Optimizing Operations and Enhancing Profitability: A Comprehensive Analysis of Inaya Cakezz

A Mid-Term Report for the BDM capstone Project

Submitted by

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1. Executive Summary

Inaya Cakezz, a medium-sized retail bakery located in Sahu Market, Shivsagar, Sasaram, faces challenges in order fulfillment and delivery efficiency. This report analyzes their cake sales data from July 2021 to December 2023 to identify high-performing flavors, locations, and times of high order volumes. The analysis aims to address order management issues caused by fluctuating sales and limited staffing. Key findings indicate peak sales during January, September, and December, influenced by special occasions. Chocolate is the top flavor, and 0.5 kg cakes are the most popular size. The customer base expanded significantly, yet many new locations have low orders, presenting an opportunity for targeted marketing. The busiest delivery times are between 3:00 PM and 6:00 PM. Recommendations include hiring an additional baker, optimizing delivery schedules, and improving inventory management. These steps aim to enhance sales performance and customer satisfaction, ultimately boosting revenue and profitability.

2. Proof of Originality of Data

The data was collected for the analysis with the help of store record books and conversations with the owner. The cake sales data was gathered from 19 July 2021 to 31 December 2023. There were some interactions with the owner which helped me gain insights about the business history, the initial challenges they faced, how their shop is performing, and their aims for the business. The business owner shared their store record books and also guided me about the products, which helped me to identify the right variables for the analysis of Inaya Cakezz. I have collected almost 2.5 years of their cake sales data, from 19 July 2021 to 31 December 2023.This covers a significant period for the analysis of business performance.

File Name	Purpose	File Type	Link of Files
Cake Sales Details	Detailed record of cake sales data from July 2021 to Dec 2023	Excel	Link
Firm Images	Images of Inaya Cakezz Shop	Images	Link
Interaction Video	Video capturing the interaction with the business owner	Video	Link

Table 1: Proof of Data Originality

3. Metadata and Descriptive Statistics

3.1 Description of Data

Variable	Data Type	Explanation
Date of Order	Date	The specific date on which the order was placed.
Year	Integer	The year in which the order was placed, aiding in annual trend analysis.
Month	Integer	The month of the year (1-12) when the order was placed, helping identify seasonal trends.
Day of Week	Integer	The day of the week (1-7) when the order was placed, useful for understanding weekly patterns.
Name	String	The name of the customer who placed the order, allowing for customer-specific analysis.
Location	String	The delivery location for the order, essential for geographic analysis and targeted marketing.
Cake Flavor	String	The flavor of the cake ordered, which helps in analyzing flavor preferences.
Cake Size (in kg)	Float	The size of the cake ordered in kilograms, providing insights into customer preferences for cake sizes.
Delivery Time	String	The scheduled delivery time, important for optimizing delivery logistics.
Cost Price	Float	The cost price of the cake, necessary for calculating profit margins.
Selling Price	Float	The selling price of the cake, crucial for revenue analysis.

Table 2: Cake Sales Metadata

3.2 Descriptive Statistics

3.2.1 Descriptive Statistics of Sales Volume

The Sales Volume variable offers an in-depth analysis of the data's distribution and central tendency. Key statistics include the mean (average), median (50th percentile), mode (most frequent value), minimum, maximum, range, variance, standard deviation, interquartile range (IQR), total sales volume, and the monthly analysis .The average sales volume is 3-4 cakes per day, providing a baseline for daily sales. The median sales volume is 3 cakes per day, indicating that half of the time, daily sales are at or below 3 cakes, and the other half are at or above 3 cakes. The mode is 1 cake per day, showing that 1

cake is the most frequent daily sales volume .The minimum sales volume is 1 cake per day, and the maximum is 43 cakes per day, resulting in a range of 42 cakes. The variance is 9.90694, and the standard deviation is 3.147529, indicating considerable variability in daily sales. The interquartile range (IQR) is 3 cakes, reflecting the middle 50% of daily sales .A total of 1620 cakes were sold over the two-year period, aiding in inventory and resource planning. December has the highest average daily sales at 3.72 cakes per day, likely due to increased holiday demand, requiring higher inventory and staffing.

April has the lowest average daily sales at 1.5 cakes per day, possibly due to fewer celebrations, allowing for lower stock and staffing levels.

