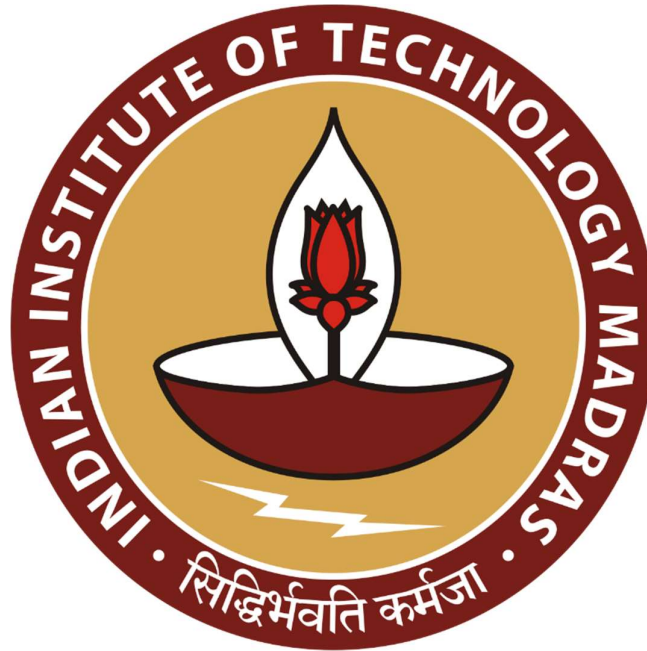


Culinary Efficiency: Revolutionizing Restaurant Performance
A Final report for the BDM capstone Project



Submitted By

Name: Ujit Kumar

Roll Number: 21f3000786

Email: 21f3000786@ds.study.iitm.ac.in

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1. Executive Summary and Title:

This capstone project revolves around a comprehensive exploration of a B2C restaurant located on the outskirts of Avadi, Chennai. Renowned for its culinary expertise, this establishment caters to a diverse customer base, offering an array of delectable dishes that cater to various tastes and preferences.

The primary objective of this final capstone project report is to provide an in-depth analysis of the insights and disclosures obtained through an exploratory investigation. This report's foundation is laid by exploratory data analysis (EDA), which is made possible by Microsoft Excel's data manipulation tools. Visually instructive graphs and charts that capture the core of the dataset finish out the report. The research makes use of Python programming to acquire a more detailed and nuanced knowledge of the dataset.

Through the art of EDA, we delve into the intricacies of the data, creating an array of diverse graphical representations. This process allows to uncover vital insights that offer a comprehensive view of the restaurant's operational landscape and its performance dynamics.

These insights serve as a guiding compass for strategic decision-making, aimed at not only boosting sales and profits but also enhancing the overall performance of the restaurant.

At the end of this project, there are findings and suggestions. These insights are like a roadmap for the restaurant to follow in order to make more money and be more successful in the future. This report is like a helpful guide, showing the way to improve sales and profits for the restaurant moving forward.

2. Detailed Explanation of Analysis Process/Method

2.1 Identifying Causes of Minimal Profit & Optimizing Inventory Management:

To analyse the cause of Minimal Profit & Optimizing Inventory Management a common approach has been used, the foundation of the analysis lies on using the tools like Microsoft Excel and Python Programming Language.

This project delves into understanding the reasons for low profits and seeks to enhance inventory management. A structured approach is being followed, employing tools such as Microsoft Excel and Python programming to gain deeper insights.

Prior to delving into numerical analysis, data was meticulously cleaned to ensure accuracy. Python, alongside specialized tools like Pandas, Polaris, and NumPy, was utilized to tidy up the data, making it ready for analysis.

To unearth the factors contributing to declining profits, an exhaustive study of the dataset was conducted. This involved using Exploratory Data Analysis (EDA) techniques, which means studying the data from various angles. Different types of visual representations like Bar Graphs, Pie Charts, and Stacked Bar Graphs were used to help understand trends. Findings from these visuals were compared to ensure accuracy and guide further analysis.

This approach aims to deeply comprehend the problem and find effective solutions by examining the data from multiple perspectives. The goal is to provide strategic

recommendations that can enhance revenue and future operations. The report serves as a practical guide, offering insights to increase sales, profits, and overall success.

The analysis also adopts a visual approach, utilizing tools like Matplotlib and seaborn to create meaningful graphs. The objective is to reveal connections between variables and their impact on sales. Heatmaps, created using covariance matrices, expose patterns in the data. Additionally, Time Series Analysis helps identify trends over time.

By employing these tools, the goal is to gain a comprehensive understanding of sales dynamics and interrelationships. This knowledge informs decision-making, aiming to improve sales and optimize overall performance.

2.2 Enhancing Data Management:

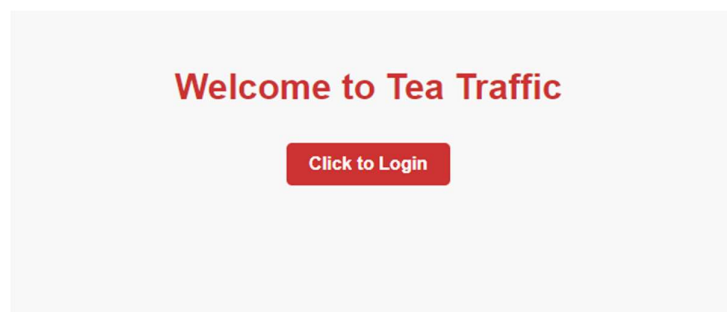
The centralized and secure data management solution application designed for Tea Traffic has been successfully completed and has been handed over to the shop. This application has been installed at Tea Traffic's shop to optimize and streamline their transaction processes efficiently. The development of the application utilized Python (Flask) and MySQL, ensuring a resilient operational framework and seamless integration.

GitHub Link: <https://github.com/ujitkumar1/CulinaryEfficiency>

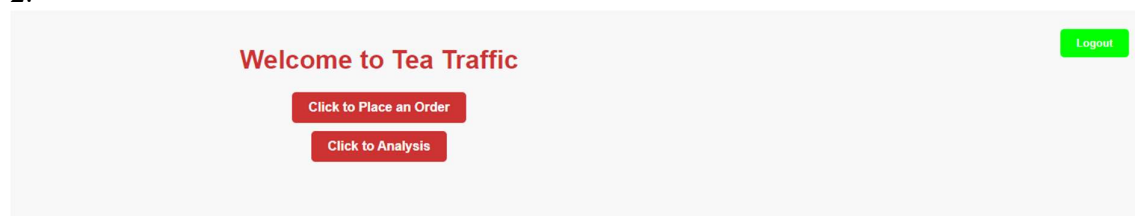
Note: The Web Application is running locally on the Shop PC

2.2.1 Images of the Web Application:

1.

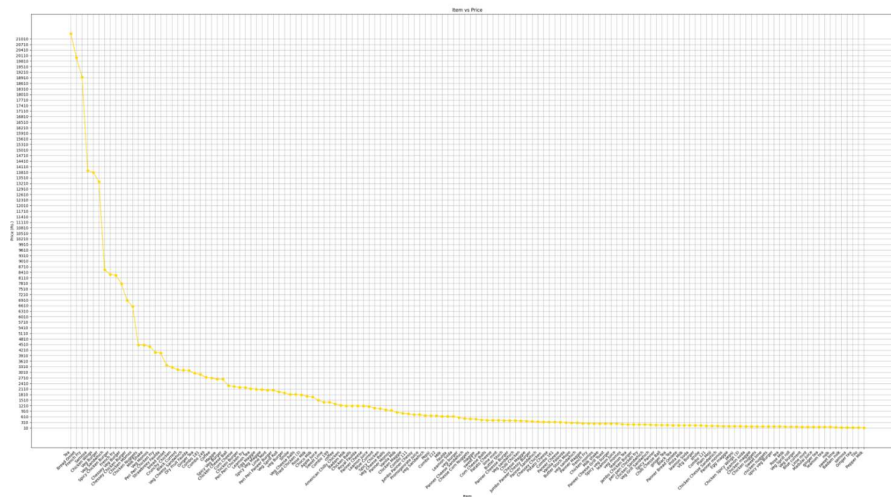


2.



3.

Graph



4.

