Improving Efficiency and Profitability of Santur Bhabani Sweets by Data Analysis

A Mid-term report for the BDM capstone Project

Submitted by

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Executive Summary:

Santur Bhabani Sweets situated in Rautara market, near Contai, Purba Medinipur, West Bengal. Santur Bhabani Sweets are facing several business problem like inefficient production management, decline in revenue, lack of skilled worker, scarcity of milk. We want to improve the overall profitability and efficiency of Santur Bhabani Sweets by analyzing various data collected over three months.

In this analysis we focused on several key areas like identifying top selling products, determining profitable items and understanding revenue generating items. We analyze daily and weekly production, sales, wastage data. From this analysis we came to know about the trends that could help to optimize stock management, reduce waste, and maximize profits. For example product like Rasogolla, Golapjam, Lancha, and Kalojam were top sales and profit generating products. These products take a vital role to improve the shop's success.

The worker data indicates potential skill development, particularly in Creativity and Teamwork. By understanding the relationship between sales and profit for each product we identify opportunities for strategic production adjustments, ensuring that high-profit items are prioritized.

Additionally, the analysis highlighted underperforming products, offering opportunities to adjust inventory and pricing strategies. By focusing on high-profit items and ensuring consistent stock of best-sellers, Santur Bhabani Sweets can better meet customer demands and increase revenue.

In conclusion, the project provides a data-driven approach to streamline operations, improve product management, and enhance employee performance at Santur Bhabani Sweets, ultimately driving sustainable growth and increased profitability.

Meta Data:

In meta data there is an information about our dataset where we describe each and every row and column of our dataset and the meaning and context of each and every variable.

Process of Data Collection: For my project I collect various type of data:

a. **Daily Production, Sales, Wastage data:** The owner enlisted 3 months of daily data in a formatted paper sheet (given by me) containing details of product name, cost price, sales price, production, wastage, sales etc. I collect that data from owner.
b. **Daily Milk Supply Data:** Similarly, owner enlisted daily Milk Supply Data collected from different milk seller and shared me. For Scarcity of milk problem I will analyze Daily Milk Supply Data
c. **Data about worker:** I came to know from the owner about each worker name, age, salary, working hours and position. I asked the owner to rate his employees skills such as Creativity, Time management, Customer Service, Team work out of 5 and take note of these. For Lack of skilled worker problem I will analyze Data about worker.
d. **Weekly Production, Sales, Wastage data:** To solve Inefficient Production Management and Decline in Revenue problem I will analyze Daily Production, Sales, wastage data and I also make Daily Production, Sales, wastage data into weekly Production, Sales, wastage data to understand trends in depth.

I stored these data in excel sheet.

About Feature and Content of Data :

a. **Daily Production, Sale, wastage data:**

   Items: Name of Sweets.

   Cost Price: Production cost of each item.

   Sell Price: Cost at which the item was sold.

   Production: Number of each item was produced in each day.

   Wastage: Number of each item was wasted in each day (broken and rotten item).

   Total Stocks: Number of each item available to sell.

   Sells: Number of each item was sold per day.

   Closing Stocks: Remaining quantity of each item in stock at the end of the day.

b. **Daily Milk Supply Data:**

   Name of Seller: From whom milk was purchased.

   Lactometer Reading: Test reading in Lactometer to know the grade of milk.

   Price: Purchase rate of milk per liter.

   Quantity of Milk: The quantity of milk purchased from different seller.

   Grade of Milk: Quality of milk as lactometer reading.

c. **Data about Worker:**

Name: Name of the workers.

Age: Workers age.

Salary: Monthly salary of worker.

Working Hours: Daily working hour of each worker.

Position: Specific role of worker.

Creativity: Ability to generate innovative ideas and solutions.

Time Management: Ability to complete the task in a stipulated time.

Customer Service: Ability to give satisfactory service to a customer.

Team Work: Ability to work collaboratively with others.

d. Weekly Production, Sales, Wastage data:

Average Cost Price: Average production cost of each item in the week.
Average Sell Price: Average selling price of each item in the week.
Production: Total number of each item produce in the week.
Wastage: Number of each item was wasted in the week (broken and rotten item).
Sells: Number of each item sold in the week.

Descriptive Statistics:

After doing data cleaning and processing I come to a concise overview of the dataset using descriptive statistics. By this method we summarize and organize our data in an informative way. We can measure mean, median, mode, standard deviation etc. of our data.