Measure	Description
Mean (Average)	3-4 cakes per day
Median	3 cakes per day
Mode	1 cake per day
Minimum	1 cake per day
Maximum	43 cakes per day
Range	42
Variance	9.90694
Standard Deviation	3.147529
Interquartile Range (IQR)	3
Total Sales Volume	1620 cakes over 2 years
Sales Volume by Month	Highest in December (average of 3.72 cakes per day), lowest in April (average of 1.5 cakes per day)

Table 3: Cake Sales Volume Statistics

3.2.1 Descriptive Statistics for Cake Sales Value

The average sales value is INR 1287.32 per day, providing a baseline for daily revenue expectations. The median sales value is INR 960 per day, indicating that half of the time, daily sales are at or below INR 960, and the other half are at or above INR 960. The mode is INR 250 per day, showing that INR 250 is the most frequent daily sales value. The minimum sales value is INR 230 per day, and the maximum is INR 19310 per day, resulting in a range of INR 19080. The variance is 1756549.001, and the standard deviation is 1325.348634, indicating considerable variability in daily sales values. The interquartile range (IQR) is INR 1200, reflecting the middle 50% of daily sales. A total sales value of

INR 624350 was generated, useful for financial planning and analysis. December has the highest average daily sales value at INR 1365 per day, likely due to increased holiday demand, requiring higher inventory and staffing. April has the lowest average daily sales value at INR 552.83 per day, possibly due to fewer celebrations, allowing for lower stock and staffing levels.

Component	Value (INR)
Mean (Average)	1287.319588 per day
Median	960 per day
Mode	250 per day
Minimum	230 per day
Maximum	19310 per day
Range	19080
Variance	1756549.001
Standard Deviation	1325.348634
Interquartile Range (IQR)	1200
Total Sales Value	624350
Sales Volume by Month	Highest in December (average of 1365 per day), lowest in April (average of 552.8333 per day)

Table 4: Cake Sales Value Statistics

4. Detailed Explanation of Analysis Process

4.1 Methodology

The data analysis process followed a structured methodology to ensure accuracy and extract meaningful insights. Here's a detailed step-by-step breakdown:

1. **Data Cleaning:** Ensuring accuracy by removing duplicates and correcting errors (such as typos or incorrect dates). This step is crucial to make sure my analysis is based on reliable data.
2. **Aggregation**: Summarizing data by months, flavors, sizes, and locations. This helped me to see overall trends and patterns, like which months had the highest sales or which flavors were most popular.
3. **Trend Analysis**: Identifying patterns over time to determine peak periods. This helps in understanding when the demand is highest and planning accordingly.
4. **Comparative Analysis**: Comparing sales across different time periods and locations.

5. **Descriptive Statistics**: Calculating measures like mean, median, mode, range, variance, and standard deviation to understand data distribution.

4.2 Justification for Methodology

The chosen methodology using descriptive statistics is suitable for several reasons:

- **Comprehensive Overview:** Descriptive statistics provide a clear and comprehensive overview of the sales performance. They help in understanding the general behavior of sales data.

- **Trend Identification:** By analyzing trends, we can identify peak periods and understand seasonal effects, which is crucial for planning inventory and marketing campaigns.

- **Comparison and Insights:** Comparative analysis allows us to pinpoint strengths and weaknesses by comparing different time periods and locations, helping in making informed decisions.

- **Variability Management:** Understanding the variability and seasonality in sales helps in managing orders better, ensuring that there are no stockouts or wastage, and optimizing resources effectively.

- **Actionable Insights:** The insights gained from this analysis can guide operational decisions, such as which flavor to promote, when to increase production, and how to allocate resources efficiently.

By following this detailed methodology, I ensure that the analysis is thorough, accurate, and provides valuable insights for improving sales strategies and operational efficiency.

5. Results and Findings

Sales Trend Analysis

The performance analysis of cake sales reveals insights that can help address business issues. Comparing 2.5 years of cake sales data highlights key trends:

- **2021:** Peak sales occurred in September, with the highest number of orders on September 5th, celebrated as Teachers' Day.
- **2022:** September remained a one of the top-performing month; with peak sales shifting to December, again, September 5th had the highest number of orders for the year.
- **2023:** There was a notable growth in the number of orders. January 2023 saw a significant increase, making it the most performing month up until August 2023. September continued to perform well, with September 5th being a peak sales day again. December 2023 became the highest performing month ever recorded up to 2023.

