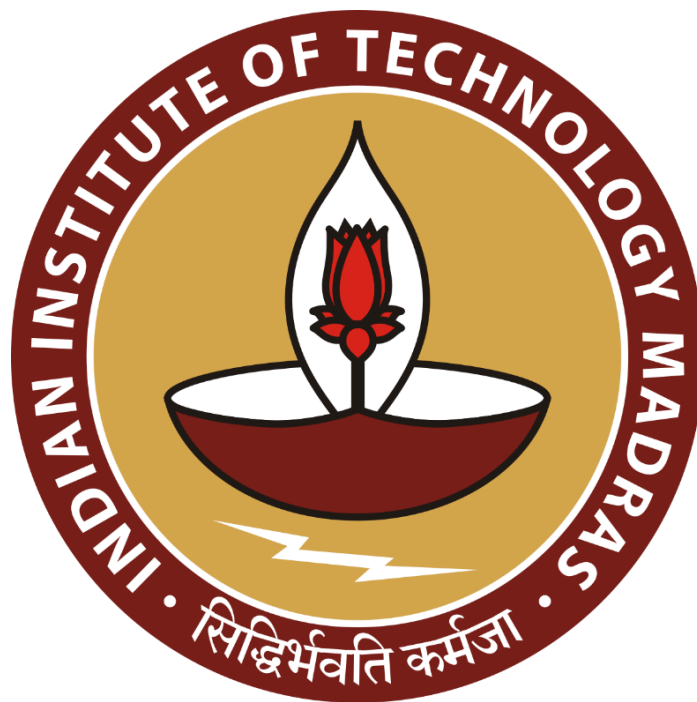# Inventory Management and Sales Forecasting of Walmart Stores

A Proposal report for the BDM capstone Project

Submitted by

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Contents

<u>Declaration Statement</u>

I am working on a Project titled "Inventory Management and Sales Forecasting of Walmart Stores". I extend my appreciation to Walmart Inc, 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 secondary 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:

Shriya

Name: Shriya Singh

Date: January 27, 2025

1 Executive Summary

The project focuses on managing the inventory and forecasting the sales of the business "Walmart Inc.", an American multinational retail company that operates a chain of hypermarket, departmental stores and grocery stores in US and 23 other countries. The business primarily operates in B2C providing vegetables and daily household items to customers seeking to buy goods.

The major issues that the business is facing are predicting the sales for the upcoming weeks and keeping the required stocks in the inventory to fulfill the demand and supply of customers, also looking out for the trends and seasonality patterns of customer behaviour to track the goods in that particular duration and managing the inventory accordingly.

To tackle the issues faced by the Walmart Stores across the country, I plan to address the issue by analyzing the data with proper business analytical approaches to understand the quantities, prices, profits and loss of the store. Therefore, I will use the Numpy and Pandas library in python for analyzing the data and Matplotlib for visualization of the data. Then I will use the Time-Series Model to predict the sales of the store for next 12 weeks. I will use spreadsheet functions like pivot tables for understanding the data and summarizing and analyzing the large set of data. The result will give a proper understanding of sales and finances of the business and I will monitor the trends of customer behaviour, which items are sold more at which duration, I will look for product demands which increase and decrease at what interval.

The data was collected from "Kaggle" website which is a data science community for data scientists and machine learning practitioners.

LINK- https://www.kaggle.com/datasets/shriyasingh900/walmart-dataset

2 Organization Background

Walmart Inc is an American multinational Retail Company that operates a chain of hypermarket, departmental store and grocery stores in the US and 23 other countries. It is headquartered in Bentonville, Arkansas. The company was founded in 1962 by brothers Sam and James Bud Walton. The business primarily operates in B2C providing vegetables and daily household items to customers seeking to buy daily goods. In 2005, Walmart reported $312 billion in sales, more than 6,200 facilities around the world. The studies showed that there are both positive and negative impacts on existing stores in the area where the new supercenter locates, which have affected the sales of Walmart. Zeekit, a Walmart acquired app uses AI to let customers try on clothing via a dynamic virtual platform. In 2021, Walmart announced it would open its Spark crowdsource delivery to other businesses as a white-label service, competing with Postmates and online food ordering delivery companies.

3 Problem Statement

The problems identified from the business are as follows:

3.1   To forecast the sales of each store for the next 12 weeks to reduce overstocking and understocking problems.

3.2   Optimizing inventory management by aligning supply with demand through customer purchasing insights.

4 Background of the Problem

- To forecast the sales of each store to prevent stockouts and under stocking-
  Using predictive modeling techniques to forecast the sales for each store for the next 12 weeks, by predicting the sales beforehand helps to manage the inventory to keep the right amount of stocks, staff needing to manage the customers in the stores and supply chain management to help with smooth coordinations. This problem results in wastage of resources which leads to unsold and expired products and also increased storage amounts which can lead to cash flow problems. Secondly due to stockouts, it can cause satisfaction problems for customers and may lead to losing customers.