Descriptive Statistics Measure:

Count: Total count of observation.

Mean: The average value of data across all observation.

Standard Deviation: It refers to the spread of the data points around the mean.

Min: The minimum value across all the observation.

25th Percentile: This refers to the 1st quartile i.e. 25% of the observation falls below this value.

50th Percentile: This refers to the 2nd quartile i.e. 50% of the observation falls below this value in ascending order. It's also called as median.

75th Percentile: This refers to the 3rd quartile i.e. 75% of the observation falls below this value.

Max: The maximum value across all the observation.

Kurtosis: Kurtosis indicates the peakedness or flatness of the distribution of data across all observation. Negative value of kurtosis has tails that are thinner than those of a normal distribution and a flatter peak and positive value of kurtosis has tails that are fatter than those of a normal distribution and a sharper peak.

Skewness: By skewness we can understand about the asymmetry of the distribution of data. Positive skewness refers to a distribution with a longer or fatter tail on the right side, while negative skewness refers to a distribution with a longer or fatter tail on the left side.

For Daily and Weekly Production, Sale, Wastage data:

I calculate total production, sales, wastage of each item across my whole data set i.e. from March'23 to May'23 and calculate below descriptive statistics on that.

Descriptive Statistics Measure	Production	Wastage	Sales
Count	18	18	18
Mean	9677.388	141.722222	9538.555
Standard Deviation	9558.443	68.529775	9540.886
Min	922.000	5.000000	921.000
25^{th} Percentile	3503.750	107.750000	3282.000
50^{th} Percentile	7295.500	134.500000	7184.000
75^{th} Percentile	7782.250	204.000000	7633.000
Max	36048.000	232.000000	35816.000
Kurtosis	1.8507805	-0.2990448	1.8291575
Skewness	1.6831612	-0.4522867	1.6797276

For Daily Milk Supply Data:

Here I calculate descriptive statistics on Quantity of Milk and Rate of Milk (per liter) over 3 months i.e. from March'23 to May'23 for each milk seller.

D-Statistic Measure	DEBU SAHOO		RATAN MANNA		SUNIL KAMILYA		SANJOY GIRI		BACHU DAS	
	QUANTITY	PRICE	QUANTITY	PRICE	QUANTITY	PRICE	QUANTITY	PRICE	QUANTITY	PRICE
Count	80	80	80	80	80	80	80	80	80	80
Mean	110.28	38.9	99.22	38.87	101.12	38.9	96.91	39.1	93.5	39.9
Standard Deviation	12.67	4.81	10.81	4.62	11.47	4.85	9.72	4.57	10.41	4.82
Min	80	33	80	33	80	33	79	33	70	33
25^{th} Percentile	100	33	90	33	93	33	89	38	88.5	38
50^{th} Percentile	107	38	100	38	100	38	97	38	94	38
75^{th} Percentile	123	45	104	45	107	45	102	45	101	45
Max	134	45	126	45	125	45	123	45	120	45
Kurtosis	-1.02	-1.44	0.04	-1.31	-0.26	-1.46	-0.22	-1.3	-0.09	-1.49
Skewness	0.004	0.14	0.43	0.188	0.37	0.15	0.41	0.13	0.02	-0.14

For Worker Data:

Here I calculate the descriptive statistics in Age, Salary, Working hours, Creativity, Time Management, Customer Service, Team Work across all worker.

D-Statistics Measure	Age	Salary	Working hours	Creativity	Time Management	Customer Service	Team Work

Count	6	6	6	6	6	6	6
Mean	40.33	20000	7.66	2.5	3	2.5	3.16
Standard Deviation	9.35	7436.39	0.51	0.83	0.63	0.54	0.40
Min	28	12000	7	2	2	2	3
25th Percentile	33.25	15625	7.25	2	3	2	3
50th Percentile	41.5	17000	8	2	3	2.5	3
75th Percentile	47.5	25875	8	2.75	3	3	3
Max	51	30000	8	4	4	3	4
Kurtosis	-1.57	-1.43	-1.49	-0.36	0	-2	1.2
Skewness	-0.17	0.50	-0.70	1.12	0	0	1.78

Details Explanation of Analysis Process/Method:

The owner enlisted 3 months raw data in a formatted paper sheet given by me. After taking that data from owner I entered that in a excel sheet. Then I preprocessed and formatted that data for accuracy and clarity. Here in this project our target is to Improve efficiency and profitability of Santur Bhabani Sweets. For this reason I analyze various trends on sales, production, profitability and I also try to find other various parameter which will help Santur Bhabani Sweets to reach its goal.

