# Reducing Stock Wastage And Increasing Profitability Of A Sweets Shop

A final report for the BDM Capstone Project


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# 1 Executive Summary

Aggarwal Sweets Corner was founded by Mr. Mukesh Aggarwal in August 2019. It is a B2C sweets business located in Nihal Vihar, New Delhi. It manufactures and sells a variety of all-weather and seasonal sweets along with packaged snacks. The business hires contract-based laborers, adjusting their number based on demand. Currently, it operates solely through its physical store, with no online presence.

The shop faces challenges in balancing production with demand, causing overproduction, stock expiration, and financial losses. The absence of a dynamic pricing strategy impacts profitability, leading to lost revenue during peak seasons and surplus inventory during slower periods.

To Understand business dynamics and provide recommendations, I gathered relevant data and computed key statistical metrics using spreadsheet functions in Google Sheets. These metrics included monthly sales trends, product-wise revenue, expiry quantities, and net revenue after accounting for expired products costs. I extensively used pivot tables and vlookup functions to calculate these figures.

I used various charts and graphs to visualize the trends and patterns. I observed that Laddoos are the most sold item, while Barfi contributed the most in terms of revenue. Additionally, I noticed that weekly average production of certain sweets is much greater than their weekly average sold quantity, which might be the primary reason for product expiration.

# 2 Detailed Explanation of Analysis Process and Methods

To effectively work on the challenges faced by the business, first gathered the necessary data and digitized it by organizing it into spreadsheets. I then preprocessed the data by adding relevant features and conducted exploratory data analysis to identify key insights.

## 2.1 Data Collection

The primary concerns of the business are overproduction of sweets, which ultimately results in product expiration and wastage, and lack of a dynamic pricing strategy that adjusts according to market conditions for better inventory turnover. In order to effectively address these challenges, I first acquired the essential data such as Manufacturing Data, Production Cost Data and Sales Data directly from the shop owner. Since this business operates on a small scale within a local market, it does not have a structured or systematic method of maintaining records. To overcome this, I manually compiled and inserted all the relevant data into Google Sheets to perform a more structured and comprehensive analysis.

I have also collected the price list of a competitor offering similar products to analyze the regional price range and refine the pricing strategy for better competitiveness of the business.

Link for Project Data With Analysis

## 2.2 Data Preprocessing

Since these challenges significantly impact both revenue and profitability, it is crucial to analyze the available data in detail. To gain better insights into the business operations, I calculated key statistical measures that will help in understanding the current business dynamics. Through these computed metrics, I aim to extract actionable insights to come up with data-driven solutions for improving inventory turnover and pricing strategies.

### 2.2.1 Total Monthly Sales for Each Individual Product

The first metric I computed is the total monthly sales for each individual product that the business sells. This analysis provided insights about the highest and lowest sales of each sweet in a given month. By understanding these sales patterns, the business can make informed decisions regarding production planning and ensuring that manufacturing aligns more effectively with actual consumer demand. I used the pivot

table feature in Google Sheets to summarize this table where rows are months and columns are sweet names. The blank cells denote that the business didn't sell those products in the given month.

| Month | Barfi | Gajar Halwa | Ghewar | Gujiya | Gulab Jamun | Laddoo | Rasgulla |
|---|---|---|---|---|---|---|---|
| January | 41.5 | 52 | | | 70 | 102 | 52.5 |
| February | 32.5 | 7 | | | 28.5 | 51.5 | 35 |
| March | 55.5 | | | 58.5 | | 71.5 | 65.5 |
| April | 26 | | | | | 32 | 25.5 |
| May | 60 | | | | | 134 | 49 |
| June | 30.5 | | | | | 45 | 33 |
| July | 29 | | | | | 42.5 | 33.5 |
| August | 85.5 | | 58 | | | 89.5 | 81 |
| September | 31 | | | | | 67 | 47 |
| October | 125 | | | | | 91 | 73.5 |
| November | 105.5 | | | | | 131 | 123.5 |
| December | 39.5 | 62 | | | 59.5 | 53.5 | 47 |

Table 1 shows Total Sold Quantity of Each Product Over Months

### 2.2.2 Total Quantity of Expired Products Over Months

The second key metric I analyzed was the total quantity of expired products recorded over multiple months. This analysis revealed the extent to which each product experienced expiration over time and highlights trends in wastage. By comparing these findings with the total monthly sales data from the previous measure, the business can identify patterns that contribute to overproduction and spoilage. This insight will enable the business to minimize product expiration by aligning production more closely with actual sales demand.

The total expired quantity is calculated by subtracting the sold quantity from the manufactured quantity.

| Week | Month | Product | Manufactured Qty (in Kgs) | Sold Qty (in Kgs) | Expired Qty (in Kgs) |
|---|---|---|---|---|---|
| 1 | January | Barfi | 10 | 8 | 2 |
| 1 | January | Laddoo | 15 | 15 | =D3-E3 |

### 2.2.3 Product-wise Revenue Over Months

I analyzed the product-wise revenue generated over months to understand sales performance trends. To conduct this analysis, I first calculated the weekly revenue for each product by multiplying its selling price by the total quantity sold during that week. I used the VLOOKUP function in Google Sheets to fetch product prices from the business's price list.

| Product | Manufactured Qty (in Kgs) | Sold Qty (in Kgs) | Expired Qty (in Kgs) | Price | Revenue Generated |
|---|---|---|---|---|---|
| Barfi | 10 | 8 | 2 | 480 | |
| Laddoo | 15 | 15 | 0 | =VLOOKUP(C3, Price_List!$A$1:$B$8, 2, FALSE) | |
| Rasgulla | 15 | 13 | 2 | 280 | |

