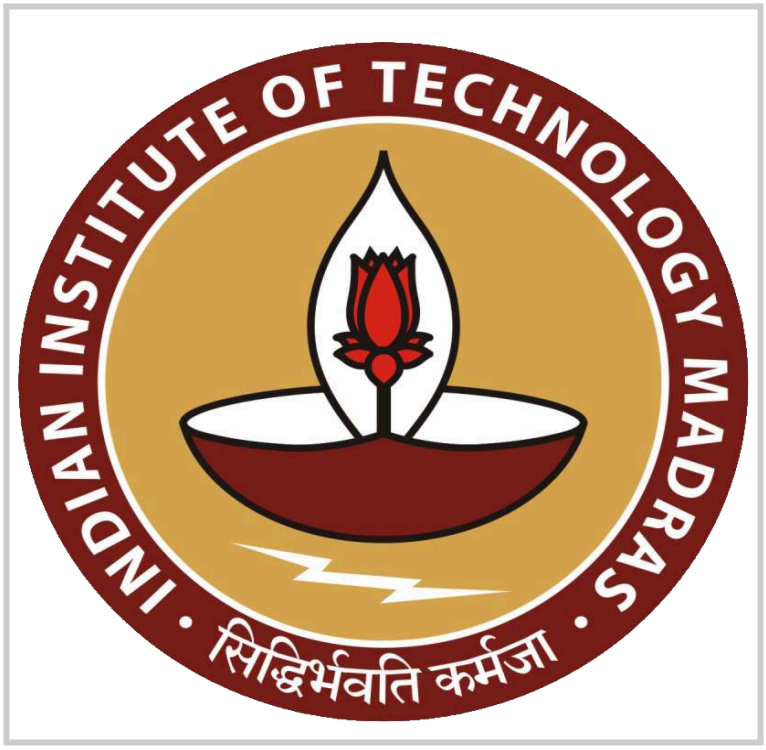
Data-Driven Approach to Reducing Deadstock and Enhancing Sales in the Hardware Shop

A Proposal report for the BDM capstone Project



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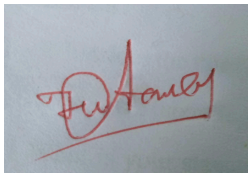
Declaration Statement

I am working on a Project Title **Analytical Study of a Hardware Retail Shop** . I extend my appreciation to **Mr. Pushap Raj** 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 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 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 Bhawani dutt

1 Executive Summary :

This project analyzes a hardware store in my town called "Thakur Das and Sons," located in Thunag, District Mandi, Himachal Pradesh (175048). The store deals in construction materials, wall and interior items, toiletries, and related miscellaneous products. It primarily operates in a B2C (business-to-consumer) model.

The real challenge for the business is managing inventory, high deadstock, and managing so many items in the shop. The Wall and Interior category (tiles) has the most deadstock. . There are no proper records of inventory and sales history also. There is also a seasonal shift in demand in the area. This shift affects some categories of business, very much as explained below briefly. The owner is unable to track these problems, so he could not build a system to solve this.

The first step to solve this problem was to track daily sales and inventory in the shop. Shop was lacking this data so I will gather data of inventory and sales from past and daily records. I have to make an organised excel sheet for both sales and inventory.I will apply pivot table analysis and draw graph, charts to see time series comparison of items. Python can also be helpful in cleaning,drawing graphs and calculating specific things by more filtering and helpful looping.By analyzing this, I can better understand sales trends and make inventory refilling better. Items with less demand in winter can be refilled accordingly.This will also allow me to select best performing items of the shop.We will also make a questionnaire for the owner and feedback to customers to better understand the solution.

2 Organization Background :

Business Name	**Thakur Dad And Sons**
Owner's Name	**MR.Pushap Raj**
Address	**Main Bazar Thunag District Mandi Himachal Pradesh 175048**
GSTIN.	**02DWEPD4660Q1ZD**

The hardware store was started by Mr. Pushap Raj on June 15, 2020 on the name of his father Thakur Das and named Thakur Das and Sons . The owner and his two brothers lost their jobs due to the pandemic and returned to their hometown. After some research, the owner saw potential in opening a hardware store. The town had limited hardware options, forcing people to travel to nearby cities. Owner opened his first store at Bagsaid mandi Hp with his two brothers.

The business grew quickly, and the owner opened three stores within a 30 km radius, now they are serving three small towns Bagsaid,Thunag, and Lambathach . I have analysed the Thunag branch of the store. The store has become the largest hardware store in the area with a net worth of more than 1 cr. The three branches are managed by the owner and his two brothers. The employee size is around 15-20 across three branches. The store has built a strong reputation in the town,establishing good relationships with customers. It offers a wide range of products, including interior materials, cement, bricks, toiletries, hardware tools, and various other items.