Enquiring Top Selling Items:

Here I calculate total number of items sold over 3 months period for each item, it will help me to identify the top selling item over 18 items. By this analysis we can benefitted by---

1. Identifying top selling products will help us to make sure that these products are always in stocks and it will also reduce the risk of stock out.
2. By this process we can also able to identify low selling product which will help to reduce over stocking and minimize waste.
3. After knowing best selling products Santur Bhabani Sweets can produce these items more to gain more profit and revenue.
4. We can satisfy customer by fulfill their demands.

ITEMS	TOTAL SELL	CUMULATIVE SELL	PERCENTAGE SELL	CUMULATIVE PERCENTAGE SELL
RASOGOLLA	35816	35816	20.860%	20.860%
GOLAPJAM	28853	64669	16.805%	37.665%
LANCHA	18851	83520	10.979%	48.645%
KALOJAM	16221	99741	9.448%	58.092%
KALAKAND	7656	107397	4.459%	62.551%
NIMKI	7564	114961	4.406%	66.957%
KSHIR KADAMBA	7482	122443	4.358%	71.315%
BAKED RASOGOLLA	7398	129841	4.309%	75.623%
CHANA VAJA	7236	137077	4.214%	79.838%
KAJU BARFI	7132	144209	4.154%	83.992%
KSHIRPAK SANDESH	6785	150994	3.952%	87.944%
KSHIR CHAMCHAM	5613	156607	3.269%	91.213%
KHASTA GAJA	3471	160078	2.022%	93.234%
TALSAS	3219	163297	1.875%	95.109%
JALVARA	3165	166462	1.843%	96.953%
NIKUTI	3039	169501	1.770%	98.723%
MISHTI DOI(500 gm)	1272	170773	0.741%	99.464%
MISHTI DOI(250 gm)	921	171694	0.536%	100.000%

Enquiring Top Profitable Items:

To find profitable items I calculate average selling price and average cost price of each item across total period and multiply the difference of selling and cost price with total number of item sold of each item across total period. It will give us valuable information about profitability of each item across all items of Santur Bhabani Sweets. By this analysis we can benefitted by---

1. After identifying high profitable items the shop can focus on these items to maximize overall profit and it will also help us to increase total revenue of the shop.
2. After this analysis the shop will also be able to identify low profitable items which will help them to reduce expenses of low profitable items.
3. Profitability information help the shop to adjust better pricing strategy which will help to maintain good profit margins.
4. By understanding profitable items we can develop similar kind of items which can help Santur Bhabani Sweets to gain more profit.

ITEMS	AVG. SELL PRICE	AVG. COST PRICE	TOTAL SELL	TOTAL PRODUCTION COST	TOTAL REVENUE	TOTAL PROFIT	CUMULATIVE PROFIT	% PROFIT	% CUMULATIVE PROFIT
RASOGOLLA	10	8.06	35816	288677	358160	69483	69483	20.18%	20.18%
GOLAPJAM	10	8.4	28853	242365	288530	46165	115648	13.41%	33.59%
LANCHA	10	8.22	18851	154955	188510	33555	149203	9.75%	43.34%
KALOJAM	7.28	5.48	16221	88891	118088.88	29198	178400	8.48%	51.82%
MISHTI DOI(500 gm)	77.56	57.88	1272	73623	98656.32	25033	203433	7.27%	59.09%
KALAKAND	10	8	7656	61248	76560	15312	218745	4.45%	63.53%
BAKED RASOGOLLA	15	13.01	7398	96248	110970	14722	233467	4.28%	67.81%
CHANA VAJA	8	6.09	7236	44067	57888	13821	247288	4.01%	71.82%
KSHIR KADAMBA	10	8.26	7482	61801	74820	13019	260307	3.78%	75.61%
KSHIRPAK SANDESH	10	8.22	6785	55773	67850	12077	272384	3.51%	79.11%
NIMKI	6	4.5	7564	34038	45384	11346	283730	3.30%	82.41%
KAJU BARFI	10	8.5	7132	60622	71320	10698	294428	3.11%	85.52%
TALSAS	12	9	3219	28971	38628	9657	304085	2.80%	88.32%
NIKUTI	10	7	3039	21273	30390	9117	313202	2.65%	90.97%
MISHTI DOI(250 gm)	38.78	29	921	26709	35716.38	9007	322210	2.62%	93.59%
KSHIR CHAMCHAM	10	8.43	5613	47318	56130	8812	331022	2.56%	96.15%
KHASTA GAJA	8	6	3471	20826	27768	6942	337964	2.02%	98.16%
JALVARA	12	10	3165	31650	37980	6330	344294	1.84%	100.00%