Table

S.No	Item	Price	% of Contribution
1	Tea	Rs. 21290.0	7.793 %
2	Bread Omelet	Rs. 20000.0	7.321 %
3	French Fry	Rs. 18950.0	6.937 %
4	Samosa	Rs. 13910.0	5.092 %
5	Chicken Wings	Rs. 13800.0	5.052 %
6	Veg Burger	Rs. 13300.0	4.869 %
7	Veg Sandwich	Rs. 8560.0	3.133 %
8	Spicy Chicken Burger	Rs. 8300.0	3.038 %
9	French fry	Rs. 8250.0	3.02 %
10	Chessey Veg Burger	Rs. 7800.0	2.855 %
11	Chessey Chicken Burger	Rs. 6900.0	2.526 %
12	Chicken Momos	Rs. 6560.0	2.401 %
13	Chicken Nuggets	Rs. 4480.0	1.64 %
14	Milk Shake	Rs. 4480.0	1.64 %
15	Veg Momos	Rs. 4410.0	1.614 %

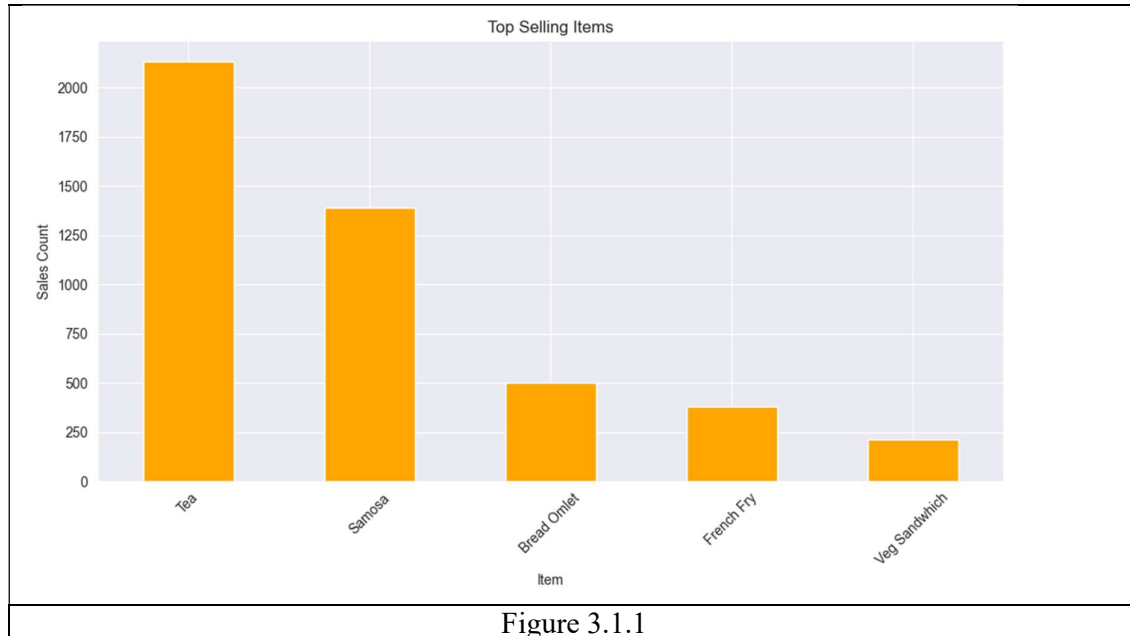
This web app has upgraded the shop's data storage from using pen and paper. Now, with just one click, it gives them quick insights into their data.

3 Results and Findings

3.1 Comparison of Top Selling items

Top 5 selling Items

i) Top 5 selling Item, sales count wise

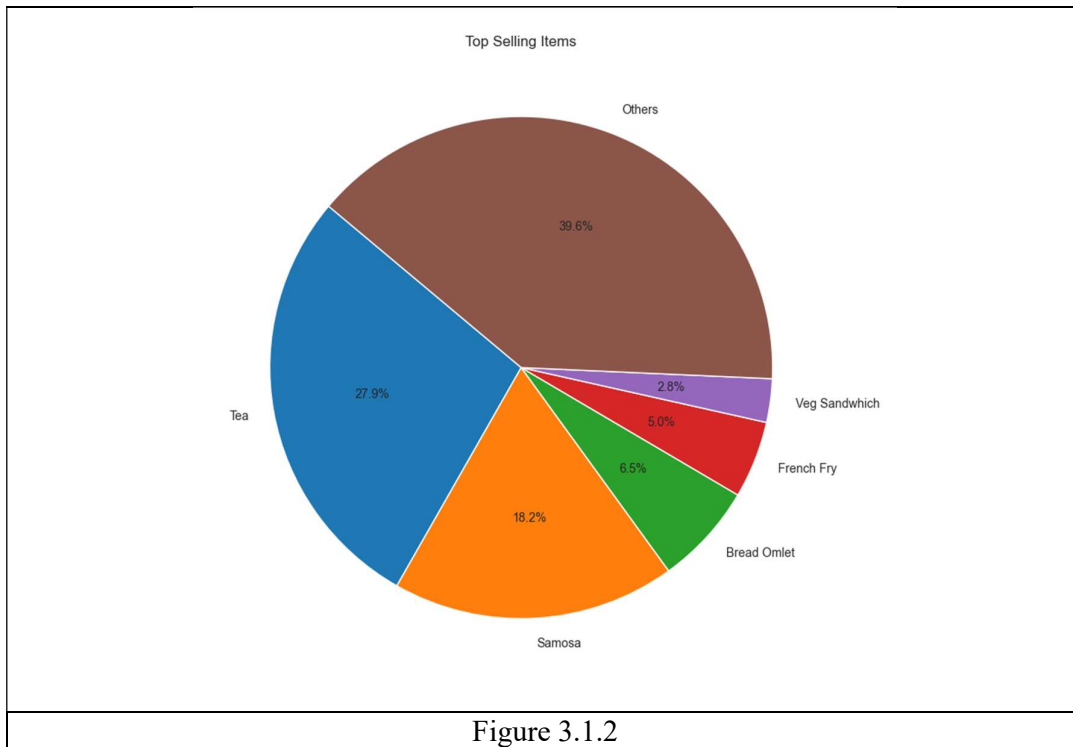


From the graph, we can see that Tea sells the most. It's interesting that Tea also costs the least compared to the other items. This makes us think about how price might be affecting what people choose to buy.

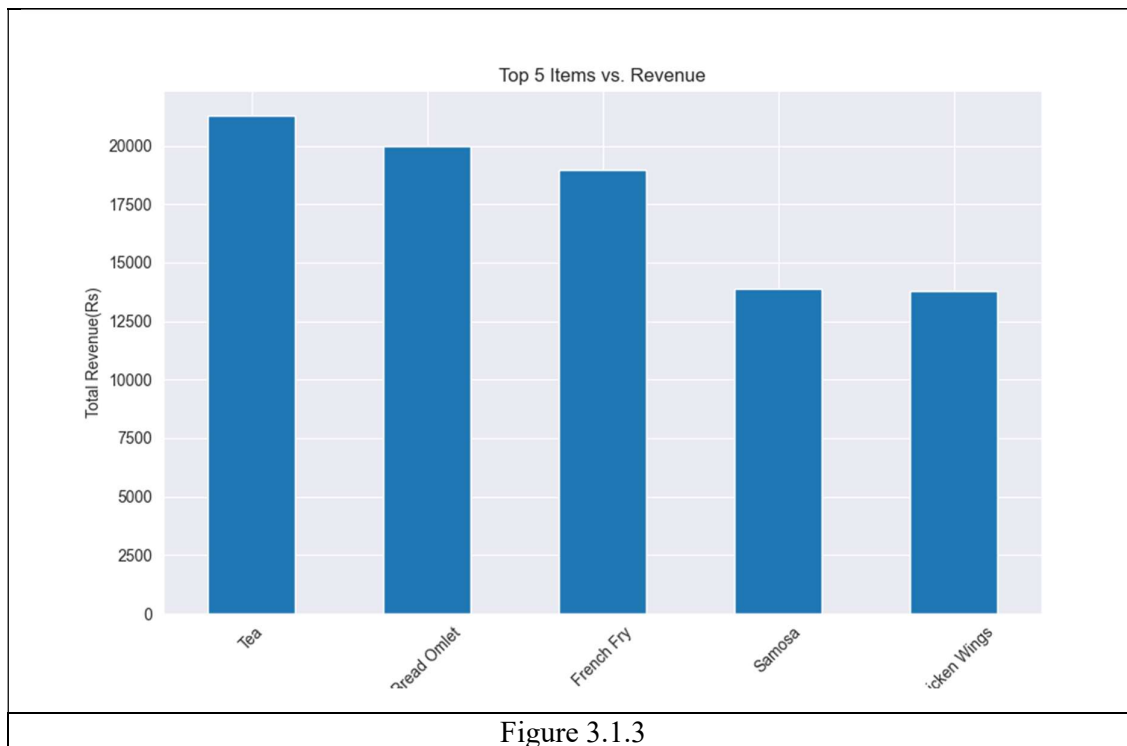
Considering this, we could use Tea's popularity and affordable price to attract more customers. It also makes sense to study why people choose Tea over other options. This could help us figure out how to set prices for different items, which could lead to more sales and success in the market.