3 Problem Statement :

3.1 Deadstocks Poor management is causing overstocking of low-moving items, particularly in the wall and interior products category. This overstocking causes deadstock, and wasted storage space of a shop store.

3.2 Seasonal Demand Mismatch Shop owner is not able to manage with very lower demand in winter in certain categories. Overstocking low-demand items in winter is causing greater loss.

3.3 Multiple Unrelated Items: The shop has a wide range of unrelated categories , they require different expertise. It's hard to stay competitive in all categories. Managing multiple suppliers and dealing with every segment of customer shift focus also.

4 Background Of Problem :

The business (B2C) Thakur Das and Sons has grown very rapidly, and the owner has opened several outlets in small towns within a very short period. Initially, the main focus was on filling demand, but they have not taken care to keep proper records of sales and inventory. Items in wall and interior (e.g. tiles and plaster), take up a lot of space as trends change, and people stop buying old stock, leading to an increase in deadstock in this category. But construction material is a fast moving item, hence we need proper management to tackle it.

Also, in our town there is a shift in demand for some items in winter due to snow. It goes very down to zero, and they are unable to manage it. Certain items, like cement, saria, and tiles, have very low demand in winter, because construction work completely stops during the time. Due to road closures, the shop needs to store these items, so it is important to know how much to stock to ensure profitability, as salaries and rents remain the same.

The hardware shop deals in multiple categories, such as structure material, wall and interior items, toiletry, paint, and glass. They are from different domains and seem unrelated, so they need different expertise. All those have multiple subcategories like different packing, quality and company. There is a different supplier for each category, making it difficult to focus. However, only a few items are sold on a large scale.

5 Problem Solving Approach:

To address the problem effectively, I began with data collection, followed by analysis using tools for visual insights. Surveys, interviews, and observations were conducted to capture what raw data might miss—like whether customers check deadstock or receive incentives.

5.1 Methods of Collection (with Justification):

Surveys: Structured questionnaires helped understand customer demand and preferences not visible in sales data.
Interviews: Discussions with shop owners and staff revealed operational challenges and practical solutions.
Observations: Tracking sales and stock levels over time highlighted deadstock and seasonal trends using the 80/20 rule.
Old Bill Books and Records: Provided reliable historical data on sales, pricing, and stock, forming the foundation for time series analysis.

5.2 Data Collection

Data collection was integral to the analysis. I recorded information from old bills and personally collected data in a sheet. Although the shop had many item categories, surveys helped me identify the best-performing items.Two sheets were made for sales (date, item, quantity sold, price sold for) and other dataset for inventory inventory (date, item, category, daily qty sold, purchase price, ending stock qty, total income).

5.3 Data Analysis

To tackle deadstocks, seasonal demand mismatches, and multiple unrelated items, we use targeted data analysis tools and quantitative methods.

5.3.1 Tools for Analysis

Google Sheets: For data organization, formulas (COUNTIF, SUM, AVG, VLOOKUP), pivot tables, and charts (line, bar, Pareto).

Python: Pandas for data cleaning and stats; scikit-learn for regression and clustering; matplotlib/seaborn for visualizations.

Financial Ratios: Inventory turnover and gross profit margin to assess effi ciency**.**

5.3.2 Quantitative Approaches

Problem 3.1: Deadstocks

Solution: Pareto analysis **(80/20 rule)** and inventory turnover (Cost of Goods Sold / Average Inventory).

Tools: Pivot tables and Pareto charts (Google Sheets/matplotlib) to identify low-turnover items; pandas for turnover calculations.

Outcome: Prioritizes inventory reduction, optimizing space.

Problem 3.2: Seasonal Demand Mismatch

Solution: Linear regression for time-series forecasting.

Tools: Pandas/scikit-learn for demand prediction; line charts for trends.

Outcome: Reduces overstocking via accurate forecasts.

