Optimizing Profits: A Data-Driven Approach for Har-Hith Grocery Store's Inventory Management

A Proposal report for the BDM capstone Project

Submitted by

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Contents

Declaration Statement

I am working on a Project titled "**Optimizing Profits: A Data-Driven Approach for Har-Hith Grocery Store's Inventory Management**". I extend my appreciation to [**Har-Hith Grocery Store**], 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 from primary sources and carefully analyzed 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 principles 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 understand that all recommendations made in this project report are within the context of the academic project taken up towards course fulfillment in the BS Degree Program offered by IIT Madras. The institution does not endorse any of the claims or comments.

Signature of Candidate: 

Name: Lakshay

Date: 26/01/2024

1) Executive Summary and Title

Optimizing Profits: A Data-Driven Approach for Har-Hith Grocery Store's Inventory Management

Details about the organization:

For the execution of this project, I engaged with Har-Hith Grocery Store, a compact grocery establishment situated in Bhattu Mandi, Fatehabad district, Haryana. This entity operates as a Business-to-Consumer (B2C) enterprise within the retail sector, providing a varied array of essential and everyday products directly to individual consumers.

About the problem:

- After discussions with the store owner and observations made from the inception of the store until now, it has been determined that the store is currently experiencing significant inventory-related issues, and its performance, particularly during winter seasons, is not meeting expectations.
- The net profit of the store is being adversely affected by these inventory issues. Despite possessing a well-equipped facility and the owner's friendly demeanor, customer retention has proven challenging.
- Initial sales were commendable, but a rapid decline has been witnessed over time.

Possible approach and solution:

- The store is equipped with a POS machine through which data can be easily accessed. Various types of data, such as inventory, purchase details, and sales, can be easily collected.
- The issues will be addressed by analyzing the data using statistical methods, including descriptive analysis and exploratory data analysis.
- The anticipated outcome is aimed at enabling the store to manage its inventory effectively, thereby overcoming seasonal profit margin challenges and ultimately increasing the overall profit.

2) Organization Background

Har-Hith Store, inaugurated by Mr. Sanjay Karwasra in June 2022, is located in Bhattu Mandi, Fatehabad, Haryana. Har-hith is a flagship project of Haryana Agro Industries Corporation Limited (HAICL), which is being implemented under the direct supervision of the Government of Haryana. There are three types of franchisee under this rural, urban small, urban large based on population of area. HAICL provides IT support (POS machine), marketing, advertising, loan requirement support, training support, logistics benefits and infrastructure benefits to franchisee store.

- The store that I am working with is rural franchisee of HAICL. Specializing as a small grocery store, it offers a comprehensive selection of household grocery items.
- The store boasts an organized layout, excellent facilities, including daily usage of a POS machine, optimal product visibility, and a robust infrastructure. These features set it apart from typical small kirana shops in rural areas.

- The initial investment made by the store owner amounted to approximately 5 lakhs. Although the store performed well in its initial phase, a subsequent decline in sales and profit margins has been observed. Upon close examination, it appears that the root cause of this decline can be attributed to issues in inventory management.

3) Problem Statement

As I discussed above regarding the problem, the problem statement can be as follows:

i. **How to optimize the store inventory based on the purchase order and sales data?** - Inventory management is crucial for maximizing the net profit margin and minimizing the inventory holding cost.
ii. **What are the main drivers of sales variation across different seasons?** Seasonal analysis can help identify the optimal marketing strategies and product mix for each season.
iii. **What are the key challenges and opportunities for enhancing customer loyalty and retention?** Customer retention is vital for increasing the customer lifetime value and reducing the customer acquisition cost.

4) Background of the Problem

The store has been visited by me since its inception, and contact has been maintained with the owner from the very beginning. Conversations regarding profit have occurred on numerous occasions. According to the owner, there is a high customer count at the start of the store, but over time, a decrease in customer count is observed. On many occasions, there is a lack of specific items that customers initially inquire about. It is recognized that, in most instances, if the initial item is unavailable, efforts are made to procure that item as well as others from elsewhere. Another problem we found is a drastic decrease in revenue during the winter season, as observed in the revenue chart.

The key factors that contributed to the above problem from my observations are:

- Inadequate inventory management that resulted in delayed product availability and customer dissatisfaction.
- Non-availability of winter season products that reduced the customer demand and revenue during the winter season.
- Elevated prices of some products that made the store less competitive and attractive compared to other grocery shops in the market.
- Wastage of products due to expiry dates that reduced the profit margin and increased the inventory holding cost.

5) Problem Solving Approach

Details about the methods used with Justification:

- **Descriptive Statistics:** Collected Comprehensive Data Sets. Acquired inventory data, sales data, purchase order data, and information on fast/slow-moving items. Descriptive statistics used to describe basic features of data in study.

- **Time – Series Analysis:** Gathered time-series data, enabling the creation of trend lines and scatter plots to discern meaningful patterns over time. This analysis helps to determine cyclic variations.
- **FSN Analysis:** FSN analysis conducted by me using the fast/slow-moving items data. The inventory was assessed and strategic decisions were made by me.
- **Graphical Representation:** Leveraged pivot tables to facilitate the generation of Pareto charts, pie charts, line charts, and stacked histograms, thereby extracting valuable insights.
- **Application of Ratios:** Utilized various ratios, including safety stock and re-order point, as derived from the course, to compute essential financial values. These calculations will contribute to resolving the inventory management issues.