Compassion of Sales with Other Items

From the below pie chart, we can see how each item adds up to the store's money. It's pretty clear that tea is a big part of it, making up around 28% overall all Items. It might be a good idea to focus on tea and see how we can make even more people interested in buying it, since it's such a money-maker.

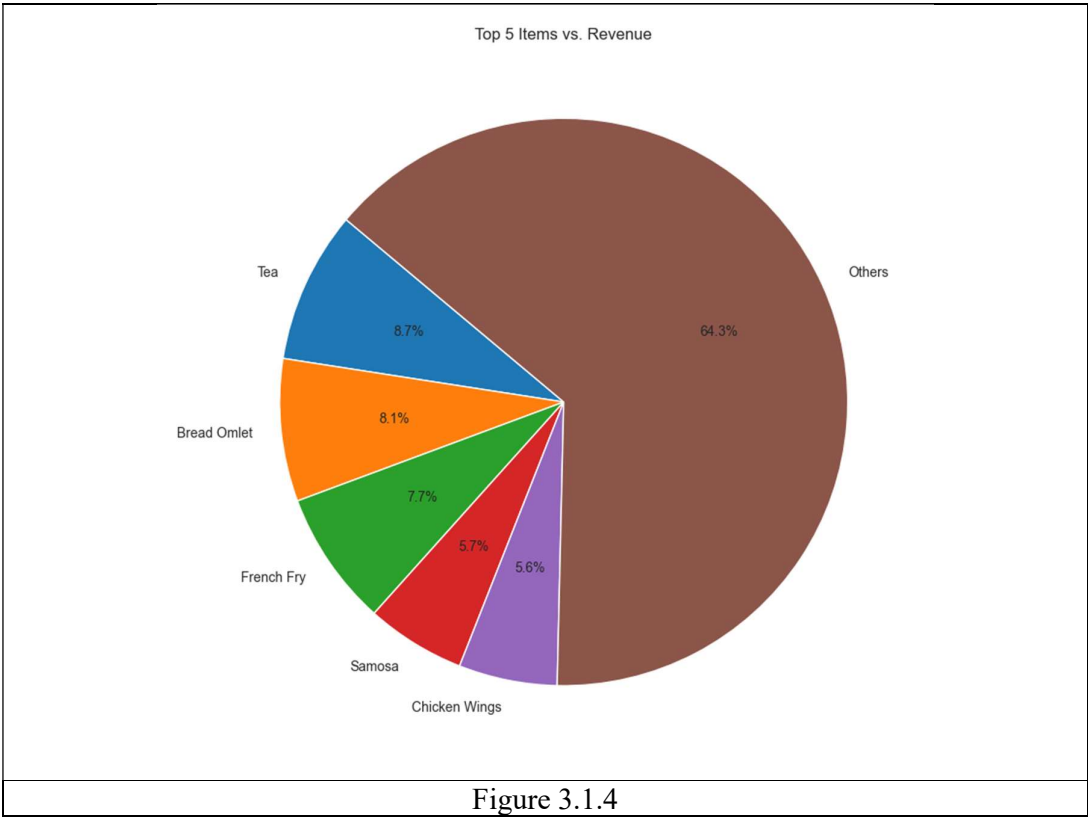


ii) Top 5 Items Revenue Wise



When we check out the bar graph, we can see that tea plays a big part in making money for the store. It's not just about how much is sold, but also about how much money it brings in. This tells us that people really like tea and are willing to spend money on it. It's smart to focus on tea to keep making good revenue and maybe even think about how to make it even more popular.