Problem 3.3: Multiple Unrelated Items

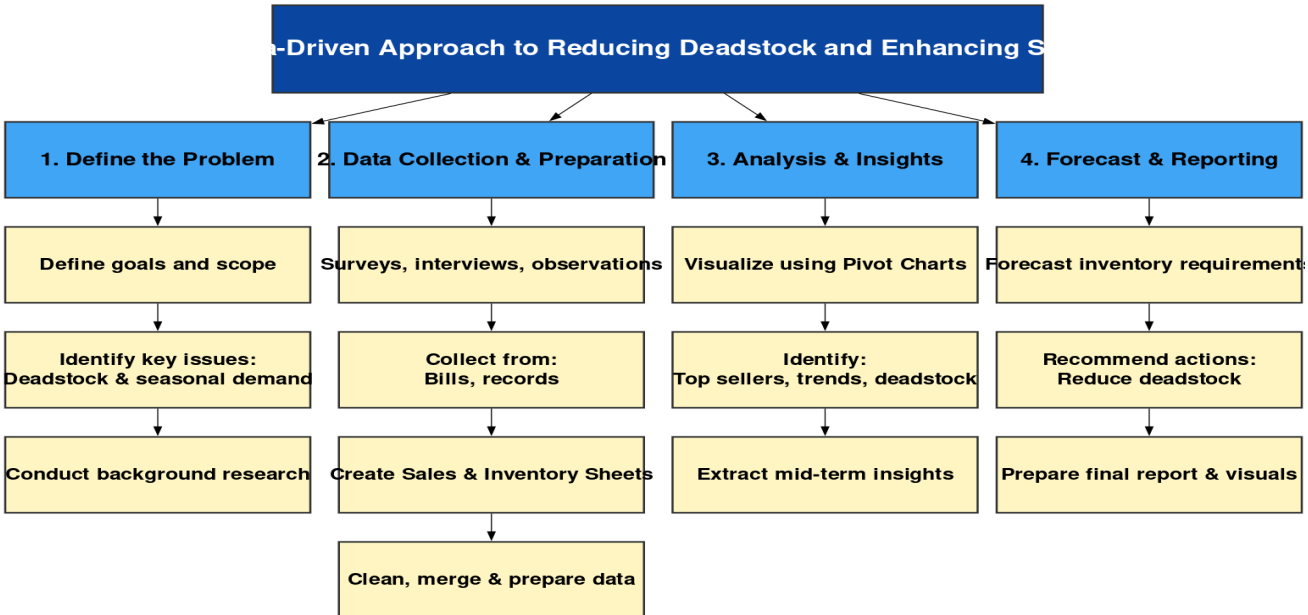
Solution: K-means clustering for product/customer segmentation.

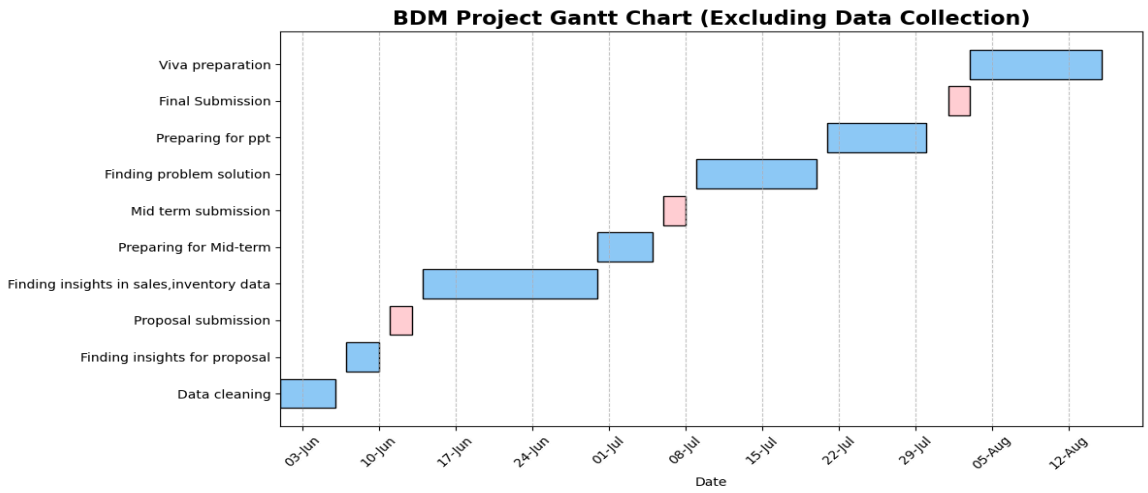
Tools: Pandas/scikit-learn for clustering; pareto(revenue vs items), bar charts for visualization.

Outcome: Streamlines product focus and supplier management.

6 Expected Timeline

Work Breakdown Structure





Gantt Chart

7 EXPECTED OUTCOME:

- Through inventory data analysis, we will identify the items with the most deadstock items and determine the reasons behind it. We could remove such items from the shop, which will help us to improve storage space.
- The sales data will help us to understand seasonal trends of items in the area. Then we will find a better way to manage inventory at that time.
- The revenue data will give us information about user preferences. We will find high selling items and will shift our focus more on these items.
- Implementing an Inventory Management System: To track inventory levels, sales trends, and demand patterns in real-time.
- Conducting Regular Sales and Inventory Analysis: To identify slow-moving items and prioritize high-profit categories
- Optimizing Storage Space: To ensure efficient use of storage facilities and reduce wasted space.
- Some suggestions to manage inventory across branches