The sales trend analysis indicates peak sales during special occasions such as Teachers' Day in September and Children's day in November. January also showed significant sales due to New Year's celebrations. The data reveals a steady growth in orders over the years, with a notable increase in 2023, underscoring the importance of special occasions in driving sales

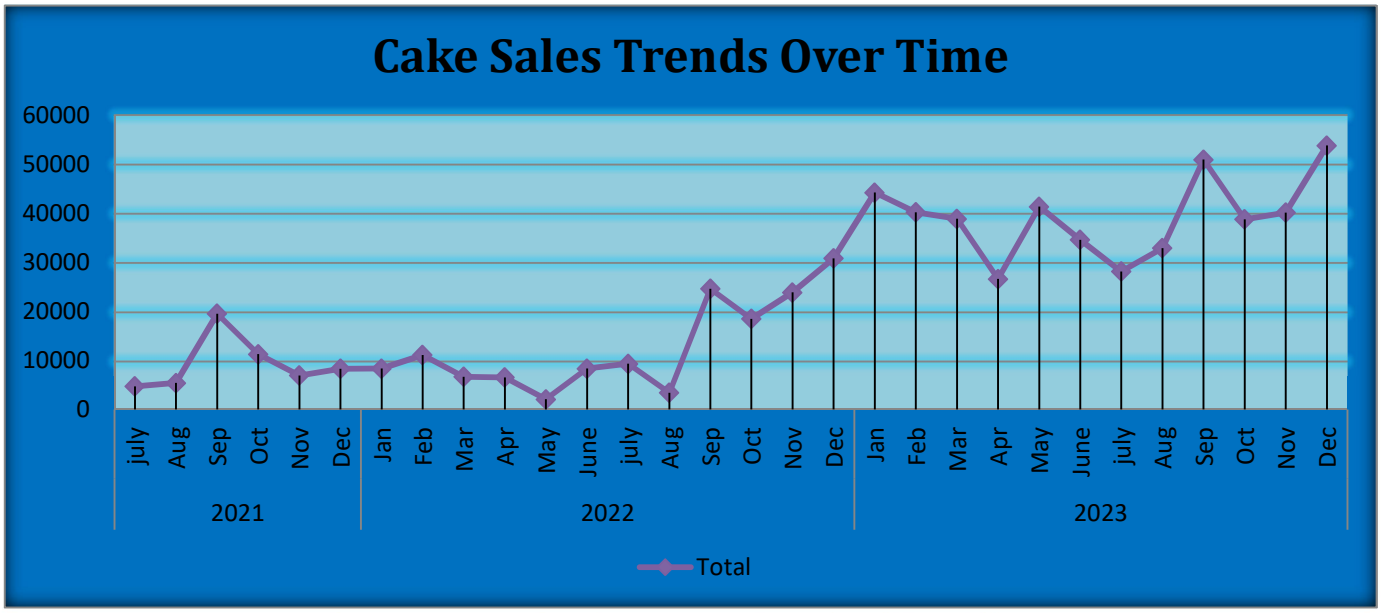

Figure 1: Monthly Cake Sales Trends Over Time (2021-2023)

Cake Performance

Chocolate flavor is the top-performing, contributing 78% to total sales. The 0.5 kg cake size is the most popular, preferred by 58% of customers.

