

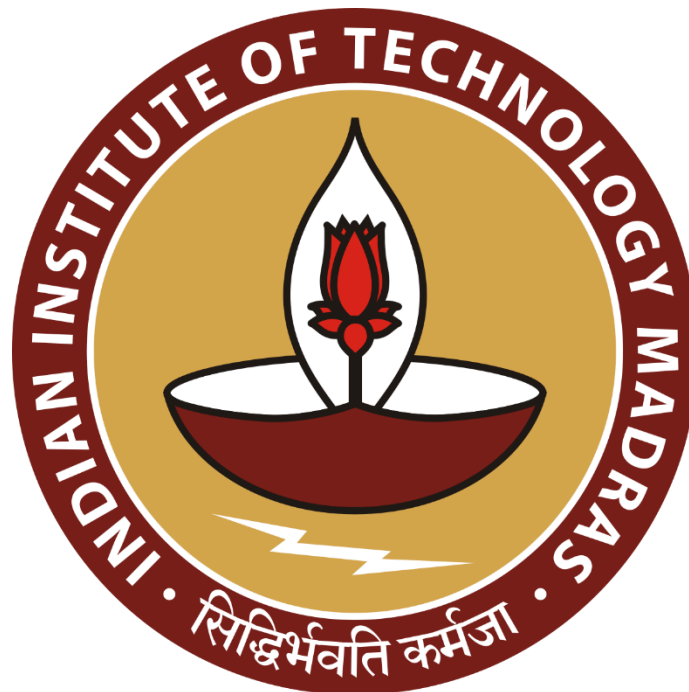
Enhancing Business Efficiency and Customer Experience for Ali's Shawarma Truck near KIIT University.

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Content

Executive Summary and Title	2
Detailed Explanation of Analysis Process	2
Results and Findings	6
Interpretation of Results and Recommendation	15

Executive Summary and Title

Title : Enhancing Business Efficiency and Customer Experience for Ali's Shawarma Truck near KIIT University.

Financial Performance Analysis: The report examines the financial performance of 'Dopamine Dose' food truck over 56 days, revealing a total revenue of ₹271,460 and a total profit of ₹106,540. Notably, the profit margin stands at an impressive 39.25%, reflecting robust financial health.

Performance Analysis: Key findings highlight 'Peri peri Chicken Shawarma' as the top performer, generating ₹53,100 in revenue, representing 19.56% of total revenue. Conversely, 'Special Salsa Chicken Shawarma' underperforms, contributing only ₹3,410 or 1.25% of total revenue.

Temperature Variation Analysis: Temperature data analysis suggests potential correlations with sales trends, particularly during temperature declines, albeit with inconclusive evidence.

Sales of Spicier Products: Sales trends of spicier products, such as Schezwan Chicken Shawarma and Salsa Chicken Shawarma, exhibit intermittent spikes correlating with temperature drops, influencing revenue generation.

Correlation Analysis with Temperature: Correlation heatmaps reveal weak correlations between menu items and temperature, with notable negative correlations observed for certain spicier products.

Interpretation of Results and Recommendations: After optimizing chicken quantity estimations and reducing daily chicken expenses by ₹525, the new profit margin jumped from 39.25% to 50.27%. Additionally, potential partnerships with online delivery services could significantly increase sales and reach. In conclusion, strategic adjustments based on data-driven insights can enhance profitability and operational efficiency for 'Dopamine Dose'.

Attachments : [Jupyter notebook, Google Sheet, Dataset folder]

Detailed Explanation of Analysis Process

Data Preparation and Cleaning

For the final analysis python, jupyter notebook and other required dependencies were used. The excel file from the midterm submission was split into two separate datasets. The datasets are converted into dataframes using 'Pandas'. First dataset consisted of the number of units sold per day, it was named number_df. Second dataset consisted of the revenue generated by the sales of shawarma wraps and it was named money_df. This split was preferred because the resulting two datasets required two different sets of calculations and plotting. Both of the datasets were further checked for missing values and cleaned. A fixed cost expenditure is established for each day. The monthly salary of staff, Diesel expenses per month and the price of the gas cylinder per month, price and quantity of chicken per day were inquired from the owner. To get the per day

expenses the prices which were available on a monthly basis were divided by 30. Per day expenditure includes :

Expenses	Expenditure
Chicken	₹2100/Day
Diesel	₹2000/30 = ₹66.66/Day
Staff	₹20000/30 = ₹666.66/Day
Gas cylinder	₹1800/30 = ₹60/Day

Table - 1 : Establishing Fixed Daily Expenses.

Feature engineering and dataset enhancements

The current price of chicken/kg is **₹210**.

The total expense per day was calculated to be the sum of the above mentioned expenses which is **₹2893** and change.

The changes that were made to the dataset consisting of the number of units sold per day are :

A separate column was created signifying the total number of shawarma wraps sold in one particular day. This was achieved by summing up the individual rows.

The changes that were made to the dataset consisting revenue information are :

A separate column was created signifying the total revenue collected at the end of each day. This was achieved by summing up the individual rows.

A separate column was created signifying the total profit captured at the end of each day. This was achieved by subtracting the total profit captured from the total revenue generated in the given day.

Observations were recorded after calling the .describe() method on both the dataframes.

Per day profit margins were calculated by dividing the total profit captured by total revenue generated on the given day.

Code :

```
Python
money_df['profit_margin_perday'] =
(money_df['profit']/money_df['total_revenue_perday']) * 100
money_df.head()
```

Formula used : net profit margin (in percentage) = (income / Revenue) * 100

Feature data frames were constructed by keeping only the feature (product, items) columns. They were named 'number_df_features' and 'money_df_features'.

A correlation matrix was constructed in an attempt to find any relevant correlations

between the products.

Identifying maximum revenue and units sold

Maximum revenue generator product was isolated by iteratively searching for the product which generated the maximum revenue at the end of 56 days. This was achieved by summing up the feature column's values.

Formula : Total Revenue : $\sum_{i=1}^n (\text{Number Sold} / \text{Day}_i \times \text{Selling Price}_i)$

Code :

```
Python
max_revenue = 0
max_revenue_generator = "

for i in money_df_features.columns:
    if money_df[i].sum() > max_revenue:
        max_revenue = money_df[i].sum()
        max_revenue_generator = i
print(f'Maximum revenue is generated by {max_revenue_generator} : Rupees
{max_revenue}')
print()
```

Maximum number of units sold of a particular product was achieved the same way.

Trend Analysis

Profit trend was plotted by going back to the money_df and plotting it against the Dates using the 'seaborn' and 'matplotlib' libraries. The trend can be found at the **Results and Findings** Section.

Similarly by using these libraries, each of the items from the menu was plotted against the dates in an attempt to notice any trend or mark sudden upticks or declines. This was achieved by iteratively going through each numeric column. Only some interesting trends were put in the **Results and Findings** section.