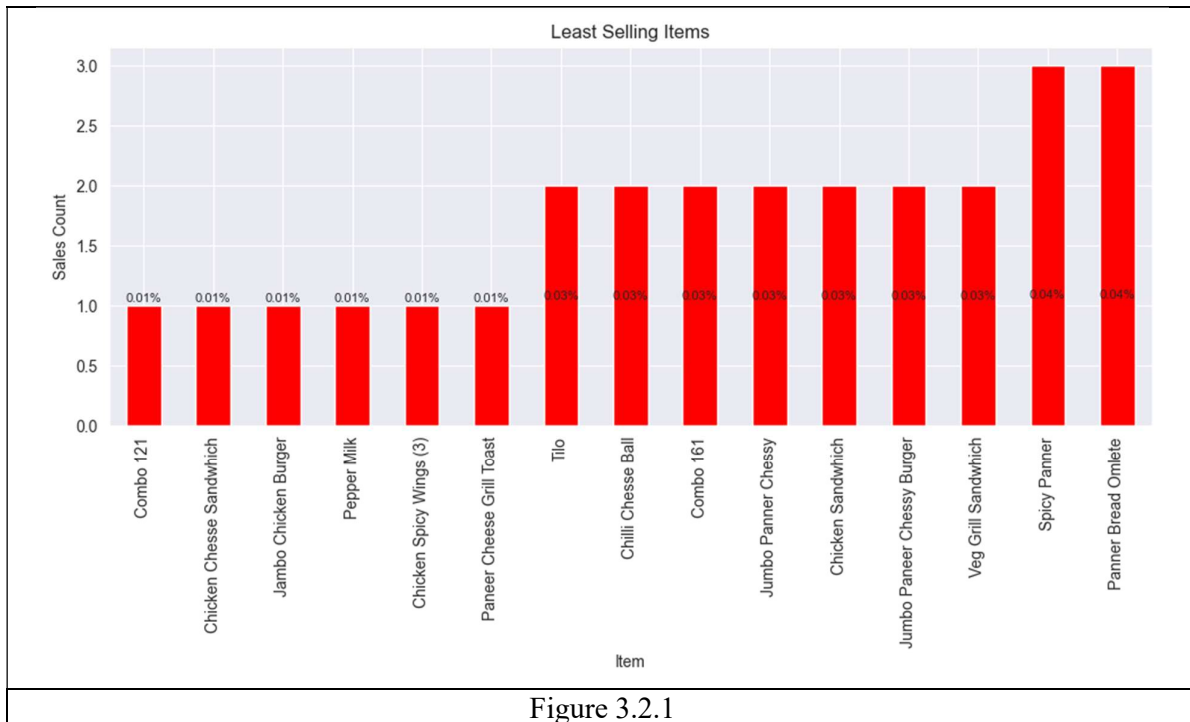
Compassion of Revenue with Other Items



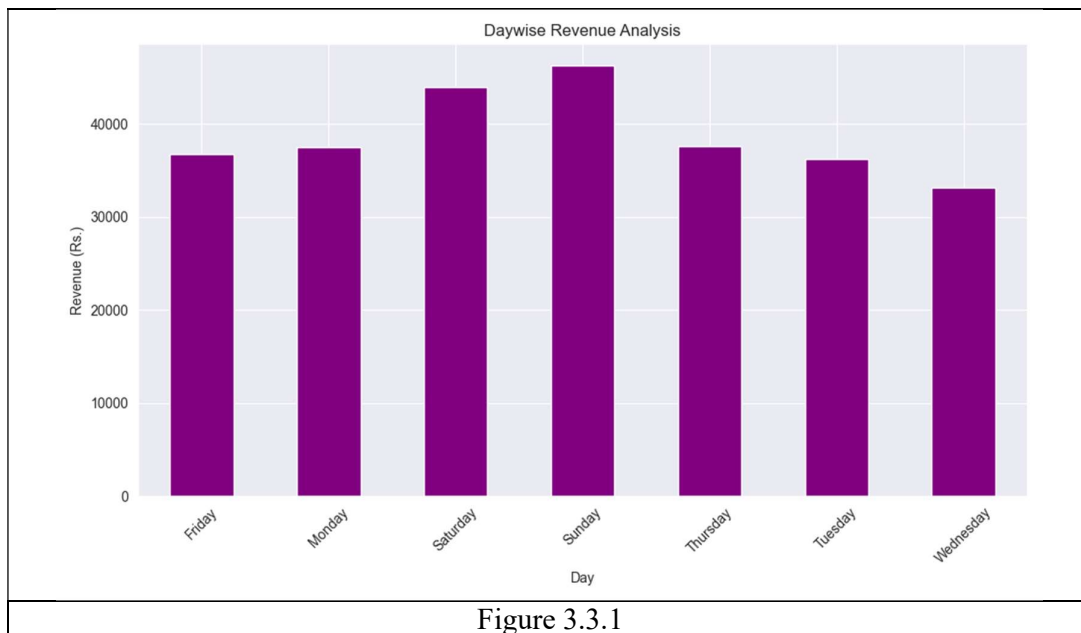
From this pie chart, it's clear that a handful of items are really important for the store's income. These top 5 items, including Tea, Bread Omlet, French Fry, Samosa, and Chicken Wings, are responsible for a big chunk of the money the store makes. Focusing on these popular items could help the store bring in even more revenue and satisfy its customers better.

3.2 Comparison of Top Least Selling items

Examining the least selling items, we observe that approximately 6 items have been sold only once, and around 15 items have been sold fewer than 4 times over the course of 3 months. These items collectively contribute insignificantly, accounting for nearly 0% (~0.01%) of the total revenue. As a result, it becomes evident that considering either the removal of these items from the menu or their replacement with new offerings is a strategic consideration worth exploring.



3.3 Day Wise Revenue Sales Trend



Analysing the graph depicting the trend on a daily basis, it becomes evident that significant spikes occur during weekdays, particularly Sundays. Similarly, the adjacent graph reflects a similar pattern, showcasing higher item sales on weekends compared to other days. Notably, Thursday also experiences an uptick in sales.

Considering these findings, it is advisable for the shop to consider introducing new products or combinations on these days. The higher customer footfall during these periods offers an opportune environment for gauging product reception and soliciting valuable feedback.

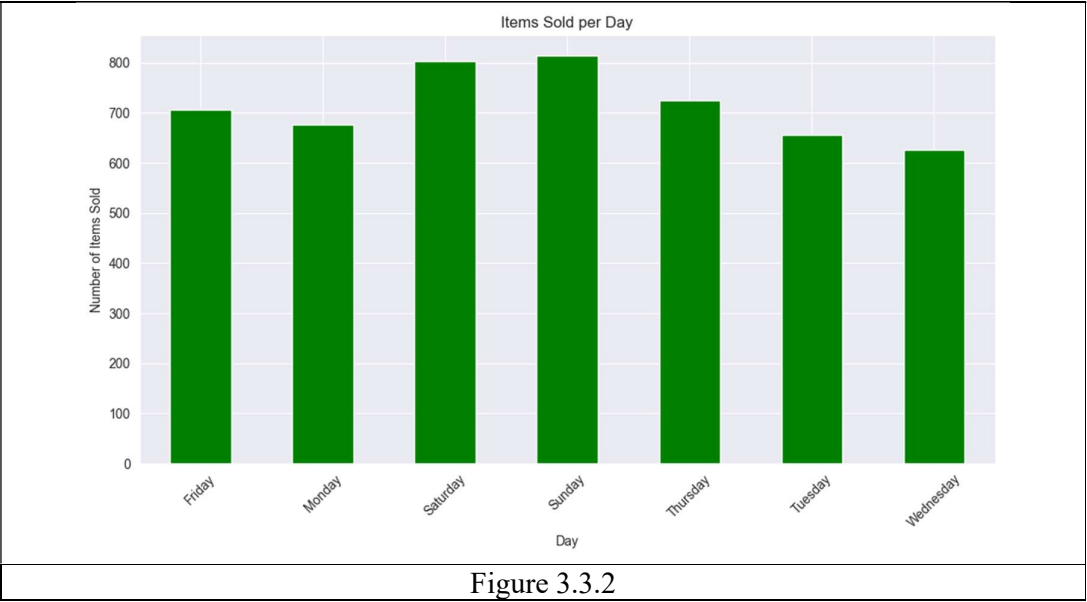


Figure 3.3.2

Note: The above 2 graphs are sorted such that the highest bar in middle

3.4 Veg vs Non – Veg Distribution

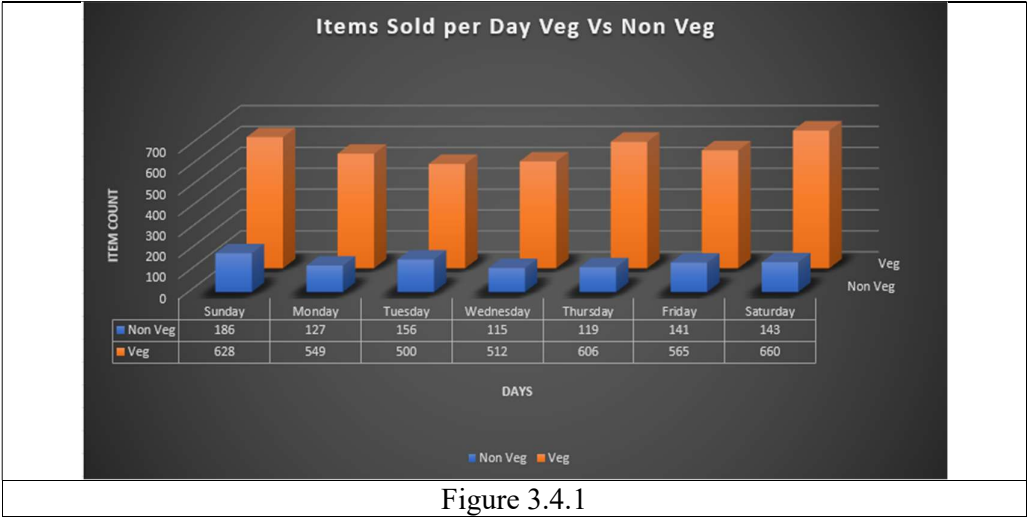


Figure 3.4.1

The analysis of the bar graph indicates a substantial disparity between the sales of Veg and Non-veg Products. With Veg dishes accounting for over 60% to 70% of total sales, there is a clear dominance in customer preference. To address this, it is crucial to introduce new and enticing varieties in the non-veg category. By expanding the menu options and incorporating innovative choices, the restaurant can attract a wider customer base and capitalize on the

untapped potential of non-veg offerings. This strategic approach aims to drive sales growth and achieve a more balanced distribution between Veg and Non-veg product