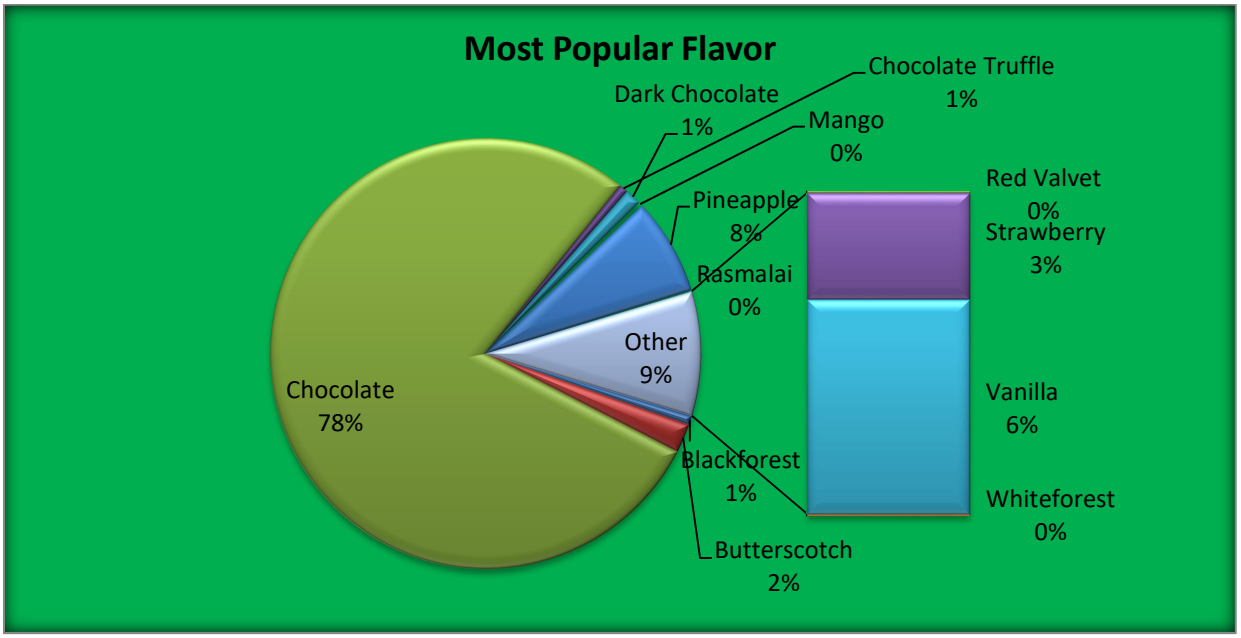

Figure 2: Most Popular Cake Flavors

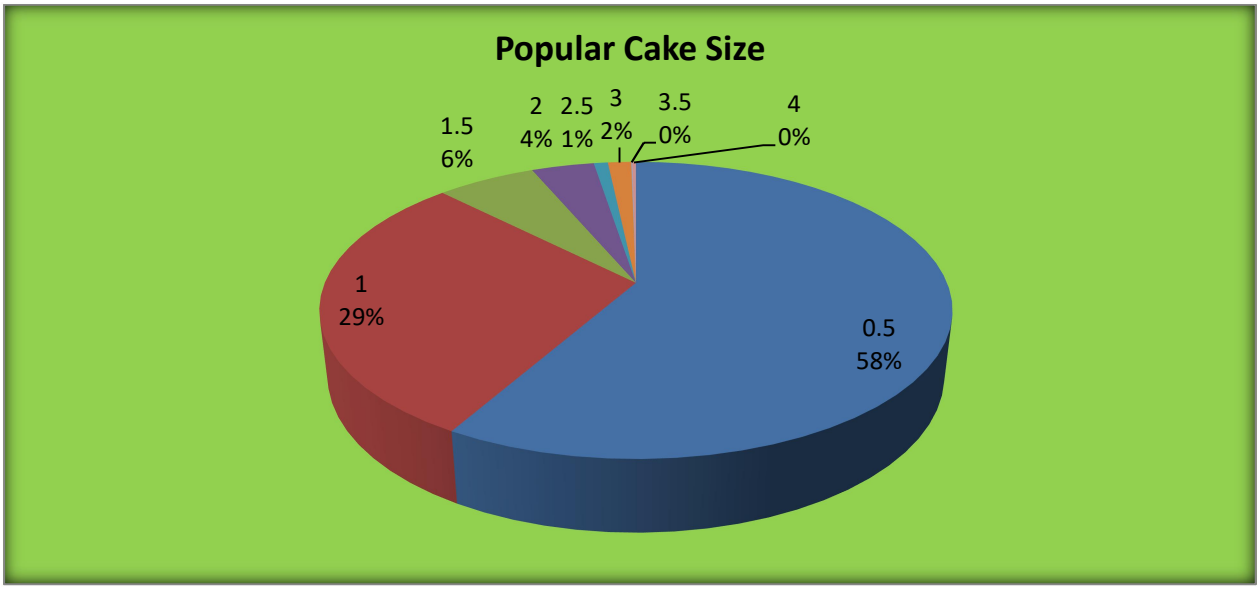

Figure 3: Popular Cake Size

Customer Demographics

The customer base has expanded from 21 locations in 2021 to 64 in 2023, with Shivsagar being the top- performing area. However, 53 locations have fewer than 10 orders, suggesting potential for targeted marketing campaigns.