Code :

```
Python
plotting_money_df['Dates'] = pd.to_datetime(plotting_money_df['Dates'])
# Excluding non-numeric columns (e.g., 'Dates', 'profit')
```

```

numeric_columns = plotting_money_df.select_dtypes(include=['float64',
'int64']).columns
# Setting up subplots
fig, axes = plt.subplots(nrows=len(numeric_columns), figsize=(12, 4 *
len(numeric_columns)))
# Looping through numeric columns and create individual plots
for i, column in enumerate(numeric_columns):
    sns.lineplot(x='Dates', y=column, data=plotting_money_df, ax=axes[i])
    axes[i].set_title(f'{column} over time')
    axes[i].set_xlabel('Dates')
    axes[i].set_ylabel(column)
# Adjusting layout
plt.tight_layout()
plt.show()

```

Next to understand the individual contribution towards revenue a pie chart was created and observations were recorded.

To get a clearer view on sales volume, the dates column of the number_df was converted to datetime using pandas .to_datetime() function and the total units sold was grouped and summed by months.

Code :

```

Python
number_df['Dates'] = pd.to_datetime(number_df['Dates'])
grouped_by_date = number_df.groupby(number_df['Dates'].dt.month)['Total units
sold/Day'].sum()
grouped_by_date_df = pd.DataFrame(grouped_by_date)
grouped_by_date_df.rename(columns={'Total units sold/Day': 'Total Units Sold/Month'},
inplace=True)
grouped_by_date_df.reset_index(inplace=True)
grouped_by_date_df.columns = ['Month', 'Total Units Sold/Month']
grouped_by_date_df

```

The execution of the above code led to the production of the *Table-2* in the *Results and Findings* section.

Temperature Data Processing

Next the temperature data from [wunderground.com](https://www.wunderground.com) was scraped for October, November and 5 initial days of December 2023. The scraped data was organized into a .csv file and later converted into a dataframe. A new dataframe was created by merging the number_df and the temperature dataframe on the dates. It was called temp_hypo_def. The non-numeric columns were dropped and a correlation matrix heatmap was plotted using seaborn. This heatmap can be found in the **Results and Findings** section.

Code :

```
Python
temp_correlation_matrix = temp_hypo_df_features.corr()
plt.figure(figsize=(12, 10))
sns.heatmap(temp_correlation_matrix, annot=True, cmap='coolwarm', fmt=".2f",
linewidths=.5)
plt.show()
```

Results and Findings

Looking at some tables initially to establish some basic fundamental values and their statistics would help a lot.

Table-2:

Financial Metrics	Quantity
1.Total Revenue generated in 56 days	₹271460
2.Total Profit captured in 56 days	₹106540
3.Profit Margin	39.25 %
4.Total Sales Volume	2679

Now to take a look at each metric closely, a table is constructed for each,

Table - 2.1 : Statistical parameters of revenue generated in 56 days

Statistical Parameter	Value in rupees	Explanation
Maximum	6840	Maximum revenue generated in a day
Minimum	2410	Minimum revenue generate in day

Average	4762.45	Average revenue generated within the span of 56 days
Standard Deviation	1051.81	Dispersion of revenue relative to the average revenue

Table 2.2 : Statistical parameters of profit captured in 56 days

Statistical Parameter	Value in rupees	Explanation
Maximum	3946.66	Maximum profit captured in a day
Minimum	336.66	Minimum profit captured in a day
Average	1869.12	Average profit captured within the span of 56 days
Standard Deviation	1051.81	Dispersion of profit relative to the average profit

Table 2.3 : Statistical parameters of profit-margin in 56 days

Statistical Parameter	Value	Explanation
Maximum	57.69%	Maximum profit-margin in a day
Minimum	-20.05%	Minimum profit-margin in a day
Average	35.82%	Average profit-margin within the span of 56 days
Standard Deviation	16.53%	Dispersion of profit-margin to the average profit-margin

Table 2.4 : Statistical parameters of sales-volume in 56 days

Statistical Parameter	Number Sold / Day	Explanation
Maximum	68	Maximum number of shawarmas sold in one day.
Minimum	24	Minimum number of shawarmas sold in one day.
Average	46.96	Average number of shawarmas sold within the span of 56 days.
Standard Deviation	10.40	Dispersion of the number of shawarmas sold from the average.

Average : $\Sigma_{i=1}^n Data_i / n$,

Standard Deviation: $(\Sigma_{i=1}^n (Data_i - Average)^2 / n)^{1/2}$

Table-3:Monthly Sales Volume Table

Month	Sales Volume	Contribution towards total Sales Volume
October 2023	933	34.82%
November 2023	1441	53.78%
5 initial days of December 2023	305	11.38%

Performance analysis

Top performing product in terms of revenue : ‘Peri peri Chicken Shawarma’

by generating a total of **₹53100**. This accounts for **19.56%** of the total revenue generated.

Top performing product in terms of number of units sold : ‘Peri peri Chicken Shawarma’

being the popular choice. Total of **531** units were sold. This accounts for **19.82%** of the total number of units that were sold.

Least performing product in terms of revenue : ‘Special Salsa Chicken Shawarma’

By generating a total of **₹3410**, which accounts for only **1.25%** of the total revenue generated.

Least performing product in terms of number of units sold : ‘Special Salsa Chicken

Shawarma’ being the least popular. Total of **31** units sold accounting for only **1.15%** of the total number of units that were sold.

