Operational Efficiency Improvement through Data Analysis: A Bharat Kirana Case Study

A Proposal report for the BDM capstone Project

Submitted by:

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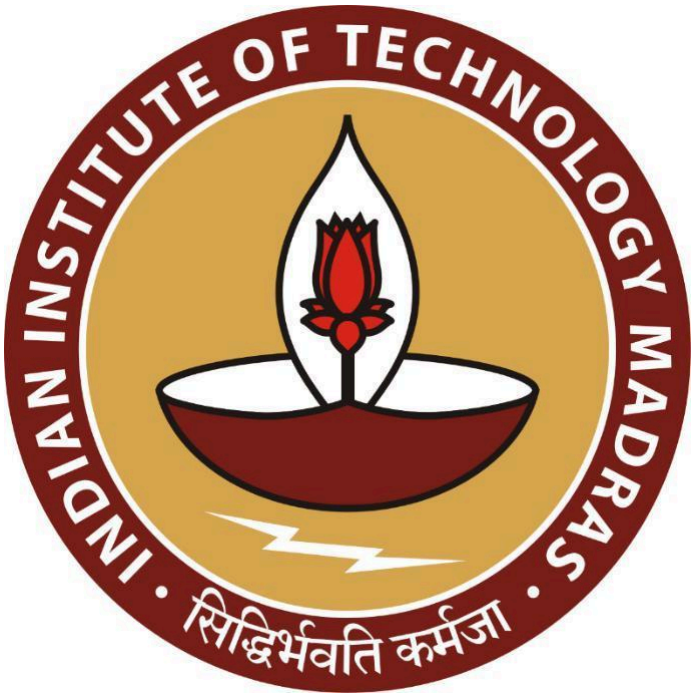

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Declaration Statement

I am working on a Project Titled “Improving Operational Efficiency through Data Analysis: A Bharat Kirana Case Study”. I extend my appreciation to Bharat Kirana Store, 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.

Ayan Nayyer

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

Name: Ayan Nayyer

Date:

1 Executive Summary and Title

This project is based on a grocery shop i.e. Bharat kirana situated in Patna, Bihar. It is located in the center of the city and caters to a very diverse customer base.. The domain of business is B2C. It comes in the category of household items, daily use and packaging goods.

The store faces operational challenges attributed to limitations in its existing software infrastructure. Dealing with efficient inventory management, stock procurement, and customer transactions remains a challenge for the grocery store.

This proposal aims to leverage data analysis techniques to identify operational bottlenecks, optimize inventory levels, and enhance supplier management strategies.We leverage a data-driven approach to deliver to the store actionable recommendations to optimize its operations, improve customer satisfaction, and business growth. By analyzing sales trends, customer behaviors, and stock dynamics, and providing actionable insights we will arm Bharat Kirana with actionable intelligence to remain service-excellent & sustain market leadership.

2 Organization Background

Bharat Kirana, Patna, Bihar has been in existence since 1940 and has been transformed into this current setup since 2010. This longstanding establishment caters to a diverse range of customers by offering a comprehensive selection of general household and everyday packaged items. With an average footfall of approximately 150 customers daily, Bharat Kirana serves the locality for their day to day needs.

Bharat Kirana's Manager uses a data management software to keep track of all the stocks and sales happening at a particular time period. We will be using data from this software in our project.

Bharat Kirana maintains a vision centered on the growth of their store and the delivery of superior quality service to their loyal customers. With the help of data driven insights and

using modern analytical tools, Bharat Kirana can work on operational efficiency, better stock management and in overall, a better customer experience.

3 Problem Statement

3.1 Identify bottlenecks/constraints in inventory management : identifying where within Bharat Kirana's inventory management processes there are inefficiencies or challenges, including pointing out stockouts, overstock situations, or incorrect inventory tracking.

3.2 Analyze customer buying patterns to optimize product demand variation : Create a schedule to meet demand variation and increase sales after analyzing customer buying in this conduct.

3.3 Improve supplier management for better cost efficiency and product availability : Strengthen relationships and purchasing practices with suppliers in order to lower costs, shorten lead times, and maintain a steady flow of product for high-demand items, increasing cost efficiency and product availability across the board.

4 Background of the Problem

Bharat Kirana is a renowned grocery store located in Patna, Bihar. It deals with various types of products on a daily basis with an average of 150 customers visiting the store. The current software used by them assists in maintaining inventory, procurement and customer transactions. But it has many drawbacks which lead to incorrect inventory measurements, poor product assortment and inconvenience in coordinating with the suppliers.

Bharat Kirana has a vision to grow and provide the best possible service by utilizing the data driven approaches. The project majorly concentrates on tackling the issues faced by them. We have analyzed the existing data and came up with some strategies which can be implemented in future to achieve the competitiveness. This overall analysis and recommendations will help Bharat Kirana to maintain the inventory as well as assist in the decision making process. Application of advanced analytics will help in revamping the

existing operational processes of BK and will provide sustainable and effective growth in accordance with the goal.

5 Problem Solving Approach

The objective is to solve operational problems through an integral analysis of the data and through recommendations. We will use different data analysis techniques to obtain actionable insights and drive informed decision-making.