3.5 Veg and Non-Veg Contribution per Day to Revenue

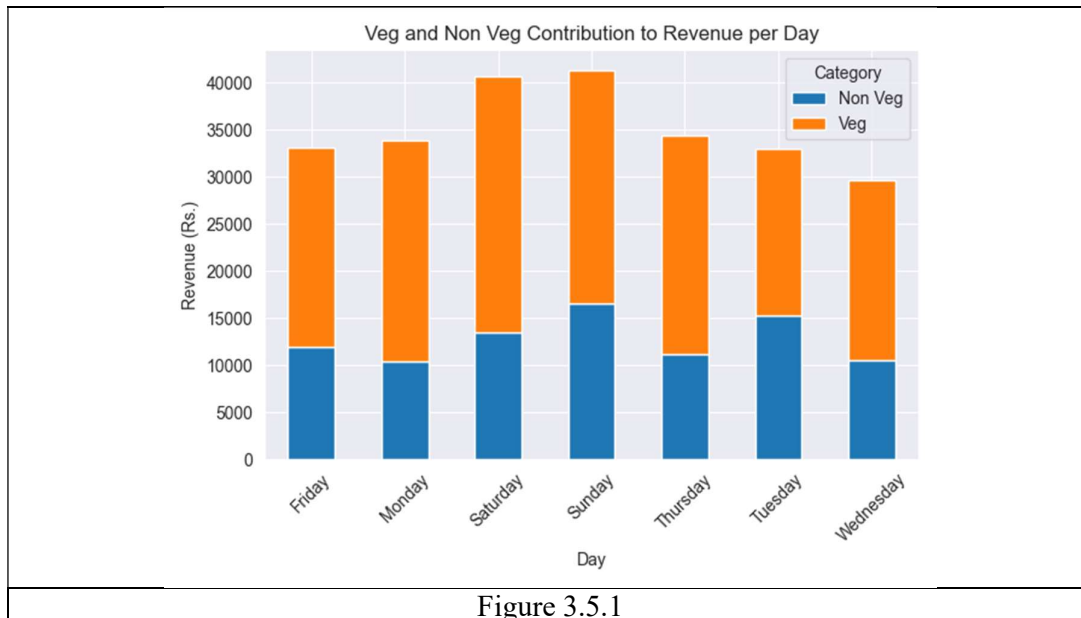


Figure 3.5.1

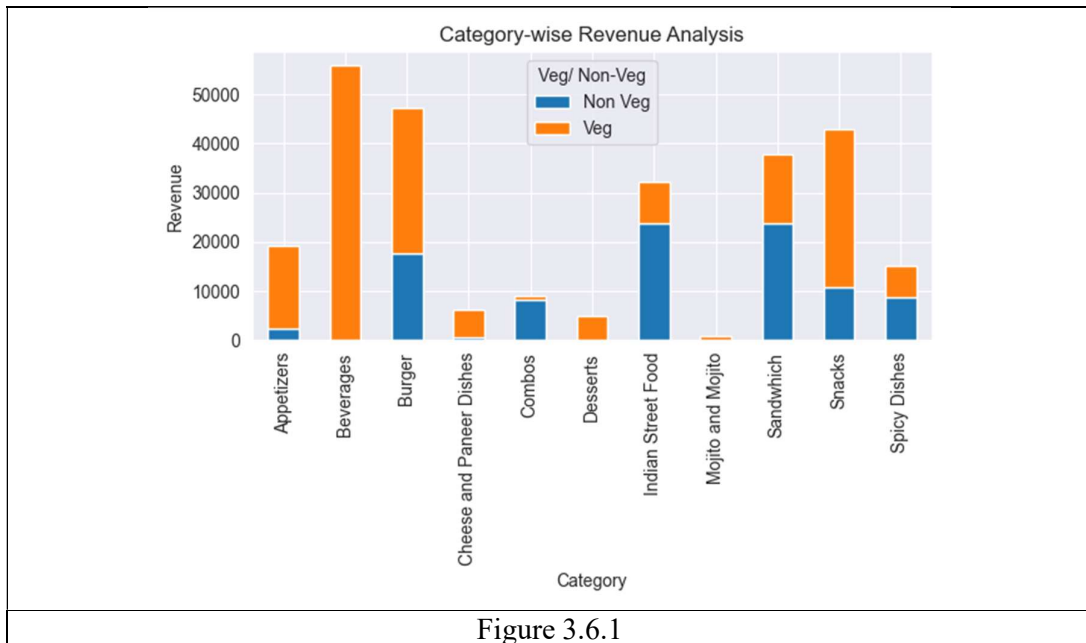
The graph depicting the contribution of Veg and Non-Veg items to daily revenue aligns with the previously discussed trend. Once again, it's evident that the majority of the revenue comes from Vegetarian food items.

3.6 Category Wise Revenue Analysis

When we take a closer look at where the money is coming from in different categories, it's interesting to note that Beverages stand out as the big money-maker. What's even more interesting is that Beverages are actually considered Vegetarian items.

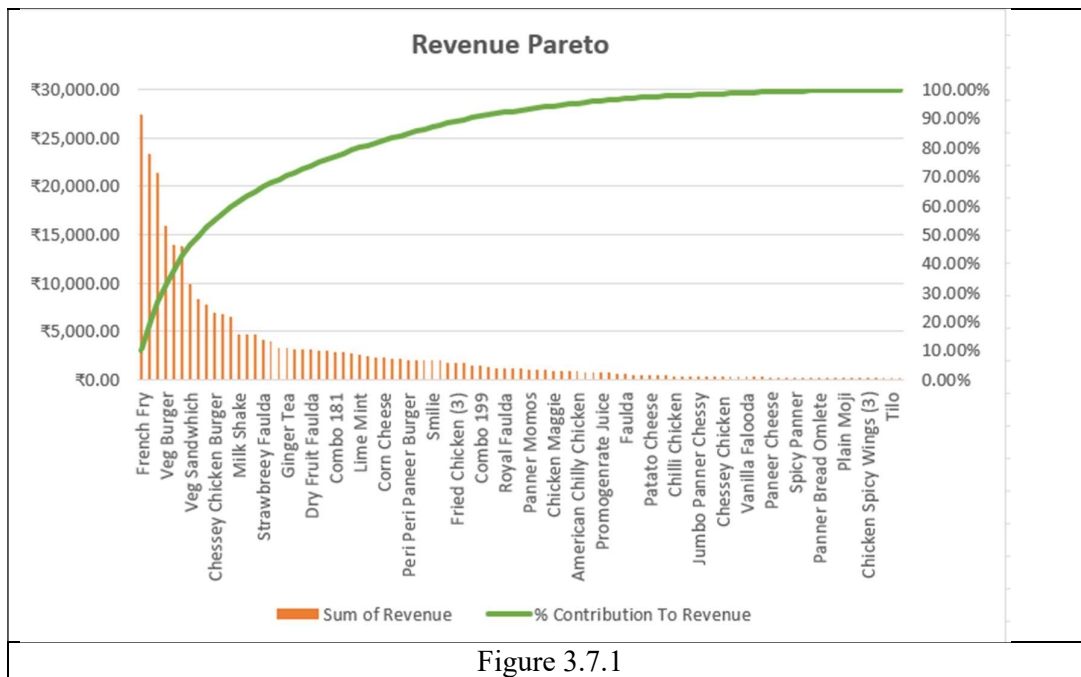
If we remember the graph we saw before, which showed the separation between Vegetarian and Non-Vegetarian items, a consistent pattern showed up – Vegetarian items were the preferred choice every day. But now, let's go a bit deeper into the numbers. There are some categories that are really catching attention when it comes to revenue from non-Veg food items. These include Indian Street Food, Sandwiches, Spicy Dishes, and Combos. Together, they contribute quite a lot, making up more than half of the total revenue in their own sections.

So, it's not just Beverages that are making a mark, but also these specific non-Veg categories that are adding up to a significant portion of the earnings. This information gives the shop a good hint about what customers is enjoying and where the money is coming from. It could be a smart move to focus on these categories to keep the sales flowing and the customers happy.



3.7 Revenue Pareto

Based on the Revenue Pareto chart above, it is evident that approximately 29 items are responsible for contributing to 80% of the total revenue. This subset of items represents nearly 30% of the total product offering. Consequently, it is recommended that the owner focuses on enhancing the variety and availability of these high-revenue items rather than introducing new products. By emphasizing these top-performing items, the owner can capitalize on their popularity and drive further revenue growth for the business.



In addition, if the owner focuses on offering more varieties of the items that bring in the most revenue, they can satisfy the different preferences of their customers. This means that these items are already popular and in demand. By increasing the choices within this successful category, the owner can make customers happier and more loyal. Also, by relying on the popularity of these items, the owner can reduce the risks that come with introducing completely new products, like not knowing if people will like them or if the demand will change. So, it's a good strategy to concentrate on adding more options and improving the items that already bring in a lot of money. This can lead to positive outcomes for the business.