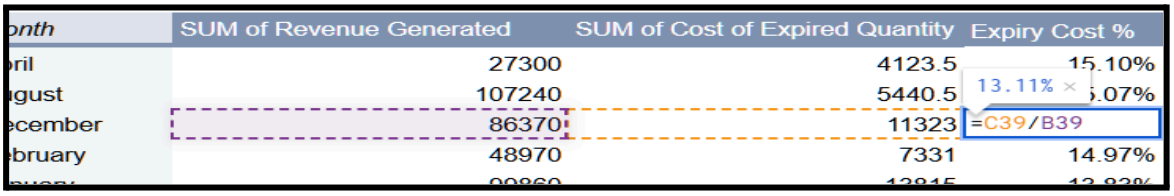
| Week | Month | Product | Manufactured Qty (in Kgs) | Sold Qty (in Kgs) | Expired Qty (in Kgs) | Price | Revenue Generated |
|---|---|---|---|---|---|---|---|
| 1 | January | Barfi | 10 | 8 | 2 | 480 | 3840 |
| 1 | January | Laddoo | 15 | 15 | 0 | 240 | =E3*G3 |
| 1 | January | Rasgulla | 15 | 13 | 2 | 280 | 3640 |

After obtaining the weekly revenue figures, I aggregated them using a pivot table to determine the total revenue for each product on a monthly basis. This analysis provided a clear picture of how much revenue each product contributes over months. This helped me to distinguish between high and low revenue-generating items. Based on these insights, the business can implement targeted pricing strategies, such as offering discounts on low-performing products to boost sales and slightly increasing the prices of high-performing products to compensate for revenue losses caused by product expiration.

### 2.2.4 Expiry Cost as a Percentage of Revenue

This metric helped me in understanding the financial impact of expired sweets on overall revenue. It quantifies the proportion of total revenue lost due to expired products. A higher percentage indicates excessive wastage in the particular month.

This analysis highlights the months with significant wastage with respect to the revenue.




I have used the following formula to calculate this metric:

Expiry Cost % = (Total Cost of Expired Quantity / Total Revenue) * 100

Here;

- Total Cost of Expired Quantity = ∑(Expired Quantity × Cost Price)
- Total Revenue = ∑(Sales Quantity × Selling Price)

| **Month** | **Total Revenue (in INR)** | **Total Cost of Expired Qty (in INR)** | **Expiry Cost %** |
|---|---|---|---|
| January | 99,860 | 13,815 | 13.83% |
| February | 48,970 | 7,331 | 14.97% |
| March | 83,200 | 4,734.5 | 5.69% |
| April | 27,300 | 4,123.5 | 15.10% |
| May | 74,680 | 6,208 | 8.31% |
| June | 34,680 | 5,066.5 | 14.61% |
| July | 33,500 | 5,320.5 | 15.88% |
| August | 1,07,240 | 5,440.5 | 5.07% |
| September | 44,120 | 4,130 | 9.36% |
| October | 1,02,420 | 5,386.5 | 5.26% |
| November | 1,16,660 | 4,712 | 4.04% |
| December | 86,370 | 11,323 | 13.11% |

Table 2 shows Month-wise Expiry Cost %

### 2.2.5 Net Revenue for Each Product

The next critical financial metric I examined is the net revenue for each product, which provides insight into the overall revenue of individual sweets sold by the business after subtracting the loss incurred due to product expiration. I calculated the Net Revenue using the following formula:

Net Revenue = $(\sum_{\text{months}} (\sum_{\text{sweets}}((\text{Sold Quantity} \times \text{Selling Price}) - (\text{Expired Quantity} \times \text{Cost Price})))$

In this formula:

- Sold Quantity: the number of kgs of sweet sold.
- Selling Price: the price of the sweet.
- Expired Quantity: the number of kgs of sweet that has expired.
- Cost Price: the manufacturing cost of the sweet.

I first extracted the cost price of each product from the production cost data using the HLOOKUP function in Google Sheets.

| Month | Product | Manufactured Qty (in Kgs) | Sold Qty (in Kgs) | Expired Qty (in Kgs) | Cost Price | Price | Revenue Generated |
|---|---|---|---|---|---|---|---|
| anuary | Barfi | 10 | 8 | 2 | 273 | 480 | 3840 |
| anuary | Laddoo | 15 | 15 | 0 | =HLOOKUP(C3,Production_Cost_Data!$B$1:$H$5,5,FALSE) | | |
| anuary | Rasgulla | 15 | 13 | 2 | 163 | 280 | 3640 |
| anuary | Gajar Halwa | 13 | 11 | 2 | 318 | 280 | 4180 |

| actured Qty (in Kgs) | Sold Qty (in Kgs) | Expired Qty (in Kgs) | Cost Price | Price | Revenue Generated | Net Revenue |
|---|---|---|---|---|---|---|
| 10 | 8 | 2 | 273 | 480 | 3840 | 94 |
| 15 | 15 | 0 | 148 | 240 | 3600 | =I3-(F3*G3) |
| 15 | 13 | 2 | 163 | 280 | 3640 | 3314 |

Then, I calculated the Net Revenue using the formula I mentioned above.

By applying this calculation across all products, I was able to determine which items generate the highest and lowest revenues after subtracting the cost of expired quantity. This analysis is essential in identifying highly revenue generating products. Understanding the net revenue of each product allows the business to optimize inventory decisions, improve pricing strategies and enhance overall financial sustainability.

## 2.3 Data Analysis

To derive meaningful insights from the dataset, I conducted four main types of analysis: Sales Analysis, Product Expiration Analysis, Revenue Analysis, and Product Cost Analysis.

### 2.3.1 Sales Analysis

I conducted sales analysis to understand monthly and weekly product demand trends. I used pivot tables to summarize sales quantities and created graphs to visualize sales patterns. This helped me in identifying best-selling products, peak sales months and weekly fluctuations in sales.

### 2.3.2 Product Expiration Analysis

To assess inventory wastage, I analyzed the expired quantity of each product across months and weeks. I also compared weekly average production and sales to highlight overproduction issues.

### 2.3.3 Revenue Analysis

I conducted revenue analysis to evaluate the financial contribution of each product over time. I used pivot tables to aggregate monthly revenues and calculated standard deviation to assess revenue consistency.

