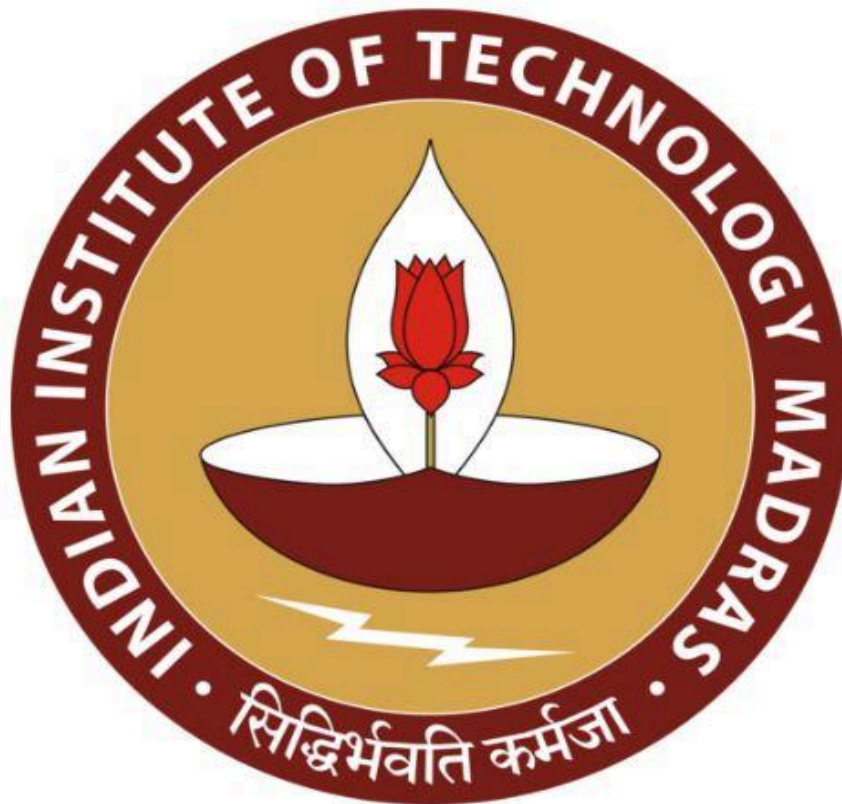


# **Optimising Business Operations : A Case Study on a Local Cafe**

A Mid-term Report for the BDM Capstone Project

Submitted by,  
Name : ISHA K S  
Roll Number : [23f3001915@ds.study.iitm.ac.in](mailto:23f3001915@ds.study.iitm.ac.in)



IITM BS Online Degree Program,  
Indian Institute of Technology, Madras, Chennai,  
Tamil Nadu, India, 600036

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# Executive Summary

This project aims to optimize operational efficiency at *Bihan Canteen*, a food service outlet located at NIT Raipur. Though it provides hygienic and affordable meals to students and staff, the cafe faces recurring issues that restrict customer satisfaction and revenue growth. These include low visibility due to weak marketing efforts, delays or uncollected food orders during peak hours, and a lack of regular menu innovation which fails to reflect changing student preferences.

To address these problems, the project adopts a structured, data-driven approach. Data is being collected through staff-maintained manual logs, short feedback surveys (Google Forms), and on-site observations. The analysis will include descriptive statistics to assess footfall trends, order handling patterns, and sales performance of individual menu items.

Key methods include cross-tabulation, peak hour trend analysis, and customer preference mapping, all implemented using Excel and Google Sheets. For the menu-related issue, sales data per item and direct feedback on preferences are being gathered to understand gaps between demand and offering.

The goal is to produce actionable insights that reduce food wastage, streamline order management, and revamp the menu to match demand. These improvements are expected to enhance customer experience and increase operational profitability for the cafe.

# Proof of Originality

This report is based on a real-time analysis of Bihan Canteen, a local food outlet operating within the NIT Raipur campus. The canteen was established in 2022 and is owned and managed by a local entrepreneur. It primarily serves students, faculty, and staff with affordable snacks, beverages, and meal combos. The canteen functions six days a week from 9:00 AM to 7:00 PM.