3.8 Volume Pareto

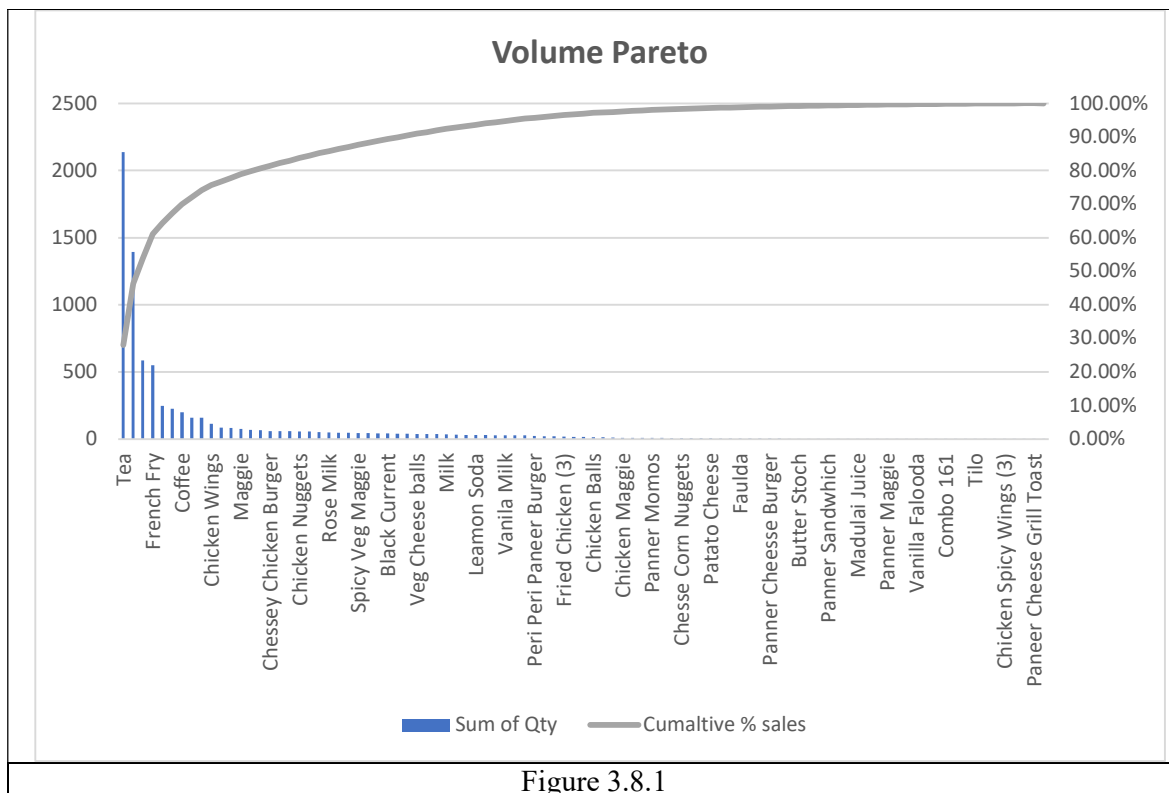


Figure 3.8.1

After carefully looking at the Volume Pareto Chart, we can see a clear pattern. About 15 important items really stand out and together, they make up around 80% of all the sales. This is a big deal and it tells us something important for the shop's strategy.

Basically, it means that if the shop puts a lot of focus on making these key items even better, it could lead to more sales and more money. It's like taking care of the stars of the show. And if the shop thinks about making new versions or different choices for these popular items, it could attract even more customers and boost sales even higher.

This approach isn't just about making the best items even better; it's also about trying new things based on what's already working well. By doing this, the shop can make customers happier, bring in more money, and use its resources in a smart way.

3.9 Correlation Between Food Items

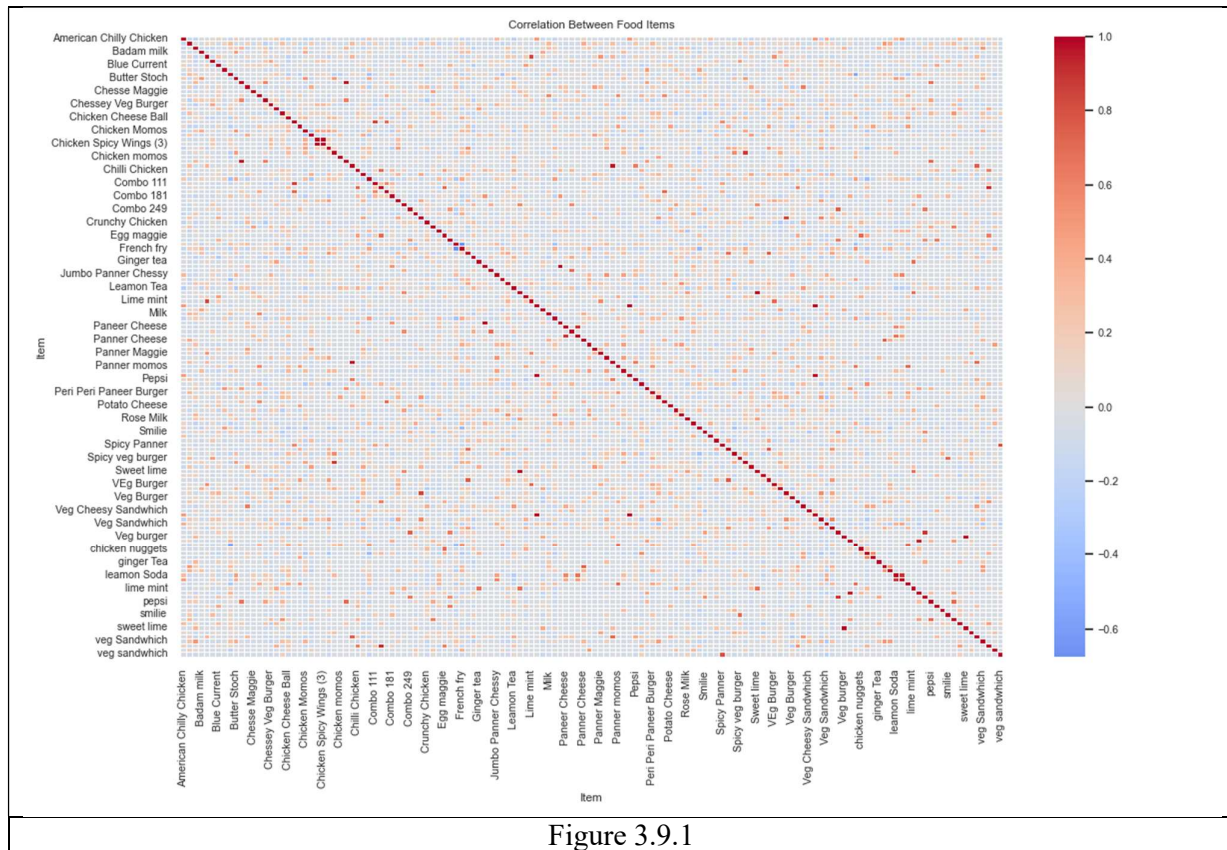


Figure 3.9.1

Upon examining the correlation between food items and whether they are interconnected, it has been observed that certain food items exhibit associations with one another, excluding the diagonal red dots. This discovery implies the possibility of interdependence between these items, suggesting that the sales of one food item could potentially influence the sales of others. In essence, these findings indicate that specific food items are interconnected and can directly impact each other's sales.

This interconnection suggests a potential interdependence among these items. In simpler terms, when one particular food item experiences higher sales, it seems to have an impact on the sales of other related items. It's like a chain reaction, where the success of one item can positively influence the success of another.

In essence, these findings shed light on a fascinating phenomenon within the sales dynamics. Specific food items are not isolated players; they form a network where their performance can have a direct influence on the performance of their interconnected counterparts.