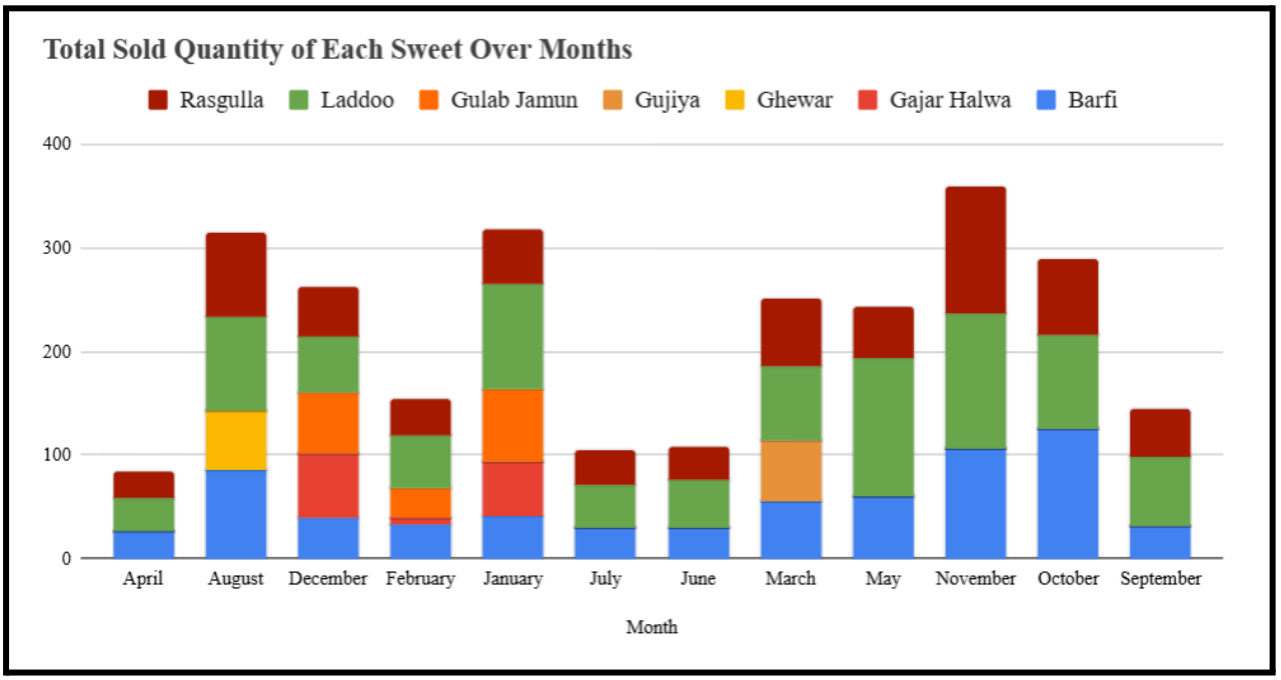
### 2.3.4 Product Cost Analysis

This analysis focused on understanding the cost implications of expired inventory and profit margins. I evaluated the financial loss due to expiration for each product. I also calculated and compared the manufacturing cost and profit margins to highlight the most and least profitable items.

# 3 Results and Findings

I have conducted a detailed analysis of the collected data and have identified key insights and significant observations. These findings serve as a foundation for making data-driven decisions to address the challenges of overproduction, inventory wastage, and pricing strategy optimization.

## 3.1 Sales Analysis

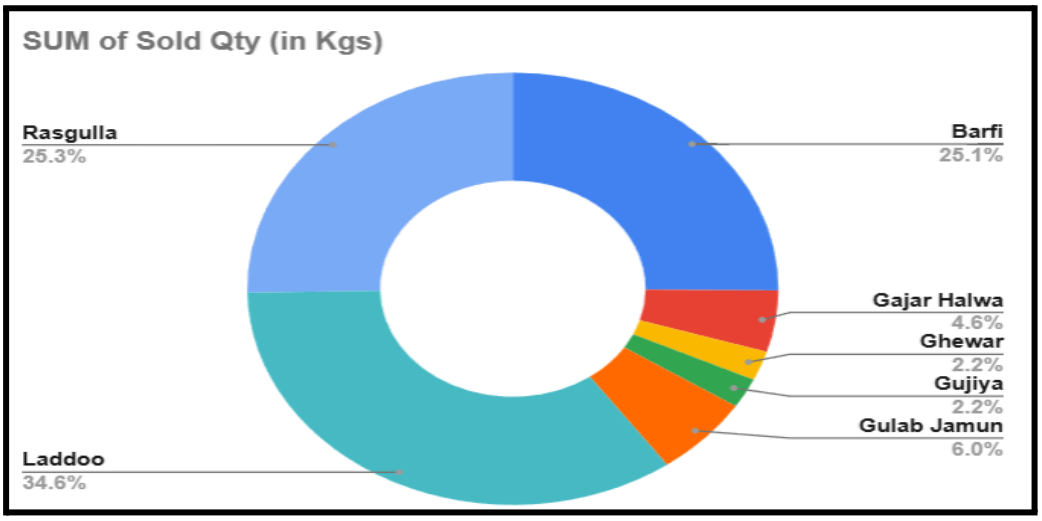



Graph 1: Total Sold Quantity (in Kgs) of Each Sweet Over Months

**Insights:**

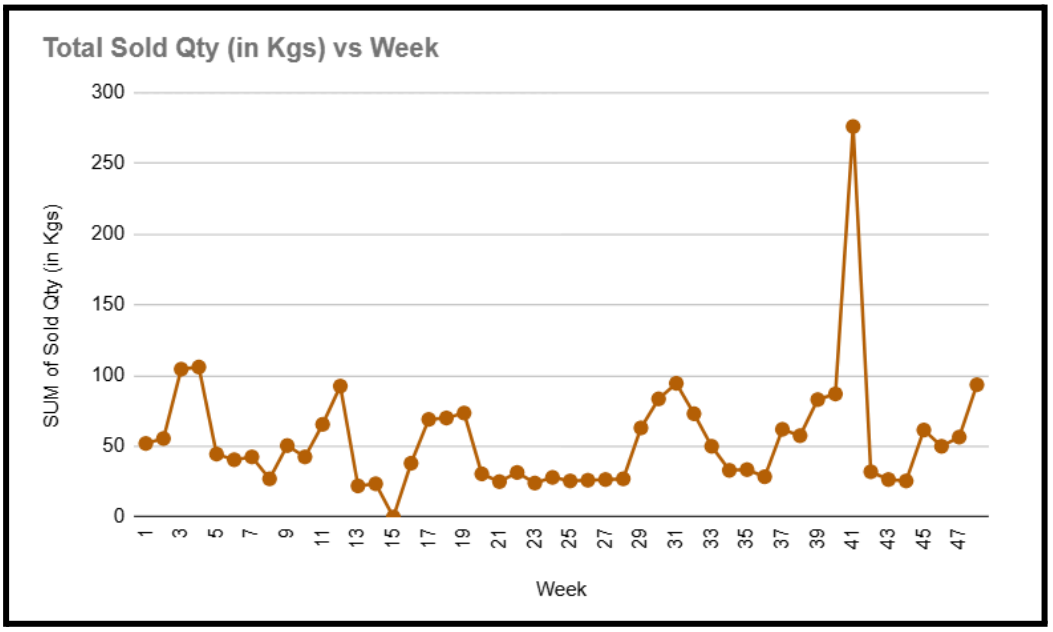
- November showed peak sales with just three products. This could be due to the biggest festival season in India i.e Diwali.
- August and January also showed better sales due to other popular festivals.
- The summer months, particularly April, June, and July, experienced the lowest sales volume. However, an exception was observed in May, which recorded relatively higher sales compared to the other summer months. This increase can be attributed to the 2024 Indian General Assembly Elections.
- Barfi is most sold in the months of October and November.

