Optimizing Inventory and Sales Strategy of Top Shelf: A Stationery Retail Business

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 Inventory and Sales Strategy of Top Shelf: A Stationery Retail Business*" I extend my appreciation to Top Shelf 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 analysed to ensure 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 undertaken towards course fulfilment in the BS Degree Program offered by IIT Madras. The institution does not endorse any of the claims or comments.

Name: Kushagra
Date: 10/06/2025

1. Executive Summary

This Business Data Management (BDM) Capstone Project is undertaken as part of the BS in Data Science and Applications curriculum offered by the Indian Institute of Technology Madras (IIT Madras). The project focuses on "Top Shelf," a stationery shop located in the academic hub of North Campus, Delhi University. The shop caters primarily to students, fluctuations in customer demand due to academic cycles, leading to inventory inefficiencies and lost sales opportunities."

The primary objective of this project is to enhance operational efficiency and drive profitability by leveraging business data to generate actionable insights. The key challenges identified include managing seasonal demand fluctuations, differentiating between fast- and slow-moving inventory items, and optimizing the product assortment to maximize profit margins. Addressing these challenges will enable the store to align inventory levels with real-time demand, improve product availability during high-demand periods, and utilize shelf space more strategically.

To achieve these outcomes, the project adopts a data-driven methodology that includes historical sales analysis, product-level performance evaluation, and demand forecasting. Microsoft Excel will be used for data organization and initial exploration, while Python libraries such as Pandas and Matplotlib will support deeper analytical processes and visual storytelling. The final deliverables will include insights and a replicable framework that improves decision-making around inventory, pricing, and product mix in a seasonally sensitive retail environment.

2. Organisation Background

Top Shelf, established in 2013 by Mr. Mukul Agarwal, is a prominent stationery store located at Malka Ganj Chowk, Kamla Nagar, in the heart of Delhi University's North Campus. Initially started as a small local setup, the shop has evolved into a well-recognized name among students and young professionals. Its strategic location ensures a steady flow of college-goers who rely on the store for quality and variety.

Top Shelf caters to a broad spectrum of academic and office needs, maintaining a strong focus on affordability and accessibility. With a small yet efficient team of two staff members,

the store handles average monthly sales ranging between ₹2.25 lakh and ₹2.5 lakh. Despite being a walk-in-only establishment, its consistent service, reliable stock, and student-centric approach have earned it a loyal customer base. Over the years, Top Shelf has built a reputation as a trusted one-stop destination for essential supplies in the North Campus area.

3. Problem Statement

3.1 Managing Seasonal Demand Fluctuations: Demand peaks during semester starts and exams, while dropping sharply during breaks, leading to inconsistent sales and inventory issues.

3.2 Optimizing Inventory Through Sales Trend Analysis: Poor visibility into fast- and slow-moving items results in overstocking, stockouts, and inefficient capital use.

3.3 Refining Product Assortment for Profitability: Unoptimized shelf space and an ineffective product mix limit profit margins and prevent capital from being used on higher-return products.

4. Background of the Problem

Top Shelf is a well-established stationery store located at Malka Ganj Chowk, Kamla Nagar, strategically positioned within the North Campus zone of Delhi University. The shop primarily serves students and academic institutions, offering a wide range of stationery products. While its location provides access to a large and consistent student customer base, the business is heavily influenced by academic cycles, resulting in seasonal fluctuations in demand. Sales typically peak at the start of semesters and during examinations but drop significantly during vacations and semester breaks, leading to inconsistent revenue and operational challenges.

A key issue faced by the store is the absence of structured demand forecasting and sales analytics. Inventory management is largely based on experience rather than data-driven insights. As a result, the shop often overstocks slow-moving items while understocking high-demand products during peak periods. This imbalance leads to poor shelf utilization, tied-up capital, and occasional customer dissatisfaction due to unavailability of essential items.

