Driving Growth: A Data-Centric Approach for ‘MK Tea Stall’

A Final report for the BDM capstone Project

Submitted by

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Executive Summary

MK Tea stall is well-established snacks shop near CHARUSAT University, Anand. The business has grown to become a key player in the business environment in the near by village by providing valuable customer service and various range of products.

The project will entail an in-depth analysis of the sales data along with fluctuation in purchasing pattern over the course of a month. A pivotal aspect of this endeavor will involve identifying gaps and areas for improvement within the current operational strategy. Identifying the gaps and areas of improvement in the current strategy will be a critical aspect of this project. The report will also include in-depth analysis of the sales data to identify patterns and trends in the sales. Learning about the customer's behavioral patterns and the right sales pattern can be inferred through the project.

Through a systematic examination of both overperforming and underperforming products utilizing Python's analytical capabilities, actionable recommendations, refined marketing strategies, and data-driven decisions aimed at optimizing revenue generation can be meticulously formulated, enabling us to understand and formulate marketing strategies to improve net sales leading to an increase in net profit and getting the right inventory . After a thorough analysis, the project report will focus on recommendations to combat the problem areas identified above.

Detailed Explanation of Analysis Process/Method

The dedicated personnel at MK Tea Stall have diligently collected and meticulously organized a wealth of data, storing it in a designated folder for analysis. This comprehensive dataset encompasses sales records, waste and demand data, and monthly expenditure details, meticulously compiled over the span of one month, from 01-March-2024 to 31-March-2024. Daily collection methods involved manual inquiries to ascertain specific requirements, albeit acknowledging the possibility of human errors that may have occurred during data collection.

Across the collection period, three distinct datasets emerged:

1. Sales Data: This dataset encapsulates the day-to-day sales figures, providing insights into the quantity and revenue generated from product sales.

2. Waste and Demand Data: Reflecting the total number of products wasted or falling short each day, this dataset serves as a crucial indicator for inventory management optimization. Additionally, it offers insights into potential revenue losses and aids in understanding inventory-related challenges.

3. Monthly Expenditure Data: Detailing the expenses incurred over the month, this dataset complements the sales and waste data, providing a holistic view of the business's financial landscape.

Utilizing Python libraries and Jupyter Notebook, an exhaustive analysis was conducted on these datasets. Descriptive analytics provided foundational insights, while preprocessing techniques were employed to handle missing and unexpected values, ensuring data integrity.

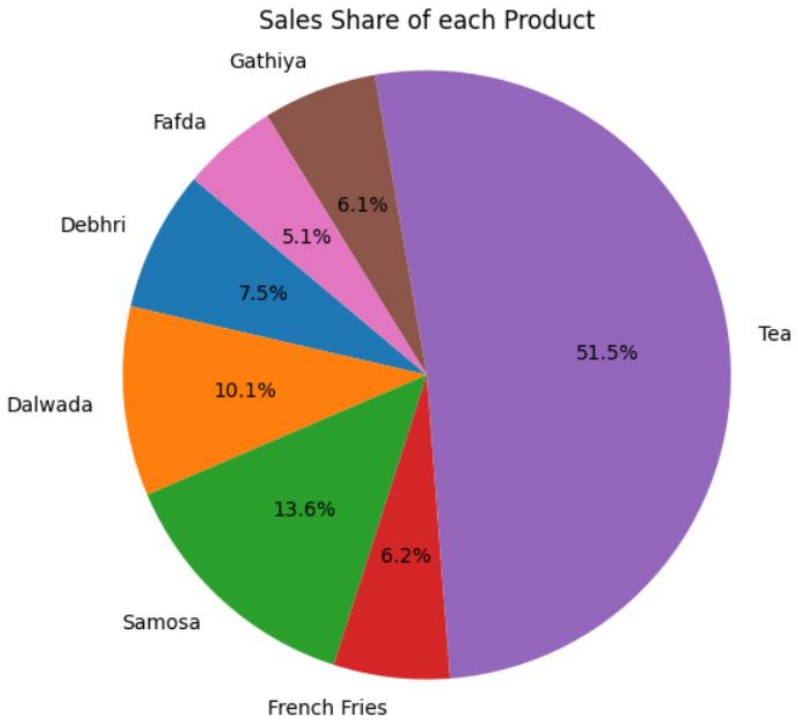
Visualizations such as pie charts, line charts, and bar charts facilitated the interpretation of sales data, revealing daily product sales trends, total product quantities sold, and overall revenue generation. Furthermore, a revenue dataset was constructed, leveraging product prices and sales data to predict daily product sales and discern monthly and daily sales trends.

Similar methodologies were applied to analyze the waste and demand dataset, unveiling patterns of product wastage, sales, and shortages. These insights not only shed light on customer purchasing behaviors but also facilitated individual product analyses to optimize inventory management strategies. Through meticulous examination and interpretation of these datasets, valuable insights were gleaned to inform strategic decision-making and drive business growth.