- Optimizing inventory management through customer purchasing insights-
  The problem is when the business fails to supply the products at the mentioned time and an imbalance of inventory with customer demand, the business faces operational and financial problems. The demands of customers are not predictable because of different market trends, seasonality, holidays and events or economic fluctuations. As a result the businesses are not able to predict the demand of items which often leads to shortage of the product or excessive amounts of quantities of goods. So by understanding customer purchasing behavior such as which product categories are preferred by different demographics, including gender and age groups can help improve inventory management and decision-making.

In conclusion, since the brand is large, it becomes more difficult to deal with inventory and provide the goods and deliveries on the specified time. The complexity of the supply chain increases with more suppliers, manufacturers and logistics providers. So businesses can make use of technology, forecast demand accurately, and create agile supply chains to avoid the negative consequences of poor inventory management.

5 Problem Solving Approach

The problems faced by Walmart Inc that are becoming a problem for its growth and development can be addressed and fixed by using a problem-solving approach involving qualitative and quantitative operations.

Data Collection

The data is collected from Kaggle website which is a community for data science. A well organized and detailed quantitative data which includes week of sales, sales of the store in that given week and other factors that have trends and seasonality which may affect the sales in some way or in cases which reduce the sales particularly. The data is in excel format ranging from February 2010 to October 2012.

Methods:

- By doing predictive analysis to forecast demand based on variables like market conditions, weather patterns, social media activity, and consumer behavior, improving the accuracy of forecasts.
- To keep an eye on the previous data of sales and seasonal trends to observe customer behaviour, if there's an increase or decrease in the demand of the product then we can adjust and manage the inventory accordingly.
- Just-In-Time Management, which allows us to keep track of items which are selling fast so we can reorder the product so as to avoid getting out-of-stock, also to keep the items as much as necessary so as to avoid getting excessive amounts of a particular item and use less space and reduce storage cost.
- Inventory management applications which provide real-time data on the order status, sales values and customer trend on frequently bought goods and items. This allows us to keep track of what's selling fast and the goods available with us.
- By using the previous sales data, current trend, seasonality to predict the future sales of the store and future inventory needs, which can help us to avoid over-stocking and under-stocking and keeping just the right amount of products.

Tools for Analysis

Google sheets and excel: Pivot Tables for summarizing and analyzing data, processing and cleaning. Inserting appropriate charts and graphs for data visualization to understand meaningful insights.
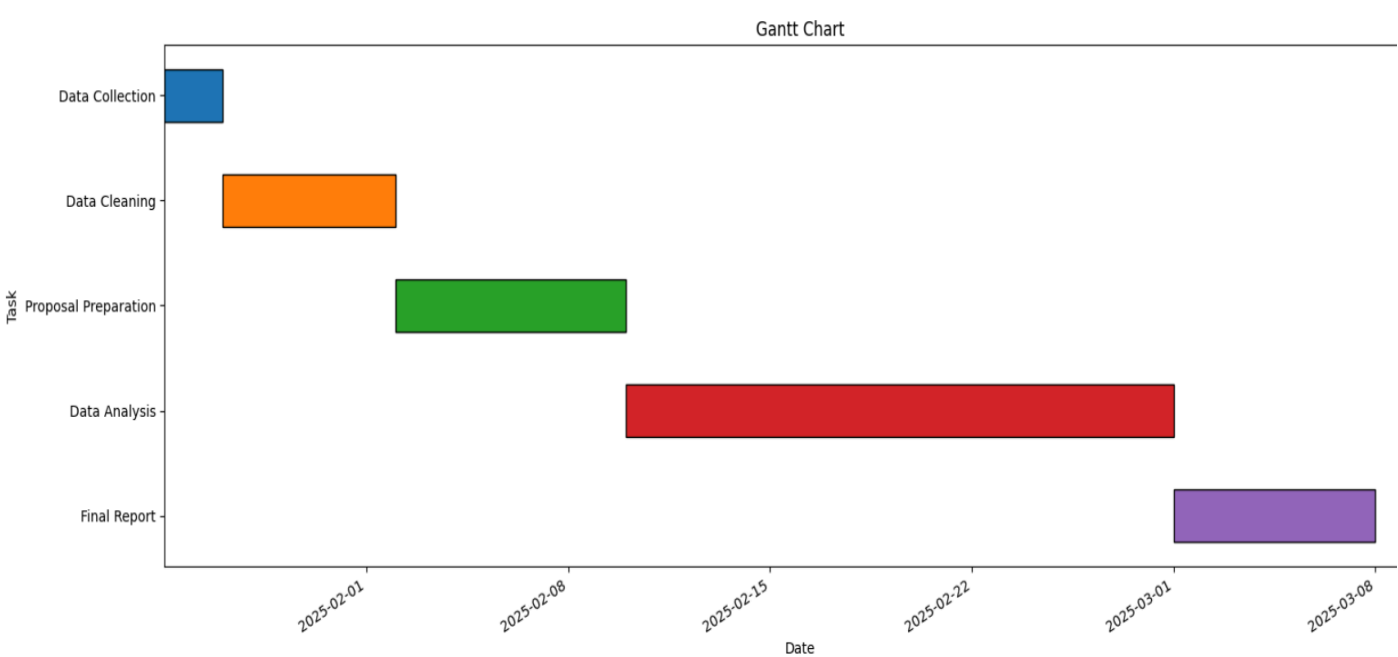
Google Colab for python with libraries like pandas, matplotlib, seaborn for exploring data, extracting meaningful insights and visualizing data. Time Series machine learning predictive modeling techniques for forecasting.