### 3.1.1 Proportion of Sales of Each Product



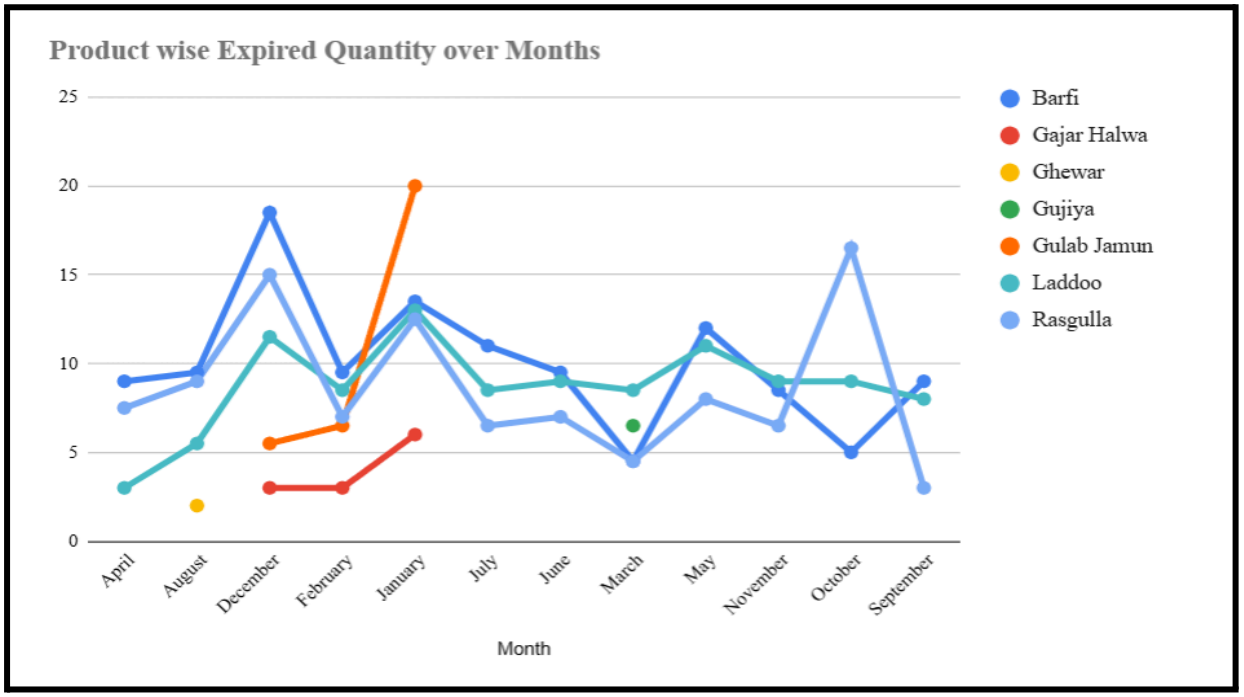

- Laddoos are the most sold item, followed by Rasgulla, Barfi, and other seasonal sweets.

### 3.1.2 Weekly Sales Pattern




- The sales were extremely low throughout the months of June and July.
- In August, sales bounced back due to the festive season, but again dropped in September.
- In certain months, such as December, January, March and October, the sales were high in ending weeks.
- The sales were zero on Week 15 as the shop was closed.