Results and Findings

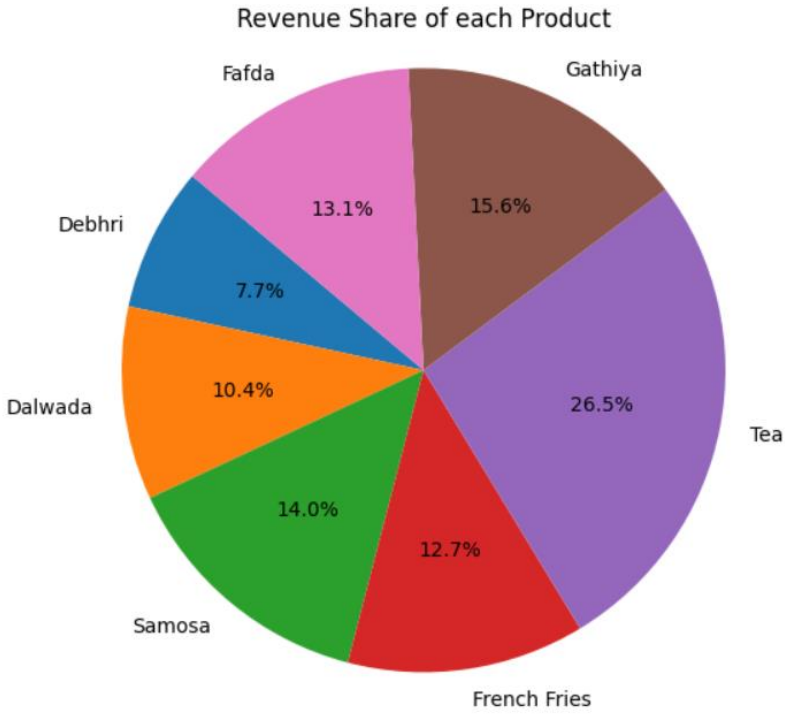
1. Relation between Sales and Revenue Shares-

By strategically analyzing top selling products, businesses can gain a competitive edge. Analyzing revenue drivers, customer preferences, and market trends empowers us to optimize product offerings, refine marketing strategies, and ultimately achieve sustainable growth.



Analysis of shares of products sold throughout the month was done. Pie-chart being the perfect graphical representation to show the percent of total products sold is used. The graphical representation shows that –

- Percent Share of Tea was more than 50%.
- Samosa and Dalwada are second and third highest selling product.
- Only Three products constituted around 75% sales of products.



Analysis of revenue generated through out the month is visualized using pie-chart. The ananlysis shows that-

- Tea contributed about 26.5% of revenue generated.
- Gathiya, Fafda, French Fries and Samosa had almost same amount of share in the revenue.

Even though products like Tea and Samosa are high selling products, they does not show a much significant contribution in generating revenue. Products like Gathiya and Fafda even though are being sold less but show a high contribution in generating revenue.

A significant rise in selling of Gathiya and Fafda can lead to increase in income and rising the prices of Tea and Samosa can also help in increasing the profits.

Gathiya and French Fries's dominance highlights its essential role in driving revenue generation. Its versatility and widespread purchase across the entire month justify the substantial investment needed to secure optimal supply. Understanding their centrality empowers informed decision-making in areas such as:

- Supplier Negotiations: Leveraging bulk purchase agreements and strategic partnerships can potentially secure favorable pricing and ensure consistent supply of this critical resource.

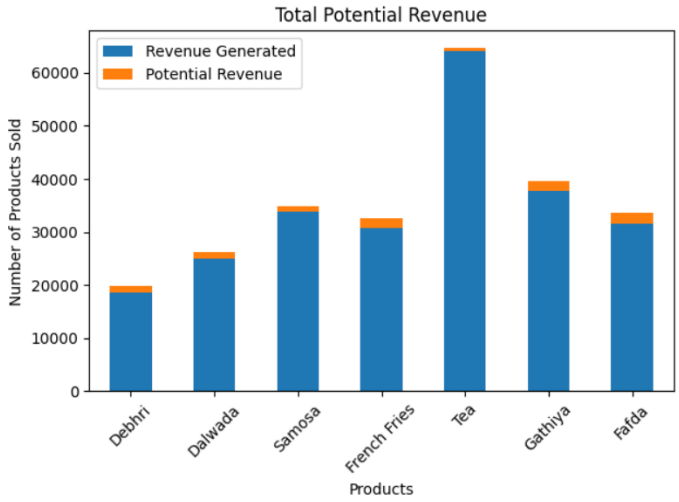
- Waste Reduction: Implementing process optimization measures to minimize wastage across production lines and sales can lead to significant cost savings without compromising quality.

2. Total Potential Revenue –

Total Potential Revenue is the revenue calculated by adding up the revenue that could have been generated either from waste particulars or by fulfilling the demand and avoiding shortages.

	Revenue Generated	Potential Revenue	Total Potential Revenue
Debhri	18620	1300	19920
Dalwada	25020	1260	26280
Samosa	33820	960	34780
French Fries	30720	1840	32560
Tea	64050	650	64700
Gathiya	37700	1900	39600
Fafda	31600	2100	33700

Potential revenue summing up with actual revenue gives total potential revenue. The stacked bar chart shows the comparison between the actual revenue and potential revenue.



The inference from the above charts are-

- Fafda , Gathiya and French Fries had the highest potential loss while making a good amount contribution in the actual revenue.
- Tea had the least potential loss and made the highest revenue for the shop.
- An average of Rs 1430 can be seen the potential revenue for the products shown above.