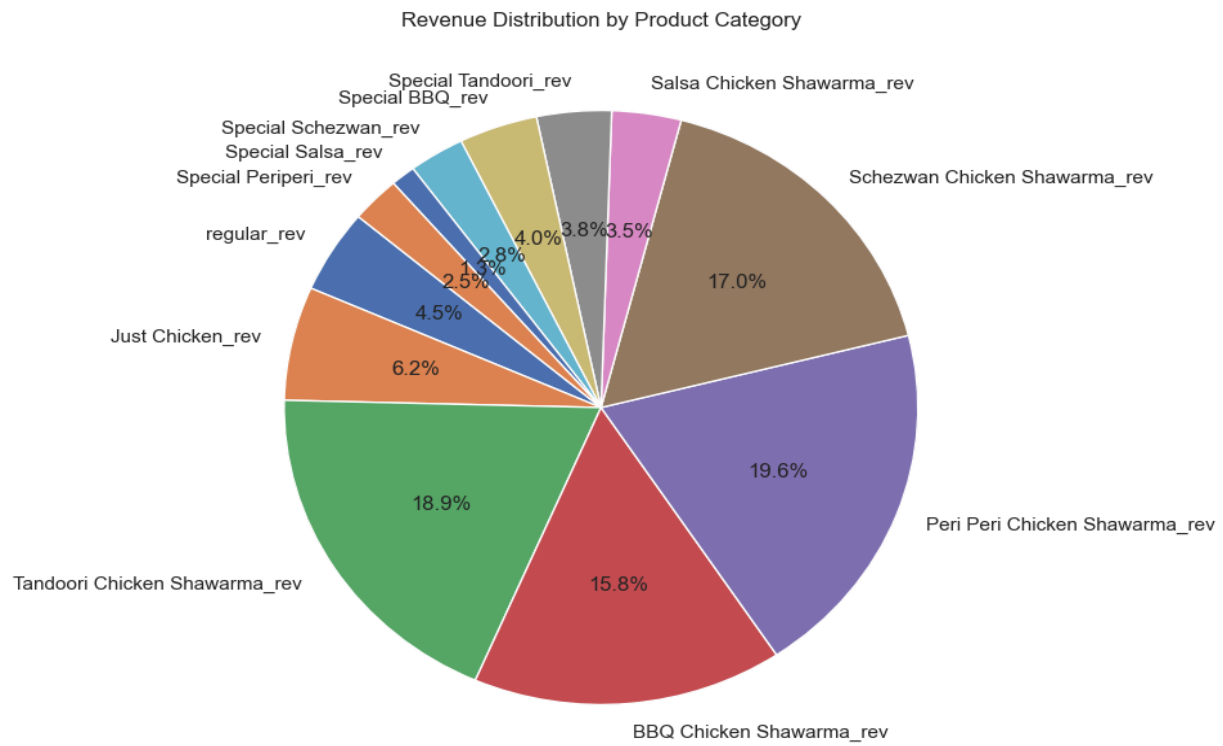


Figure - 1 : Pie chart showing revenue distribution

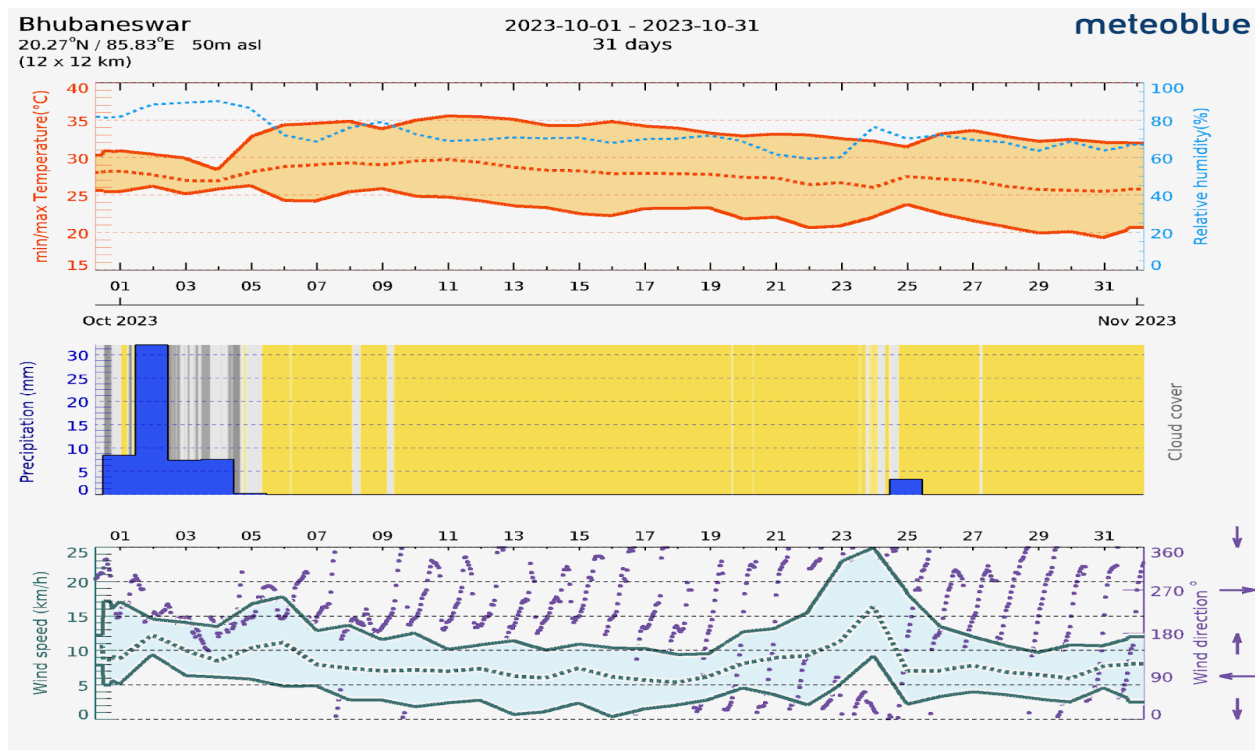


Figure - 2 : Temperature variation in the month of October 2023, Bhubaneswar

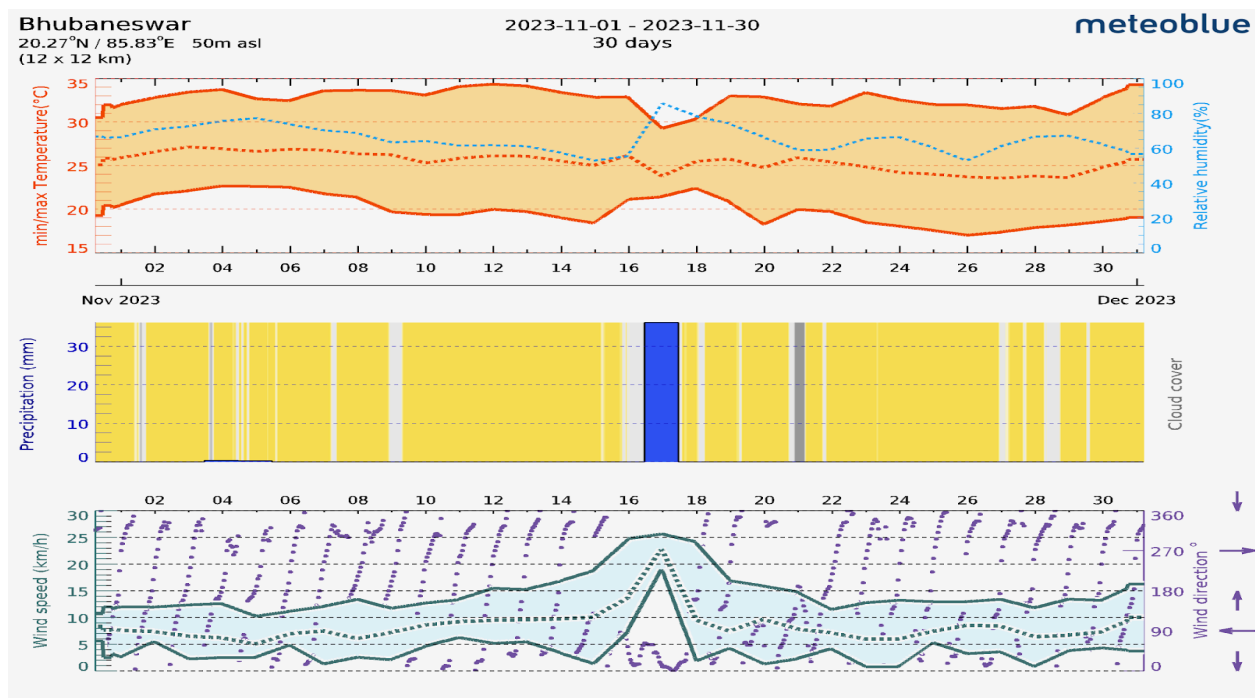


Figure - 3: Temperature variation in the month of November 2023, Bhubaneswar

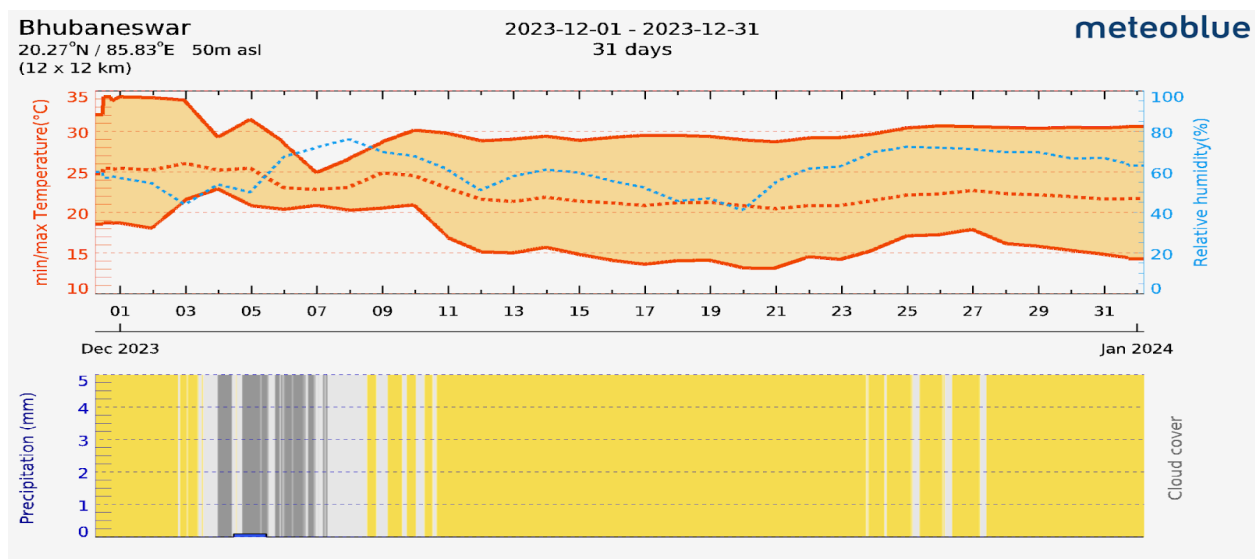


Figure - 4 : Temperature variation during initial 5 days of December 2023, Bhubaneswar

Temperature variation Analysis

Figure 2 : The collection of the temperature data from [wunderground.com](https://www.wunderground.com) and [meteoblue.com](https://www.meteoblue.com) was done with the intention to test that the sales of spicier products in the menu is somehow related to the temperature drop. In October 2023, it can be seen that the temperature dropped gradually from October 9th to October 22nd and from October 28th to October 31st, although the variation between the maximum and minimum temperature is not so significant. The wind speed significantly changed (went up) from October 19th 2023 to October 24th 2023.