### 3.2 Product Expiration Analysis

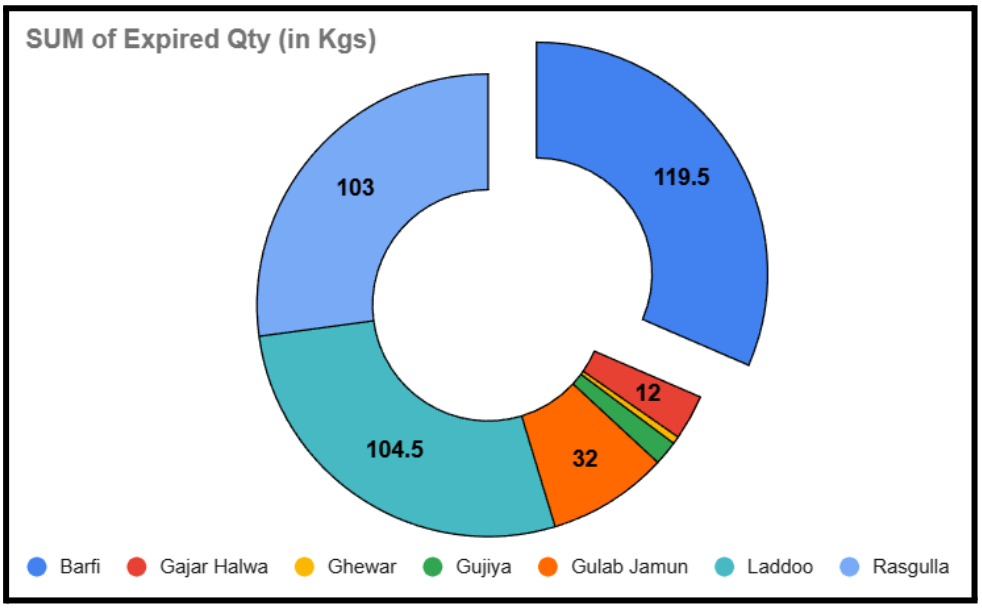



Graph 2: Product wise Expired Quantity (in kgs) Over Months

**Insights:**

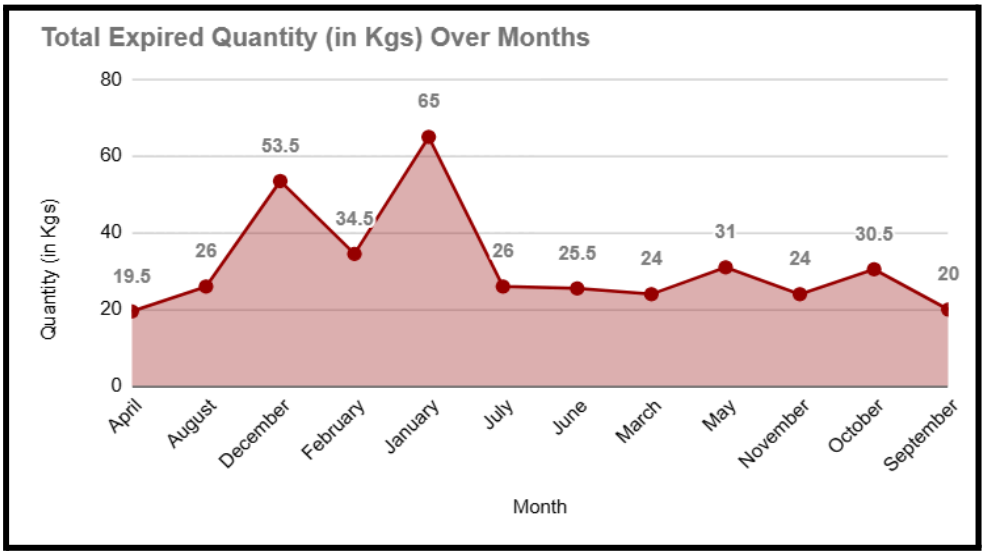
- Rasgulla and Barfi showed high expiration rates across multiple months.
- In January, seasonal sweet Gulab Jamun and Gajar Halwa expired the most. However, January showed better sales but overestimation of demand might have led to significant wastage.
- As Gujiya and Ghewar were sold in one month only, there is no trend available for these sweets.
- In December, Gajar Halwa and Gulab Jamun showed good sales, thus minimal expiration. But other regular sweets expired in significant amounts.

### 3.2.1 Total Expired Quantity of Each Product



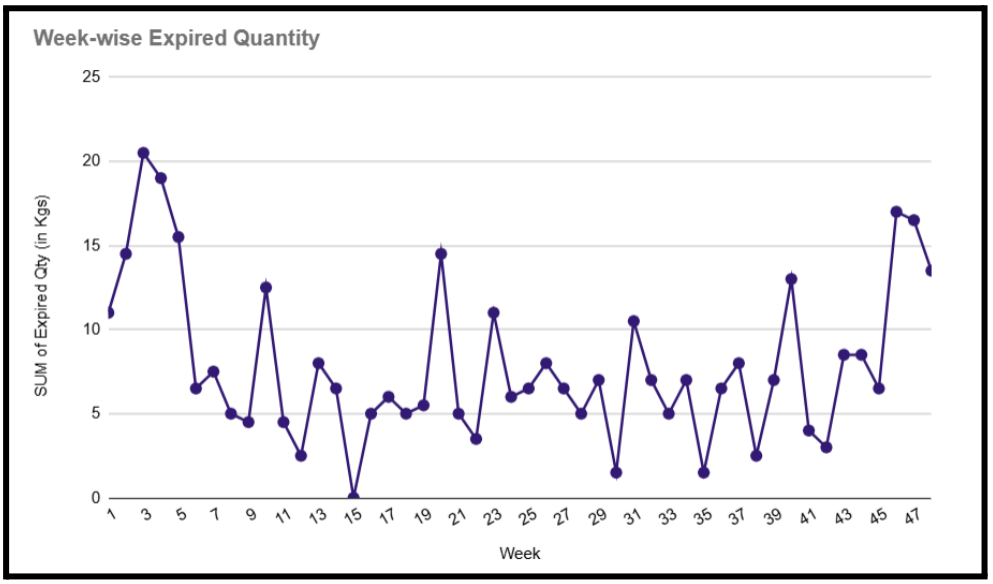

- Barfi expired the most in the whole year, followed by Laddoos, Rasgulla and other seasonal sweets.

### 3.2.2 Total Expired Quantity Over Months



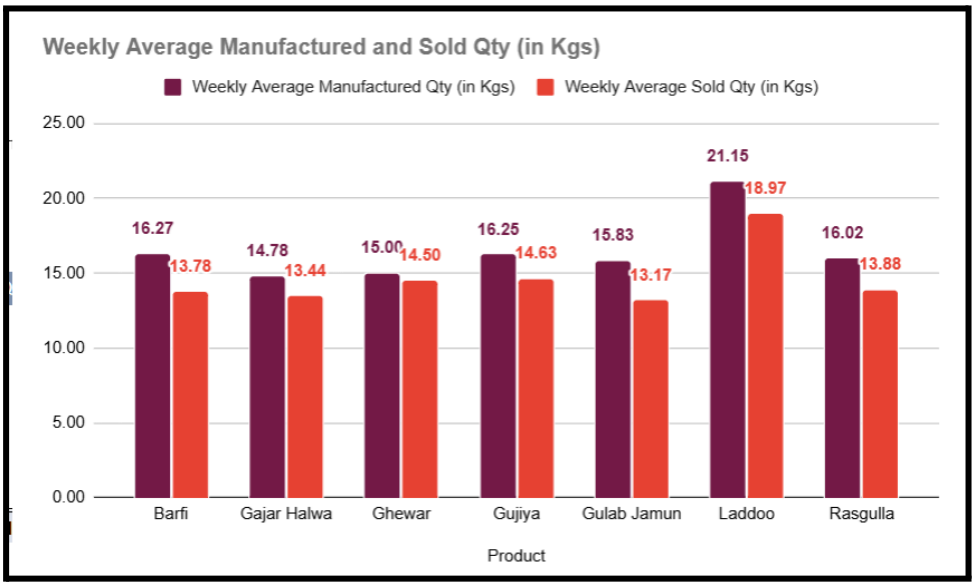

- January recorded the highest expiry of products, followed by December, despite good sales. And April recorded the least.
- The average expired quantity is approximately 31.6 kg, with most months reporting expiry levels below this average.

