Increasing Operational Effectiveness: KD Hero's Demand and Inventory Analysis

A **Proposal Report** for the BDM Capstone Project

Submitted by

Vishnu Kumar Jha
23f3004186

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

Contents Page No.

1. Executive Summary ---------- 3
2. Organization Background ---------- 3-4
3. Problem Statement ---------- 4
   - 3.1 Problem Statement 1 ---------- 4
   - 3.1 Problem Statement 2 ---------- 4
   - 3.1 Problem Statement 3 ---------- 4
4. Background of the Problem ---------- 4-5
5. Problem Solving Approach ---------- 5-6
6. Expected Timeline ---------- 6-7
7. Expected Outcome ---------- 7

Declaration Statement

I am working on a Project Title **"Increasing Operational Effectiveness: KD Hero's Demand and Inventory Analysis"**. I extend my appreciation to KD Hero, 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.

Vishnu Kumar Jha

Signature of Candidate: (**Digital Signature**)

Name: Vishnu Kumar Jha

Date: 01 February 2025

1. Executive Summary

Located in Darbhanga Bihar, KD Hero Dealership is a B2C business, was founded in 2019 and specialized on Hero MotoCorp motorcycles and scooters. With a yearly revenue of INR 12 crores, the showroom provides sales and after-sales services to a wide range of customers.

However, the dealership encounters difficulties with data-driven decision-making, inventory control, and demand forecasting. Inaccurate demand forecasting leads to stock imbalances, which frequently result in shortages of high-demand items and overstocking of slow-moving products. Furthermore, using manual inventory management results in more operational inefficiencies, which raise expenses and result in lost sales opportunities.

To address these issues, this project employs a data-driven approach using time series analysis, regression models, ABC classification, and Economic Order Quantity (EOQ) models. A Reorder Point (ROP) system will be implemented to automate stock replenishment, while predictive analytics will enhance demand forecasting accuracy. By integrating sales, inventory, and market trend data using Microsoft Excel and Python, the dealership aims to improve inventory optimization, reduce costs, and enhance overall efficiency. The proposed solutions will enable KD Hero to better align its inventory with customer demand, leading to improved profitability, higher customer satisfaction, and a more responsive supply chain.

2. Organization Background

KD Hero Dealership, established in 18 October 2019 by Dr.Vikas Arora, located in Saidnagar, Darbhanga, is a well-known retail establishment that sells Hero MotorCorp items such as motorbikes and scooters. The showroom serves a large customer base in Darbhanga and the neighboring areas, providing both sales and after-sales services.

With a devoted team of 50 people, including sales staff, service technicians, and support personnel, the showroom has established itself as a dependable dealer in the area. KD Hero Showroom's yearly turnover is roughly INR 12 crores, indicating a consistent development trajectory despite regional market problems.

The showroom operates from 9:30 AM to 7:00 PM daily, ensuring ample opportunity for customers to explore products, make purchases, or avail of service offerings KD Hero Showroom intends to improve operational efficiency by applying data analytics into demand forecasting, inventory management, and supply chain optimization, solving present issues like as inventory imbalances and decision-making inefficiencies.

3. Problem Statement

3.1 Difficulty in Predicting Demand:

- The showroom struggles to estimate which products consumers will require, resulting in too much or too little inventory.

3.2 Inefficient Inventory Management:

- The current stock management method is inefficient, causing high costs and wasted resources.

3.3 Poor Data Usage for Decisions:

- Sales, supply, and inventory data are not adequately connected, making it difficult to make sound, timely decisions.

4. Background of the Problem

1. Difficulty in Predicting Demand:

- KD Hero Dealership faces difficulties in predicting customer preferences and demand trends. Limited historical data analysis and the lack of predictive models result in inventory mismatches, which cause overstocking of slow-moving products and frequent stockouts of high-demand products.

2. Inefficient Inventory Management:

- KD Hero's stock management techniques are based on manual processes and antiquated systems. This causes poor visibility into stock levels, higher carrying costs, and waste due to overstocking, preventing the showroom from maintaining ideal inventory levels to satisfy customer needs efficiently.

3. Poor Data Usage for Decisions:

- KD Hero lacks integration of sales, supply, and inventory data. Disconnected systems and limited data insights impede management's capacity to make sound choices, limiting response to market changes and demand fluctuations, and lowering overall operational efficiency and profitability.

In conclusion, determining the fundamental cause of the problems is critical to developing practical solutions to the business challenges that KD Hero is facing.

5. Problem Solving Approach

I have used the following analysis techniques to address the inventory and demand forecasting challenges at KD Hero Dealership. By leveraging data-driven methodologies, the aim is to enhance demand prediction accuracy, optimize stock management, and improve overall operational efficiency. The approach involves gathering relevant sales and inventory data, applying analytical models, and integrating insights into decision-making processes to mitigate overstocking and stockout issues.

Data Gathering and Segmentation is the first step towards effectively resolving inventory and demand forecasting issues. I've collected sales information of the past six months from July 2024 to December 2024. Additionally outside variables such as seasonal demand fluctuations and economic indicators is also taken into consideration. Stock levels, sales velocity, and carrying costs, all are included in the consolidated inventory data. Microsoft Excel and Python is used to integrate this data, providing smooth access and segmentation for efficient decision-making. For analysis, the following has been utilized.

1. Time Series Analysis and Regression Models:

- It is utilized to forecast demand patterns based on previous sales data and seasonal trends.

2. ABC Analysis and Economic Order Quantity (EOQ) Models:

- It helps to divide inventory into priority groups and calculate the appropriate stock levels.

