# “Optimizing Inventory Management for a Kitchen Appliances Retailer: A Primary Data Analysis ”

**A Proposal report for the BDM capstone Project**

Submitted by

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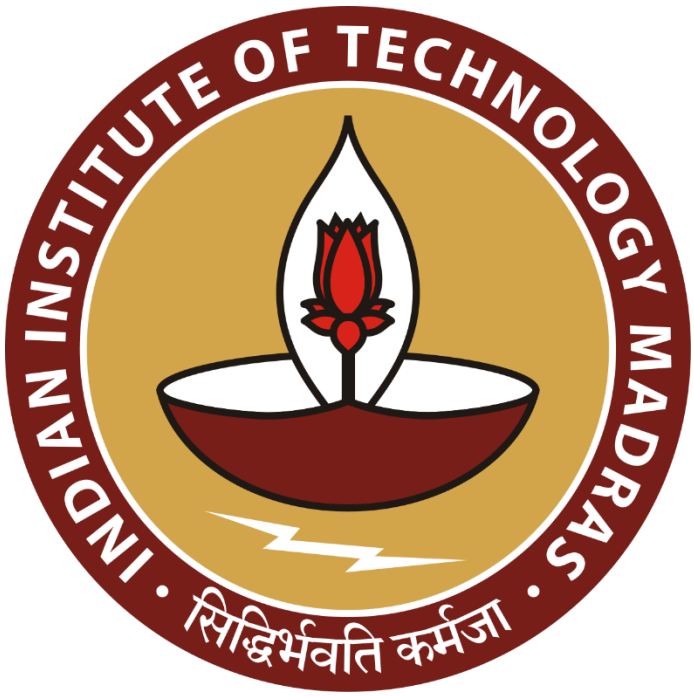


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# Declaration Statement

I am working on a Project titled “Optimizing Inventory Management for a Kitchen Appliances Retailer: A Primary Data Analysis”. I extend my appreciation to “Anand Steel Emporium” 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.

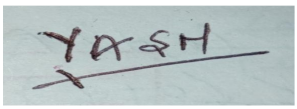
Additionally, I affirm that all procedures employed for the purpose of data collection and analysis have been duly explained in this report. The outcomes and inferences derived from the data are an accurate depiction of the findings acquired through thorough analytical procedures.

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:



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Date: 12/06/2025

## 1 Executive Summary and Title

This project focuses on a kitchen appliances retail shop based in Korba, Chhattisgarh, operating under the B2C model. The store, with a diverse product portfolio including induction cooktops, pressure cookers, utensils, and mixer grinders, caters to a wide base of local customers and households. Despite being well-established, the shop faces persistent challenges in managing its inventory efficiently, especially during seasonal peaks and demand fluctuations.

The primary issues involve frequent stockouts of fast-selling products, overstocking of slow-moving goods, and an absence of systematic, data-informed decision-making processes. These inefficiencies have resulted in blocked working capital, missed sales opportunities, and declining profitability. The root causes are largely attributed to manual inventory practices and lack of structured demand forecasting.

This project aims to address these challenges through a structured primary-data-based approach. It involves collecting transactional records, conducting stakeholder interviews, and applying methods such as Exploratory Data Analysis (EDA), ABC classification, and time-series forecasting. Tools like Python, Excel, and Google Sheets will be used for analysis and visualization.

The expected outcome is to deliver practical, data-driven insights and dashboards that help the business optimize stock levels, improve capital utilization, and enhance customer satisfaction through better product availability.

## 2 Organization Background

The shop that I am working with is Anand Steel Emporium , a well-established local retail business in korba, Chhattisgarh, India. Operating on a B2C model, the shop primarily caters to individual customers. Opened in 2008, it quickly became a reliable source for essential kitchen home appliances. Its diverse product portfolio, including induction cooktops, various utensils, and knife sets, consistently meets local demand. By 2024, the shop had significantly expanded its offerings, serving thousands of households annually. Anand Steel Emporium now stocks an average of over 100 unique kitchen appliance products, building its reputation over 16 years of dedicated service to the community.