The current product assortment strategy is also not optimized for profitability. A significant portion of the inventory includes low-margin or underperforming products that occupy valuable retail space without contributing meaningfully to revenue. There is a need for systematic analysis of product-level sales performance to guide assortment planning and improve margins

5. Problem Solving Approach

5.1 Methods: Explanation with Justification

To address Top Shelf's operational challenges including seasonal demand swings, inventory inefficiencies, and suboptimal product assortment, a structured data-driven approach will be adopted. The key methods include Sales Trend Analysis, Demand Forecasting, and Product Assortment Optimization.

5.1.1 Sales Trend Analysis will help identify seasonal purchase patterns and sales fluctuations across different academic periods (e.g., semester start, exams, breaks). This enables better planning and resource allocation, ensuring the shop is adequately stocked during peak demand while avoiding excess inventory in off-seasons.

5.1.2 Demand Forecasting will utilize historical sales data to predict item-level demand using time series techniques. Forecasting fast- and slow-moving products supports better stocking decisions, reduces the risk of stockouts, and optimizes working capital utilization.

5.1.3 Product Assortment Optimization will be performed using ABC analysis and contribution margin analysis. This will help identify top-performing and underperforming items based on sales and profitability, guiding decisions on product placement and inventory priority to maximize shelf utility and business margins.

5.2 Data Collection: Strategy and Relevance

A focused data collection approach will be adopted, covering three key areas to support the analysis.

5.2.1 Sales Records: Daily or monthly item-wise sales data over at least one academic year will be gathered. This is vital for identifying seasonal trends and differentiating between fast- and slow-moving products.

5.2.2 Inventory Logs: Opening and closing stock data will be used to evaluate stock turnover, detect overstocked items, and measure inventory efficiency based on demand fluctuations.

5.2.3 Qualitative Inputs: Insights from the shop owner and staff regarding customer behavior, product popularity, and inventory challenges will provide valuable context to complement the quantitative data.

5.3 Analysis Tools

In the initial phase, Microsoft Excel will be utilized for structured data entry, preliminary trend analysis, ABC classification, and basic visualizations. Tools such as Pivot Tables and functions like SUMIF and VLOOKUP will support efficient data organization and reporting.For advanced analysis, Python, leveraging libraries such as Pandas and Matplotlib, will be employed to conduct time series forecasting, visualize sales trends, and analyze product performance.To enhance demand forecasting, models like ARIMA and Exponential Smoothing will be applied to improve inventory planning, particularly during seasonal fluctuations.

