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Innovative Strategies for Optimizing Inventory and Enhancing Profitability at UBC Supermarket

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Declaration Statement

I am working on a Project Title "Innovative Strategies for Optimizing Inventory Management and Enhancing Profitability at UBC Supermarket". I extend my appreciation to [Name of Business/Company], for providing the necessary resources that enabled me to conduct my project.
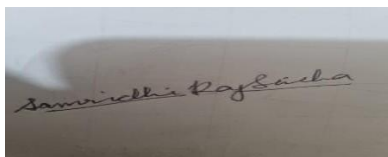
I hereby assert that the data presented and assessed in this project report is genuine and precise to the utmost extent of my knowledge and capabilities. The data has been gathered through primary sources and carefully analysed to assure its reliability.

Additionally, I affirm that all procedures employed for the purpose of data collection and analysis have been duly explained in this report. The outcomes and inferences derived from the data are an accurate depiction of the findings acquired through thorough analytical procedures.

I am dedicated to adhering to the information of academic honesty and integrity, and I am receptive to any additional examination or validation of the data contained in this project report.

I understand that the execution of this project is intended for individual completion and is not to be undertaken collectively. I thus affirm that I am not engaged in any form of collaboration with other individuals, and that all the work undertaken has been solely conducted by me. In the event that plagiarism is detected in the report at any stage of the project's completion, I am fully aware and prepared to accept disciplinary measures imposed by the relevant authority.

I agree that all the recommendations are business-specific and limited to this project exclusively, and cannot be utilized for any other purpose with an IIT Madras tag. I understand that IIT Madras does not endorse this.

Signature of Candidate: (Digital Signature)

Name: Samridhi Raj Sinha

Date: 5 July 2024

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Project Proposal for Business Data Management Capstone Project

Executive Summary

UBC Supermarket, located in Kharghar, Navi Mumbai, and owned by the UBC group, is a prominent grocery store offering a wide range of quality products, including grocery items, stationery, xerox services, plastic goods, and crockery, along with excellent customer service. Despite its strong customer base and high sales volume, the supermarket has been facing significant financial challenges over the past 2-3 months due to intense competition from nearby online delivery companies such as Zepto and Swiggy, which operate in the same lane. This competition has led to a preference for online shopping among customers, resulting in overstocking, wastage, and missed opportunities for maximizing profitability.

The primary objective of this project is to address these challenges through a comprehensive data analysis approach, aiming to optimize inventory levels, improve sales forecasting accuracy, and enhance overall profitability.

Organization Background

UBC Supermarket, located in the bustling area of Kharghar, Navi Mumbai, is a well-known grocery store dedicated to providing an extensive range of daily necessities to its customers. The supermarket offers a wide variety of products, including:

- Groceries: Rice, flour, pulses, sugar, oil, dairy products, and dry fruits.
- Stationery: Essential office and school supplies.
- Xerox Services: Convenient photocopying services for customers.
- Plastic Goods: Various plastic products for household use.
- Crockery: Quality kitchen and dining ware.

Owner: Mayuri Munde

Operating Hours: 8:00 AM to 10:00 PM daily

Daily Customer Count: 250 to 280 customers
Operational History:
- UBC Supermarket: 2 years
- Previously Rajaram Supermarket: 5 years

Problem Statement

UBC Supermarket is experiencing financial losses due to ineffective inventory and sales management amid rising competition from online delivery services. The primary issues include:

1. Overstocking and Wastage: Inefficient inventory management has led to excess stock of low-demand items, causing significant waste.
2. Inaccurate Sales Forecasting: Poor sales forecasting practices have resulted in missed opportunities and inefficient resource allocation.
3. Declining Profitability: Financial performance has suffered as a result of the misalignment between inventory levels and actual demand, exacerbated by competitive pressures.

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To address these challenges, the supermarket needs to optimize inventory levels, enhance forecasting accuracy, and improve overall financial performance.

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Background of the Problem

UBC Supermarket has been a cornerstone in the Kharghar community, offering a wide range of products to meet daily needs. However, despite having a strong customer base and high sales, I've been facing significant financial difficulties. These issues are primarily due to poor inventory management and inaccurate sales forecasts, which have been exacerbated by the competition from nearby online delivery services like Zepto and Swiggy.

