OPTIMIZING INVENTORY MANAGEMENT FOR ENHANCED BUSINESS EFFICIENCY AND MINIMIZING OPERATIONAL COSTS

A PROPOSAL REPORT FOR THE BDM CAPSTONE PROJECT

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Executive Summary

‘**Pizzalicious’** is a small pizzeria located at C78, Jhilmil Colony, Near Yamuna Sports Complex, Dilshad Garden, New Delhi. It is a B2C that deals directly with customers in the segment of ‘Food Service’.

The major issue that the pizzeria is facing is in tracking inventory and keeping stocks of the amount of product inflow and outflow. The fast-paced nature of the restaurant and the wide variety of materials utilized make inventory management a complex task. This problem has led to potential wastage, stock discrepancies, and operational inefficiencies.

The main objectives include implementing a data-driven approach to inventory management, accurately tracking and quantifying inventory, and identifying cost-saving opportunities. By utilizing tools such as Excel, Python, and Machine Learning, the pizzeria seeks to streamline data processing and decision-making, optimizing stock levels, and minimizing wastage and stockouts.

The expected outcome includes enhanced operational efficiency, reduced food wastage, and improved customer satisfaction.

Organisation Background

Established in 2014, under the sole proprietorship by Mr. Ansh Dhingra, **‘Pizzalicious’** is a renowned local restaurant located in Jhilmil Colony, surrounded by the posh localities of East Delhi. The images of the pizzeria along with its location as mentioned in Appendix A.

The pizzeria employs a total of 7 staff members which includes 2 chefs, 1 waiter, 1 cashier, and 3 helper/delivery.

They provide service through the methods below:

- **Dine-In and Takeout Services:** They cater to both sit-in customers and those who prefer to carry out their orders.

- **Collaboration with Leading Food Delivery Platforms:** They are collaborating with the popular food delivery platforms like Swiggy, Zomato, and Magic Pin to expand the reach and offer delivery services to a wider customer base.
- **Home Delivery Service:** They offer free home delivery orders within the first 3 kilometres.

The pizzeria manages its online presence through an interactive website (ppizzalicious.dotpe.in/), enabling customers to view the menu, place orders, and access relevant information easily. The customers can also follow the pizzalicious Instagram handle(https://www.instagram.com/pizzalicious0423/).

Problem Statement

The business owner expressed satisfaction with the favourable profits and noted that the customer retention was high, attributed to high quality delicious meals resulting in customer loyalty and inflow of new customers. The major challenge that the owner seemed to be grappling with was inventory management, as it proved to be difficult due to the diverse range of materials involved, making tracking a complex task.

Below is the list of problems in inventory management:

1. **Inventory Tracking**: The fast-moving nature of a restaurant and varying consumer consumption patterns make inventory management a challenging task. Keeping track of numerous materials with specific shelf lives becomes an issue, leading to potential wastage and stock discrepancies.
2. **Classify Inventory Materials and Quantify Usage**: While the owner has a rough approximations of stock levels, the amount of stock used in each item, there are items that are not classified and can be overstocked or understocked, that can lead to wastage. By understanding the demand for different ingredients, the pizzeria can make informed decisions to reduce food wastage and optimize purchasing patterns.
3. **Minimize Operational Costs**: Due to a lack of an effective inventory management system and stock flow, resources are underutilized, and financial waste occurs. The inability to identify cost-saving opportunities and minimize operational issues arising from the problems stated above.

Background of the Problems

Expanding the problems

1. **Inventory Tracking**: Tracking proves challenging due to the wide variety of items, including dairy, cheese, condiments, sauces, bakery items, and vegetables. Some items like condiments have bills, those purchased from local wholesale markets, like vegetables, lack proper documentation, making tracking difficult. Additionally, the fluctuating costs of vegetables (e.g., tomatoes and onions), influenced by weather conditions and rainfall, pose further complexities, leading to sudden increases in their prices overnight.
2. **Classify Inventory Materials and Quantify Usage**: The owner heavily depends on rough estimates for most items, leaving unclassified items vulnerable to overstocking or understocking, leading to wastage. Perishable items, such as milk and bread, with short shelf lives, are at risk of going to waste due to inaccurate tracking. Relying on rough approximations can lead to overstocking or understocking, resulting in food wastage or lost revenue due to product unavailability.
3. **Minimize Operational Costs**: By creating an effective inventory management system that is easy to use. By streamlining the inventory processes, the pizzeria can optimize resource allocation, reduce wastage, and avoid unnecessary expenses.

The pizzeria faces challenges in inventory tracking, especially with a diverse range of items and lack of proper documentation for some purchases. Rough approximations lead to overstocking and waste. Implementing an easy-to-use inventory management system can minimize operational costs and optimize resource allocation.