Details of the canteen:

Name of outlet : Bihan Canteen

Address : NIT Raipur, GE Road, Raipur, Chhattisgarh

Name of manager : Shristi Verma

To ensure the authenticity and originality of the data presented in this project, the following first-hand primary materials were collected and included:

- **Photographs** of the canteen's front and inside view
- **A short video interview** with the canteen manager, discussing daily challenges, order management, and customer preferences
- **A signed letter** from the manager of Bihan Canteen, granting permission to conduct the study and use the data for academic purposes
- **Survey responses** collected via Google Forms to gather feedback on the menu, service speed, and satisfaction

Drive Link : [📁 BDM : Proof of Originality](#)

All materials were gathered exclusively for this academic project as part of the BDM Capstone requirement. Ethical practices were followed throughout the data collection process, with transparency and verbal consent from all individuals involved.

# Metadata and Descriptive Statistics

The Bihan Canteen order dataset was collected over the period from May 1 2025 to May 31 2025, capturing a full month of daily transactions to analyze customer behavior, peak hours, and menu preferences. Data was maintained in manual logs by the staff and is formatted into an excel sheet. The dataset includes columns such as:

- date (the day of the order)
- order\_id (unique order identifier)
- time\_stamp (when the order was placed)
- item (menu item ordered)
- quantity (number of units ordered)
- price\_per\_item (cost per item)
- total\_price (total revenue from each order)
- collected (whether the order was picked up)
- paid (payment status)
- mode\_of\_payment (payment method used)

Tracking the date and time\_stamp enables analysis of customer footfall patterns, helping to identify peak hours and service bottlenecks—directly supporting solutions for the problem of delayed or uncollected orders. The item, quantity, and price fields allow for a detailed assessment of menu popularity and sales trends, which is essential for understanding customer preferred items. Additionally, the collected and paid columns help pinpoint operational inefficiencies, payment issues, and the amount of uncollected orders.

Dataset Link : [📄 Bihan Data](#)

## Descriptive Statistics :

The descriptive statistical summary of Bihan Canteen's sales for May–June 2025 reveals a diverse and dynamic menu performance, reflecting both customer preferences and operational variability. Snapshot of the summary sheet is given below in Figure 1.

ITEM	COUNT	Total_revenue_per_item	Mean_Revenue	MEDIAN	MODE	Max_Revenue	Standard Deviation	Variance
masala dosa	67	5560	82.9851	80	80	240	42.5339	1809.1361
paneer 65	104	11460	110.1923	120	60	240	53.6074	2873.7491
veg chowmein	114	10050	88.1579	50	50	300	56.5617	3199.2315
fried rice	83	9300	112.0482	120	60	300	59.0940	3492.0952
brownie	85	6300	74.1176	60	60	180	30.2094	912.6050
masala tea	75	2640	35.2000	30	15	120	26.5014	702.3243
dhokla	104	7140	68.6538	70	35	140	37.1185	1377.7819
patties	87	2925	33.6207	25	25	75	14.1768	200.9824
cola	67	3480	51.9403	30	30	180	38.5824	1488.6024
coffee	96	4975	51.8229	50	25	150	30.1847	911.1157
hakka noodles	116	12400	106.8966	100	50	300	54.3325	2952.0240
veg pasta	88	5300	60.2273	50	50	150	24.1631	583.8558
cheese maggi	12	1080	90.0000	60	60	180	54.2720	2945.4545
paneer chilli	111	16080	144.8649	120	180	360	70.7475	5005.2088
utappam	77	6575	85.3896	70	35	170	40.2032	1616.2936
pakora	79	4050	51.2658	30	30	180	36.9465	1365.0438
vada sambar	76	5280	69.4737	60	30	120	35.3985	1253.0526
sprite	92	4620	50.2174	30	30	120	27.8133	773.5786
veg thali	32	2200	68.7500	50	50	200	39.6558	1572.5806
masala maggi	21	1300	61.9048	50	50	100	21.8218	476.1905
cold coffee	70	8650	123.5714	100	50	350	69.0103	4762.4224
idli	84	2910	34.6429	30	30	90	12.7484	162.5215
maza	92	2440	26.5217	20	20	60	12.2640	150.4061
poha	77	2475	32.1429	25	25	75	12.7328	162.1241
donuts	86	6240	72.5581	60	60	180	26.2202	687.4968
plain dosa	83	4710	56.7470	60	30	120	30.3680	922.2157
aloo gunda	80	1940	24.2500	20	20	60	8.8267	77.9114
samosa	87	2800	32.1839	20	20	120	20.3130	412.6169