## 3 Problem Statement (Listed as objectives)

The Primary business challenge identified at Anand Steel Emporium is inefficient inventory management, leading to stockouts of popular kitchen appliances and accumulation of slow-moving stock, impacting profitability.

3.1 **Inefficient Inventory Management :** Leads to stockouts of high-demand kitchen appliances and excessive inventory of slow-moving items, impacting sales and capital utilization.

3.2 **Lack of Detailed Understanding of customer preferences and Purchasing Patterns :** It hinders effective product assortment and targeted marketing strategies for kitchenware.

3.3 **Absence of Data Driven Insights :** It prevents the implementation of optimized inventory planning and replenishment processes, affecting overall operational efficiency and profitability.

## 4 Background of the Problem

In the competitive retail landscape, particularly in the home and kitchen appliances segment, inventory management plays a pivotal role in ensuring customer satisfaction and business profitability.

Anand Steel Emporium , a well-established retail shop in korba, Chhattisgarh, faces challenges typical of many small-to-medium-sized enterprises (SMEs): frequent stockouts of high demand products and accumulation of slow-moving or obsolete inventory.

These problems arises due to combination of internal and external factors. Internaly, inventory decisions are often based on intuition and past experience rather than on real-time data or sales analytics. This leads to overstocking of less popular items and understanding of high-demand ones.

Additionally, the absence of categorized sales records and trend-based purchasing patterns contributes to inefficient product assortment and poor shell utilization.

Externally, seasonal demand fluctuations, evolving consumer preferences, and supplier delays exacerbate the inventory mismatch. Without a systematic method to capture and analyze data from daily transactions, the shop struggles to predict demand accurately and optimize stock levels.

Consequently, capital gets locked in slow moving goods, while missed sale opportunities due to stockouts affect customer loyalty.This project sees to diagnose the root causes using primary data and offer data-informed strategies to streamline inventory management and improve overall profitability.

Addressing this gap will enable the business to make data-backed procurement decisions and improve long-term sustainability.

## 5 Problem Solving Approach

To address the inventory management challenges at Anand Steel Emporium, a structured, data-driven problem-solving approach will be implemented. This will involve collecting primary data, applying appropriate analysis techniques, and deriving actionable insights to guide better decision-making.

1. Methods :

   The methodology involves a blend of descriptive and predictive analytics. Initially, Exploratory Data Analysis (EDA) will be used to uncover patterns in sales and inventory movement. Products will be segmented using ABC analysis, classifying them based on sales frequency and contribution to revenue. Time series forecasting techniques such as Moving Averages or ARIMA will then be used to project future demand for high-performing items. The goal is to identify inefficiencies in stocking and enable data-backed restocking strategies to minimize both stockouts and excess inventory.

2. Data Collection :

   Primary data will be collected directly from the business. This includes:

- **Sales Transactions:** Product-wise sales records, including sale dates, quantities, and prices.
- **Inventory Logs:** Data on current stock levels, reorder quantities, and stock aging.

- **Procurement Records:** Information on supplier timelines, purchase frequency, and pricing.
- **Qualitative Inputs:** Interviews with the owner and staff to understand restocking practices, customer preferences, and common challenges.

This data is essential to evaluate demand trends, product movement, and the financial impact of inventory decisions. For instance, to resolve stockout issues, it is necessary to analyze variables like opening stock, closing stock, and restock intervals.

3. Analysis Tools :

The analysis will be conducted using Python for statistical modeling and visualization, with libraries such as Pandas, Matplotlib, and Statsmodels. ABC analysis and forecasting will be performed using Jupyter Notebook. Excel or Google Sheets will be used to build an inventory dashboard for the shop owner, providing an easy-to-use interface for monitoring stock levels, identifying dead stock, and triggering restock alerts.

These tools are chosen for their flexibility, accessibility, and relevance in small business environments. The combination ensures both rigorous analysis and practical usability.