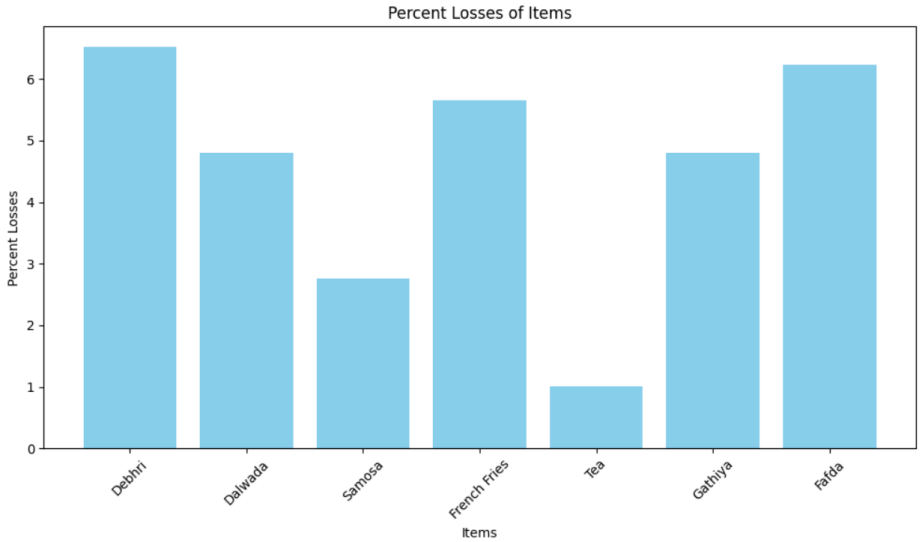
3. Percentage of Potential Revenue-

The above analysis gave a numeric value for the potential loss that was incurred or the potential revenue that could have been gained. The ratio of Potential revenue to the Revenue generated gives the relative value of loss that is incurred.

	Revenue Generated	Potential Revenue	Total Potential Revenue	% Potential Revenue
Debhri	18620	1300	19920	6.526104
Dalwada	25020	1260	26280	4.794521
Samosa	33820	960	34780	2.760207
French Fries	30720	1840	32560	5.651106
Tea	64050	650	64700	1.004637
Gathiya	37700	1900	39600	4.797980
Fafda	31600	2100	33700	6.231454

Comparison using bar charts for the individual losses makes it further clear. The below shown chart clearly states that-

- Fafda and Debhri have the highest relative potential revenue.
- Though in the above section it was observed that Fafda, Gathiya and French Fries had the highest numerically potential revenue but the current scenario states that the potential revenue against the revenue generated have a complete different image.



Key findings-

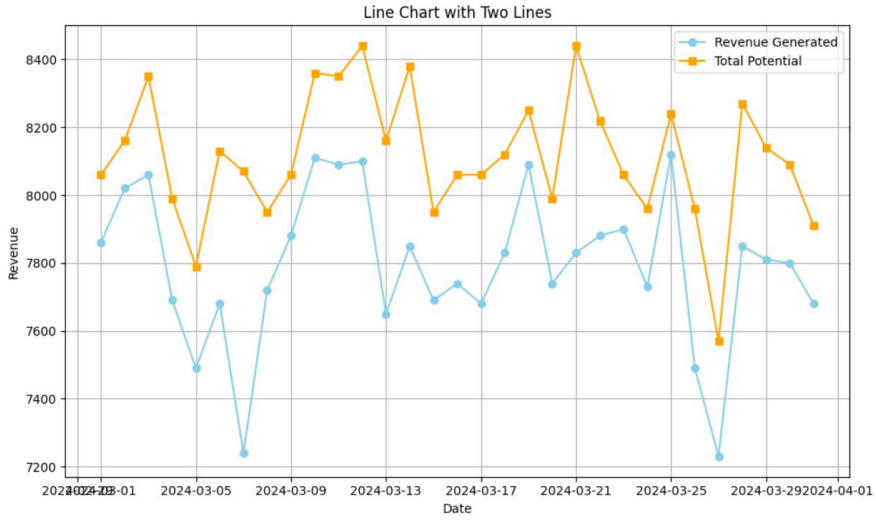
1. Inventory management becomes an important factor for the above shown products.
2. The amount of products that were short or were wasted were relative to the ones that are produced and hence the impacts negatively on the production.

Analysis of purchase data reveals a strategic allocation of resources in raw materials, adhering to the principles of the Bar chart shown above. Fafda and Debhri, emerges as the undisputed leader, commanding the most wasted product as per revenue. This prioritization

can be attributed to customer's daily change in demand or the change in customer's churning ratio

4. Revenue vs Total potential

Analysis of potential revenue incurred on daily basis was done. This helped to look the everyday scenario and make decision for day-to-day analysis for inventory management and invest for the expenditures



The line chart with two lines shown above helps us to know the daily total potential revenue incurred and actual revenue generated. We can infer from the above chart that there more instances of difference being more than the instances when the both the graph grows up or down simultaneously. This means that instances of wastages or shortages have been seen very frequently.

Insights and Learning-The revenue generated is the actual revenue, so we need to scale our inventory to the extent that both the graphs either coincide or the difference between the graphs minimizes the most.

Key Takeaways:

- Monthly revenue exhibits a gradual and sustained increase over the month.
- Occasional outliers reflect substantial revenue spikes resulting from sales of high-value products.
- Understanding the factors behind these fluctuations is crucial for accurate forecasting and strategic pricing decisions.