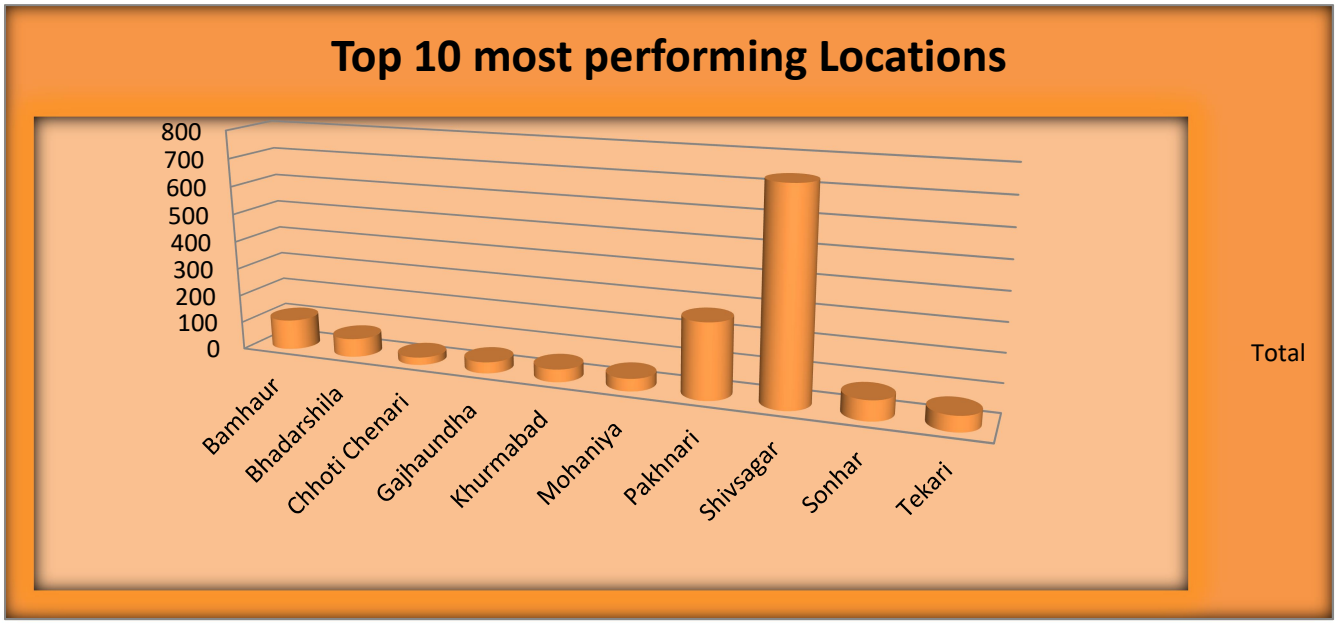

Figure 4: Top 10 Performing Locations

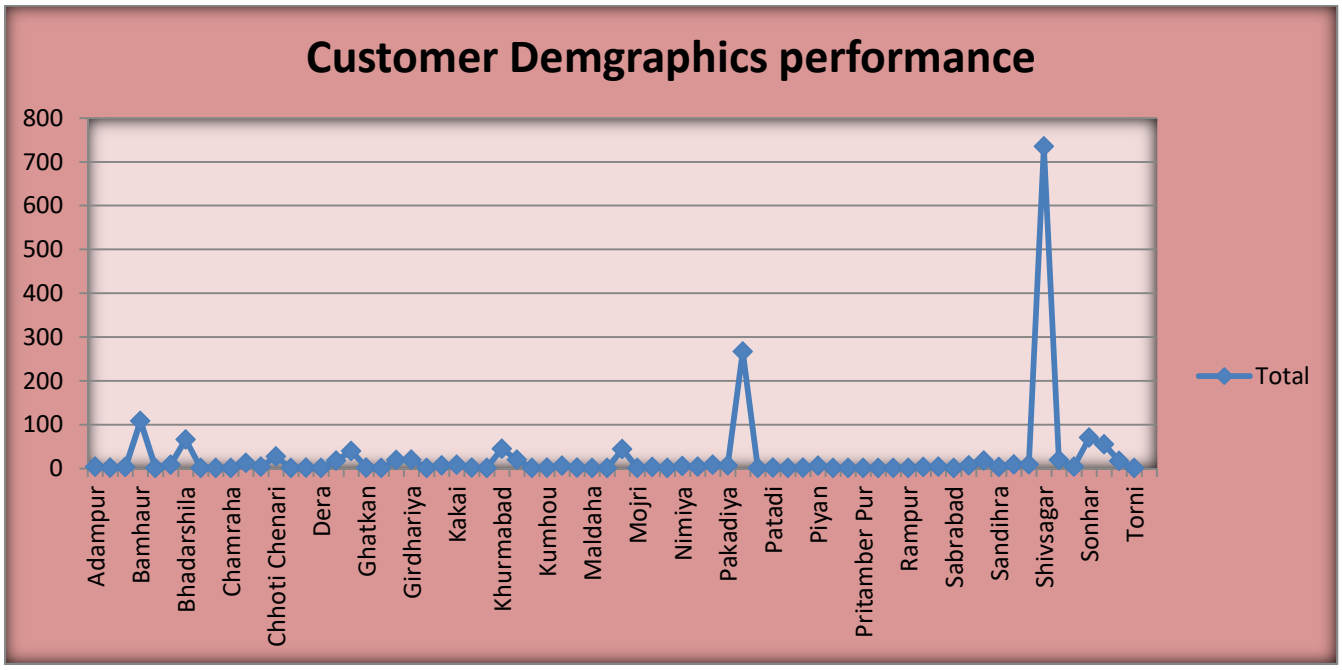

Figure 5: Customer Demographics Performa

Peak Delivery Times

The busiest delivery times are between 3:00 PM and 6:00 PM, causing potential scheduling