

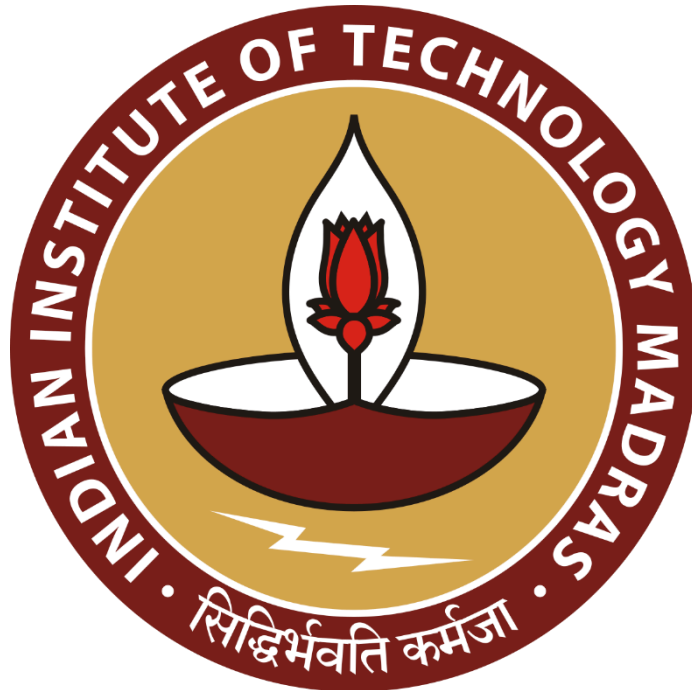
A Quantitative Study to Analyse and Optimise the Inventory and Sales for an Automobile Parts Retailing Shop

A Proposal report for the BDM capstone Project

Submitted by

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Declaration Statement

I am working on a Project titled “A Quantitative Study to Analyse and Optimise the Inventory and Sales for an Automobile Parts Retailing Shop”. I extend my appreciation to Kusum Enterprise, 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: *Satyaki Goswami*

Name: Satyaki Goswami

Date: 2nd February, 2024

1 Executive Summary and Title

The project focuses on Kusum Enterprise, a Tata Motors Authorised Retailer situated at Chandrakona Road in West Bengal. Owned by Mr Joy Prakash Loadha, this B2C business deals with motor parts of automobiles.

Situated at a place where agriculture and timber based businesses are booming and thriving, demand for a business which serves heavy vehicles will always be there for Kusum Enterprise. However, there are two major issues which the organisation is facing - lack of stock inventory management and nominal profit. With the growth of competition in the nearby areas, it is very important for Kusum Enterprise to tackle these issues with proper planning.

The problems will be addressed by employing various analytical methods to infer information from the analysis of data. Some of the methods to be applied would be examining trends in Opening Balance, Inwards, Outwards, and Closing Balance to detect patterns. Exploring the correlation between various categories and products and their assessment according to high and/or low turnover rates could help in pinpointing the most lucrative categories.

The expected result could aid the business in alleviating the quality of stock inventory management while enhancing the profitability with the goods in demand.

2 Organization Background

The project is based on the data provided by Mr Joy Prakash Lodha, owner of Kusum Enterprise. Established in 1997 at Chandrakona Road, West Bengal, Kusum Enterprise is a retailer of motor parts manufactured by Tata Motors. This business is amongst the many owned by Mr Lodha's family and their shop is situated at a spot where heavy vehicles cross by frequently. Mr Lodha has three main employees who assist him with the front while two help him with the stocking room at the back of their store. Although being a popular business, they are facing competition from the new shops, in the same domain, coming up in the area.

3 Problem Statement

- 3.1 Kusum Enterprise is facing challenge due to lack in proper inventory management. Lack of structured inventory management process has led to a significant amount of dead stocks which is negatively impacting the factor demand fulfillment.
- 3.2 Another immediate concern is the factor of nominal profitability despite being a well-established business in the local market with probable reasons being inefficient resource utilisation and inventory management.