Further Analysis:

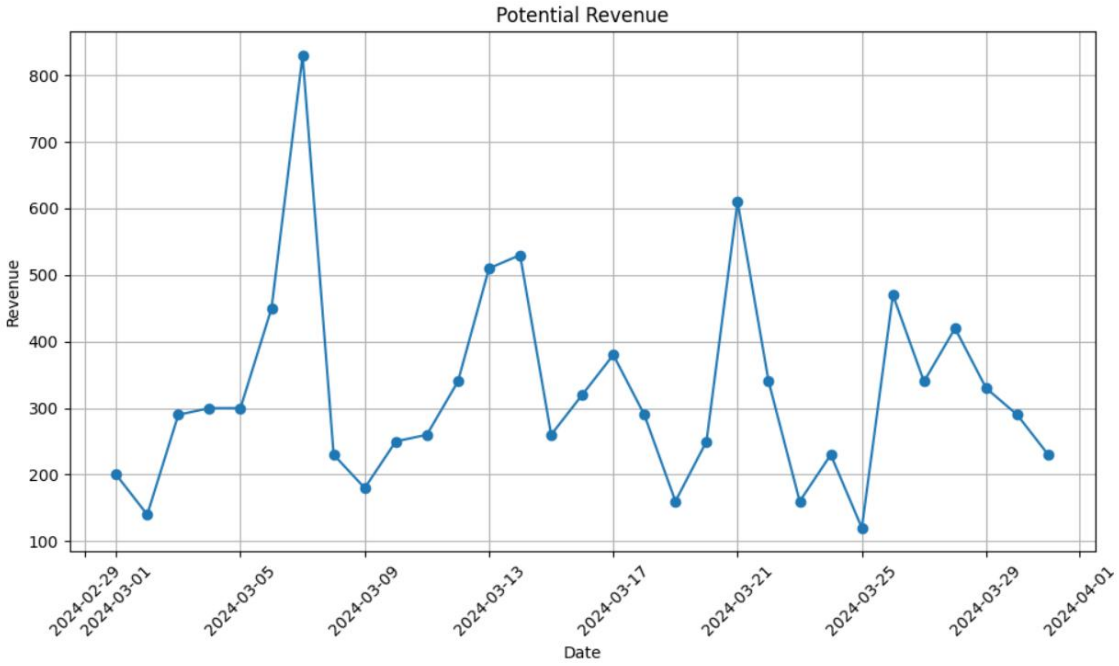
- The specific dates and frequency of outlier occurrences.

- The correlation between specific high-value products and increased revenue.
- The potential for leveraging these insights to optimize inventory management and promotional strategies for high-impact products

5. **Potential Revenue:**

The line chart shows the everyday potential revenue. The range varied from Rs 100 to Rs 800.

There has been a regular increase or decrease throughout the month except a few spikes were seen. These spikes indicate sudden change in number of customers and an unexpected change in the demand of products.



Further analysis:

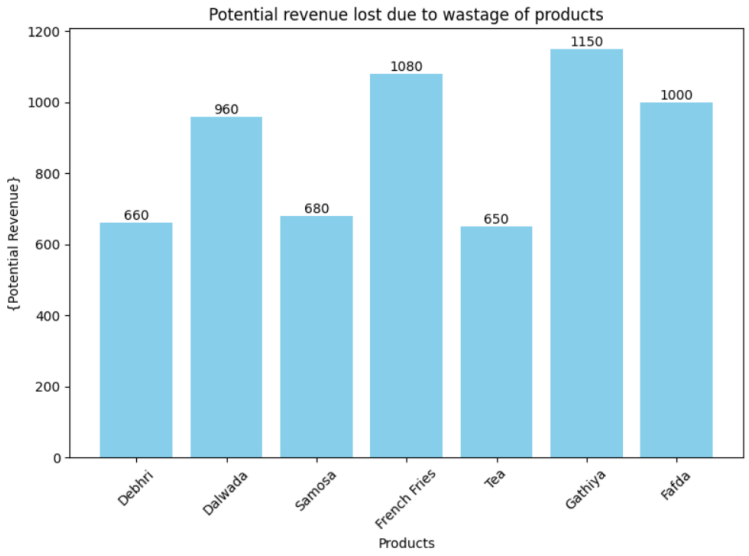
- The specific impact of individual holidays or events on sales patterns.
- The correlation between specific product offerings and fluctuating demand.
- Potential strategies to mitigate or leverage the effects of external factors on sales.

Product wastage and shortages pose significant threats to financial stability and customer satisfaction. Wastage, resulting from poor inventory management and inadequate quality control, leads to direct financial losses and damages brand reputation.