Figure 1

The dataset shows significant differences in order counts, total revenue, and measures of central tendency and dispersion across items. Popular items such as paneer 65, veg chowmein, and paneer manchurian lead in both sales count and total revenue, highlighting a strong preference for Indo-Chinese cuisine among customers. The mean revenue per item varies widely, with beverages like cold coffee and cold coffee with ice cream achieving the highest average order values, while staple snacks and meals like aloo gunda and poha remain at the lower end. Measures of spread—standard deviation and variance—are particularly high for certain items, indicating substantial variability in order sizes and revenue, which can be attributed to group orders or bulk purchases. The median and mode values for many items are close, but the presence of higher maximum revenues and substantial standard deviations confirms the occurrence of large, atypical orders. Conversely, some items such as plain maggi and chila consistently show low sales and revenue, suggesting limited appeal or scope for targeted promotion. Overall, the data provides actionable insights for menu optimization, inventory management, and targeted marketing, supporting data-driven decision-making to enhance both customer satisfaction and business performance.

#### 1. Sales Volume and Popularity

- Items like paneer manchurian (129 orders), veg chowmein (114) and paneer 65 (104) are the most frequently ordered, indicating a strong customer preference for Indo-Chinese dishes.

#### 2. Revenue Generation

- Paneer manchurian (₹16,895), paneer chilli (₹16,080) and hakka noodles (₹12,400) are the top revenue earners, making them critical contributors to the canteen's financial performance.

#### 3. Central Tendency (Mean, Median, Mode)

- The mean revenue per order ranges from as high as ₹144.8649 (paneer chilli) to as low as ₹23.50 (normal tea), reflecting differences in typical order size and price point.
- For many items, median and mode values are similar, indicating a common order size, but the presence of higher maximum revenues suggests occasional bulk or group purchases.

#### 4. Dispersion (Standard Deviation and Variance)

- High standard deviation and variance for items like grilled sandwich (SD: 90.5450, variance: 8198.3890) and paneer manchurian (SD: 78.7378, variance: 6199.6397) indicate significant variability in order sizes, while items like aloo gunda and normal tea show low dispersion, reflecting more consistent, single-portion sales.

#### 5. Maximum Revenue per Order

- The maximum revenue for some items is much higher than the mean or median (e.g., paneer manchurian at ₹390, fried rice at ₹300), confirming the presence of large, atypical orders, likely for groups or special occasions.

#### 6. Underperforming Items

- Items such as cheese maggi (12 orders, ₹1080), plain maggi (17 orders, ₹840), and masala maggi (21 orders, ₹1300) have low sales and revenue, suggesting limited demand or the need for targeted marketing.

## Detailed Explanation of Analysis Process/Method

### 1. Frequency Distribution (Sales Count)

- Method: The COUNT column shows how many times each item was ordered.

Frequency distribution is fundamental in descriptive statistics to reveal which items are most and least popular. This directly addresses the problem statement of identifying bestsellers and underperformers, helping us focus on items that drive customer traffic and those that may need promotion or replacement.

### 2. Measures of Central Tendency (Mean, Median, Mode)

- Method: The summary includes mean, median, and mode of revenue per item.

These measures summarize the “typical” revenue per order for each item . The mean gives the average revenue, the median shows the central value, and the mode identifies the most common order value. This helps compare items fairly and understand customer purchasing patterns, supporting menu pricing and promotional strategies.

### 3. Measures of Dispersion (Standard Deviation and Variance)

- Method: Standard deviation and variance columns quantify the spread of revenue per item.

These statistics indicate how much the revenue for each item varies from the average. High variability may signal group orders or inconsistent demand, while low variability suggests steady, predictable sales. This insight is vital for inventory planning, risk management, and ensuring consistent service quality.

### 4. Maximum Revenue per Order

- Method: The Max\_Revenue column shows the highest single-order revenue for each item.

Identifying maximum order values helps spot bulk or special event purchases, which can inform marketing (e.g., targeting group orders) and operational readiness for large orders.



## 5. Total Revenue per Item

- Method: The `Total_Revenue_per_item` column aggregates all sales for each menu item.

This directly addresses the problem statement of understanding which items contribute most to overall revenue. It supports decisions on inventory allocation, menu engineering, and promotional focus.

## 6. Comparative Analysis Across Items

- Method: By presenting all statistics side-by-side for each item, the summary enables direct comparison.

