Improving Performance through Customer Segmentation and Shipping Cost Optimization: A Case Study on Walmart

A Proposal Report for the BDM Capstone Project

Submitted by:
Kulkarni Amit Dilip
Roll Number:
23f1001947

IITM Online BS Degree Program,
Indian Institute of Technology, Madras, Chennai
Tamil Nadu, India, 600036

Contents

Declaration Statement

I am working on a Project titled "**Improving Performance through Customer Segmentation and Shipping Cost Optimization : A Case Study on Walmart**". I extend my appreciation to "**data.world**", for providing the necessary resources that enabled me to conduct my project.

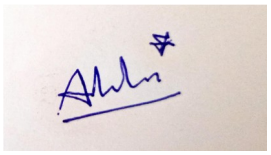
I hereby assert that the data presented and assessed in this project report is genuine and precise to the utmost extent of my knowledge and capabilities. The data has been gathered from primary sources and carefully analyzed to assure its reliability.

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.



Candidate Signature (Digital)

Name: Kulkarni Amit Dilip

Date: 08-10-24

Executive Summary :

The project based on the analysis of retail sales of an American multinational retail corporation ‘Walmart’. They are both B2B and B2C at the same time and sell a wide variety of general items like groceries, furnitures, stationary, hygiene products etc.

The case study is focused on understanding how Walmart manage their retail sales and shipping. Due to unavailability of an model to accurately allocate shipping modes, the shipping costs are high and the profit margins are affected. The company can also make use of customer segmentation to make personalized ads for customers of every age group.

To address these issues, a data of 1 million rows consisting of the retail sales data of Walmart US has been taken. The data will be analyzed by different analytical plots and graphs continued by machine learning models and optimization models to optimize costs and profits.

Hence the project will provide recommendations for the enhancement in shipping issues and customer satisfaction. Still, these solutions are practical improvements that cover only a minute fraction of the entire business landscape of this company.

Background of the Company :

Walmart Inc. is an American multinational retail corporation that operates a chain of supermarkets and departmental stores in the USA and 23 other countries. The company was founded by the brothers, Sam and Bud Walton in Rogers, Arkansas, USA in 1962 and incorporated on October 31, 1969.

As of today, Walmart has 10,586 stores and clubs in 24 countries under 46 different names. The company is headquartered in the Walmart Home Office complex in Bentonville, Arkansas, USA. Walmart also is the largest private employer in the world with over 2,100,000 employees worldwide. Walmart US's transportation has a fleet of 9,000 tractors, 80,000 trailers and more than 11,000 drivers which ship general merchandise and dry groceries along with other specialty categories to the consumers daily from their distribution centers.

The company's business model is based on selling a wide variety of general merchandise at low prices. Unlike many other retailers, Walmart does not charge slotting fees to suppliers for their products to appear in the store. Instead, it focuses on selling more-popular products and provides incentives for store managers to drop unpopular products.

Problem Statements :

1. Shipping Cost Optimization: Walmart US uses different types of shipping modes to deliver the orders based on the order priority and the location. Sometimes, choosing inefficient shipping mode for an order can cause delivery delays affecting customer satisfaction and can also increase shipping costs and reduce profit margins.

2. Customer Segmentation and Retention: Walmart serves millions of customers with diverse needs and preferences in various countries. Not tailoring their marketing strategies to different customer segments can reduce Customer Lifetime Value (CLTV) and Customer Satisfaction(CSAT) .

Background of the problem :

1. Walmart US has three shipping modes, Express Air, Regular Air, Delivery Truck. The ship mode is decided on the priority chosen by the customer. Yet, sometimes an order with low priority is allotted Express Air for delivery which rises shipping costs . In other cases, orders with high or critical priority are allotted Regular Air or Delivery Truck which leads to dissatisfaction of the customer. These incidents ultimately affect the profit margins and customer satisfaction for the company.

2. The company serves customers from all age groups and all regions in the USA. The demographics change from place to place and the stores should optimize their strategies according to them. For example, someone from Texas would purchase more kinds of Barbeque charcoal than someone from New York, so the Walmart Store in Texas should keep more types of Charcoal comparatively. This is not only a Customer Retention problem but also an inventory management problem.

Problem Solving Approach:

- **Methodology :**

To solve the above stated problems, the process will start by cleaning the data then followed by plotting scatter plots, box plots , histograms and bar graphs to understand the trends and insights of the data. Furthermore, optimization models can be fitted over the data to reduce shipping costs while keeping the delivery time optimal. For customer segmentation, machine learning clustering models can be used to identify different groups of customers and analyze their preferences to make personalized marketing campaigns to retain them.