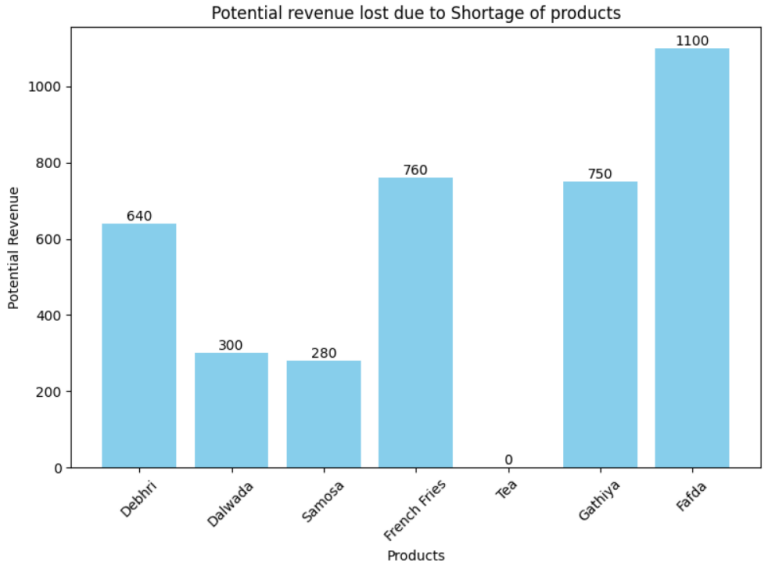
Conversely, product shortages, caused by inaccurate demand forecasting and unreliable suppliers, result in missed sales opportunities and operational disruptions.

6. Potential Revenue Lost Due To Shortage and Wastage:

A) Potential loss due to wastage of products:-
Different visualization helps to know which product have been wasted the most throughout the month. This is a direct loss to the shop as the products available are not sold and are disposed . Gathiya and French Fries made the most of the lost due to wastage.



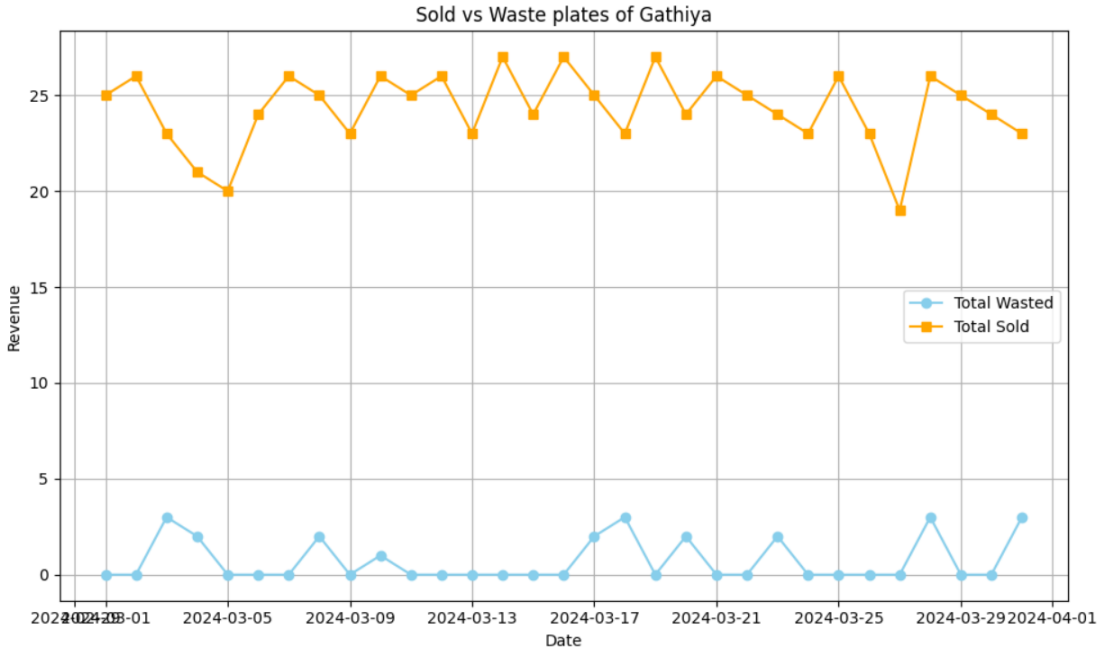
B) Potential loss due to shortage of products: -
Visualizations helps to know which product have been demanded the most throughout the month. This is an indirect loss made by the shop. This is not only monetary loss but also the customers they have lost. Also, it affects the trust value build by the shop. The highest shortage products are Fafda and French Fries. The operational inefficiency should be met on time and the reason behind this situation should be get to known.