Figure 3 : Similarly, here it can be seen that temperature variations in November 2023 are more than the temperature variations in October 2023. It can be seen that from the beginning of the month, till 26th November 2023, the temperature followed a downward trend, despite a few ups and downs in between. But it was safe to say that it got colder towards the end of November 2023. The wind speed was low throughout with a spike around November 17th 2023.

Figure 4 : Here, only the initial 5 days of December 2023's temperature data was required which didn't say much about anything.

The important thing to note here is that the temperature drop needed to be noticed. The sudden difference in temperature is often felt more intensely than gradual difference in temperature because the body gets less time to adapt to the difference.

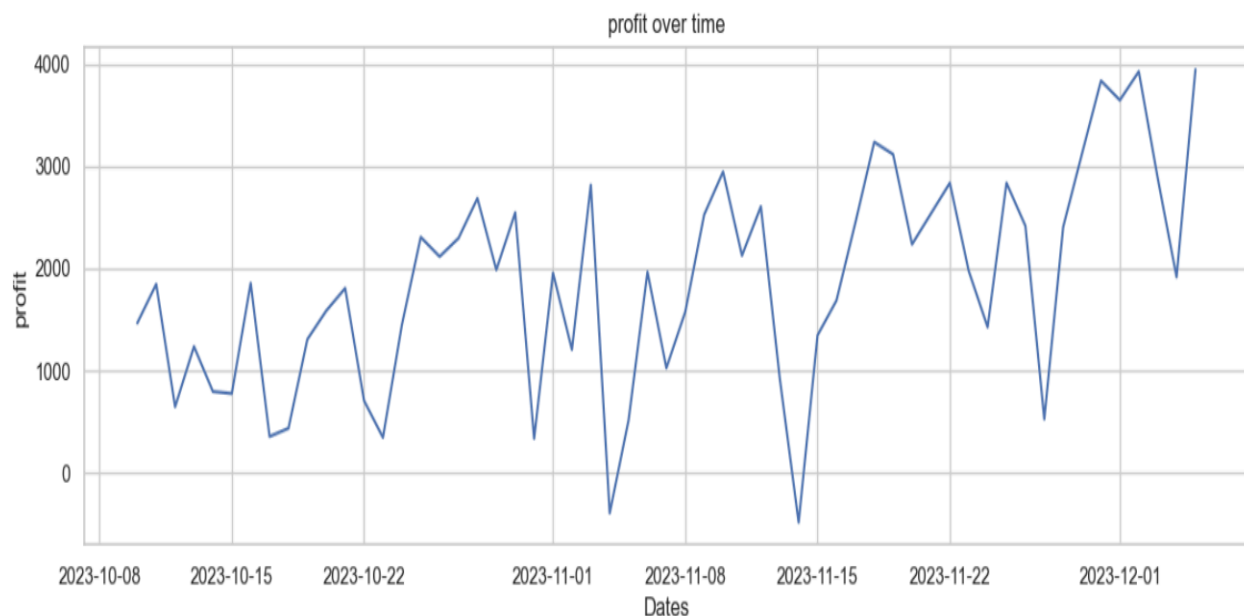


Figure - 5 : Profit vs time.

Sales of Spicier Products Analysis

It can be seen that the sales increased leading to an increase in profit from 15th November 2023 to around 28th November 2023. It doesn't provide conclusive evidence to prove that sales increased with drop in temperature, in general. To take a look at the sales of spicier products in

the menu, the revenue trend of ‘Schezwan Chicken Shawarma’ and ‘Salsa Chicken Shawarma’ was evaluated.