With Zepto and Swiggy operating their stock centers in close proximity, there's been a noticeable shift in consumer preferences towards online shopping. This has put additional pressure on my supermarket, leading to overstocking, wastage, and declining profitability. My current operational strategies are no longer effective in navigating these competitive pressures.

To address these challenges, I plan to analyze monthly sales data, inventory purchases, and specific product information for items such as rice, flour, pulses, sugar, oil, dairy products and non food items. By using advanced data analytics, I aim to gain insights that will help optimize inventory levels, improve sales forecasting, and increase profitability. My goal is to align inventory with actual demand, reduce waste, and ultimately enhance financial performance and customer satisfaction.

Problem-Solving Approach

To address the challenges faced by UBC Supermarket, a comprehensive and systematic data analysis approach will be employed. This approach focuses on improving inventory management, enhancing profit margins, and developing accurate sales forecasting. Here is a detailed breakdown of each step:

1. Data Collection
- **1.1 Sales Data Collection:**
  - **Data Needed:** Monthly sales data from bills, including product names, quantities sold, sales prices, and transaction dates.
  - **Collection Method:** Extract data from point-of-sale (POS) systems or sales reports, ensuring data is captured consistently for the past two months.
- **1.2 Inventory Purchase Data Collection:**
  - **Data Needed:** Records of inventory purchases for the same period, including purchase dates, quantities, costs, and product names.
  - **Collection Method:** Obtain data from inventory management software or purchase logs to track all relevant transactions.
- **1.3 Specific Product Data Collection:**
  - **Data Needed:** Detailed data for key products such as rice, flour, pulses, sugar, oil, dairy products, and dry fruits.
  - **Collection Method:** Focus on these products to ensure detailed tracking and analysis, which involves filtering relevant entries from the collected sales and inventory data.

2. Data Cleaning
- **2.1 Error Correction:**
  - **Identify Errors:** Look for duplicates, incorrect dates, or outlier values that could skew the analysis.
  - **Correct Errors:** Remove duplicate entries, correct erroneous dates, and adjust outliers to ensure the data's accuracy.
- **2.2 Data Standardization:**
  - **Uniform Formatting:** Ensure that all dates are in a consistent format and product names are standardized.

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     ○ **Handle Missing Values:** Use appropriate methods to fill in missing values or remove incomplete records to maintain data integrity.

3. Data Analysis

- **3.1 Inventory Analysis:**
  - **Turnover Rates:** Calculate inventory turnover rates to understand how quickly products are sold and replaced. This helps in identifying slow-moving or overstocked items.
  - **Stock Levels:** Use the historical sales data to recommend optimal inventory levels for key products, minimizing excess stock and reducing holding costs.
- **3.2 Sales Analysis:**
  - **Trend Identification:** Analyze sales data to identify trends such as peak sales periods and popular products. Look for patterns that indicate high-demand periods or seasonal variations.
  - **Visualization:** Create visualizations such as pie charts, histograms, and scatter plots to easily interpret sales trends and make data-driven decisions.
- **3.3 Financial Analysis:**
  - **Profit Margin Calculation:** Calculate key financial ratios, including Gross Profit Margin and Net Profit Margin, to assess the store's profitability. This involves analyzing cost of goods sold (COGS) and total revenue.
  - **Cost Analysis:** Review costs related to inventory and sales to identify areas where expenses can be reduced or efficiency can be improved.
- **3.4 Sales Forecasting:**
  - **Linear Regression Model:**
    - **Model Building:** Develop a linear regression model using historical sales data to predict future sales. This involves fitting a line to the data that best represents the relationship between time and sales.
    - **Forecast Generation:** Use the linear regression model to generate forecasts for future sales, which will help align inventory levels with anticipated demand.
    - **Model Validation:** Validate the model by comparing its forecasts with actual sales data to ensure its accuracy and reliability.

4. Tools and Techniques

- **4.1 Excel:**
  - **Uses:** For initial data cleaning, basic analysis, and visualization. Excel is suitable for pivot tables and charts to summarize and visualize data.
- **4.2 Python:**
  - **Uses:** For advanced data analysis and linear regression modeling. Utilize libraries such as pandas (for data manipulation), NumPy (for numerical operations), and scikit-learn (for machine learning) to build and validate the regression model.
- **4.3 Statistical Analysis:**
  - **Uses:** Apply statistical methods to interpret financial ratios and trends. This includes calculating mean, median, and standard deviation to understand data distribution and variability.