This multi-stage approach ensures that the recommendations are not only grounded in solid data analysis but also tailored to the operational scale and technological comfort level of Anand Steel Emporium.

# 6 Expected Timeline

## 6.1 Work Breakdown Structure:

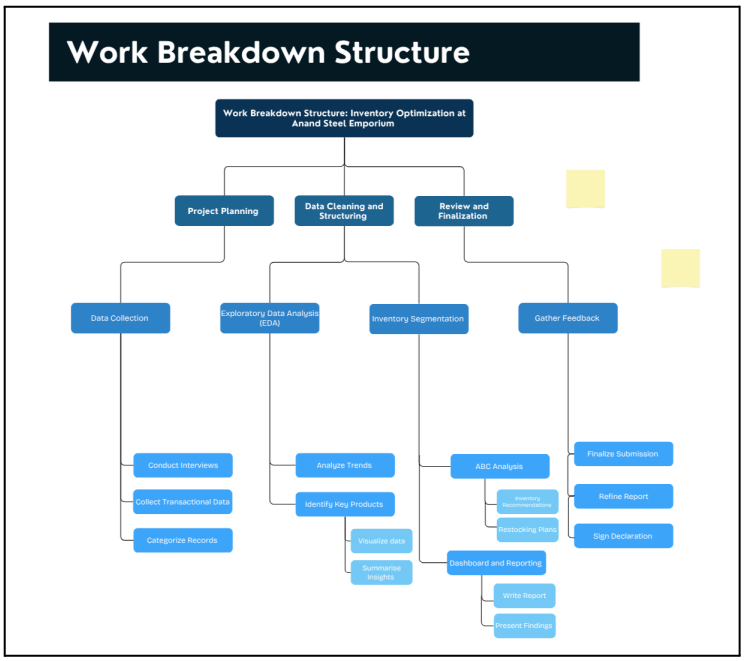


Figure 1. WBS Showing the Workflow of this BDM capstone project

## 6.2 Gantt chart

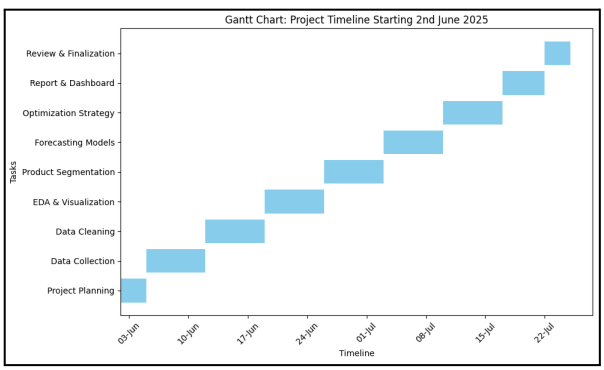


*Figure 2. Gantt Chart Showing Weekly Timeline for Inventory Optimization Project*

## 7 Expected Outcome

The Primary goal of this project is to improve inventory management and profitability for Anand Steel Emporium through data driven insights derived from primary research. By analyzing sales and stock movement data, the project is expected to deliver tangible, actionable recommendations that help the business better align inventory and customer demand.

Key Expected Outcomes include :

7.1 A categorized list of products based on sales frequency and value (via ABC analysis), helping the owner prioritize stocking decisions.

7.2 Identification of slow-moving items that tie up capital and occupy shelf space unnecessarily, enabling strategic clearance or reduced procurement.

7.3 Forecast models for high-demand products to help avoid stockouts during peak periods, enhancing customer satisfaction and repeat business.

7.4 A practical, easy-to-use inventory monitoring dashboard that provides real-time visual insights into stock levels, sales performance, and reorder alerts.

By implementing these outcomes, the shop can significantly reduce excess inventory, optimize working capital, and improve product availability. Over time, this is expected to increase customer trust, streamline operations, and enhance overall profitability. The recommendations will be realistic and tailored to the operational capacity and technological resources available at Anand Steel Emporium .