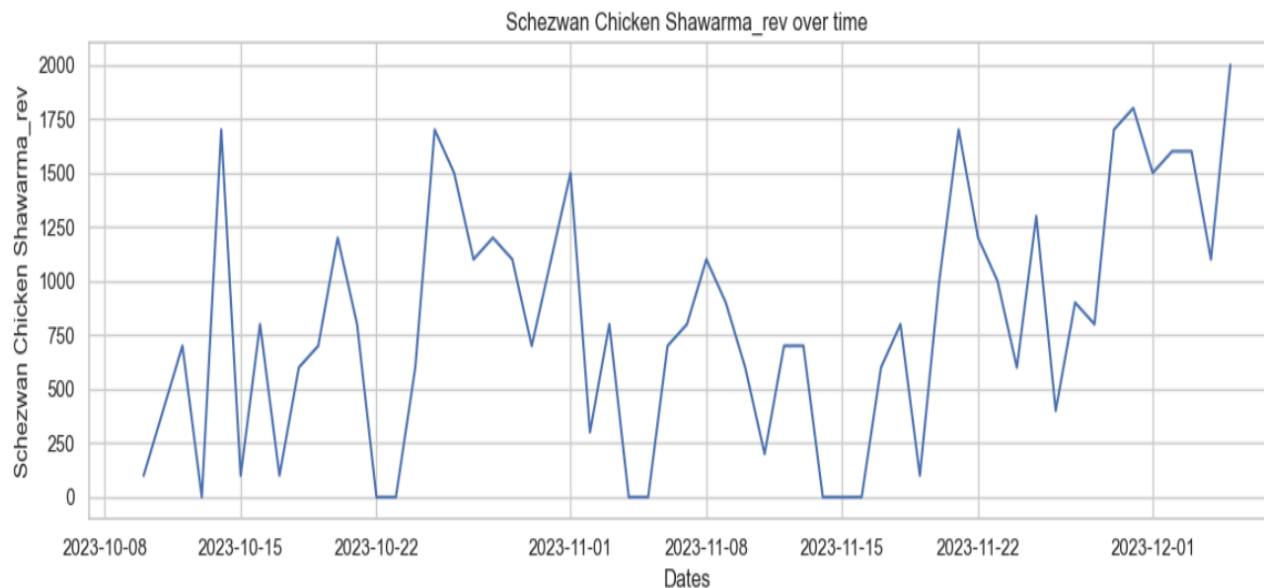


Figure - 6 : Schezwan Chicken Shawarma sales (revenue generation) vs time.

It can be seen that revenue generation of ‘Schezwan Chicken Shawarma’ was higher than its average (₹810.52) between October 22nd and October 31st, and between 18th November and 26th November.

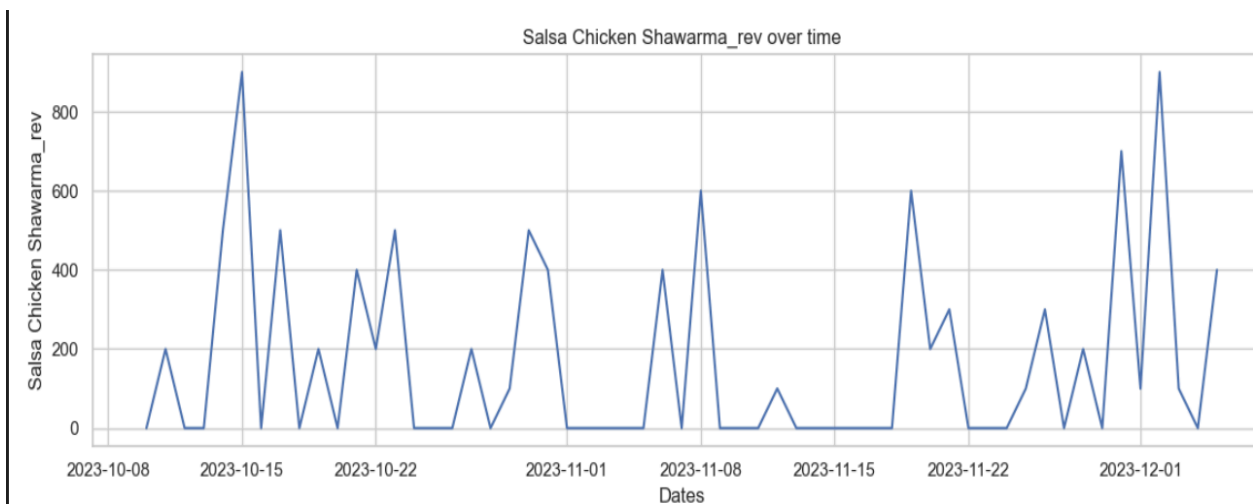


Figure - 7 : Salsa Chicken Shawarma sales (revenue generation) vs time.

It can be seen that revenue generation of ‘Salsa Chicken Shawarma’ was higher than its average (₹168.42) on specific dates like 15th October 2023, 8th November 2023, 2nd December.

To conclude, the sales trend went up on some dates which aligned with the temperature decline and in other cases, it remains inconclusive.