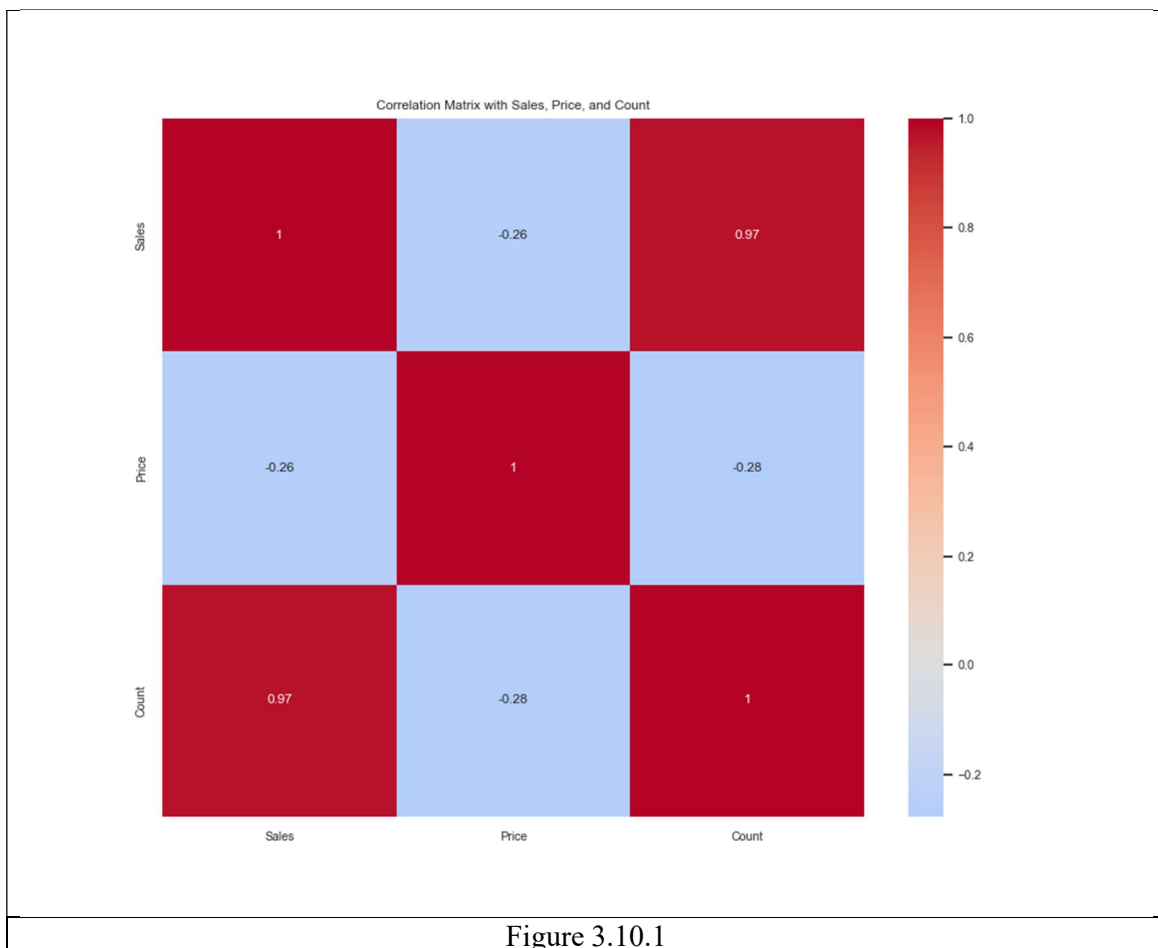
Table of Food items related to each other (Threshold is kept as 0.5 for this table):

Note: The below table is just the sample of actual table as the dimension of actual table is huge, this table is to get the idea for which food item is related to which on another food item

Item		Highly Correlated Items	37	Chicken Momos	Butter Stoch
1	Badam Milk	veg Sandwich	38	Chicken Sandwich	Chicken Spicy Wings (3)
2	Black Current	Lime mint, Panner Maggie, Veg Burger	39	Chicken Spicy Wings (3)	Chicken Sandwich
3	Butter Stoch	Chicken Momos	40	Chicken Wings	Fried Chicken (3)
4	Butter Stoch Mojito	Chessy Chicken Burger, Chicken nuggets, Pepsi	41	Chicken Maggie	Spicy Veg Maggie, Strawbreey Fauld
5	Cheses Corn Nuggets	Veg Cheese balls	42	Chicken nuggets	Butter Stoch Mojito, Chessy Chicken Burger, Pepsi
6	Chessy Chicken	Milk, Panner momos, Plain Moji	43	Chilli Cheses Ball	Panner Sandwich, Pepsi, veg Burger
7	Chessy Chicken Burger	Butter Stoch Mojito, Chicken nuggets	44	Chilli Chicken	Combo 121, veg burger
8	Chicken Burger	spicy veg Burger	45	Combo 111	Chicken Cheses Sandwich, Combo 161
9	Chicken Cheses Sandwich	Combo 111, Combo 161, Spicy Panner	46	Combo 121	Chilli Chicken, Egg Maggie, Veg Cheese Balls, veg burger
10	Combo 161	Chicken Cheses Sandwich, Combo 111, Plain Moji	47	Pepsi	Chilli Cheses Ball, Panner Sandwich
11	Combo 181	Jambo Chicken Burger, Milk shake	48	Peri Peri Chicken Fry	coffee
12	Combo 222	Leamon soda, Paneer Cheese Grill Toast, Sweet lime	49	Peri Peri Paneer Burger	Panner momos
13	Combo 249	Veg Spill roll, milk	50	Pista Milk	Corn Cheese Balls
14	Corn Cheese Balls	Pista Milk, Vanilla Fauld, Veg Momos	51	Plain Moji	Chessy Chicken, Combo 161
15	Dry Fruit Fauld	spicy veg Burger	52	Rose Milk	Leamon Soda, Milk Shake
16	Egg Maggie	Combo 121, chicken nuggets, veg burger	53	Smilie	milk
17	Fauld	Veg Spill roll, milk, peri peri Chicken fry	54	Spicy Panner	Chicken Cheses Sandwich, veg sandwich
18	French fry	bread Omlet	55	Spicy Veg Burger	Fried Chicken (3), Tilo, Veg Spill Roll
19	Fried Chicken (3)	Chicken Wings, Spicy Veg Burger, Tilo	56	Spicy Veg Maggie	Chicken Maggie
20	Ginger tea	lime mint	57	Spicy veg burger	Smilie
21	Jambo Chicken Burger	Combo 181, Milk shake	58	Strawbreey Fauld	Chicken Maggie
22	Jumbo Paneer Chessy Burger	Paneer Cheese Grill Toast	59	Sweet lime	Combo 222, Leamon soda, lime mint
23	Leamon soda	Combo 222, Sweet lime, lime mint	60	Vanilla Fauld	Corn Cheese Balls, Veg Momos
24	Lime mint	Black Current, Panner Maggie, Veg Burger	61	Veg Cheese Balls	Combo 121, veg burger
25	Milk	Chessy Chicken	62	Veg Grill Sandwich	Madurai Juice, Pepper Milk
26	Milk shake	Combo 181, Jambo Chicken Burger	63	Veg Spill Roll	Spicy Veg Burger, Veg Momos
27	Paneer Cheese Grill Toast	Combo 222, Jumbo Paneer Chessy Burger	64	Veg burger	sweet lime
28	Panner Bread Omlet	Paneer Cheese, Leamon Soda	65	Veg sandwich	Maggie

29	Panner Maggie	Black Current, Lime mint	66	chicken nuggets	Egg Maggie
30	Panner Momos	Jumbo Panner Chessy	67	coffee	Peri Peri Chicken Fry, French Fry
31	Panner Sandwich	Chilli Cheses Ball, Pepsi, veg Burger	68	French Fry	coffee
32	Pepper Milk	Madurai Juice, Veg Grill Sandwich	69	Leamon Juice	ginger tea
33	Maggie	Veg sandwich	70	Leamon Soda	Paneer Cheese, Panner Bread Omlet, Leamon Tea
34	milk	Combo 249, Fauld, Smilie, Veg Spill roll	71	Leamon Tea	Jumbo Panner Chessy, Leamon Soda
35	veg Burger	Chilli Cheses Ball, Panner Sandwich	72	Pepsi	Butter Stoch Mojito, Chicken nuggets, spicy veg Burger
36	veg Sandwich	Badam Milk			

3.10 Correlation with Sales, Price, and Count



After examine at the heatmap that shows how Sales, Price, and Quantity (Qty) are connected, we notice something important. Sales and Quantity have a strong connection, meaning when more items are sold (higher quantity), sales go up too. On the other hand, Price and Quantity, as well as Price and Sales, don't have much of a connection.

This tells us that focusing on selling more items (increasing quantity) is a better way to make more money than just raising prices. So, if the shop wants to make more profit, it's a good idea to try selling more things rather than making things more expensive.