6 Expected Timeline

6.1 Work Breakdown Structure:
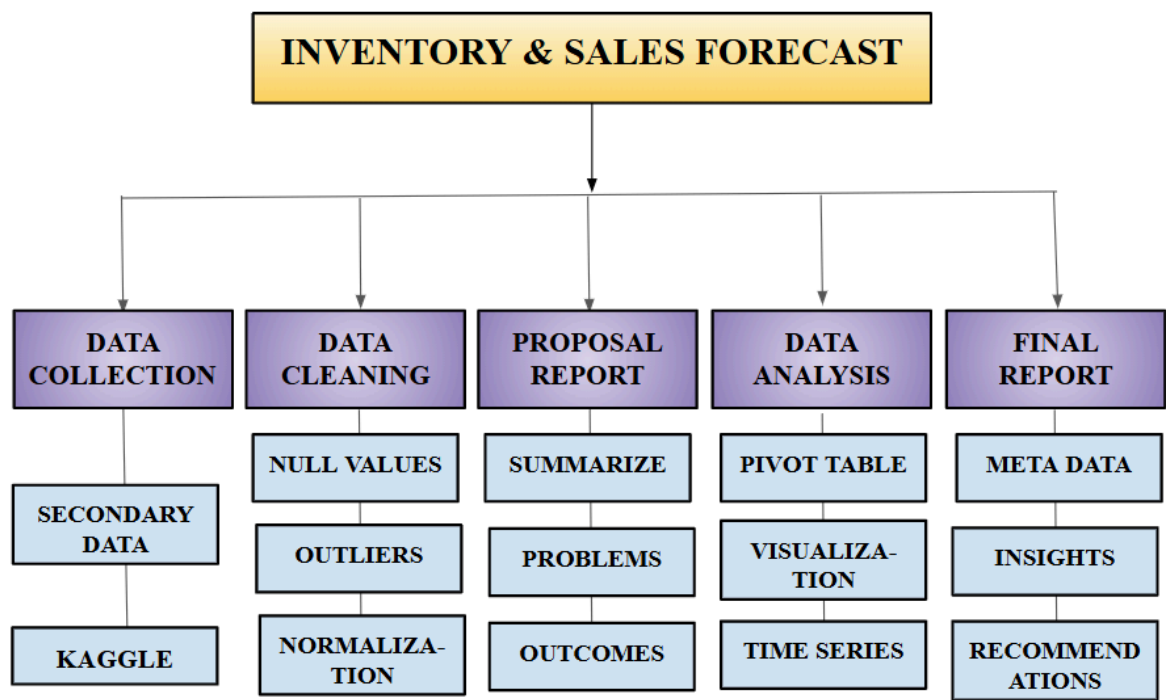
6.2 Gantt chart

7 Expected Outcome

7.1 Formulating better managing strategies to increase the profitability of the store and reduce the loss by meeting the demands with the supply in the desired time frame so as to reduce customer dissatisfaction and less revenue generation.

7.2 Provide a financial report and analysis of the data including cost price, selling price, quantities and profits earned through a particular product.

7.3 Prepare a thorough analysis by using python data science libraries like pandas, numpy for data analyzing and matplotlib for data visualization and future sales forecasting by using Time-Series machine learning model for a better understanding of requirements of the store and inventory.

7.4 The sales data can show noticeable fluctuations over time, which can be due to seasonal trends and economic factors, so we can analyze the trends and seasonality to help the business owner identify the key patterns in sales, optimizing inventory and resource allocation and improving customer engagement and marketing.

7.5 To assist the business owner in better store management by formulating data-driven strategies and criteria developed through the detailed analysis.