Correlation Analysis with Temperature

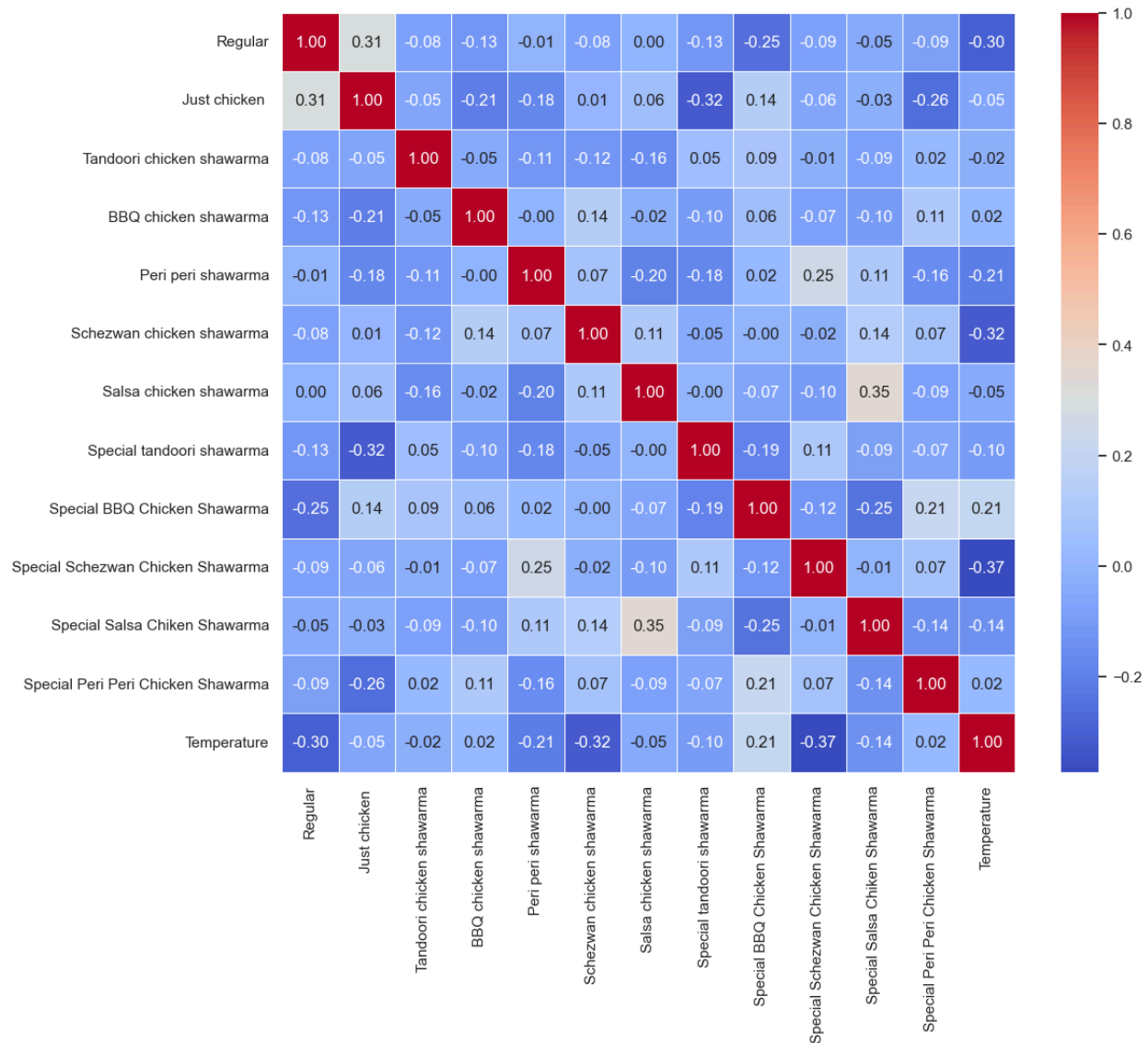


Figure - 8 : Correlation heatmap showing the correlations between the features (including temperature)

As it can be noted that, there are no significant correlations between the items on the menu and the temperature which doesn't concretely prove the existence of a relationship between temperature drop and the preference of spicier products but one interesting thing to note here is, Most of the items in the menu are negatively correlated with the temperature. Especially when it comes to 'Schezwan Chicken Shawarma' and 'Special Schezwan Chicken Shawarma' the

negative correlations are higher than others, **-0.32** and **-0.37** respectively. This weakly suggests in accordance with the previously mentioned test.

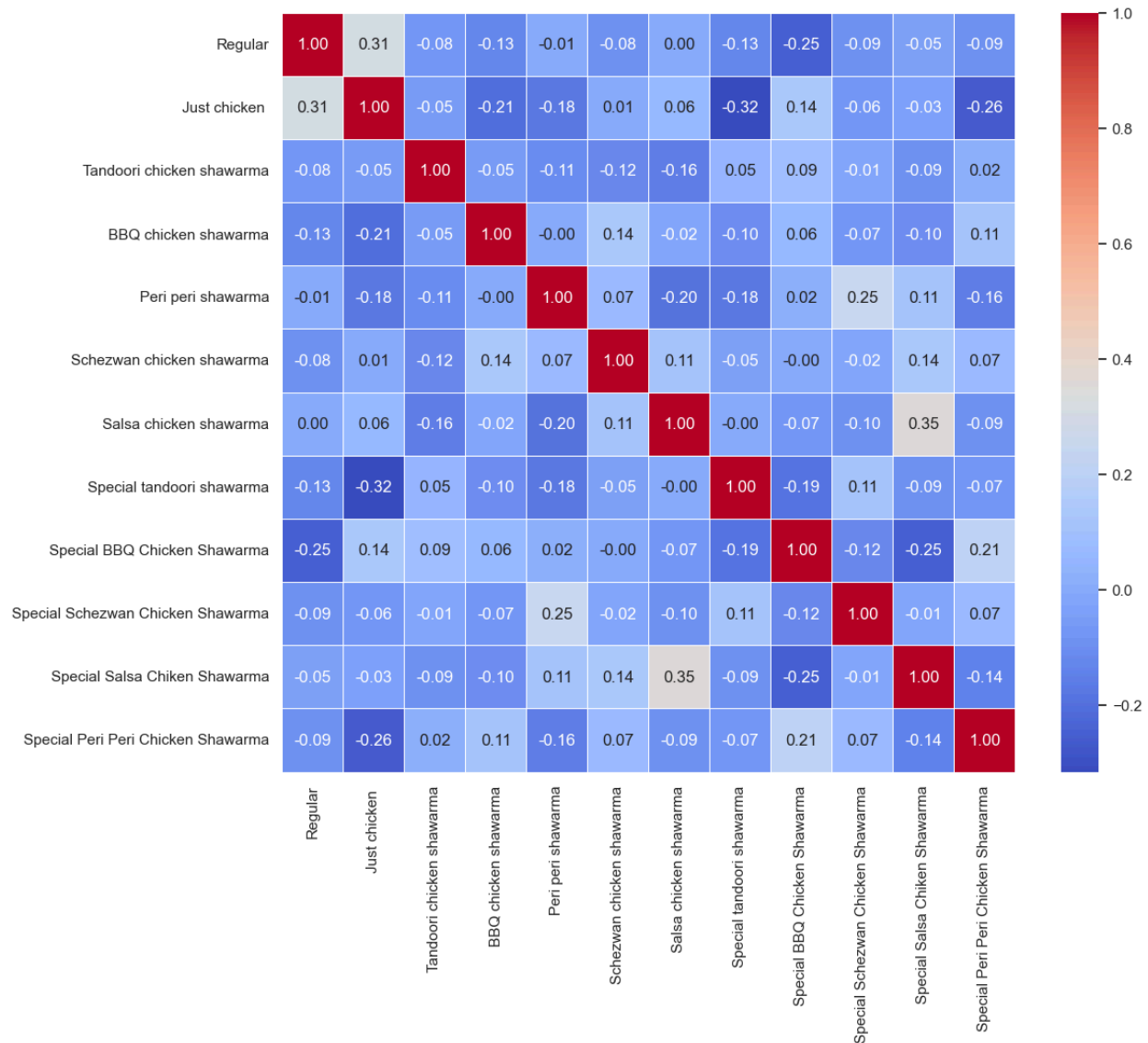


Figure - 9: Correlation heatmap showing correlations between features (items on the menu)

There are no significant correlations between the features or the items on the menu. There are some weak positive correlations which don't account for anything meaningful. Interpretation of these correlations can be found in the '*Interpretation of Results and Recommendation*' section.