4 Background of the Problem

Kusum Enterprise (KE Henceforth) has been operational since 1997 at Chandrakona Road (CKR Henceforth) - a location that offers a favourable environment for an Auto Motor Part Retailer due to the following factors:

- 4.1 The forest area around CKR is huge as it lies in a district which accounts for 12-13% of the total forested area of the state. This make it a hotspot in the timber business, in terms of storage as well as transport.
- 4.2 CKR is situated at the convergence of NH 14 and NH 116B making it susceptible to the presence of automobiles and vehicles (heavy and light).
- 4.3 CKR railway station is positioned along the Kharagpur-Bankura-Adra railway line within the SE railway zone - aline which serves as a major freight line to transport coal, ores, and steel products; requiring heavy vehicle involvement.
- 4.4 CKR has been a key player in the potato business, involving both harvesting and cold storage; necessitating robust transportation facilities.

Despite the evident profitability potential in this ecosystem, KE faces challenges. The generated revenue has been consistent, but the profit remains nominal. There is an apparent lack of structure in inventory management, resulting in dead stock due to insufficient demand. In an area with perpetual demand, inadequate inventory management, a lack of demand understanding, and heightened competition contribute to nominal profits. These are issues which are mainly hampering KE's profitability.

5 Problem Solving Approach

This project seeks to leverage mathematical and statistical analyses to understand the issues faced by KE in depth. First of all, the data would be needing careful pre-processing in order to work on. The focus would be on understanding inventory dynamics, sales pattern, and profitability. By analysing opening, inwards, outwards, and closing balances, the goal is to provide actionable insights for inventory optimisation, identify high-performing products, and develop optimal plans for future sales. This project shall contribute to informed decision-making and strategic planning for KE. The primary focus shall be on leveraging the following:

- 5.1 Inventory Optimisation to optimise stock levels and reducing carrying costs.
- 5.2 Identifying high margin products and categories for profitability enhancement.
- 5.3 Implementing Outlier detection to identify and address irregularities in transactions, ensuring data integrity.
- 5.4 Evaluate the performance of different categories and figure out strategies to enhance sales in each category.
- 5.5 Identify potential cross-selling opportunities to enhance customer experience and increase average transaction value.
- 5.6 Assess which product lines contribute the most to the overall profit.
- 5.7 Including regression analysis can help in determining strength and significance of relationship between variables; it would also add to the identification of key drivers.

By combining advanced analytical techniques, this project seeks to empower the business with a robust data-driven framework for sustainable growth and competitiveness in the automotive parts retail sector. Talks and discussions are going on with the owner and a part of the total dataset has been acquired as of now. Rest shall be collected soon. The attributes present in the dataset are as follows:

- Product Particulars
- Opening Balance (including quantity, cost, total value)
- Inwards/Purchase (including quantity, cost, total value)
- Outwards/Sale (including quantity, cost, total value)
- Closing Balance (including quantity, cost, total value)
- Month of Sale

For the analysis part, Python libraries like Pandas (for data analysis), NumPy (for computing), Seaborn and Matplotlib (for data visualisation/graphs) shall be used. LibreOffice Calc shall also be used for cross verifications of Python based analysis as well processing of data if needed, especially the components like Pivot Table.

