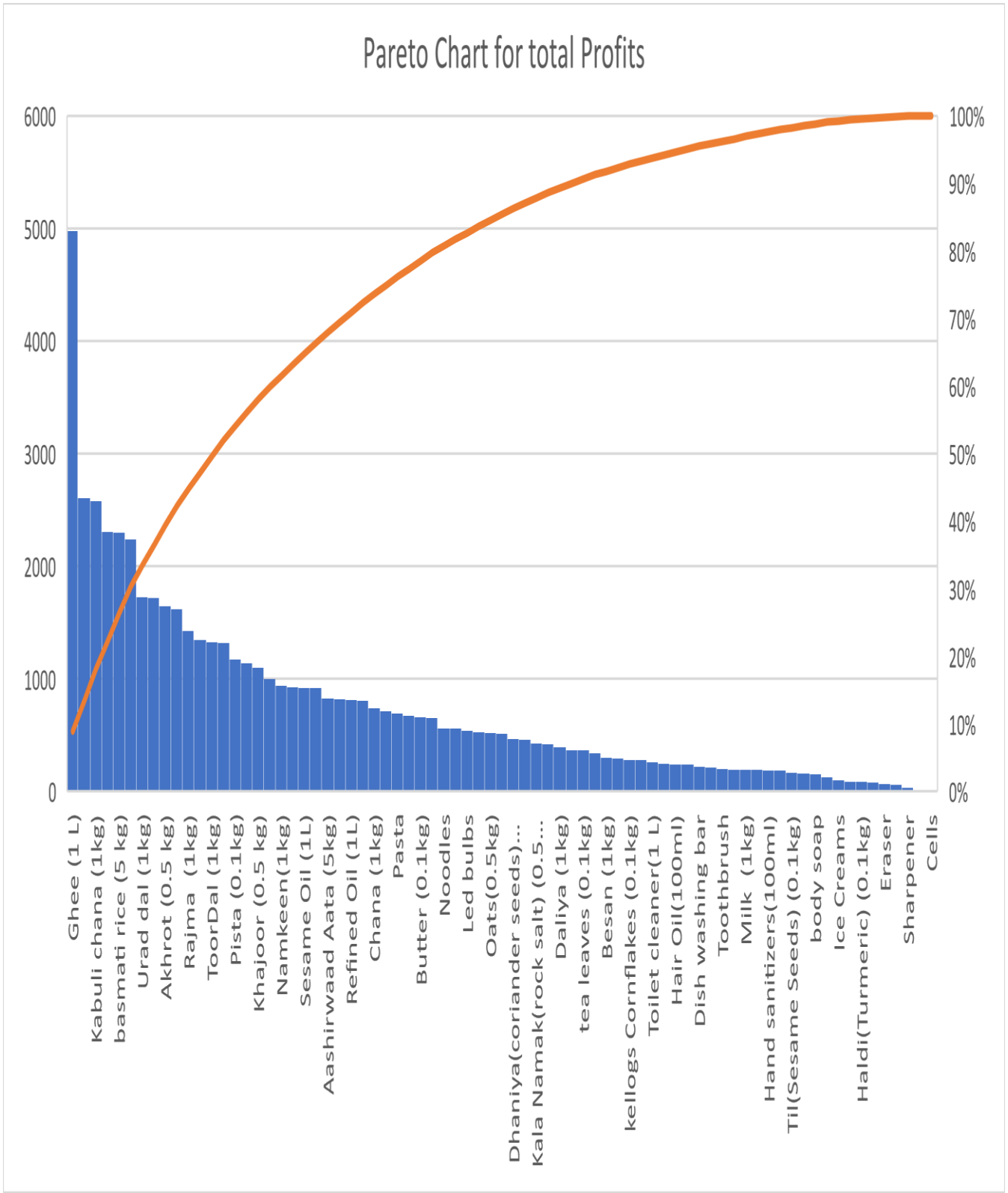
Average: 6


Pareto Chart of average monthly revenue
60000
50000
40000
30000
20000
10000
0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Ghee (1 L)
Anjeer (0.5 kg)
Rajma (1kg)
Badam (0.5 kg)
Urad dal (1kg)
Akhrot (0.5 kg)
Aashirwaad Aata (5kg)
Namkeen(1kg)
Moongfali (1kg)
Curd (1kg)
Khajoor (0.5 kg)
Elaichi(Cardamom) (0....
Sunflower Oil (1L)
Oats(0.5kg)
Buttermilk (1L)
Washing machine...
Refined Oil (1L)
Pasta
Air freshner (200 ml)
tea leaves (0.1kg)
Gud(Jaggery) (1kg)
Floor cleaner (1 L)
Maida (1kg)
Toilet cleaner(1 L)
Glass cleaner (500 ml)
Toothbrush
shampoo(100ml)
Toothpaste(0.1kg)
Dhaniya(coriander...
Hair Oil(100ml)
Hand sanitizers(100ml)
Kala Namak(rock salt)...
body soap
Haldi(Turmeric) (0.1kg)
Pen
Pencil
Sharpener
Cells