Interpretation of Results and Recommendation

Interpretation of Results

1. **Analyzing Customer Base :** The ‘Dopamine Dose’ Food truck gets parked adjacent to ‘KIIT Information Centre’. The street doesn’t have any traffic signal and it’s fairly wide allowing two-way movement of vehicles. The movement of vehicles is usually quite speedy. Parking at the side of the street results in immediate towing of the vehicle. So, it's safe to say that the customer-base of ‘Dopamine-Dose’ is fairly composed of students of ‘KIIT University’ who take a stroll or people who take a walk in the evening at the campus. To prove that the customer-base of the truck is largely composed of students of the university, a list of holidays of the university was taken. The dates were noted and the sales of the truck was checked on and around these days.

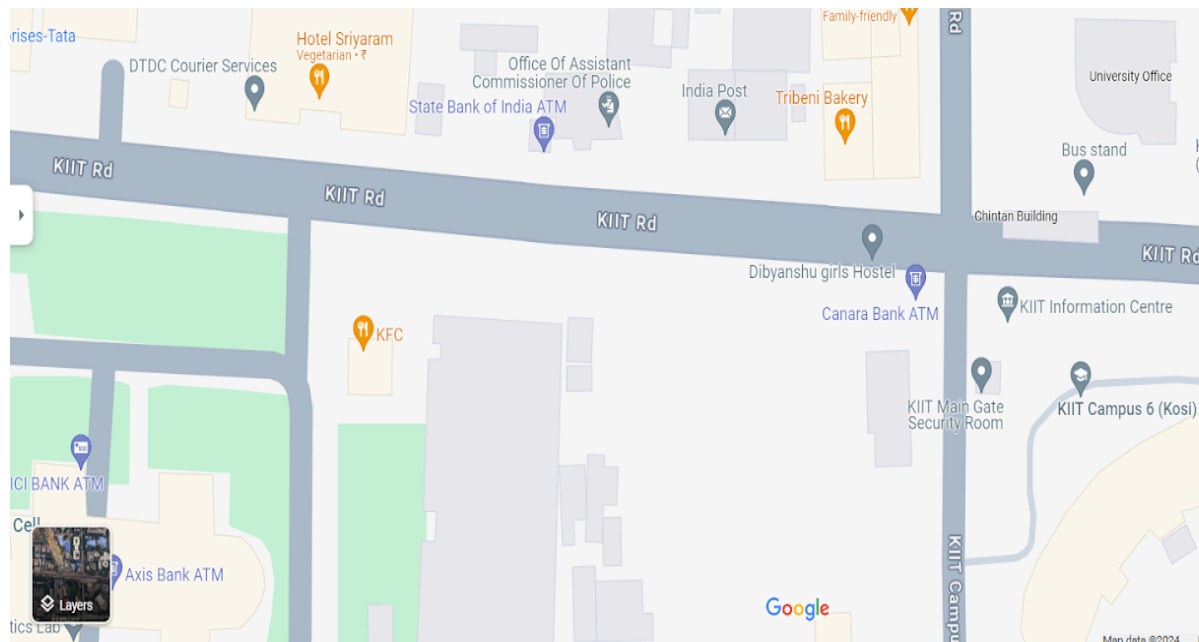


Figure - 10 : Map of the location of Dopamine Dose

Table 3: Holiday List of KIIT university

02.10.2023	Wednesday	Gandhi Jayanti
10.10.2023 – 16.10.2023	Thursday-Sunday	Durga Puja
31.10.2023	Thursday	Kali Puja and diwali
15.11.2023	Friday	Kartika purnima

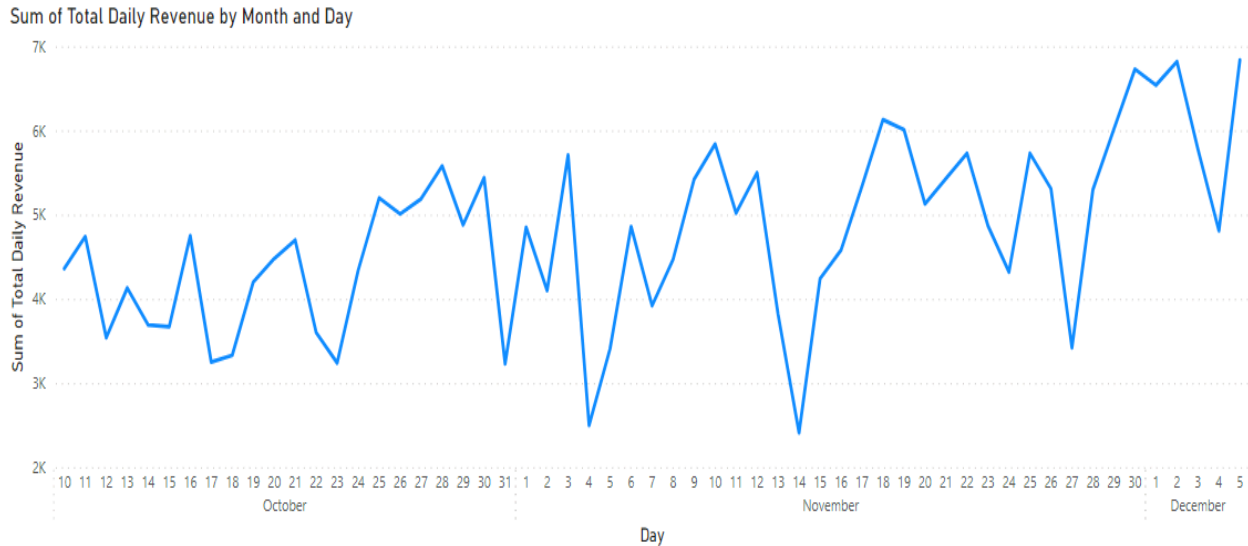


Figure - 11 : Sum of Total Daily Revenue by Day

Here it can be seen that the revenue dropped significantly on 31st October, 4th November and around 14th November of the year 2023, and it continued low from 11th October till 16th October in the beginning of the data collection. This roughly proves that the customer-base of ‘Dopamine Dose’ is largely composed of students from ‘KIIT university’. Recommendation to improve this given situation can be found in the **Recommendation** subsection.

2. **Menu item correlation analysis :** There was no particularly strong correlation between features or the items of the menu of the food truck. The sale of one item doesn’t affect the sale of another. The menu provides a selection from which customers can choose what to eat based on their liking. So that makes it a question of preference which is independent of sales of items. Given that, there are some weak positive correlations which might be the result of inquiring the owner about the items on the menu such as the popular choice or the ingredients present, the quantity of ingredients. The inquiry might have induced some dependency on popular choice and kind.
3. **Addressing Chicken Quality concerns :** The owner of ‘Dopamine Dose’ doesn’t prefer to partner up with online food delivery services because the chicken dries up within about 10 minutes of getting cooked. It is normally advised to enjoy the shawarmas immediately. So, the reluctance for partnering up with online food delivery services is understandable for quality reasons. Recommendation to improve this given situation can be found in the **Recommendation** subsection.
4. **Optimizing Chicken Quantity Estimations :** The current estimation for the quantity of chicken bought everyday accounts for the least performing products like ‘Special Salsa Chicken Shawarma’ or anything in the “Special” section, as well. The difference between the special section and the normal section as discussed in the proposal is that the lettuce or the potato in the normal section is replaced by chicken in the special section. In

essence the special section shawarmas consist of more chicken in quantity. The chicken is bought considering all the items in the menu, including the least performing products. Recommendation to improve this given situation can be found in the **Recommendation** subsection.