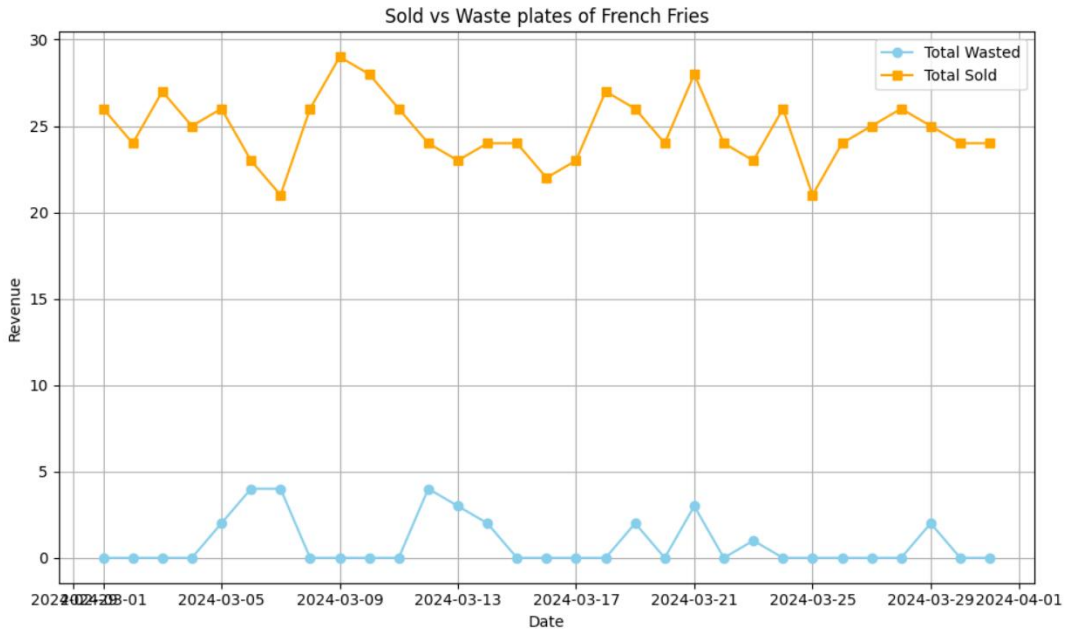


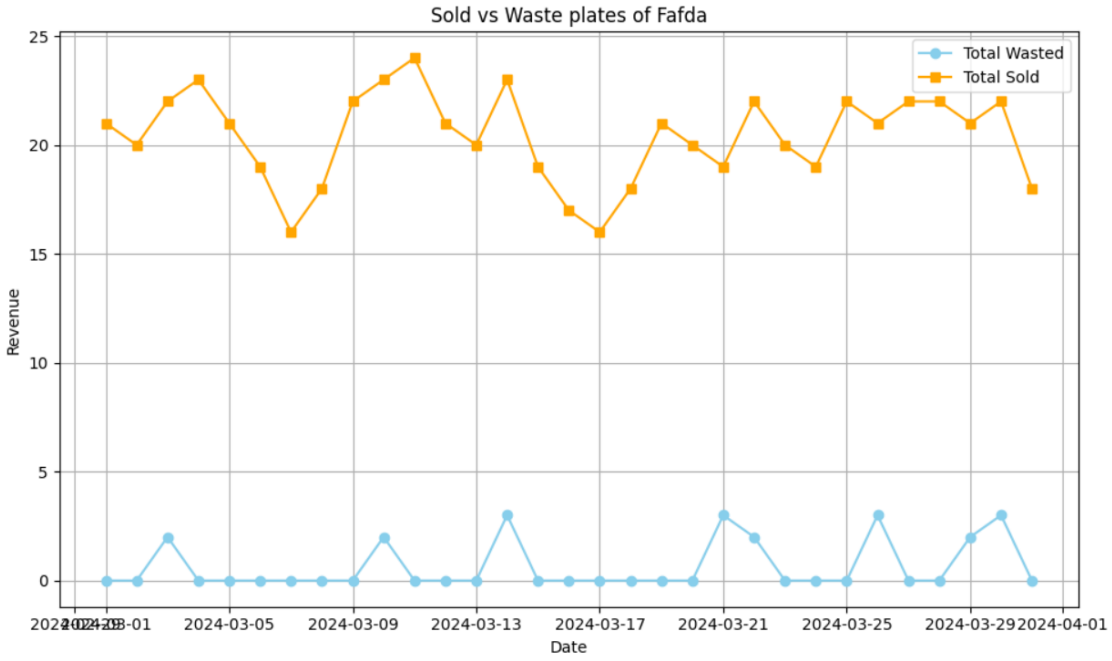
Few insights by the shopowner and the analysis on the shortage and wasted products are-

1. Customers churning ratio change on the day-to-day basis leads to change in sudden variation.
2. Few special occasion and holidays sometimes leads to unexpected demand which leads to shortage.
3. Non-availability of raw materials in the remote area during high demands leads to shortage.