### 3.2.3 Week-wise Expired Quantity (in kgs)



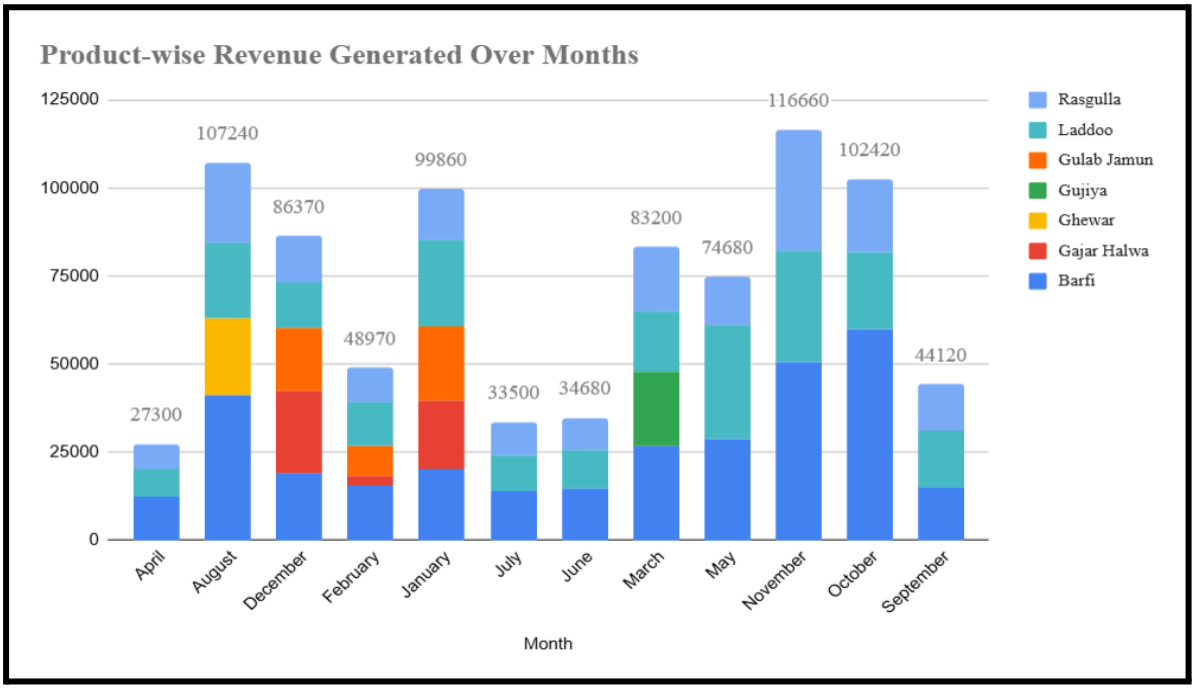

- This graph shows which weeks of the month particularly contributed the most in expiry of products.
- The shop was closed on Week 15.
- In January, all four weeks showed significant expiry of products.
- In December, the expiry was comparatively less in 1st week, but showed a major spike in next 3 weeks.

### 3.2.4 Weekly Average Manufactured and Sold Qty (in Kgs)




- The difference in average manufactured and sold quantity is highest in Gulab Jamun, followed by Barfi, Laddoo, and Rasgulla.
- This significant overproduction leads to stock expiration.

### 3.3 Revenue Analysis




Graph 3: Product wise Revenue Generated Over Months

**Insights:**

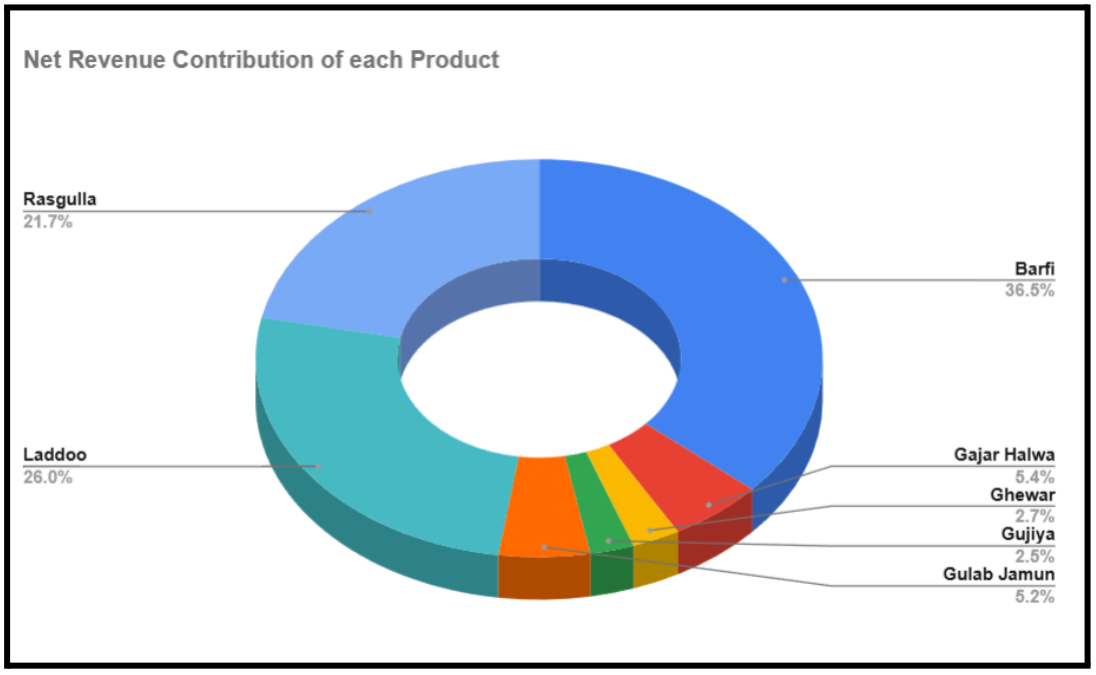
- The average revenue generated per month is around ₹71,583. Only in 7 months, the total revenue has crossed the average revenue mark.
- The least revenue was generated in the month of April, which is around ₹27,300. Whereas, the highest revenue of ₹11660 was recorded in November due to the festive season.
- The standard deviation in monthly sales is approximately ₹32270, which is around 45% of mean revenue. This indicates that the revenue fluctuates significantly and sales are quite inconsistent.
- Here is the table for product-wise revenue generated over months.