Recommendations

1. **Optimizing location for increased visibility :** As discussed above, the customer-base of ‘Dopamine Dose’ is primarily made up of university students. To go beyond that, or in other words, to increase sales which would in turn increase the revenue and profit of the business, it is recommended to park at a spot where potential customers would be able to stop and look. As the truck is mobile, it can be parked at a spot where the vehicles in the traffic tend to be slower. The distance from KIIT square to the truck is approximately 1 Kilometer.

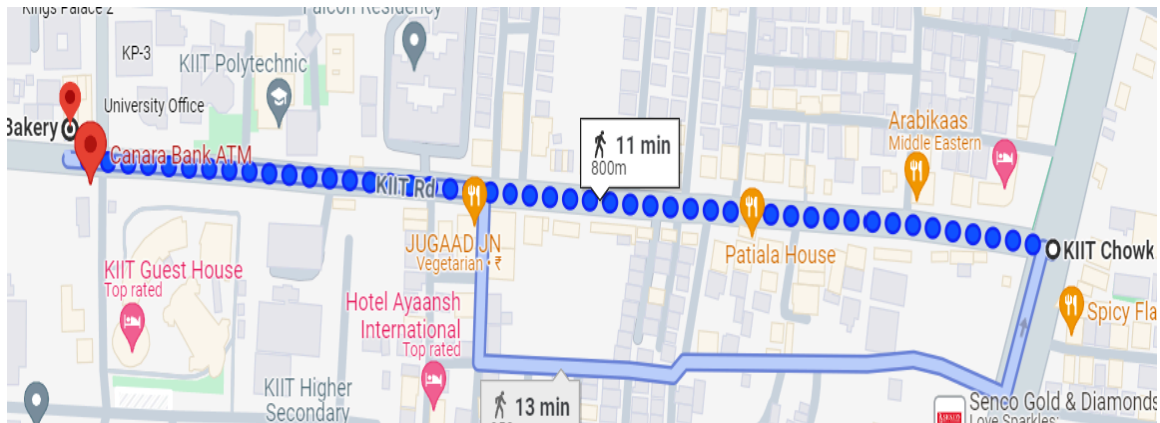


Figure - 12: Current location of the truck where it is parked.

People generally do not tend to park at the square and walk up to the truck. So, it is recommended to park the truck at the nearest car park.

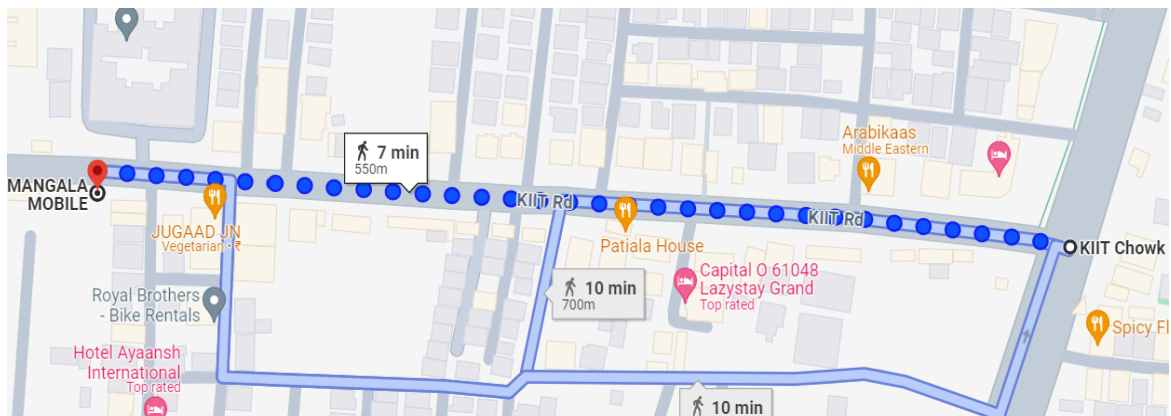


Figure - 13 : Proposed location where it is recommended to park.

This new location is adjacent to a huge car parking spot which directly catches the eye of people parking there. This opens up the avenue to diversify the customer-base of Dopamine Dose.

2. **Menu Optimization for Cost Efficiency :** There are **12** different items on the menu. The quantity of chicken bought everyday is **10kgs** keeping the above fact in mind. The current estimation leaves out **833 grams** of chicken for each product on the menu, out of which some products like the ones mentioned above, do not perform well so the three underperforming products can be overlooked while buying chicken. So multiplying the current requirement of chicken for each product with **9** instead of **12** items on the menu we get somewhere around **7.5 kgs**. This would be the optimum amount of chicken to buy everyday. This would significantly cut costs, precisely **₹525 rupees** everyday, while buying chicken. To test this out a new dataframe is created called 'proposed_money_df' which is just a copy of the 'money_df'

Change in net profit margin :

Python

```
optimized_reduction = 525
cost_cylinder = 1800/30
cost_chicken = 2100
cost_diesel = 2000/30
cost_staff = 20000/30
new_cost_chicken = cost_chicken - optimized_reduction
total_cost_price_perday = new_cost_chicken + cost_cylinder + cost_diesel + cost_staff
proposed_money_df['profit'] = proposed_money_df['total_revenue_perday'] -
total_cost_price_perday
proposed_money_df['profit_margin_perday'] =
(proposed_money_df['profit']/proposed_money_df['total_revenue_perday'])*100
grand_total_revenue = proposed_money_df['total_revenue_perday'].sum()
grand_total_profit = proposed_money_df['profit'].sum()
print("Total Revenue Generated by Dopamine Dose at the end of 56 days :",
grand_total_revenue)
print("Total Profit Captured by Dopamine Dose at the end of 56 days :",
grand_total_profit)
profit_margin = (grand_total_profit / grand_total_revenue) * 100
print(f"Profit Margin: {profit_margin:.2f}%")
```

Impact analysis on profit margin : It can be seen in the attached jupyter notebook that plugging in the new value for the cost of chicken made the profit and the profit margin jump from ₹1,06,540 and 39.25% to ₹1,36,464.99 and 50.27% respectively. The profit goes up by ₹29,924 and the profit-margin by 11.02 %.


3. **Investing in Online Delivery Partnerships :** If the business chooses to partner up with online delivery services, like ‘zomato’ or ‘swiggy’, it can invest in **aluminum foils**, which would allow it to keep the chicken warm and in turn would significantly increase the sales and reach of the business.

Attachments :

Analysis Jupyter Notebook -

<https://drive.google.com/file/d/1C-E26oaCwumcFScngTgm9-xOdEbFFOSR/view?usp=sharing>

Google Sheets -  final_submission

Datasets -  data