conflicts. Optimizing delivery slots could alleviate this issue.

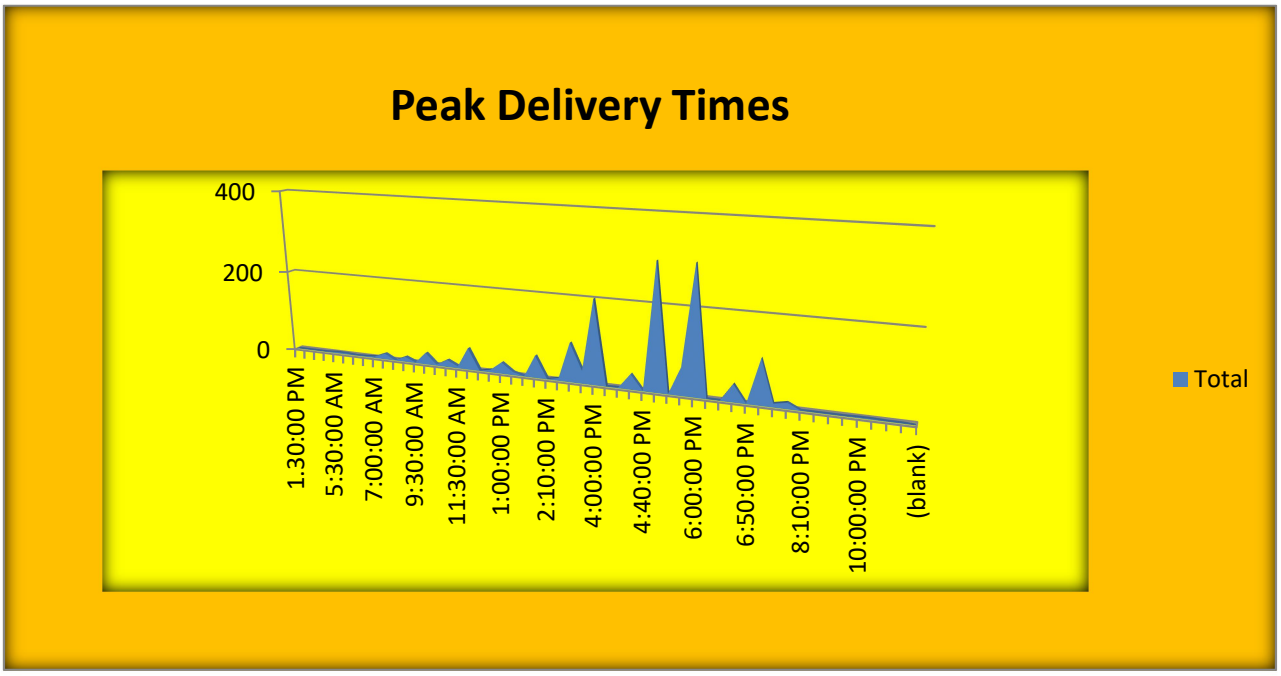

Figure 6: Peak Delivery Time

Revenue Trends

Year	Revenue	COGS	Gross Profit	Profit Margin (%)
2023	470605	239462	231143	49.13
2022	153745	79090	74655	48.56
2021	56210	28050	28160	50.11

