Strategic Resilience:
Data-Driven Customer-Centric Sales and Marketing for Improving Pesticide Shop Performance

A Proposal report for the BDM capstone Project

Submitted by

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Declaration Statement

I am working on a Project Title "**Strategic Resilience:** Data-Driven Customer-Centric Sales and Marketing for Improving Pesticide Shop Performance". I extend my appreciation to **Krishna Agritech Industries,** 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.

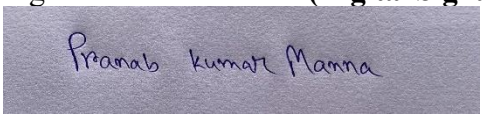
Additionally, I affirm that all procedures employed for the purpose of data collection and analysis have been duly explained in this report. The outcomes and inferences derived from the data are an accurate depiction of the findings acquired through thorough analytical procedures.

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.

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



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Date: 28.04.2025

1 Executive Summary and Title

Krishna Agritech Industries, Amtala, Po-Kanyanagar, Ps-Bishnupur, South 24 Parganas, West Bengal 743503, is a pesticide retailing shop catering to farmers and retail clients. It's a B2C business in the segment of insecticides, herbicides, fungicides and Plant-Nutrition whose supply chain & marketing agency is **K.C.Pal & Co**.

Still, the store has difficulties maintaining stock, forecasting demand, and holding onto customers within a competitive market for pesticides. Overstock causes product to go bad, and stockout produces lost business with fierce competition from other sellers of pesticides. All these put a strain on profitability and compromised the shop's image as a solid supplier since new customers have gone elsewhere based on stockouts or lack of one-on-one contact.

This project suggests Machine Learning solutions for these challenges by leveraging insights from historical data:

- **Sales Forecasting**: Applying time-series models for predicting product demand to maintain optimum stock.
- **Inventory Optimization**: Utilizing regression models for management, minimizing wastage of perishable products.
- **Customer Segmentation**: Segmentation of customers for personalized promotions, for example, bulk offers for farmers or small packs for retail.
- **Product Recommendations:** Using collaborative filtering to recommend complementary products, enhancing cross-selling.
- **Churn Prediction:** Recognizing customers who are likely to churn for strategic retention campaigns in order to re-establish loyalty.

In addition, a strategic brand initiative will overcome competitive forces and negative attitudes with regional advertising, collaborations with agriculture e-commerce sites, and community outreach events. These initiatives will reposition Krishna Agritech Industries as a customer-oriented, dependable market leader in the retail of pesticides. This project provides a plan to streamline operations, enhance customer relationships, and improve profitability.

2 Organization Background

Krishna Agritech Industries is a reliable retail outlet for pesticides established in 1993 by Shyamaly Pal and Dr. Krishnendu Pal. Initially, they started their small unit in Amtala where they start selling seeds as well as few pesticides, after couple of years, they completely focusing on pesticides business. They are Committed to empowering local agriculture, it deals in good quality pesticides, such as insecticides, herbicides, and fungicides, to small as well as large farmers and retail consumers. Krishna Agritech Industries is an essential outlet at Amtala, it has another branch at Shirakole offering

economical solutions to fight pests and increase crop production. Their yearly turnover around 30 lakhs.

A group of 8 personnel, including sales and inventory coordinators, ensure smooth operations and individualized attention, receiving competitive wages of Rs 8000/- per month with perks such as transport allowances, fooding and lodging. The shop's multicultural clientele comprises Large Farmers and Retail purchasers, generating regular in-store turnover.

They provide service through the online platform like Amazon and on counter service. They are also planning to come up with their own website. Recently they open a small manufacturing unit nearby their premises where they hired a small research team to manufacture few pesticides.

3 Problem Statement

The problems that I have identified from the given information are as follows:

3.1 **Ineffective Inventory Management**: Incorrect demand forecasting results in overstocking, resulting in product expirations and stockouts, which lead to lost sales. This incurs extra costs and decreases profitability.

3.2 **Restricted Customer Awareness and Engagement**: Low brand awareness and poor customer insights restrict personalized marketing. Most potential customers are not aware of the shop's products, and churn dilutes loyalty.

3.3 **Competition and Negative Perceptions**: Stiff competition from big stores and negative market perceptions lose market share and reputation, exacerbated by limited capacity of personnel to impact service quality.

This project uses Machine Learning to maximize inventory, promote customer engagement, and neutralize competition for operational efficiency and growth.