7. Time Series Analysis of Sold vs Waste products:



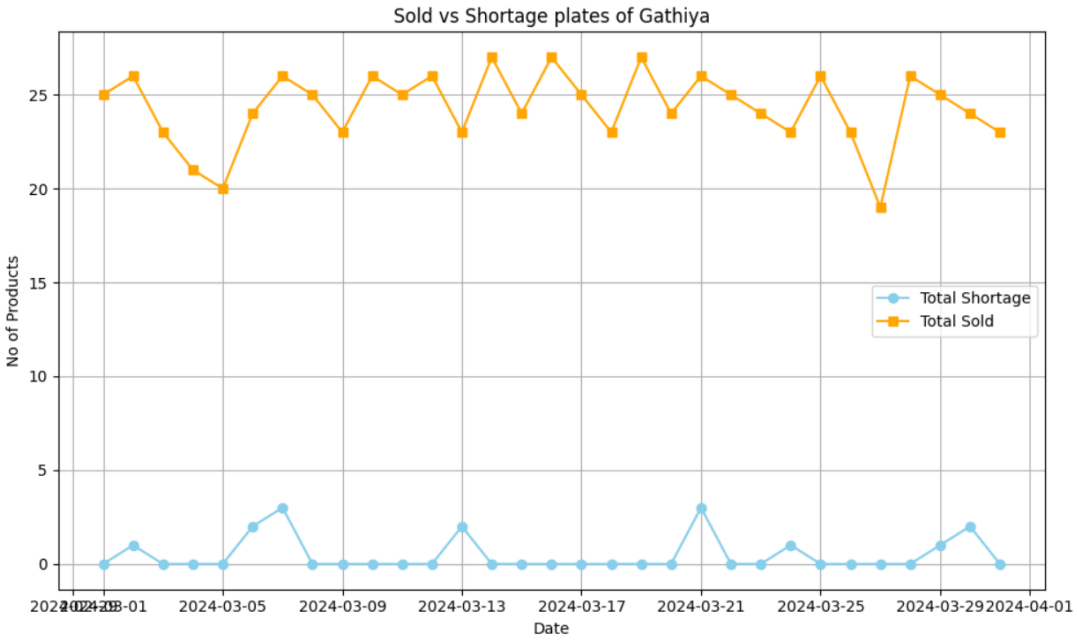


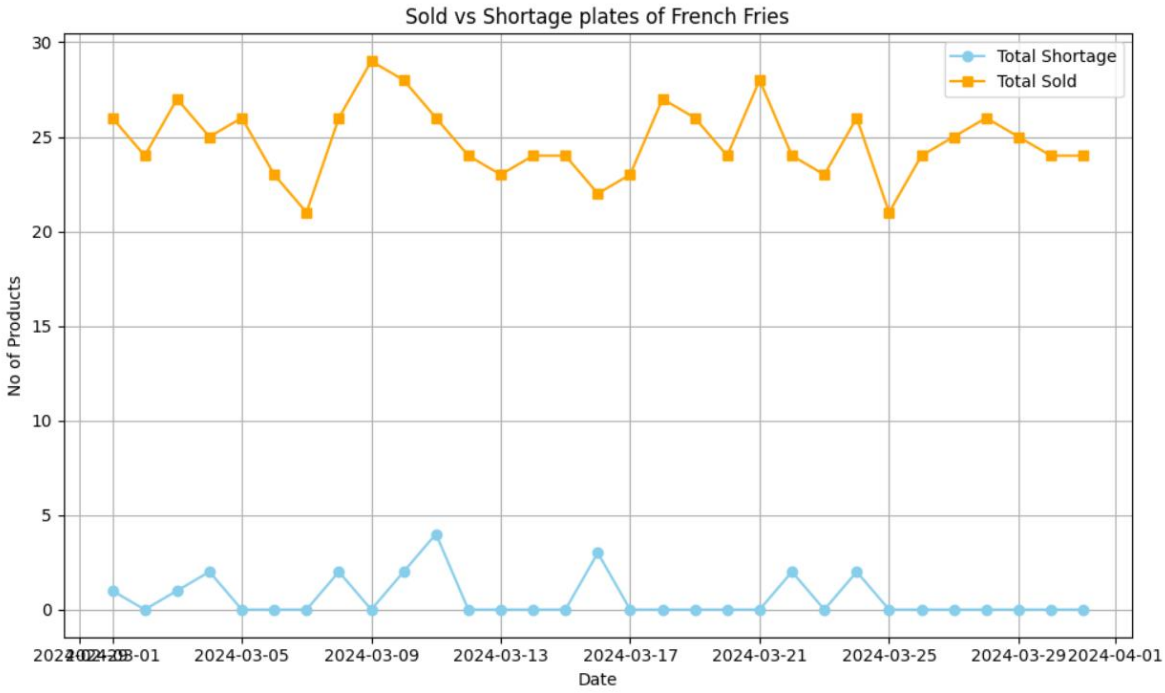


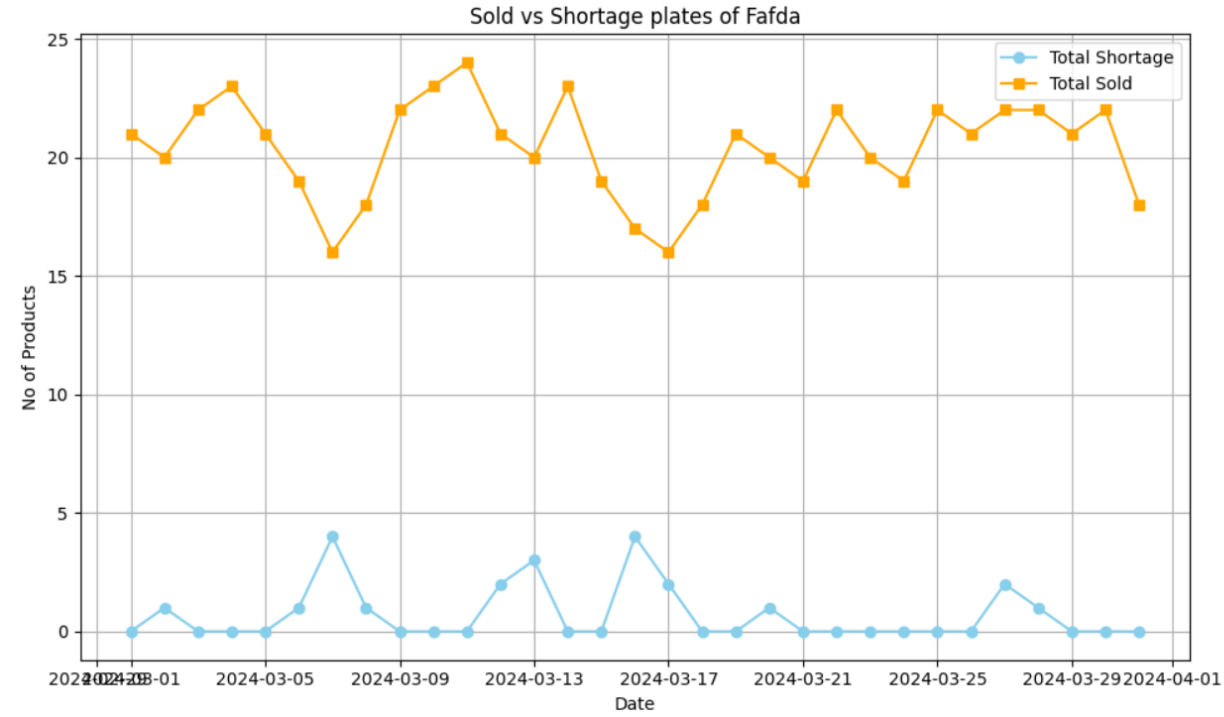
The time series analysis of three most wasted products – Gathiya, Fafda and French Fries were analyzed. The analysis showed that even during the days of low sales there were no more amount of losses incurred. The days sudden after the high spikes of sales saw some waste products the next few days.