Table 5: Annual Financial Performance

- The company's revenue has been steadily increasing over the past three years. When comparing 2022 to 2023, there was almost a 206% growth in 2023, indicating positive growth and possibly effective business strategies or increased market demand.
- The profit margin has been relatively stable around the 48-50% range, indicating consistent management of costs relative to revenue.
- The cost of goods sold has also increased over the years, which could be due to various factors such as inflation, higher material costs, or increased production.

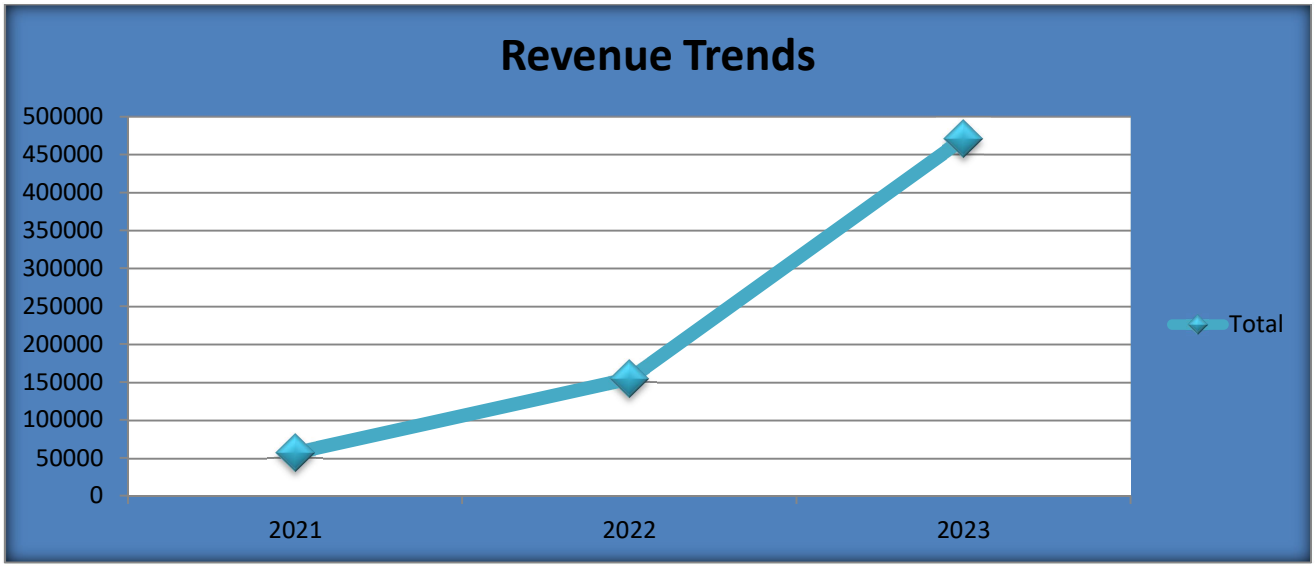

Figure 7: Revenue Trends

6. Recommendations

1. **Hire an Additional Baker**: To manage increased workload during peak periods and ensure timely order fulfillment.

2. **Optimize Delivery Schedules**: Introduce multiple delivery slots and offer incentives for off-peak times.

3. **Targeted Marketing Campaigns**: Focus on underperforming locations to boost sales through localized promotions and social media advertising.

4. **Improve Inventory Management**: Implement dynamic inventory systems based on real-time sales data to maintain optimal stock levels.

5. **Expand Delivery Areas and Services**: Reach more customers by expanding delivery areas and offering additional services like same-day delivery and cake customization.

6. **Financial Analysis and Cost Control**: Regularly review financial performance, negotiate better supplier rates, and optimize pricing strategies.

7. **Data-Driven Decision Making**: Continuously monitor and analyze sales data to make informed decisions and adapt strategies.