6. Expected Timeline
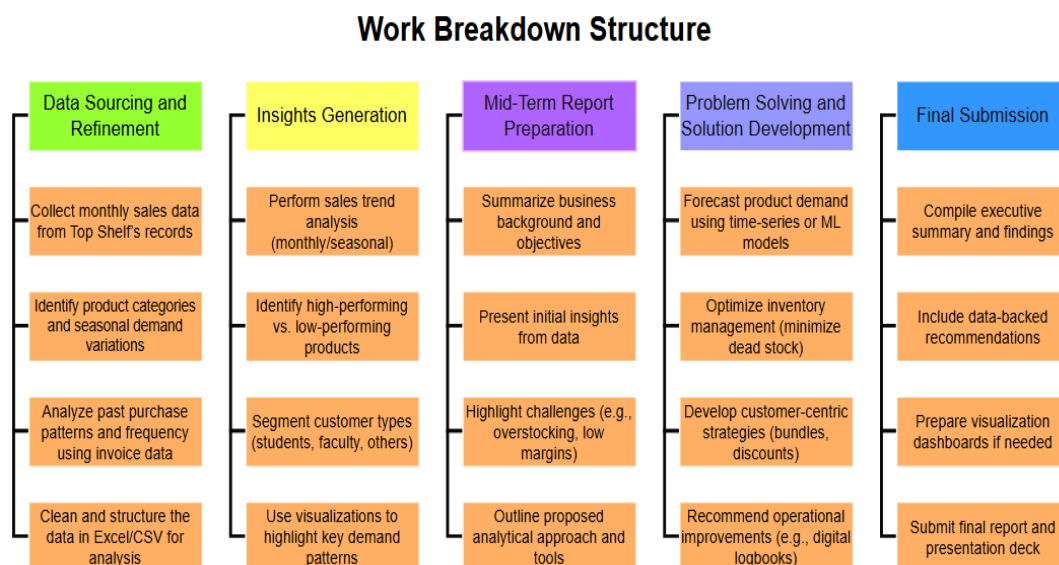
6.1 Work Breakdown Structure

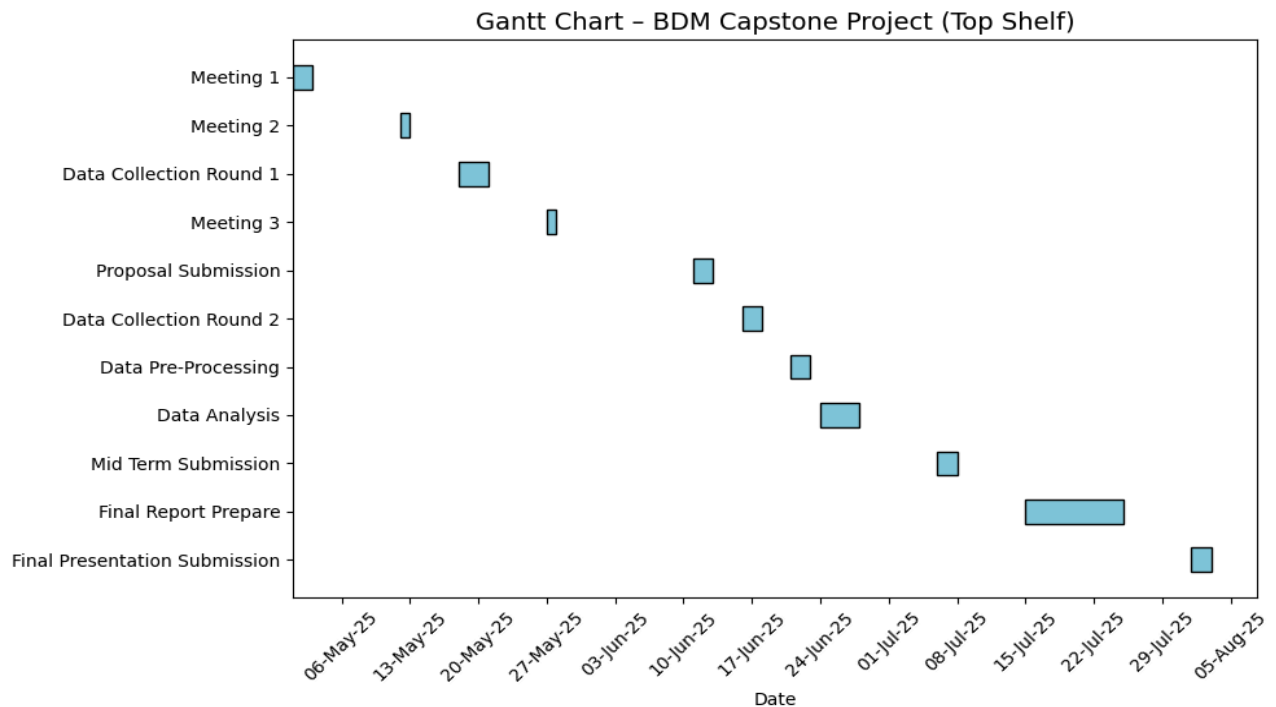Figure 1: Work Breakdown Structure

6.2 Gantt Chart

Figure 2: Gantt Chart

7. Expected Outcome

7.1 Stabilized Seasonal Revenue: By anticipating academic-cycle-driven demand patterns, the store will maintain consistent stock levels during peak and off-peak periods, reducing lost sales during high-demand times and minimizing excess stock during breaks.

7.2 Streamlined Inventory and Capital Use: Better visibility into fast- and slow-moving items will allow more efficient inventory planning, freeing up shelf space and capital from underperforming products and reducing waste due to overstocking.

7.3 Increased Overall Profitability: A refined product assortment strategy will ensure high-demand, high-margin items are prioritized. This shift will improve sales performance and contribute directly to higher profit margins and customer satisfaction.