3.11 Time Series Analysis (Revenue vs Date)

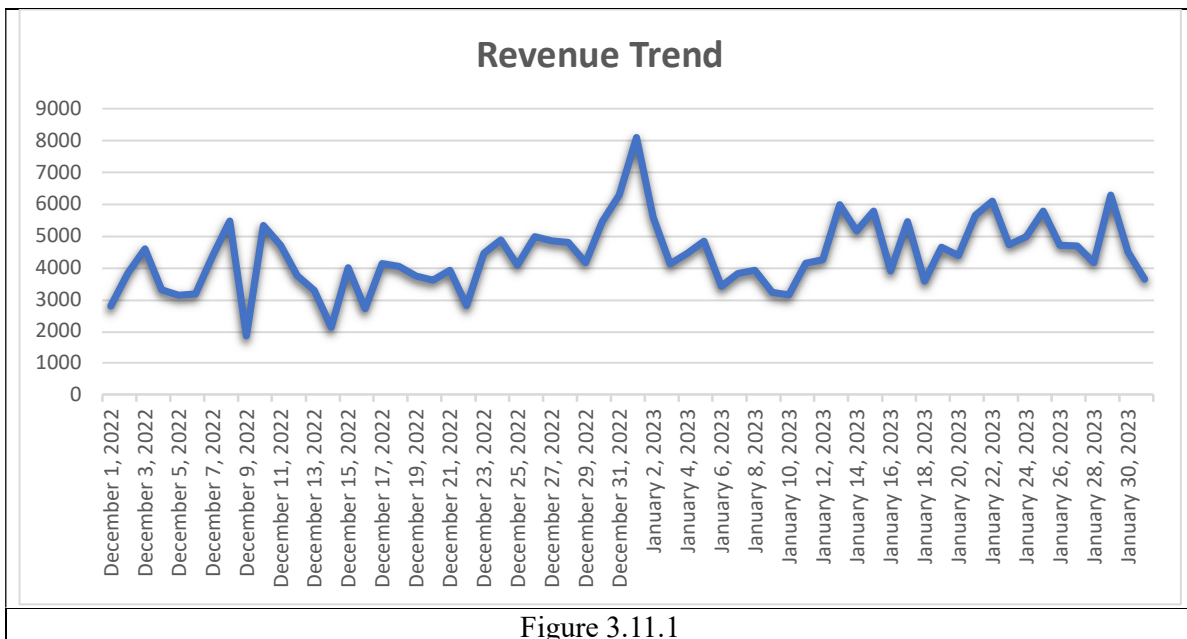


Figure 3.11.1

After studying the Time Series data, a distinct pattern emerges. Towards the end and beginning of each month, there's a noticeable drop in sales. However, this is followed by a spike in revenue around the middle of the month, albeit for a brief duration. Subsequently, the pattern exhibits fluctuating peaks and valleys. Given these observations, it presents an opportune window for the shop to consider testing new products within this timeframe, potentially yielding more favourable outcomes.

3.12 Popular Food Combinations (Top 10)

After looking closely at the top 10 favourite food combinations, a clear pattern emerges. Tea appears frequently in many combinations, and interestingly, the pairing of Tea and samosa stands out as the most popular combination. What's even more intriguing is that if we check the chart, we'll see that most of these popular combinations come from the Beverages section, making up more than 50% of the total.

This insight tells us that people really enjoy having Tea with various items, and Tea seems to have a strong connection with samosas. The fact that a lot of these favourite combinations involve beverages shows that drinks play a big role in what customers like to order together. This information could be quite valuable for the shop in terms of planning their menu and promotions.

In a nutshell, the top 10 popular food combinations teach us that Tea is a superstar, especially when paired with samosas, and drinks have a big influence on what people like to eat together.

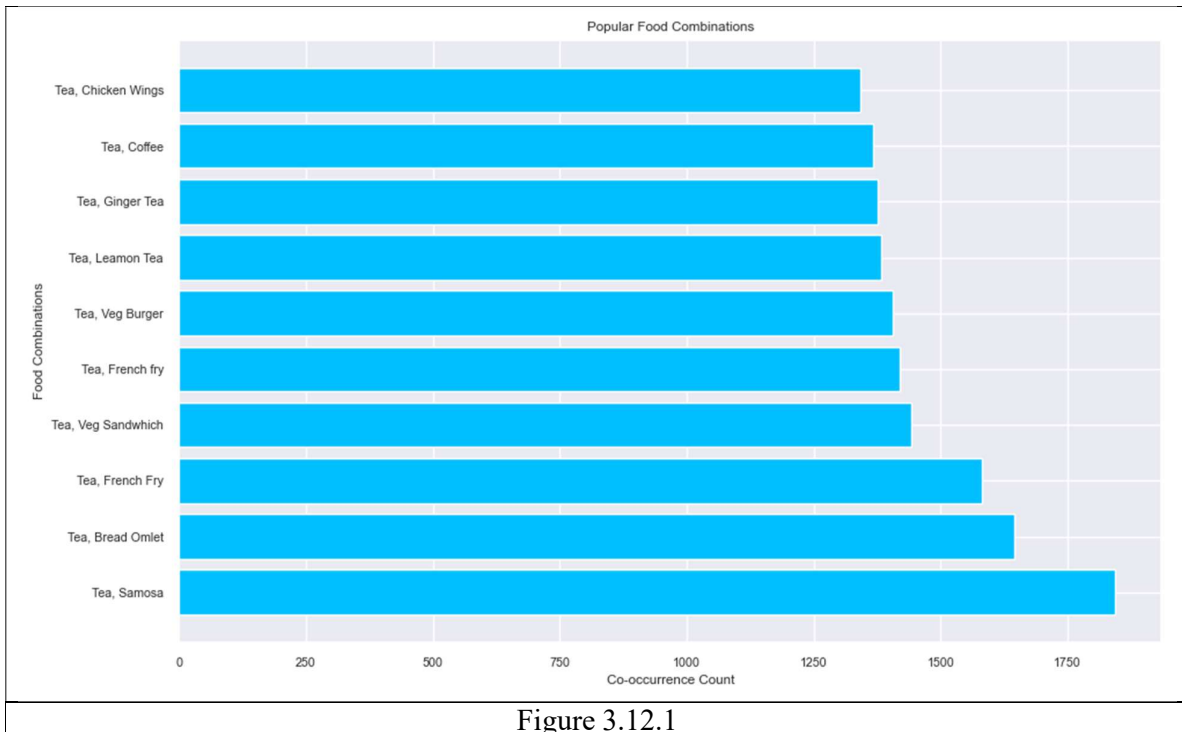


Figure 3.12.1

4. Interpretation of Results and Recommendation

Upon conducting a thorough and detailed examination of the data, the ensuing Results and Recommendations have been deduced:

- i. **Value Proposition:** Instead of just adjusting prices, the shop could focus on communicating the unique value and benefits of their offerings. Highlighting what sets their products apart can influence customer choices.
- ii. **Price and Demand:** The research suggests that changing prices doesn't have a big impact on how much customers buy. This means that people are more influenced by other factors, like taste and quality, when deciding what to order.
- iii. **Profitable Pricing:** Setting a balanced price that matches the perceived value of the product can help maximize profits. It's important to find the sweet spot where both customers and the shop benefit.
- iv. **Product Optimization:** Regularly reviewing the menu and discontinuing items with consistently low sales can create space for introducing new, potentially more popular

dishes. This ensures a dynamic and appealing menu. By doing this, the shop can manage costs better and keep a close watch on their inventory, making sure they have the right items available for customers

- v. **Weekend Innovation:** When trying out a new item or combination, the weekends are the best time for testing. The weekends not only offer a higher customer volume for testing but also provide a chance to engage with a diverse range of customers, gaining varied perspectives on new offerings.
- vi. **Veggie Delights:** If a new dish is vegetarian, it's likely to be popular because a lot of customers prefer veg options. Similarly, if the new item is a drink in the Beverages category, there's a good chance it will boost sales.
- vii. **Bundle Strategy:** Offering combo deals or meal packages can encourage customers to try multiple items and increase overall spending, aligning with the focus on selling larger quantities.
- viii. **Mid-Month Boost:** Considering the sales spikes around the middle of the month, the shop could design targeted promotions during this time to drive additional sales and maintain consistent revenue.
- ix. **Customer Engagement:** Actively seeking customer feedback during peak times and using it to make real-time adjustments to new offerings can foster a culture of responsiveness and customer-centricity.
- x. **Staff Training:** Equipping staff with the knowledge to effectively upsell complementary items, especially those that align with customer preferences like Tea, can contribute to higher sales and better customer experiences.
- xi. **Limited-Time Specials:** Introducing time-limited specials or limited-edition combinations during weekends could create a sense of urgency and exclusivity, driving higher demand and sales.
- xii. **Tea Connection:** If a new product goes well with Tea, it's likely to be successful. Since Tea is a favourite among customers, combining it with other items can lead to more sales and profits.