Details about the intended data collection with Justification:

To streamline the data collection process, I focused on categories of products from the seller's product range. This improved the efficiency of data analysis. I collected various details for these products, such as: Cost Price, Sell Price, Quantity Bought, Quantity Sold, Fast/Slow Moving Classification, Opening/Closing Stock. With this information, I gathered essential findings such as the average day of inventory, average daily sales, gross profit margin, net profit margin, revenue, and expenditure. Additionally, I conducted a comparison of selling prices with the local other shops items and online grocery items. Furthermore, I assembled data concerning capital investment, fixed assets, and variable costs like electricity, transportation, and rent. This data helped me calculate relevant financial ratios such as Return on capital Invested, gross profit ratio, net profit ratio.

Details about the analysis tools with Justification:

Excel serves as a valuable tool for data analysis, especially in the context of the collected data. Its versatility allows for a comprehensive analysis, and various components within Excel contribute to this capability. The key features and functions that will be used for data analysis include:

- **Pivot Table:** Utilized to filter data in different ways and explore datasets interactively.
- **Functions:** Employed to calculate and derive insights from the data using functions like VLOOKUP, AVERAGE, AVERAGEIF, SUM, MAX, MIN, etc.
- **Various Charts:** A variety of chart types such as Pareto charts, pie charts, line charts, scatter plots, histograms, etc., will be used to visually represent and interpret the data, enhancing the comprehensibility of the analysis.
- **Data Validation:** Implementation of data validation rules to ensure the integrity and consistency of the collected data while minimizing false positives and negatives.
- **Conditional Formatting:** Application of conditional formatting techniques to subtly highlight trends, patterns, or anomalies within the dataset without making them overly conspicuous.
- **Data Sorting and Filtering:** Used to focus on relevant information by sorting and filtering the data based on specific criteria judiciously, minimizing the risk of overemphasis on certain aspects.

6) Expected Timeline

6.1 Work Breakdown Structure

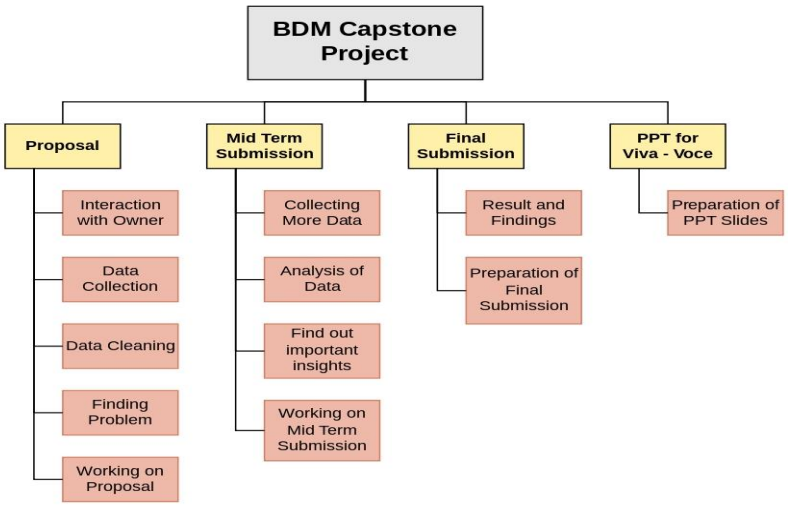

Figure 1: Work Breakdown Structure

6.2 Gantt chart

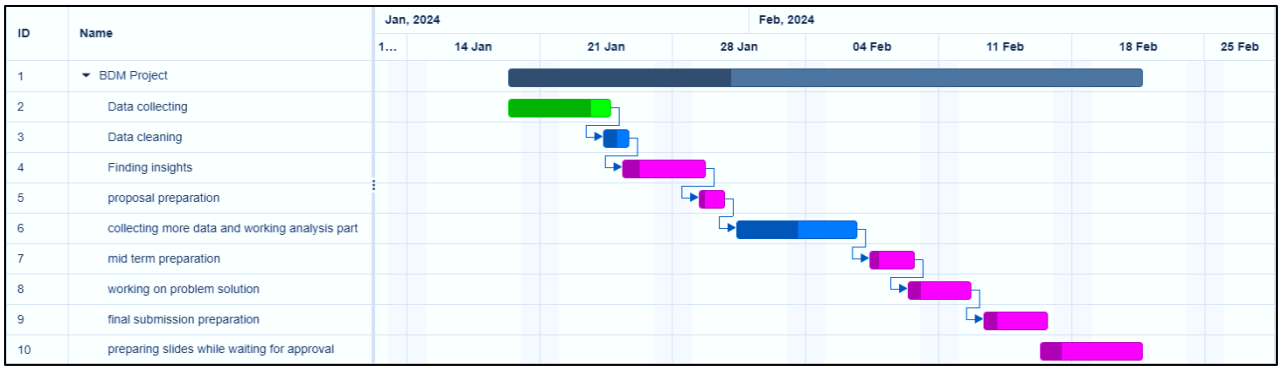

Figure 2: Expected timeline for completion of project

7) Expected Outcome

- Enhanced inventory management: Anticipated resolution of stock out issues through the utilization of average day of inventory and analysis of fast and slow-moving items.
- Optimal utilization of the POS machine: The owner is expected to be assisted in maximizing the functionality of the POS machine.
- Improved customer retention: Expectation of providing the owner with proactive suggestions for enhancing customer retention strategies.

It is expected that the implementation of these solutions will contribute to overcoming the business problems and enhancing the overall profit margin. Additionally, the ability to compete in the online marketplace will be facilitated by this implementation