Enquiring Most Revenue Generating Items:

To know most revenue generating items we calculate average selling price over the total period of each item and multiply that with total number of items sold over the period for each item. By this we can know about the most revenue giving items. From this analysis we can benefitted by---

1. After knowing most revenue generating items Santur Bhabani Sweets can produce these items more to increase their income.
2. The shop can make sure that high revenue generating items are always in stocks which will reduce the risk of lost sales due to stockouts.
3. By understanding low revenue generating items the shop can avoid overstocking of those items to reduce wastage.
4. High revenue giving items can help the shop to establish a strong marketing position by fulfilling the customer demands.

	A	B	C	D	E	F	G
1	ITEMS	AVG. SELL PRICE	TOTAL SELL	TOTAL REVENUE	CUMULATIVE REVENUE	PERCENTAGE REVENUE	CUMULATIVE PERCENTAGE REVENUE
2	RASOGOLLA	10	35816	358160	358160	20.084%	20.084%
3	GOLAPJAM	10	28853	288530	646690	16.179%	36.263%
4	LANCHA	10	18851	188510	835200	10.571%	46.833%
5	KALOJAM	7.28	16221	118089	953289	6.622%	53.455%
6	BAKED RASOGOLLA	15	7398	110970	1064259	6.223%	59.678%
7	MISHTI DOI(500 gm)	77.56	1272	98656	1162915	5.532%	65.210%
8	KALAKAND	10	7656	76560	1239475	4.293%	69.503%
9	KSHIR KADAMBA	10	7482	74820	1314295	4.195%	73.698%
10	KAJU BARFI	10	7132	71320	1385615	3.999%	77.697%
11	KSHIRPAK SANDESH	10	6785	67850	1453465	3.805%	81.502%
12	CHANA VAJA	8	7236	57888	1511353	3.246%	84.748%
13	KSHIR CHAMCHAM	10	5613	56130	1567483	3.147%	87.895%
14	NIMKI	6	7564	45384	1612867	2.545%	90.440%
15	TALSAS	12	3219	38628	1651495	2.166%	92.606%
16	JALVARA	12	3165	37980	1689475	2.130%	94.736%
17	MISHTI DOI(250 gm)	38.78	921	35716	1725192	2.003%	96.739%
18	NIKUTI	10	3039	30390	1755582	1.704%	98.443%
19	KHASTA GAJA	8	3471	27768	1783350	1.557%	100.000%

Result and Findings:

Product wise total sale:

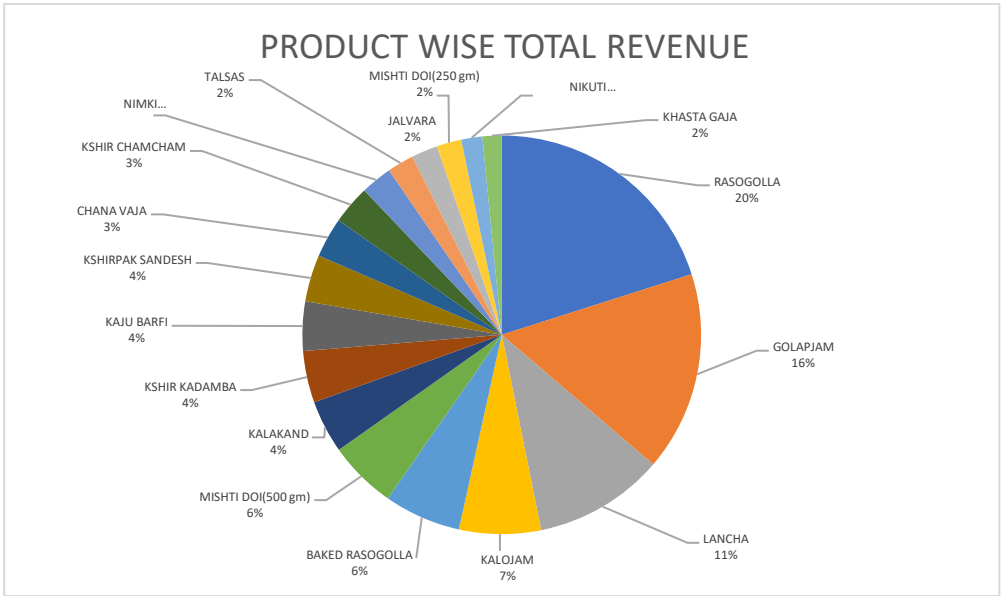
After calculating product wise total sales we plot a bar chart to visualize most selling items. By prioritize production on top selling products we can avoid stock out and fulfil the demands of customer and we also can plan on low selling items to increase their sales.