| Month | Barfi | Gajar Halwa | Ghewar | Gujiya | Gulab Jamun | Laddoo | Rasgulla |
|---|---|---|---|---|---|---|---|
| January | 19,920 | 19,760 | | | 21,000 | 24,480 | 14,700 |
| February | 15,600 | 2,660 | | | 8,550 | 12,360 | 9,800 |
| March | 26,640 | | | 21,060 | | 17,160 | 18,340 |
| April | 12,480 | | | | | 7,680 | 7,140 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| May | 28,800 | | | | | 32,160 | 13,720 |
| June | 14,640 | | | | | 10,800 | 9,240 |
| July | 13,920 | | | | | 10,200 | 9,380 |
| August | 41,040 | | 22,040 | | | 21,480 | 22,680 |
| September | 14,880 | | | | | 16,080 | 13,160 |
| October | 60,000 | | | | | 21,840 | 20,580 |
| November | 50,640 | | | | | 31,440 | 34,580 |
| December | 18,960 | 23,560 | | | 17,850 | 12,840 | 13,160 |

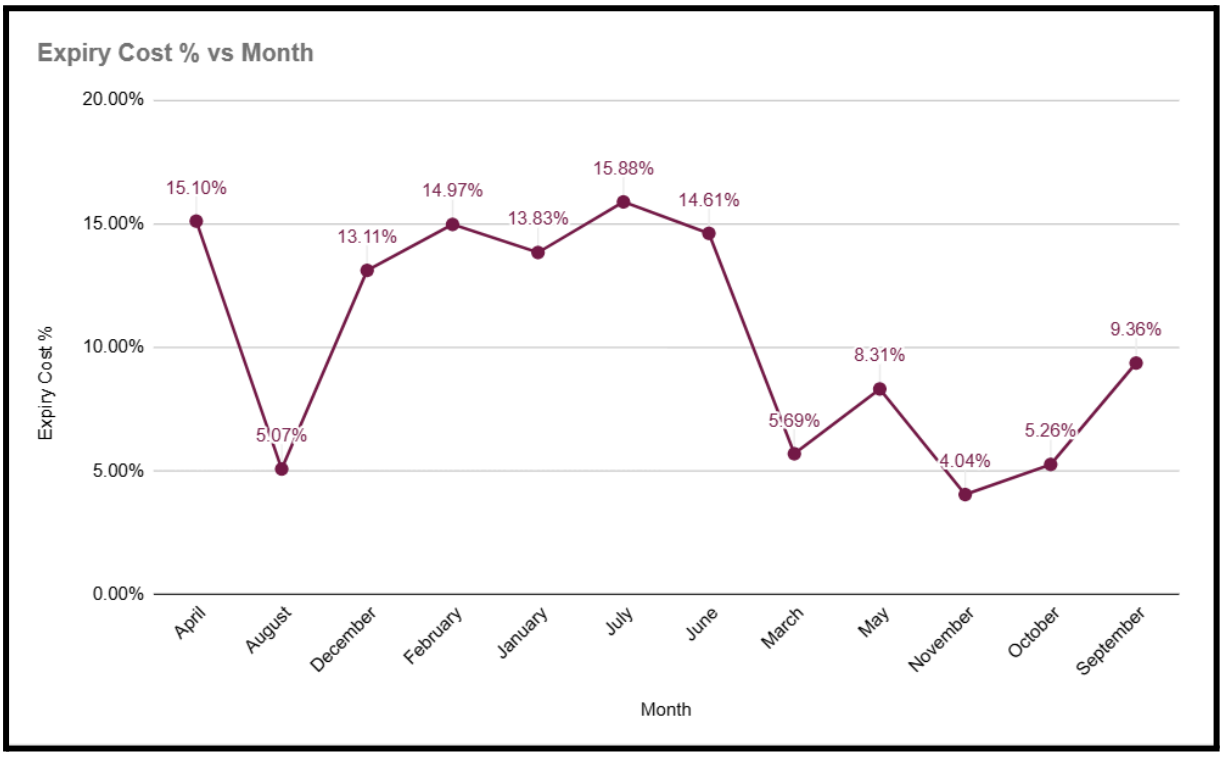
Table 3 shows Product-wise Revenue Generated Over Months

### 3.3.1 Net Revenue Contribution of each Product




- Barfi contributed the highest in net revenue of the business, followed by Laddo and Rasgulla.
- The similar pattern is shown in overall revenue of the business.