4 Background of the Problem

Ineffective Inventory Management: Krishna Agritech Industries is faced with poor demand forecasting for its wide range of pesticide stock, including insecticides and fungicides. Manual recording and unrecorded local sourcing make it difficult to monitor stock, resulting in overstocking and expirations or stockouts, resulting in loss of sales. Seasonal fluctuations in demand worsen the situation, driving up costs and eroding dependability.

Limited Customer Awareness and Engagement: While, it caters to large number of farmers and retail buyers, the shop lacks brand visibility. Many prospective customers are unaware of its products due to insufficient marketing. Limited customer preference insights prevent personalized engagement, leading to churn, lowering repeat business and loyalty.

Competition and Negative Impression: The retail market of pesticides is extremely competitive, with larger stores selling wider ranges and at lower prices. Negative impressions, fueled by stockouts and erratic service, have damaged Krishna Agritech Industries's image, leading customers to seek alternatives. This reduces market share and undermines the shop's position.
Operational Constraints and Expenses: A small team of [Number] finds it difficult to handle inventory and provide quality service, exacerbated by manual procedures. Relying on rough estimates for stock consumption results in wastage and inefficiencies, increasing operational expenses. These issues, stemming from old systems and competitive forces, pose risks to profitability and expansion, making it imperative to have a Machine Learning-based strategy to streamline operations and improve customer interaction.

5 Problem Solving Approach

In order to solve the problems of Krishna Agritech Industries. in inventory control, customer interaction, and rivalry, I am going to utilize some analytical approaches that consist of some steps in order to retrieve from the series of different sales data. Some descriptive statistics, some bar chart, pareto chart, pie chart will be followed in order to graphically represent the data.

a. **Methods and Data Collection**:
   - **Inventory Optimization**: Utilize Prophet time-series models for forecasting sales, incorporating Date, Quantity_Sold, and Season to forecast demand for items such as Fungicide 'Saaf', maximizing stock levels. Utilize regression models to regulate Inventory_Level, minimizing waste of expired items. Gather sales history (Quantity_Sold), inventory levels (Inventory_Level), and supplier information to rectify unknown sourcing.
   - **Customer Engagement**: Apply K-means clustering on customer segmentation against Customer_Type and Region (Ex- Large Farmers and Retail) to make promotions personalized (Ex- discounts in bulk for farmers and small packs for retail). Apply collaborative filtering to make product recommendations (Ex- offering Insecticide with Herbicide) to increase cross-selling. Use Random Forest to predict churn and target at-risk customers (Ex- last buy) for retention efforts. Collect customer feedback through surveys to determine preferences and drivers of churn.
   - **Reputation and Competition**: Gather competitor pricing and community feedback to compete with larger retailers and combat negative sentiment from stockouts.

b. **Strategic Initiatives**:

- **Inventory Management**: Use ML models to automate restocking and train employees number to utilize tools, enhancing tracking accuracy and lowering costs.
- Visibility and Engagement: Initiate social media promotions, farmer workshops, and agriculture e-commerce alliances to increase awareness. Inform customers about product value through guides to build loyalty.
- **Reputation Management**: Share stock updates openly and organize community activities to restore confidence and dispel negative impressions.
- **Service Quality**: Increase training staff to enhance customer interactions through soft skills, product knowledge, right ethics to fill service lapses.

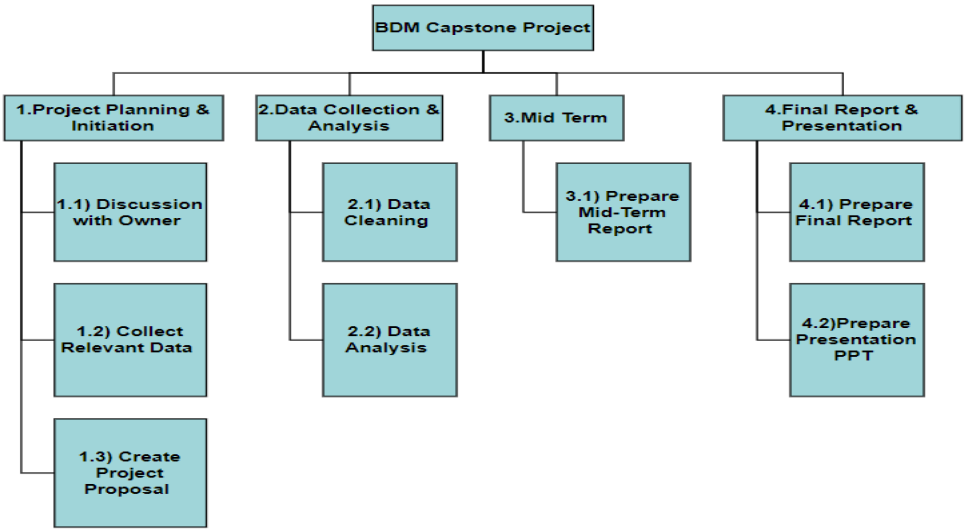
c. Analysis Tools:

- **Microsoft Excel**: Structured data with pivot tables and graph trends with bar and pie charts (such as product demand, customer segments).
- **Python and ML**: Leverage Pandas, NumPy, and Scikit-learn for forecasting, clustering, and churn prediction, allowing strong data analysis and visualization.