Comparative analysis helps you benchmark items against each other, revealing not just popularity but profitability and sales consistency.. This holistic view is essential for optimizing the menu and aligning offerings with customer demand.

# Results and Findings

The analysis of Bihan Canteen's sales data provides a clear, data-driven picture of operational strengths and areas for improvement. By examining daily order trends, uncollected or delayed orders, and detailed item-wise performance, the analysis reveals that popular menu items such as paneer 65, hakka noodles, and paneer manchurian are the primary drivers of both sales volume and revenue. However, the recurring issue of uncollected or delayed orders during peak hours points to operational bottlenecks, while consistently low sales for certain items highlight opportunities for menu innovation and targeted marketing. The accompanying charts—including line graphs tracking daily orders versus uncollected orders, bar charts comparing revenue and order counts by item visually reinforce these findings.

### **Analysis Based on Figure 2.1: Item vs Revenue Bar Graph**

Figure 2.1 presents a bar graph comparing each menu item with the revenue it generated over the observed period. A clear trend can be seen—revenue is highly concentrated in a few top-selling items, while a significant portion of the menu performs poorly. The standout performers include: Paneer chilli, paneer manchurian and hakka noodles. These items consistently generated

revenues over ₹10,000, significantly outpacing others. On the other end of the spectrum, items like Plain Maggi, masala maggi and cheese maggi made minimal contributions, some barely crossing ₹1,000–₹2,000.

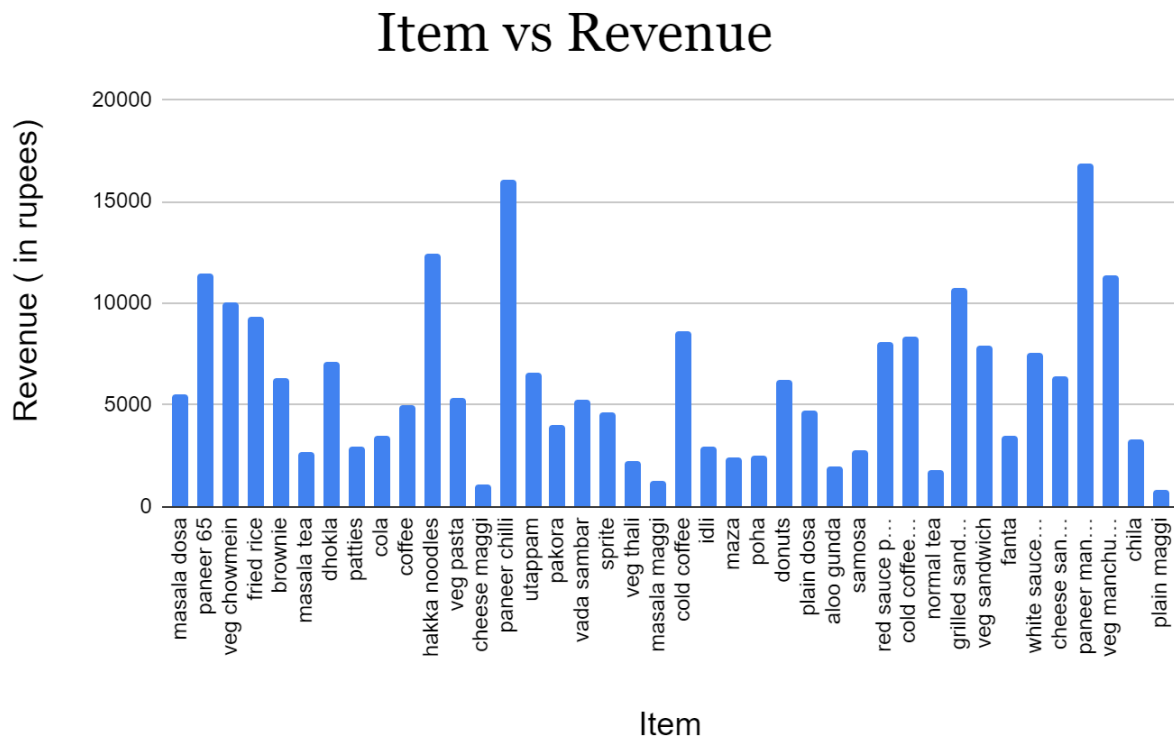


Figure 2.1

## Interpretation:

This revenue skew indicates two major challenges:

1. **Lack of Effective Marketing:** Many items are not gaining customer attention, possibly due to poor placement on the menu, absence of promotions, or weak visual representation. If customers consistently choose a small set of items, it often signals that other offerings lack visibility or appeal.
2. **Outdated or Oversized Menu:** Some menu items may no longer align with evolving customer tastes or dietary preferences. With consumer behavior constantly changing, a

static menu can become a liability. Items that generate negligible revenue likely need to be removed, rebranded, or promoted differently.

