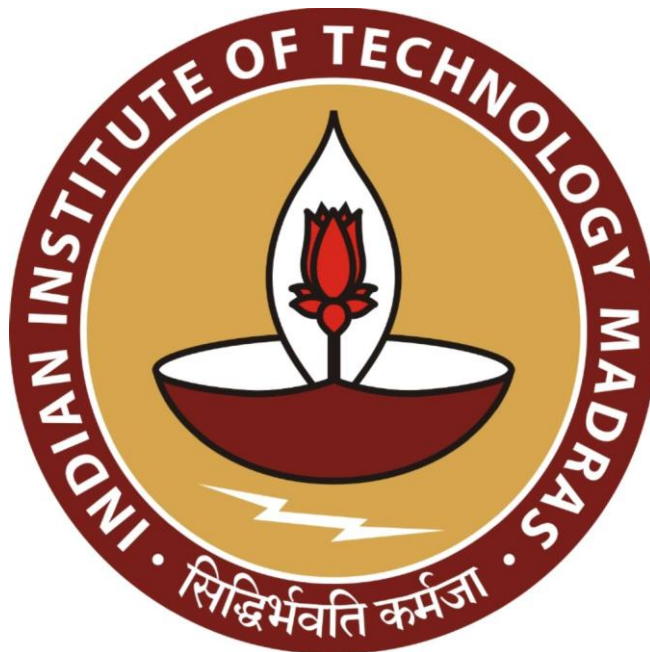**Strategic Resilience:**

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

A final report for the BDM capstone Project

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Contents

1 Executive Summary

Krishna Agritech Industries, located in **Amtala, Shirakol, South 24 Pgs**, **West Bengal**, a pesticide retailer catering to both **large-scale farmers and retail buyers** is facing significant challenges including a declining customer base, frequent stockouts, generic customer service and lack of targeted follow-up. These issues make customer attrition, loss of market competitiveness. Moreover, data inconsistencies and fragmented information systems which hinder coherent business overview and decision-making.

To address these challenges, this project analyzed 22 weeks of historical sales, purchase, inventory data spanning Nov'24 to Apr'25. The methodology employed **descriptive statistics**, **ABC analysis, pie charts, time-series** analyses to uncover sales patterns, inventory gaps and key product performances. Additionally, a **customer survey** was conducted to understand preferences between **online** and **offline** purchase and the factors driving these choices.

The analysis revealed that insecticides such as **'Ridomil Gold**', **'Sumiprint'**, **'Exponus'** are the most profitable product categories, contributing to revenue while some high-volume sellers like **'Saaf'**, **'Ekka', '24-D'** generate minimal profit. Seasonal sales peaks and troughs were identified providing a basis for **demand forecasting**. The study also highlighted operational issues like stockouts and customer **switching behavior** caused by inadequate inventory.

Based on these insights, targeted recommendations include implementing a dynamic inventory strategy focused on high-margin products, aligning stock with seasonal demand, improving data integration, and enhancing customer engagement through loyalty programs. Early indications show that adopting these data-driven strategies can improve inventory efficiency, free up working capital, elevate customer satisfaction and enhance overall profitability, positioning Krishna Agritech for sustained competitive advantage in the agricultural market.

2 Detailed Explanation of Analysis Process/Method

2.1 Understanding the Problem Statement

The analysis begins by clearly defining the challenges faced by Krishna Agritech Industries and establishing the objectives.

2.1.1 Challenges:

- **Profit Margin Optimization:** This analysis identified insecticides is the most profitable product category with specific product like **Ridomil Gold an Exponus** leading in revenue and profit generation. Conversely, it was found that some items like **Saaf** contribute very little to overall revenue.

- **Growing Competition from Other Sources:** Krishna Agritech Industries faces competition from larger, well-branded retailers with broader product ranges and more aggressive marketing. E-commerce platforms, other competitor stores which offer the convenience of home delivery, discount are drawing customers away.

- **Ineffective Inventory Management:** Manual recordkeeping, lack of systematic demand forecasting and uncoordinated restocking lead to frequent overstocking (causing product wastage) and stockouts (leading to lost sales). This misalignment between actual demand and inventory levels results in increased costs and impacts customer satisfaction.

- **Inadequate Demand Forecasting:** Shop owner tries to predict how much of each product to buy often feels like a shot in the dark. Most purchasing decisions are made using gut feeling or rough averages from past weeks, not by using patterns that take busy seasons or unexpected spikes into account. That means missed chances to catch big sales or avoid tying up cash in slow-moving goods.