- **Top 5 products according to monthly profits**
  Pictorial representation of our average monthly sales data tells us that the top 5 products according to monthly profits are:
  Ghee
  Kabuli Chana
  Basmati Rice
  Urad Dal
  Akhrot

1	Row Labels	total profit
2	Ghee (1 L)	4980
3	Milk Powder (1kg)	2610
4	Kabuli chana (1kg)	2580
5	Masoor Dal(1kg)	2310
6	basmati rice (5 kg)	2300
7	Anjeer (0.5 kg)	2240
8	Urad dal (1kg)	1730
9	Moong dal (1kg)	1720
10	Akhrot (0.5 kg)	1650
11	Badam (0.5 kg)	1620
12	Rajma (1kg)	1430
13	Moongfali (1kg)	1350
14	ToorDal (1kg)	1330
15	Arhar Dal (1kg)	1320
16	Pista (0.1kg)	1175
17	Chana dal(1kg)	1144
18	Khajoor (0.5 kg)	1100
19	Dettol(500ml)	1000
20	Namkeen(1kg)	945
21	Elaichi(Cardamom) (0.05 kg)	930
22	Sesame Oil (1L)	925
23	Vegetable Oil (1L)	925
24	Aashirwaad Aata (5kg)	830
25	Gud(Jaggery) (1kg)	820
26	Refined Oil (1L)	817
27	Washing machine detergent (1kg)	810

Sales Data | Open stock data | Sheet2


Pareto Chart for total Profits
6000
5000
4000
3000
2000
1000
0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Ghee (1 L)
Kabuli chana (1kg)
basmati rice (5 kg)
Urad dal (1kg)
Akhrot (0.5 kg)
Rajma (1kg)
ToorDal (1kg)
Pista (0.1kg)
Khajoor (0.5 kg)
Namkeen(1kg)
Sesame Oil (1L)
Aashirwaad Aata (5kg)
Refined Oil (1L)
Chana (1kg)
Pasta
Butter (0.1kg)
Noodles
Led bulbs
Oats(0.5kg)
Dhaniya(coriander seeds)...
Kala Namak(rock salt) (0.5...
Daliya (1kg)
tea leaves (0.1kg)
Besan (1kg)
kellogs Cornflakes (0.1kg)
Toilet cleaner(1 L)
Hair Oil(100ml)
Dish washing bar
Toothbrush
Milk (1kg)
Hand sanitizers(100ml)
Til(Sesame Seeds) (0.1kg)
body soap
Ice Creams
Haldi(Turmeric) (0.1kg)
Eraser
Sharpener
Cells

INTERPRETATION OF RESULTS AND RECOMMENDATION–

Our results give us some important insights and useful information which can help us to increase the profitability of our Kirana store.

- **Average monthly sales by category using VLOOKUP function**

  The categories arranged according to decreasing order of monthly sales are:
  Rices/grains/pulses
  Dairy Products
  Dry Fruits
  Bathroom/cleaning products
  Beverages/Snacks
  Salt/Sugar/Spices
  Cooking Oils
  Flours
  Electronics
  Stationary`

  The Kirana store should focus more on the categories that are driving our sales more and ensure proper inventory is maintained in those categories. Since winters are near the demand for dry fruits is also likely to increase in coming months.

- **Top 5 products according to sales volume**

  Products with high sale volumes are the items that bring customers to the store. Top 5 products according to sales volume are:
  Milk
  Moong Dal
  Curd
  Chana Dal
  Rajma
  So, The Kirana store should ensure that pulses being the highest sold category of items especially Moong Dal and Chana Dal and Rajma are always in inventory in adequate amounts as they are always high in demand.

For dairy products such as milk and curd which expire quickly, they should ensure daily replenishment of inventory and at the same time not keep excess inventory to both prevent wastage and keep our customers satisfied.

- **Top 5 products according to monthly revenue and monthly profits**

  The top 5 products according to monthly revenue are:
  Ghee
  Anjeer
  Rajma
  Badam
  Urad Dal

  top 5 products according to monthly profits are:
  Ghee
  Kabuli Chana
  Basmati Rice
  Urad Dal
  Akhrot

  These are items that are sold mostly in the first week of the month as monthly rations and hence the kirana store should keep a healthy stock at the beginning of the month and restock only near the end of the month.

- **Other useful findings**
  According to the data weekends turn out to be highly engaging days in terms of sales and customer engagement. Buyers prefer weekends for shopping, and at weekends store earns higher profit rates than weekdays.

  Similarly, Festivals and national holidays also bring more customers. So, always make your Kirana store available with the updated inventory and essential items at the weekends to maximise the sales and profit margins.

  Also, Kirana stores offer small credits to multiple individuals making it difficult to keep track of them. Using digital payments and bookkeeping more frequently can help in managing and tracking credits.