### Analysis Based on Figure 2.2 : Uncollected vs Total Orders Line Graph

Figure 2.2 tracks the total orders received versus the uncollected orders across the month of May 2025. The red line represents total orders per day, generally hovering between 90 and 120, showing a stable customer demand. However, the blue line representing uncollected orders reveals a persistent issue—roughly 20 to 40 orders daily remain uncollected.

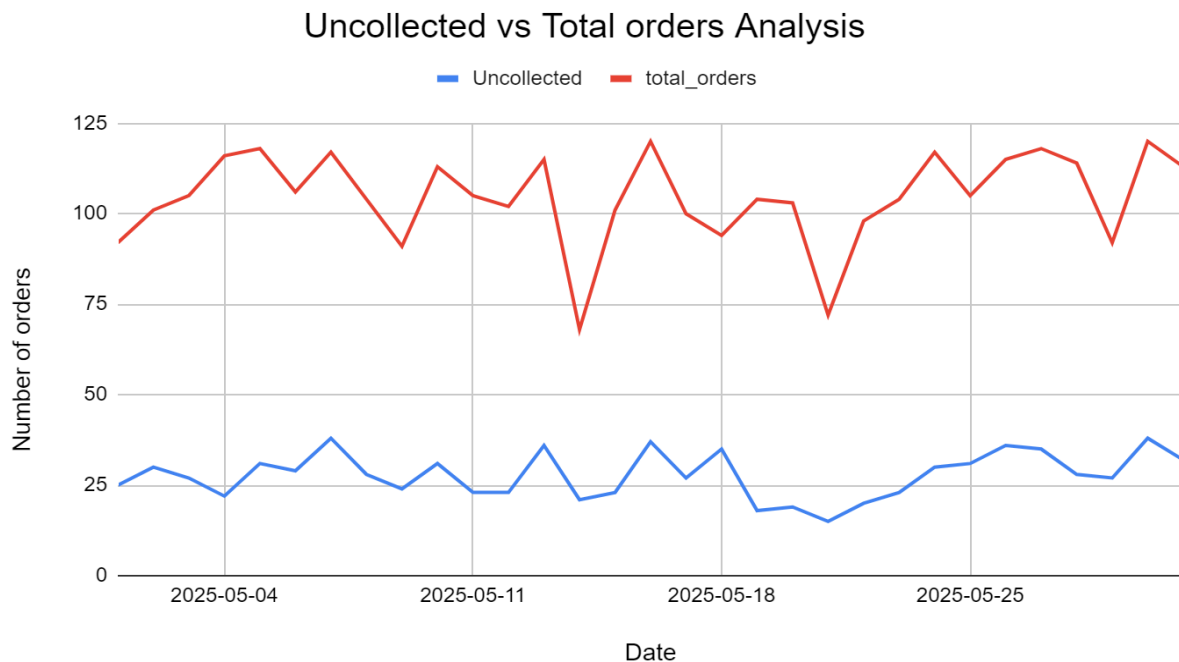


Figure 2.2

## Interpretation:

This is a substantial problem and points toward operational inefficiencies or customer experience issues, including:

1. Delayed preparation or long wait times, leading customers to abandon their orders.
2. Poor communication or alert mechanisms, where customers might not be notified promptly when their order is ready.
3. Mismatch between order time and pickup time, indicating lack of time-slot features or ETA clarity.

Uncollected orders not only result in wasted food and lost revenue, but also affect kitchen productivity, increase operational cost, and degrade customer trust over time.

The combined insights from both graphs paint a clear picture of where operational and strategic improvements are needed. The concentration of revenue in a few items, as shown in Figure 2.1, emphasizes a need for better marketing and menu management. Simultaneously, the persistent uncollected order issue in Figure 2.2 confirms customer experience and communication inefficiencies. By acting on these findings—revamping marketing, optimizing the menu, and enhancing order collection systems—the business can unlock higher revenue, reduce wastage, and improve customer satisfaction in a sustainable and data-driven way.