- **Customer Base Decreasing:** Many customers, whether they're large-scale farmers or retail, come in once but don't come back. **Stockouts**, generic service or lack of follow-up leave them with little reason to remain loyal. But also, there is limited understanding of customer preferences and purchasing patterns. As a result, many customers including large farmers and retail buyers - either do not return or switch to competitors after negative experiences such as **stockouts or lack of targeted service**.

- **Data Inconsistency and Integration Issues:** Sales numbers, stock lists and purchase records live in separate files, making it difficult to spot what is really happening in the business. There are columns **"Quantity_Sold"** which erroneous units, another column

"Sale_Price" which was different for same product, even couple of duplicate records, wrong units present in datasets whereas different formats mean errors and missed insights and combine to block a clear big-picture view for better decision-making.

2.2 Data Collection and Preparation

Data Cleaning and Preparations is indeed an essential step before deep dive into any data analysis. Clean, well-structured data ensures that all subsequent statistical methods, visualizations and business insights are based on accurate information. By addressing errors and inconsistencies at the outset, the analysis avoids misleading, ensure integrity of results and supports data-driven recommendations for the business. Sales, revenue, Inventory data were collected for various pesticides product over a **22- week period (Nov'24 - Apr-25)**.

2.2.1 Operational Data:

- **Sales, Revenue and Inventory Data:** Weekly data includes Sales_Price(price per quantity), Sales_Quantity(per packet sale), Profit(cost price minus sale price), Purchase_Quantity(weekly purchase quantity), Closing_Stock(weekly closing quanity).

- **Customer and Products' Data:** This includes Customer_Name(purchased customer name), Cutomer_Type(type of customer), Region(customer's location), Product_Name(purchasing product), Category(product types), Season(time frame).

2.2.2 Mathematical Data Processing:

- **Revenue per Pesticide Product (R):**

  $R_i = X_i \times Q_i$ where X_i is the price per units and Q_i is the quantity sold of product i.

- **Profit per Pesticide Product (Π):**

  $P_i = R_i - C_i$ where C_i is the purchase price per units of product i.

- **Season Mapping:**

$$f(x) = \begin{cases} 'Pre-Winter', & if\ W \leq 6 \\ 'Winter', & if\ 7 \leq W \leq 13 \\ 'Growing', & if\ W \geq 14 \end{cases}$$

  where w is weeks.

2.2.3 Data Cleaning:

The operational data is stored in an Excel sheet, which is cleaned and pre-processed for outliers or missing values using following methods. First, I started by consolidating all relevant sheets (sales, purchase, inventory) into a master file, ensuring consistency and backups. Standardize column names, date formats, units across all sheets to maintain uniformity. I remove duplicates, blank rows and irrelevant data to improve accuracy. Then I address missing and inconsistent values by filling with mean, mode or others values and ensure consistent spelling for products, categories, customer types and regions. I verify numerical data types and investigate any anomalies like negative values. For example, I corrected 16 types in product name, corrected 'Ridomil gold', 'rido gold' with 'Ridomil Gold', corrected 'fungi' with 'Fungicide', format 'Sales_Date' 's range in the form of (Day-Month_Name-Year). For inventory data fields like 'Closing_Stock', 'Sales_Quanity' 'Purchase_Quantity', missing values were filled logically using available data, for example if 'Units Sold' was empty, then it was calculated using below formula:

Units Sold = Opening_Stock + Purchases – Closing_Stock

Importance: Precise cleaning eliminated data ambiguities, ensured correct calculation of totals, averages, laid the foundation for robust and precise statistical analysis. And also, clean data underpins the validity, reliability of all further results and recommendations.

2.3 Comprehensive Operational Analytical Process

The core analysis involves assessing the operational data to uncover inefficiencies and opportunities for improvement.

2.3.1 Descriptive Analysis:

- **Objective:** The goal is to provide clear, comprehensive summary of sales, quantity, revenue, inventory data collected over 22 weeks (Nov'24-Apr'25) period for four categories (Fungicides, Insecticides, Herbicides, Plant Nutrition). It helps to understand underlying patterns, variability, ranges, averages that characterize the business performance which help to identify which product category, time frame stand out exceptional or concerning, highlighting variability, spotlighting bestselling.

- **Approach:** Using MS Excel, we can calculate mode, mean, variances, standard deviation.

Mean (Average):

$$\bar{x} = \frac{1}{N} \sum_{w=1}^{N} x_w$$

Mode (Maximum Frequency):

M_o = value that appears most frequently in the categorical dataset

Kurtosis:

$$\kappa = \frac{n(n+1)}{(n-1)(n-2)(n-3)} \sum_{i=1}^{n} \left(\frac{x_i - \bar{x}}{s}\right)^4 - \frac{3(n-1)^2}{(n-2)(n-3)}$$

where x_i are data points, $\bar{X}$ is the mean and n is the sample size.