### 3.4 Product Cost Analysis

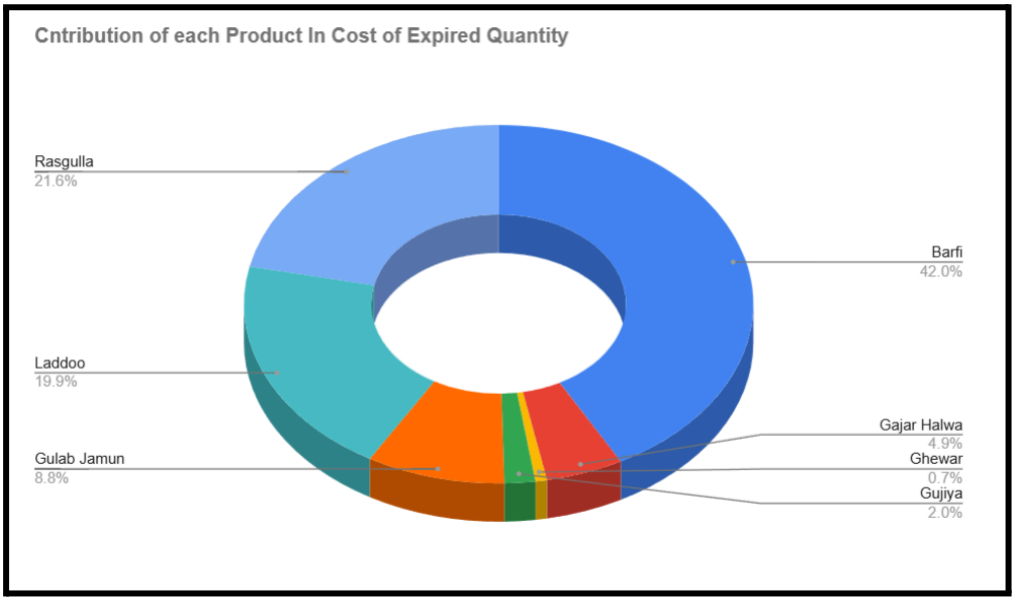



Graph 4: Expiry Cost Percentage Over Months

**Insights:**

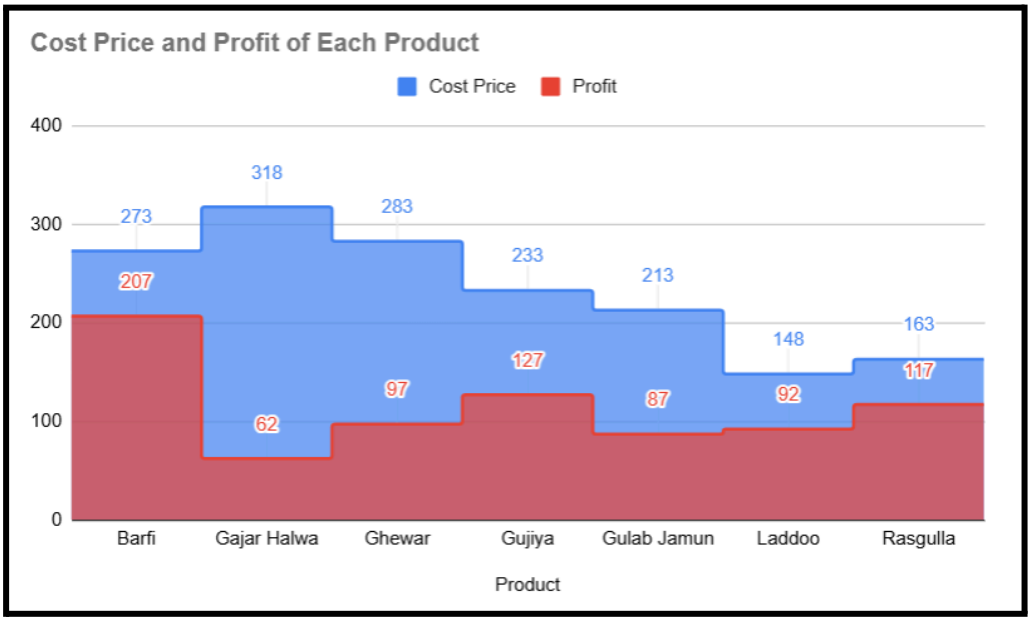
- The highest expiry cost percentage is observed in July (15.88%) and April (15.10%). Based on previous graphs, July and April recorded the lowest sales. The high expiry cost percentage in these months can be attributed to various factors, such as low sales during summer and the shorter shelf life of sweets due to higher temperatures.
- Whereas November (4.04%) and August (5.07%) witnessed low expiry cost % due to exceptionally good sales figures, and lower expiration of products.

### 3.4.1 Contribution of Each Product In Cost of Expired Quantity




- Barfi contributed the highest in net revenue of the business, but it also has the maximum contribution in revenue loss due to expiration.

### 3.4.2 Manufacturing Cost and Profit of Each Product




- Gajar Halwa has the highest manufacturing cost and least profit margin, which is around 19.5% of manufacturing cost.
- Barfi has the highest profit margin of Rs. 207 against the manufacturing cost of Rs. 273.
-

# 4 Interpretation of Results

The analysis of the collected data has provided valuable insights into business dynamics. This section summarizes the key findings from various graphs and tables. These interpretations will help in understanding the root causes of the challenges faced by the business and provide data-driven recommendations.

- Laddoos are the most sold item in terms of the quantity. The primary reason for this might be affordability of the product.
- Barfi generated the maximum revenue for the business. But it expired the most, contributing a significant chunk in overall losses.
- Sales are exceptionally good in January, August and November due to the festive season.
- Despite strong sales, December and January recorded the highest level of product expiry.
- Based on temperature records in Delhi in 2024, the extreme heat during the summer months likely contributed to reduced consumer demand and high expiry of products due to their perishable nature.
- In contrast, December and January experienced relatively moderate temperatures, suggesting that the high levels of product expiration during these months were more likely due to overestimation of demand rather than climatic factors.
- The period from April to June witnessed the lowest sales volume, with an exception of May, where sales showed a temporary boost during election campaigns.
- Barfi is the most profitable product and Gajar ka Halwa is the least profitable product.
- With the sales of above-mentioned sweets, the business generated a total revenue of Rs. 8,59,000.
- The loss due to expiration of products is around Rs. 77,591.

# 5 Recommendations

After analyzing the data, I have deduced the following recommendations that can help the business to improve their inventory turnover and profitability:

- The business should reduce sweets production during December and January to prevent excessive wastage, as these months typically see lower demand.
- Since sweet sales decline in summer, the business can introduce seasonal discounts, promotional offers, or price reductions to attract more customers and improve sales.
- As Laddoos are the best-selling sweets, the business can improve inventory turnover by launching weekly promotions and leveraging festive occasions like Ganesh Chaturthi to drive demand.
- Introduction of deep freezers or cold storage can increase the shelf life of sweets, reducing spoilage, particularly during hot summer months.
- The business should align its weekly manufacturing of products more closely with average weekly sales, especially for high-expiry items like Gulab Jamun, Barfi, and Laddoo. This can reduce stock wastages to significant amounts.
- The shop should start building its presence on social media. This will help more people in the region know about weekly discounts and special offers, leading to more customers and better brand recognition.
- The shop can also use social media to gather customer feedback without additional costs that will help them work on their weaknesses.