3. Reorder Point (ROP) System:

- To avoid stockouts, ROP will be built, with automatic replenishment triggers defined based on sales velocity and lead times.

4. Predictive Analysis:

- Integrating with machine learning helps to optimize inventory adjustments by forecasting demand fluctuations and increasing stock management efficiency.

The analysis will provide a clearer understanding of sales fluctuations and inventory management inefficiencies. With integrated data and predictive analytics, KD Hero Dealership will be able to maintain an appropriate stock balance, lowering excess inventory expenses and stockout concerns. By optimizing inventory and demand forecasting tactics, the dealership certainly improves customer happiness, lower operational expenses, and increase profitability.

6. Expected Timeline

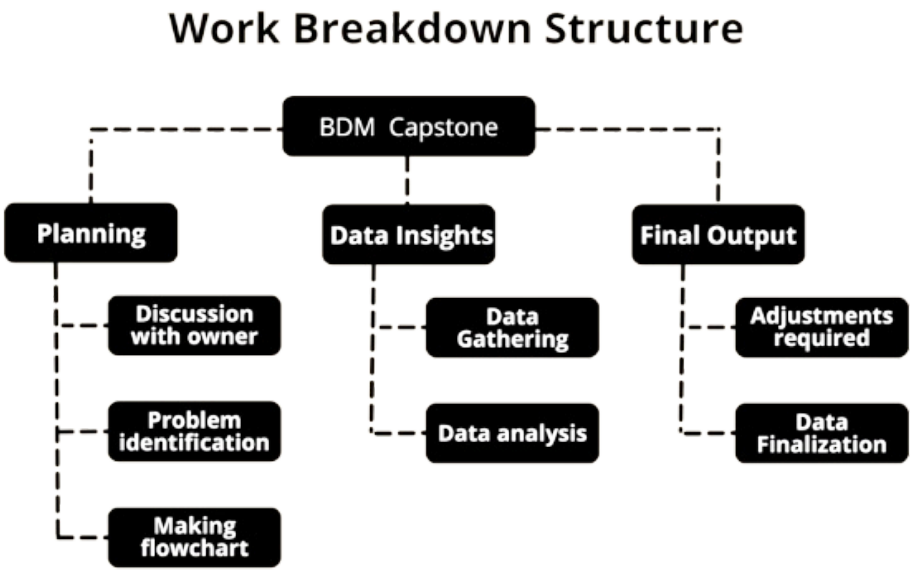

Figure 1.1

- **Owner Firm Discussion:** 18 December - 10 January
- **Collect Relevant Data:** 12 January - 22 January
- **Draft Project Proposal:** 24 January - 01 February
- **Data Cleaning:** 25 February - 05 March
- **Data Analyzing:** 20 March - 10 April
- **Complete Analysis, Submit:** 13 April

Here is the Gantt chart illustrating my expected timeline.

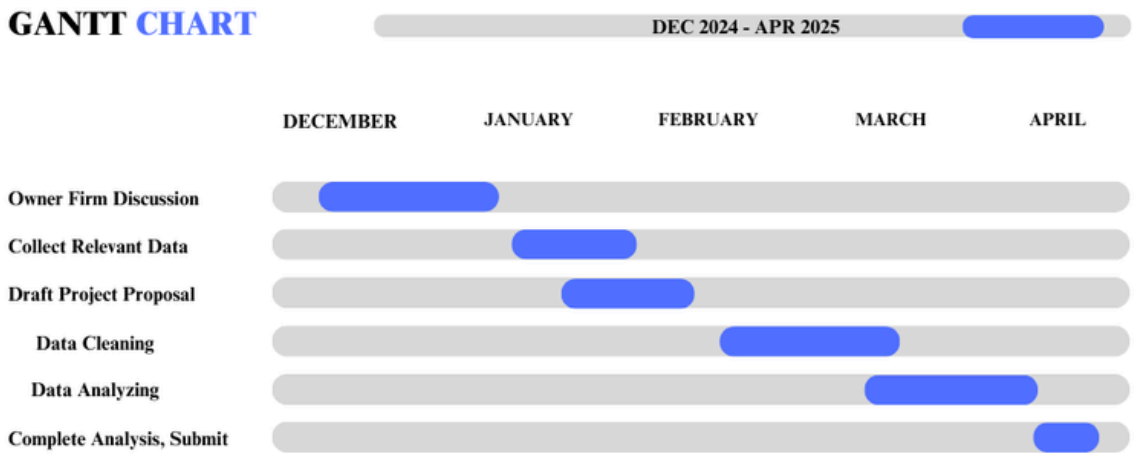

Figure 1.2

7. Expected Outcome

The operational efficiency of KD Hero Dealership will significantly increase with the implementation of the suggested data-driven methods. Improved demand forecasting will ensure that the proper inventory levels are maintained to satisfy consumer demand by lowering the frequency of overstocking and stockouts. Better customer satisfaction, more sales, and an enhanced reputation for the brand will result from this.

Optimized inventory management will lower carrying costs and minimize waste, resulting in improved profitability. The integration of predictive analytics and automated stock control systems will streamline decision-making, reducing manual errors and enhancing overall productivity. Furthermore, real-time insights from integrated data systems will allow for quick adaptation to market trends and seasonal variations, ensuring competitive advantage.

Overall, the implementation of these analytical techniques will foster a more efficient and responsive dealership operation. KD Hero will be better positioned to meet market demands, enhance financial performance, and build long-term customer loyalty through improved service and product availability.