Skewness:

$$\Upsilon 1 = \frac{n}{(n-1)(n-2)} \sum_{i=1}^{n} \left(\frac{x_i - \bar{x}}{s}\right)^3$$

where s is the sample standard deviation, x_i are data points, $\bar{X}$ is the mean and n is the sample size.

Sample Variance:

$$s^2 = \frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2$$

where x_i are data points, $\bar{X}$ is the mean and n is the sample size.

Standard Deviation:

$$\sigma = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2}$$

where x_i are data points, $\bar{X}$ is the mean and n is the sample size.

Standard Error:

$$\text{Standard Error (SE)} = \frac{\sigma}{\sqrt{n}}$$

where n is the sample size.

2.3.2 Revenue Vs Sales Analysis:

- **Objective:** To assess the correlation between weekly sales and revenue.

- **Approach:** Use scatter plots and regression analysis.

- **Correlation Coefficient (r):**

$$r = \frac{\sum(x_i - x_{mean})(y_i - y_{mean})}{\sqrt{\sum(x_i - x_{mean})^2 \sum(y_i - y_{mean})^2}}$$

where x_i represents weekly sales volume and y_i represents weekly revenue.

- If r is close to +1, sales and revenue are highly correlated. If it is low, this indicates possible

inefficiencies.

2.3.3 Profit Margin Analysis:

- **Objective:** To evaluate how much profit each product actually contributes on each sale relative to its selling price and to identify the products and categories that drive to highest profit for Krishna Agritech Industries, this analysis helps optimize inventory decisions, pricing, promotional focus by distinguishing between high-margin and low margin products.

- **Approach:** Profitability of different types of products is assessing by using below formula.

$$Profit\ Margin(\%) = \frac{(SP - CP)}{SP} * 100$$

where SP is selling price at which product has been sold and CP is cost price at which product has been purchased.

2.3.4 Trend And Seasonality Analysis:

- **Objective:** To identify and understand underlying patterns in sales and revenue across different weeks, seasons revealing how business performance is influenced by recurring cycles, crop calendar and time-based market factors. This analysis provides the foundation for smatter inventory planning and target base sales strategy which enables owner -an anticipation for high and low demands period and help to arrange stocks more efficiently.

- **Approach:** sales quantities are plotted weekly using **line charts** to reveal trends, seasonal peak, dips and **Moving Average** are used to spot the shifts in trend directions or sudden spikes in sales.

  Growth Rate Calculation:

  $$Sales\ Growth_w = \frac{(Q_w - Q_{w-1})}{Q_{w-1}} * 100\%$$

  where Q_w is sales in week w.

2.3.5 ABC Analysis:

- **Objective:** The goal of ABC analysis is to categorize pesticide products based on how much each one contributes to the overall revenue for Krishna Agritech Industries. By sorting products into "A", "B" and "C" classes where 'A' items are the top earners, 'B' are moderate contributors and 'C' are low-revenue products. This analysis helps focus on

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resource allocation more efficiently and management attention on the products that matter most. This targeted prioritization is crucial for optimizing inventory, maximizing profitability and avoiding wasted efforts on low-impact items.

- **Approach:** Use **cumulative products' revenue** percentage in descending order and visualize using **tree map**.

Total Revenue Per Product:

$$R_i = \sum_{i=1}^{n} X_i * Q_i$$

where X_i is the price per units and Q_i is the quantity sold of product i.

Cumulative Percentage Contribution:

$$C_i = \frac{\sum_{j=1}^{i} R_{[j]}}{\sum_{j=1}^{m} R_{[j]}}$$

where m is the total number of products and $R_{[j]}$ denotes revenues ordered from largest to smallest.

Classifying Category:

A: Top around **20%** of products generating about **80%** of the revenue.

B: Middle around **30%** of products generating next **15%** of revenue.

C: Bottom around **50%** of products generating final **5%** of revenue.

2.4 Customer Preference Survey

A structured survey is conducted to understand purchasing behaviors and preferences.

2.4.1 Survey Structure

- **Name:** Name of customer.

- **Location:** Location of customers

- **Purchasing Preference:** Krishna Agritech Industries vs. Online vs. Other Store

- **Reason for Preference:** Reasonable Price**,** Discounts, Offers, Variety, Trust, Convenience, Quality Products.