Expected Timeline

1. Data Collection and Preparation (July 25-30, 2024)
   - 1.1 Collect Data (July 25-26, 2024)
   - 1.2 Data Preprocessing (July 27-30, 2024)
2. Proposal Submission (August 1-5, 2024)
   - 2.1 Develop Proposal (August 1-3, 2024)

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    o 2.2 Submit Proposal (August 4-5, 2024)
3. Mid-Term Data Insights (August 11 - September 5, 2024)
    o 3.1 Analyze Data (August 11-25, 2024)
    o 3.2 Prepare Report (August 26 - September 5, 2024)
4. Mid-Term Submission (September 6-10, 2024)
    o 4.1 Finalize Report (September 6-9, 2024)
    o 4.2 Submit Report (September 10, 2024)
5. Detailed Analysis and Forecasting (September 16 - October 10, 2024)
    o 5.1 In-Depth Analysis (September 16-30, 2024)
    o 5.2 Sales Forecasting (October 1-7, 2024)
    o 5.3 Draft Recommendations (October 8-10, 2024)
6. Final Submission (October 11-15, 2024)
    o 6.1 Prepare Final Report (October 11-13, 2024)
    o 6.2 Submit Final Report (October 14-15, 2024)
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Gantt Chart for Project
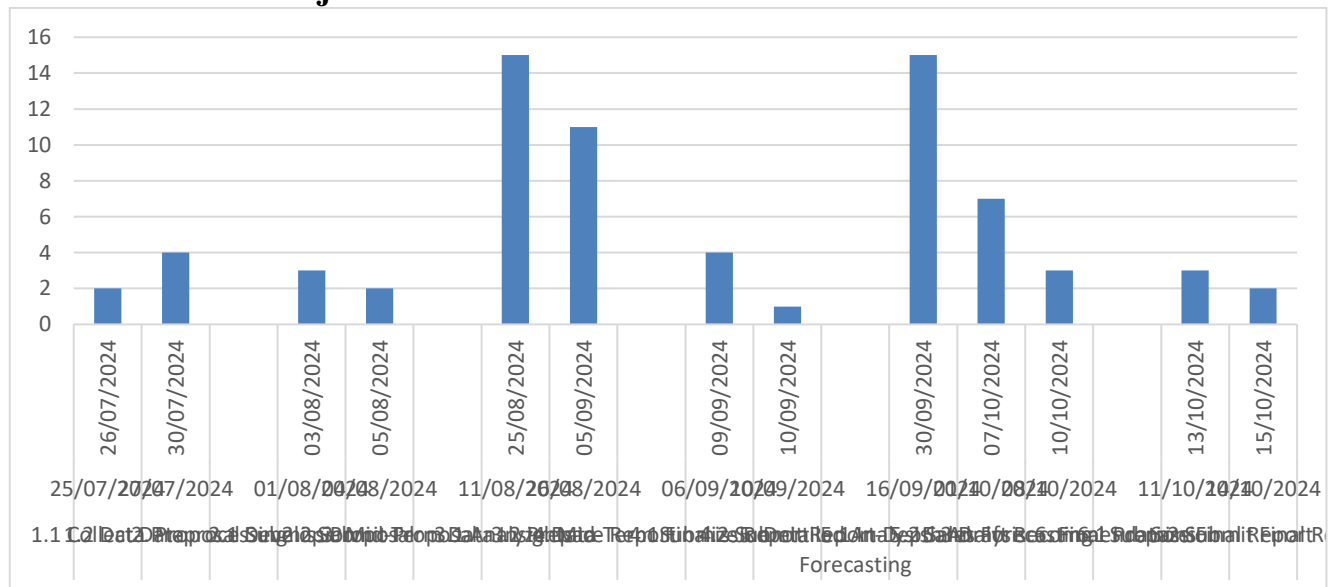
Expected Outcome

- **Optimized Inventory Management:**
  - Recommendations to maintain optimal inventory levels
  - Reduction in wastage and holding costs
- **Improved Profit Margins:**
  - Strategies for better pricing and promotional activities
  - Increased net profit margins
- **Accurate Sales Forecasting:**
  - Tools and methods for predicting future sales
  - Better alignment of inventory with demand
- **Enhanced Customer Satisfaction:**
  - Improved availability of popular products
  - Reduction in stockouts and better customer service