This approach integrates ML-driven solutions, marketing, operational enhancements to optimize inventory, deepen engagement and strengthen competitiveness. By leveraging data insights and communities, Krishna Agritech Industries will achieve efficiency, loyalty, and sustainable growth.

6 Expected Timeline

6.1 Work Breakdown Structure:



6.2 Gantt Chart:

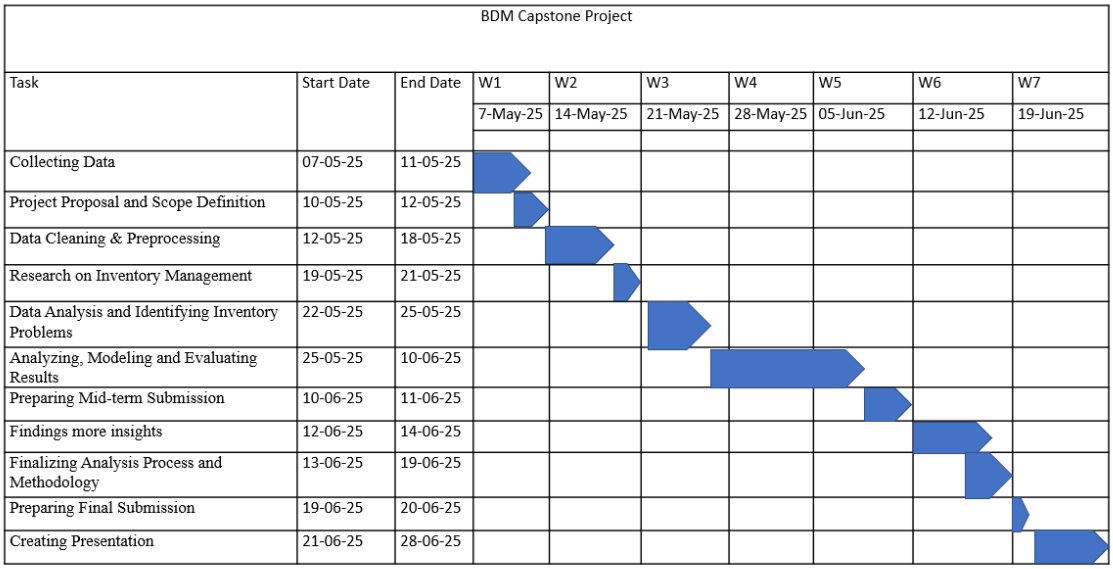


Figure 1 Expected timeline for completion of project

7 Expected Outcome

The data-driven strategy for Krishna Agritech Industries will transform operations, customer engagement, market presence, ensuring sustained success in pesticide retail.

7.1 **Improved Operations:** Sophisticated forecasting and inventory optimization will reduce stockouts and expirations for such products as Fungicide C, increasing reliability. Computerized tracking will automate processes, minimize waste, and decrease costs, enabling effective resource utilization.

7.2 **Improved Customer Satisfaction:** Personalized promotions and product recommendations, for example, bundling complementary pesticides, will address various needs of farmers and retail buyers. Targeted retention will promote loyalty, providing consistent customer satisfaction through guaranteed stock availability and customized service.

7.3 **Greater Visibility:** Strong marketing, farmer workshops, and e-commerce partnerships will raise brand visibility, entice new customers. Community outreach will promote Krishna Agritech Industries's products, reinforcing connection with local agriculture.

7.4 **Restored Reputation:** Open communication and strategic branding will combat negative attitudes, restoring confidence. Consistent service will differentiate the shop from the major players, reinforcing its reputation as a reliable supplier.

7.5 **Sustainable Growth:** Waste reduction and efficient operations will conform to sustainable standards, cutting down on the shop's footprint. Improved service quality and evidence-based decision-making will foster profitability, making Krishna Agritech Industries a customer-focused, robust industry leader in pesticide retail.