2.4.2 Survey Data Analysis

- **Quantitative Analysis:** Categorize responses based on preference (Krishna Agritech Industries vs. Online vs. Other Store).

- **Qualitative Analysis:**

- **Text Analysis**: Perform sentiment analysis on open-ended responses (Ex- why customers prefer online shopping).

- **Thematic Analysis**: Group reasons into themes such as convenience, trust and variety.

2.5 Integrated Analysis and Insights

The final step is to integrate the **operational analysis** with **customer behavior** and **product preference insights** to identify critical business patterns and offering actionable recommendations.

- **Linking Operational Data and Customer Insights**

  - **Customer Purchase Patterns: Large Farmers** contribute a significant share of revenue, yet their retention is challenged by occasional stock unavailability and lack of personalized engagement. **Retail customers** show a steady purchasing frequency but represent lower per-transaction value.

  - **Seasonality and Demand Fluctuation:** The sales data confirm distinct seasonal patterns aligned with agricultural cycles like Pre-Winter, Winter and Growing phase with demand surges at **weeks 8, 11 and 17**. Tailoring inventory and marketing strategies around these can improve responsiveness and efficiency.

  - **Product Profitability Insights:** A handful of products such as **Ridomil Gold, Simodis, Sumiprint, Exponus** disproportionately drive revenue and profits. Conversely, some high-volume sellers like **Samrat 70, Ekka, Saaf** generate relatively low profits, indicating the need for focused pricing and promotional strategies.

2.6 Integrated Recommendations

Based on this integrated analysis, below are the following actionable recommendations are proposed to boost operational efficiency, customer satisfaction and profitability.

- **Inventory Management:** Owner should priorities stocking up of those products with high demand and low expiry or waste risk.

- **Promotional Strategi:** Owner should offer discounts on perishable products nearing the end of expiry.

- **Adopting new Technology:** Business owner needs to onboard their product onto online platforms so that they can capture tech-savvy customers while retaining offline trust.

- **Expansion Strategy:** Focus on that region where with high on store purchase preference while considering partnerships with e-commerce platforms.

2.7 Analysis and Summary

The detailed mathematical models, formulas, statistical technique provides a strong foundation of making data driven decision.

- **Regression Analysis:** Identifies inefficiency in sales vs revenue.

- **ABC Analysis:** Prioritize key important pesticides for inventory focus.

- **Trend Analysis:** Seasonality and trends plays a significant role in demand fluctuations, requires proactive planning and marketing.

- **Churn Analysis:** Customer segmentation highlights opportunities for tailored engagement to reduce higher churn and increase repeat purchases.

- Business heavily depends on a concentrated portfolio of products that generate the majority of revenue and profit.

3 **Results & Findings**

3.1 Descriptive Overview of Pesticides Categories

all product categories move similar weekly unit volumes, their volatility and sales event patterns are different.

- **Key Findings:**
  - Fungicide (**6.70**), Herbicide (**6.83**), Insecticide (**6.89**) and Plant Nutrition (**6.67**) have nearly **identical average sales** which indicating **uniform demand** across all categories.
  - Insecticides have highest Variability with St. dev 2.25 and variance 5.04 compared to other categories and Insecticides sales distribution is highly peaked (Kurtosis is 8.24), right skew (Skewness is 1.34) which suggesting occasional weeks have **high sales demand**.
  - **Fungicides (0.05) and herbicides (-0.06)** both have low skewness and Kurtosis of

fungicide and herbicide are -0.28 and -0.38 which are very low, suggesting they are **more predictable** to meet day to day demand.

▪ Total number of units sold and transaction since Nov'24 to Apr'25 is highest for Fungicide **(2,694 and 402)** and Insecticide **(3,099 and 450),** showing broader product or transaction participation.

Fungicide		Herbicide		Insecticide		Plant Nutrition	
Mean	6.701492537	Mean	6.834254144	Mean	6.886666667	Mean	6.673913043
Standard Error	0.096981755	Standard Error	0.097804023	Standard Error	0.105836132	Standard Error	0.120202518
Median	7	Median	7	Median	7	Median	7
Mode	6	Mode	7	Mode	7	Mode	6
Standard Deviation	1.944478149	Standard Deviation	1.860848441	Standard Deviation	2.245123396	Standard Deviation	1.996954203
Sample Variance	3.780995273	Sample Variance	3.462756921	Sample Variance	5.040579065	Sample Variance	3.987826087
Kurtosis	-0.27499775	Kurtosis	-0.376059773	Kurtosis	8.240781918	Kurtosis	-0.003913607
Skewness	0.053337183	Skewness	-0.06258442	Skewness	1.348419745	Skewness	-0.170010129
Range	12	Range	9	Range	21	Range	11
Minimum	1	Minimum	2	Minimum	1	Minimum	1
Maximum	13	Maximum	11	Maximum	22	Maximum	12
Sum	2694	Sum	2474	Sum	3099	Sum	1842
Count	402	Count	362	Count	450	Count	276

Table 1. Summary Statistics of Pesticides Categories

● **Key Insights:**

▪ Insecticide sales are unpredictable and "peaked", so they need more attention and close monitoring so that inventory management can avoid costly stockouts or overstock during sales peaks and dips.