The further analysis from the shop owner states that the sudden change in number of customer is the main reason behind the wastage. The new number of customer on sudden days lead them to shortage so dealing with this situation they prefer to store some of the products on the prior basis.

8. Time Series Analysis of Sold vs Shortage products:







The above shown charts display the number of products sold on the day-to-day basis and the number of products short on the day-to-day basis. The analysis show there are many instances when there is a dip in the number of products sold and there was a demand of the products.

Further analysis and discussion with the shop owner inferred that the reason behind such pattern is the unexpected number in increase of customers. The new customers and near by villagers sometimes order on a huge scale without any expected warning.

9. Expenditure:

Expenditure have been recorded for the purpose of analyzing the monthly expenditure. The expenditure of any form tells about what is the major investment of the firm.

Products Used in March

Particulars	Daily Used	Monthly Used	Daily Cost Per Unit	Daily Cost	Monthly Cost
Besan	7 Kg	210 Kg	90	630	19530
Maida	3 Kg	90 Kg	85	255	7905
Sugar	2.5 Kg	75 Kg	40	100	3100
Tea	0.5 Kg	15 Kg	500	250	7750
Methi	3 Kg	90 Kg	50	150	4650
Dal	3 Kg	90 Kg	220	660	20460
Onion	1.5 Kg	45 Kg	30	45	1395
Oil	7 Ltr	210 Ltr	170	1190	36890
Potato	10 Kg	300 Kg	30	300	9300
Total				3580	110980

The most costly product is oil. It plays a significant role throughput the production. Hence it becomes necessary for oil to a major factor while planning the inventory.

Monthly Expenditure	
Particulars	Price
Raw Materials	110980
Rent	12000
Workers Wages	36000
Misc	10000
Total	168980

Also the Raw materials is the highest investment hence the operational costs have the highest share in the overall expenditure throughout the month.

Interpretation of Results and Recommendation

This comprehensive analysis represents a pivotal moment for MK Tea Stall, offering a roadmap to enhance its operational efficiency and solidify its position as a market leader. By delving deep into the nuances of sales data and extrapolating actionable insights, the company is well-equipped to seize substantial growth opportunities and navigate towards a future characterized by sustained profitability and customer satisfaction.

The identification of top-performing products, such as Fafda and French Fries, underscores the importance of targeted marketing and product development strategies. By channeling resources towards these high-impact products, MK Tea Stall can amplify its market presence and replicate success across its product portfolio. Furthermore, the insights gleaned from daily sales patterns enable the company to devise proactive inventory management tactics, thereby optimizing stock levels and minimizing the risk of stockouts.

The utilization of Python and Jupyter Notebook as analytical tools has proven instrumental in unraveling the intricacies of the data. Through data preprocessing, pattern plotting, and pivot table analysis, these tools facilitate a comprehensive understanding of sales dynamics and aid in strategic decision-making. Descriptive statistics and visualizations serve as guiding beacons, illuminating key trends and informing targeted interventions to drive performance and profitability.

To tackle the challenges of dataset collection , MK Tea Stall can employ a problem-solving approach using MS Excel. Utilizing intuitive graphs and visualizations within Excel can offer insights into demand patterns by analyzing revenue and purchase data, pinpointing the most selling and impactful product, and identifying outliers through scatter plots. This strategy facilitates informed decision-making.

An in-depth examination of products leading to potential losses sheds light on areas ripe for optimization. Whether due to shortages or wastage, addressing these inefficiencies is paramount to maximizing revenue and minimizing losses. By bridging the gap between supply and demand, MK Tea Stall can capitalize on untapped revenue streams and bolster its bottom line. Moreover, leveraging predictive analytics to anticipate shifts in consumer behavior enables the company to stay ahead of the curve and adapt its inventory management practices accordingly.

Operational inefficiencies often stem from discrepancies in product performance and demand dynamics. By scrutinizing sales patterns and demand trends, MK Tea Stall can fine-tune its operations and streamline its inventory management processes. This targeted approach ensures

that resources are allocated efficiently, mitigating the risk of overstocking or understocking and optimizing overall performance.

In conclusion, embracing data-driven strategies and implementing the recommendations outlined in this report will propel MK Tea Stall towards sustainable growth and unparalleled customer satisfaction. By harnessing the power of data analytics and leveraging insights to drive informed decision-making, the company is poised to thrive in an increasingly competitive market landscape. This meticulously crafted roadmap lays the groundwork for operational excellence and cements MK Tea Stall's status as a frontrunner in the ever-evolving namkeen industry.