Here we can see that 80% sales are coming from 9 products out of 18 products and almost 60% sales are coming from 4 products. So, Rasogolla, Golapjam, Lancha, Kalojam are the top selling products. Rasogolla is the most vital product for Santur Bhabani Sweets which is giving almost 20% of total sales. The selling pattern of Kalakand, Nimki, Kshir Kadamba, Baked Rasogolla, Chana Vaja, Kaju Barfi, Kshirpak Sandesh are similar type. These products are medium selling products. Kshir Chamcham, Khasta Gaja, Talsas, Jalvara, Nikuti are low selling products.

Product wise total revenue:

We plot the pie chart from product wise total revenue table to visualize percentage of total revenue generated by each product. From this distribution of revenue Santur Bhabani Sweets can plan their production accordingly to gain more revenue.

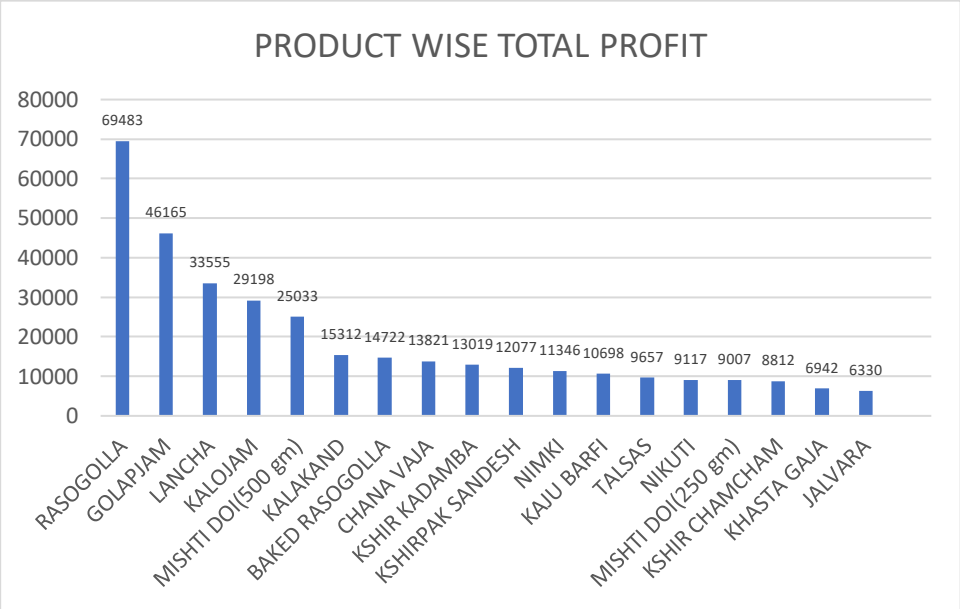
Here we can observe from product wise total revenue pie chart that Rasogolla, Golapjam, Lancha, Kalojam, Baked Rasogolla, Misti Doi(500gm), Kalakand, Kshir Kadamba, Kaju Barfi are giving almost 80% of total Revenue but Rasogolla, Golapjam, Lancha are contributing significantly towards generating revenue. On the other hand Nikuti and Khasta Gaja are low revenue generating items.