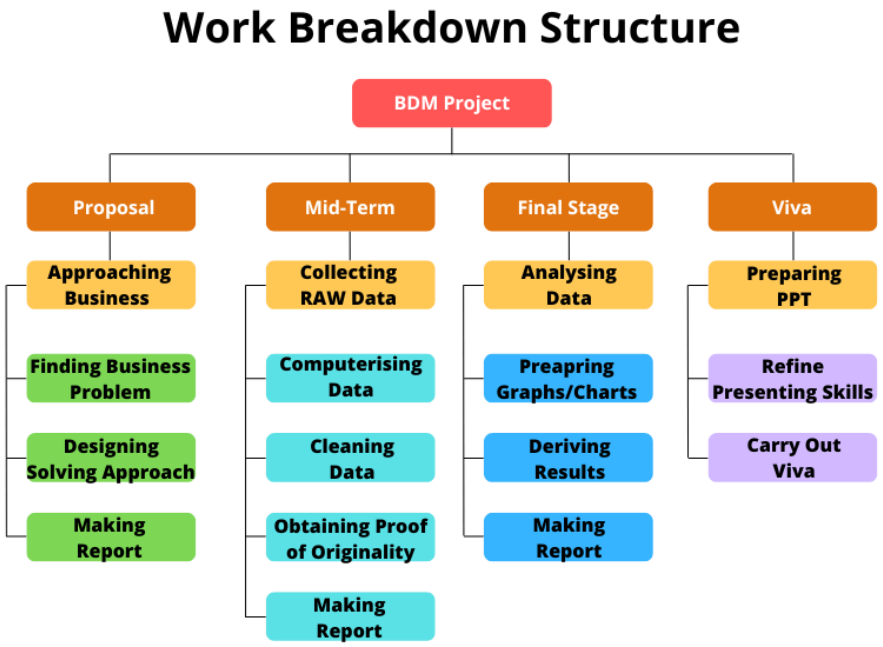
We will leverage two primary datasets: the Sales Detail Report (April 2023 to April 2024) and the Sales vs. Stock Data (April 2023 to April 2024). These datasets encompass transactional information, product details, inventory metrics, and sales performance. We review the data and check for patterns, trends and seasonality in the sales dataset and determine the top products that customers demand the most. Next we will estimate the demand using time-series and, if applicable, regression analysis. Finally we calculate the optimal stock based on the estimated demand and implement a replenishment strategy that ensures inventory is always at optimal levels. Lastly, we track actual sales data and update demand forecasts and inventory if necessary.

We will use descriptive statistics (mean, median, mode, variance, etc.) to summarize and analyze relevant metrics like daily sales, product prices, inventory levels, customer payments, etc. Use clustering techniques to segment customers by their purchase behavior and preferences. Use association rule mining algorithms to discover products that are often bought together. Create demand forecasting models to estimate future sales patterns and products demand.

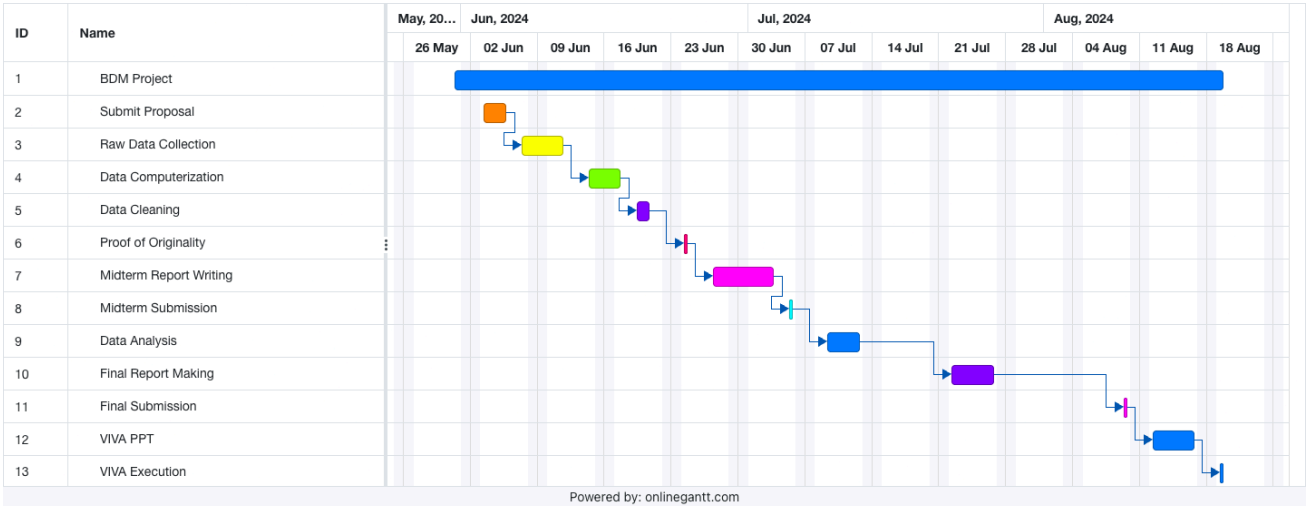
We will use software such as R or Python with libraries such as pandas, NumPy, and scikit-learn to pre-process, analyse and model the data. Libraries like matplotlib to create meaningful charts, graphs and heatmaps to present our results. By detecting patterns and trends in the data we can more accurately forecast future sales and tune inventory levels to satisfy customer demand.

6 Expected Timeline

6.1 Work Breakdown Structure:



6.2 Gantt chart



Expected timeline for completion of project.

7 Expected Outcome

We expect the following to result from our data-driven process:

- Determining Operational Bottlenecks in Inventory Management.
- Optimization of product placement and assortment based on customer preferences.
- Better supplier management strategies, reducing costs and increasing the availability of products.
- Enhanced decision-making capabilities through actionable insights derived from advanced data analysis techniques.

By adopting these aforesaid methodologies, Bharat Kirana is looking to revolutionize its operation.