Problem-Solving Approach

To address the inventory management challenges faced by the pizzeria, a comprehensive problem-solving data-driven and systematic approach is required. This approach encompasses a mix of methods, data collection strategies, and analysis tools, each justified for their role in optimizing inventory control and minimizing operational costs.

a. Methods Used

- The pizzeria will adopt a data-driven approach, utilizing historical sales data and customer consumption patterns to forecast demand accurately. This will help in identifying which items are frequently ordered, enabling better inventory planning, and reducing wastage. Additionally, employing the ***ABC analysis*** method, categorizing inventory based on value and consumption, will prioritize critical items, ensuring optimal stock levels and avoiding stockouts for high-demand ingredients.

b. Intended Data Collection

- The intended data collection for inventory management includes:
    i. **Sales data**: The total number of items sold for each menu item.
    ii. **Stock and inventory data:** Approximations and values for all purchased items.
    iii. **Quantity data**: The owner is willing provide rough approximations of the quantities of ingredients used in preparing each menu item.
    iv. **Historical Sales Data**: If the owner agrees to provide it then we will be able to identify demand patterns, seasonal variations, and predict future demands.
- This comprehensive data collection approach will be instrumental in quantifying consumption patterns, identifying popular items, and optimizing stock levels to minimize wastage and avoid stockouts.

c. Analysis Tools

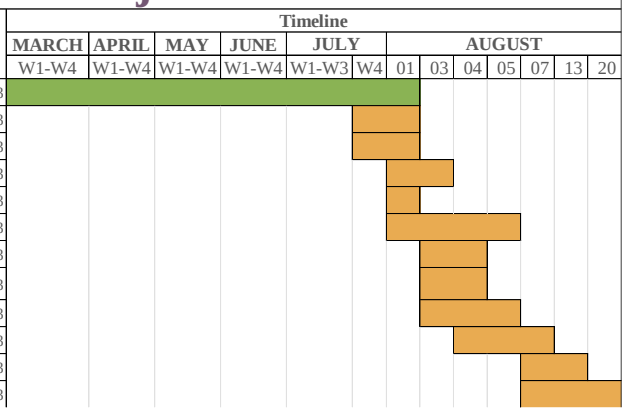
- **Microsoft Excel:** Excel will be used as the central tool for the pizzeria to manage its inventory data effectively. It allows to input, organize, and store inventory information, facilitating data manipulation, calculations, and generating tables for tracking stock levels and sales. The graphing and pivot table features help visualize trends and consumption patterns, enabling data summarization and analysis. Pareto charts aid in identifying significant inventory items contributing to sales or wastage, assisting in prioritizing efforts for inventory management.
- **Python and Machine Learning (ML) tools:** Python, as a versatile programming language, offers numerous libraries and frameworks, such as Pandas and NumPy, which provide robust data manipulation, processing, and statistical analysis capabilities. With Python, the pizzeria can handle large datasets, perform complex calculations, and extract valuable insights from inventory data.

The combination of these methods, data collection, and analysis tools will create a robust inventory management system. It will empower the pizzeria to make data-driven decisions, reduce wastage, optimize stock levels, and minimize operational costs effectively. The focus on accuracy and efficiency in inventory management will not only enhance customer satisfaction by ensuring product availability but also contribute to the pizzeria's long-term success and profitability in a competitive market.

Expected Timeline

BDM Capstone Project

ACTIVITY	Start Date	End Date
Data Acquisition	01 March 2023	01 August 2023
Project Proposal and Scope Definition	26 July 2023	01 August 2023
Data Collection for Inventory Analysis	26 July 2023	01 August 2023
Data Preprocessing	01 August 2023	03 August 2023
Research on Inventory Management	01 August 2023	02 August 2023
Data Analysis and Identifying Inventory Problems	01 August 2023	05 August 2023
Collecting Additional Data	03 August 2023	04 August 2023
Analyzing and Evaluating Inventory Optimization Results	03 August 2023	04 August 2023
Preparing Mid-term Submission	03 August 2023	05 August 2023
Finalizing Analysis Process and Methodology	04 August 2023	07 August 2023
Preparing Final Submission	07 August 2023	13 August 2023
Creating Presentation	07 August 2023	20 August 2023



The project is anticipated to be completed within the projected timeframe, aligning with the project cycle of August 2023. The workflow follows the structure outlined in the Gantt chart.

Expected Outcomes

The expected outcome of this inventory optimization project is to enhance pizzeria's financial performance and operational efficiency by effectively tracking and quantifying inventory, thereby reducing wastage and stockouts. This will result in minimized operational costs and improved customer satisfaction due to consistent product availability and quality. The project's success will also align with pizzeria 's commitment to sustainability and responsible business practices by reducing food wastage. Ultimately, the implementation of this project will strengthen the pizzeria's competitive position and contribute to its long-term success in the food industry.

Appendix A

Images:

Location: https://goo.gl/maps/C387HwpJ1pz61uV17