Product wise total profit:

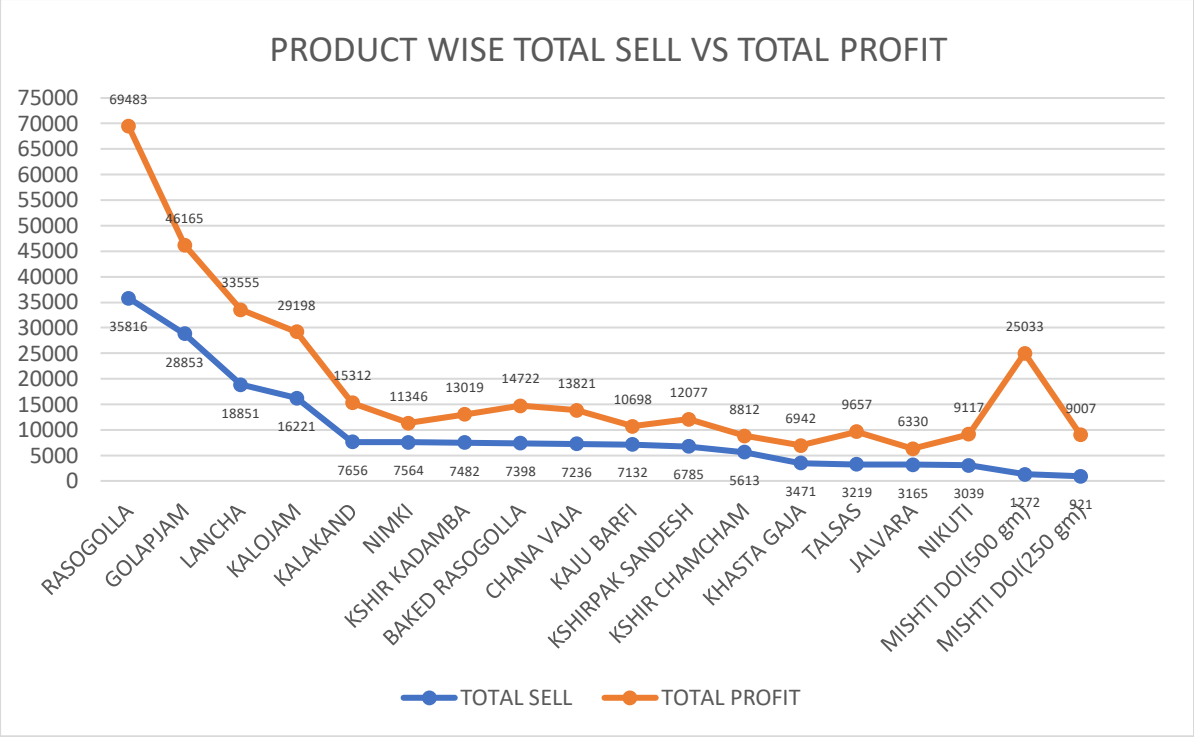
We plot the bar chart to know product wise total profit. By focusing on promoting and optimizing high profitable products while facing challenges in less profitable products the shop can reach sustainable growth and success.

From this analysis we came to know about the profitability of each product. Here we can observe that Rasogolla, Golapjam, Lancha, Kalojam, Misti Doi(500gm), each contributes more than 7% of total profit. Rasogolla is the most selling as well as most profitable item. It is generating almost Rs. 70,000 profit out of total profit of Rs. 344294.



Product wise total sell vs total profit analysis:

In business sell and profit are the two most important component. Product-wise total sell vs. total profit analysis provides a detailed view of each product's contribution to the business. After this analysis Santur Bhabani Sweets can enhance its overall profitability, reduce costs, and ensure sustainable growth. From this component the business come to know about their financial status. Here we wanted to see the relationship between total sell verses total profit of each product. This analysis is crucial for business. From this scatter plot with line chart we can see that first four items are giving more profit as well as their sells are high. But some products like Misti Doi(500gm) which is less in sells with respect to some other products but are giving more profit than those products.


PRODUCT WISE TOTAL SELL VS TOTAL PROFIT
75000
70000
65000
60000
55000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
69483
46165
33555
29198
15312
11346
13019
14722
13821
10698
12077
8812
6942
9657
6330
9117
25033
9007
35816
28853
18851
16221
7656
7564
7482
7398
7236
7132
6785
5613
3471
3219
3165
3039
1272
921
RASOGOLLA
GOLAPJAM
LANCHA
KALOJAM
KALAKAND
NIMKI
KSHIR KADAMBA
BAKED RASOGOLLA
CHANA VAJA
KAJU BARFI
KSHIRPAK SANDESH
KSHIR CHAMCHAM
KHASTA GAJA
TALSAS
JALVARA
NIKUTI
MISHTI DOI(500 gm)
MISHTI DOI(250 gm)
TOTAL SELL
TOTAL PROFIT