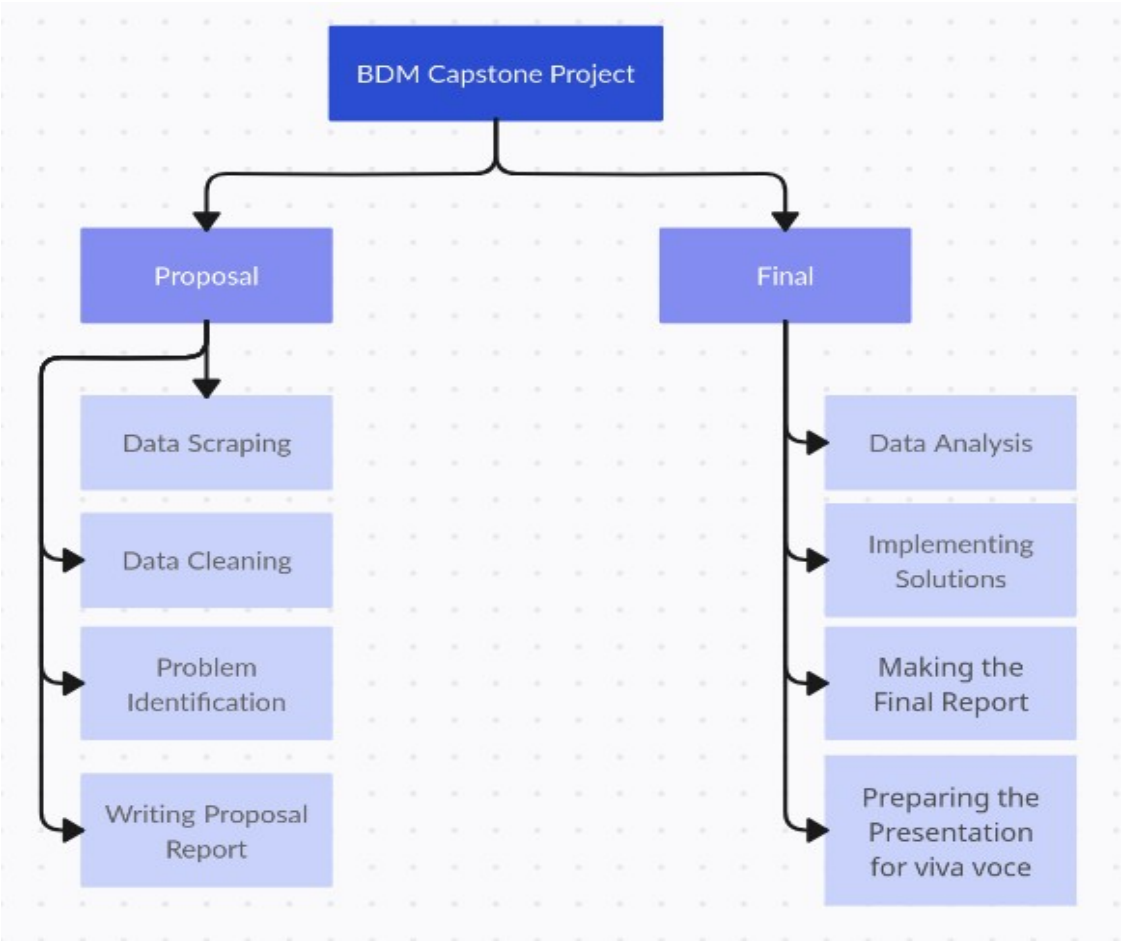
- **Data Collected :**

The data collected is the retail sales data of Walmart US, which consists of 1 million customers and their order details and shipping details. The variables in the data include customer_age, city, order_priority, order_date , order_quantity, ship_date, profit, shipping_cost, state, product_category and more.

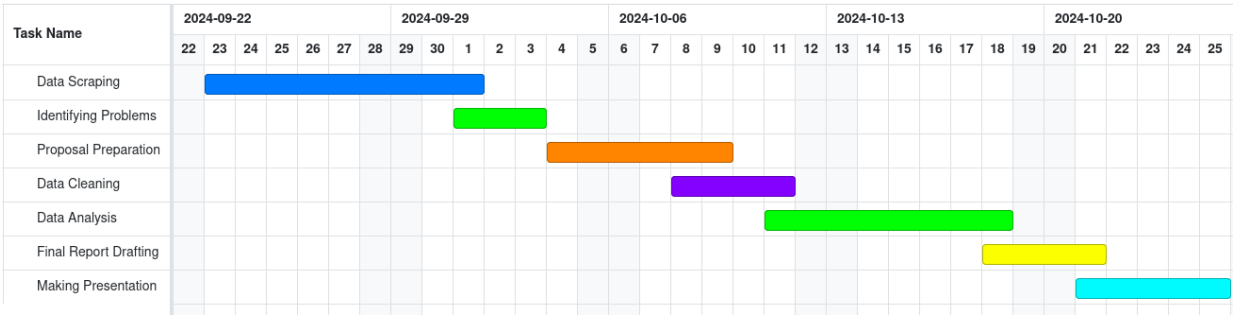
- **Analytical Tools :**

The primary analytical tool for the project is Python, which has a rich ecosystem of libraries that help in data analysis and visualization. The data can be loaded and cleaned using pandas and numpy library so it is fit to be analyzed and processed. Python has libraries like Plotly and Seaborn which offer attractive and informative statistical graphics which are perfect for data analysis in this project. The combination of these tools will provide a comprehensive approach to understand the data which will result in better recommendations for the identified problems.

Expected Timeline:



Work Breakdown Structure



Gantt Chart

Expected outcomes:

- Optimize the shipping cost to maximize profit margin while maintaining customer satisfaction.
- Implement customer segmentation and personalized marketing to attract customers from all age groups and regions.
- Identify and understand the trends and patterns which will help in solving above problems.