6 Expected Timeline

6.1 Work Breakdown Structure:

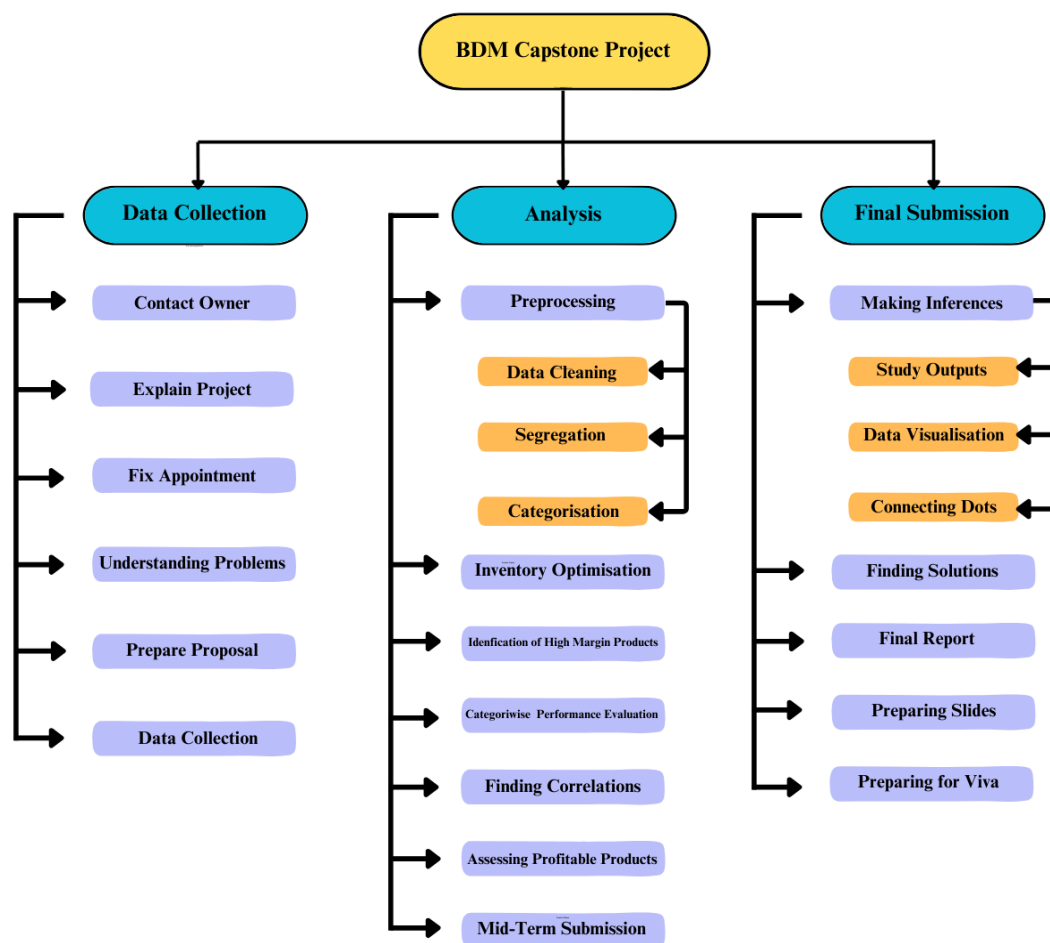


Figure 1 Breakdown of each section of the BDM Capstone Project.

6.2 Gantt chart:

BDM CAPSTONE PROJECT

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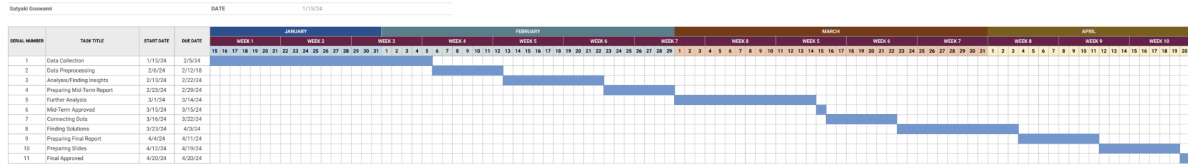


Figure 2 Expected timeline for completion of project.

7 Expected Outcome

- 7.1 To offer practical insights that facilitate well-informed decision-making and elevating the quality of inventory management.
- 7.2 To empower the business with actionable intelligence, enabling it to understand which category of product adds to the profitability the most.
- 7.3 To ensure that the organisation remains adaptive and responsive to the dynamic landscape of the domain.
- 7.4 To understand the correlation between products sold and the categories in demand.