▪ Fungicide and Herbicides products are providing predicable, steady weekly sales which supports planning and **cash-flow** stability. These could be **base load** products.

3.2 Revenue vs. Sales Data Overview

The weekly data spanning 22 weeks serves as a foundation for understanding the correlation between sales volume and revenue

● **Revenue and Sales Summary:**

Total Revenue across 22 weeks is **Rs 48,14,640**

● **Key Findings:**

▪ A **Pearson correlation** value of **0.892,** suggest that there is a **strong positive correlation** between sales and revenue. Which implies higher sales generates higher revenue, consequently, that higher sales will boost high profit.

- Most data are tightly clustered around trendline, showing **relation** is **consistent** throughout observed period.
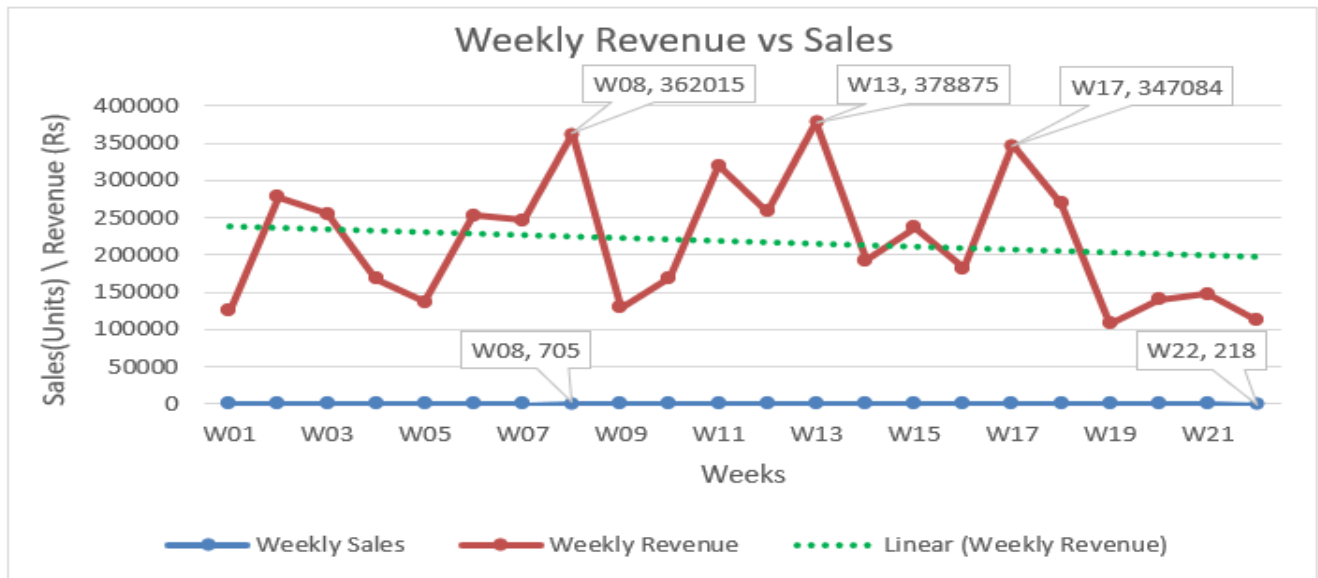

Fig 1: A Correlation line chart showing the relationship between sales and revenue over 22-week period

- **Key Insights:**
  - The revenue shows a stable trend with uniform fluctuations. The peak occurs in week 8, week 13 and week 17 are **Rs 3,62,015**, **Rs 3,78,875** and **Rs 3,47,084** respectively.
  - The sales volume also remains constant with very minor increase and decrease. The peak sales happen in **week 8** at **705 units** and low in **week 22** at **218 units**.

3.3 Identifying Key Products

An **ABC analysis** was conducted to identify the top performing pesticides products in terms of sales and revenue.

- **Key Findings:**
  - Revenue is highly concentrated on few products. The **A-Class** segment, representing the top 80% of revenue, is overwhelmingly dominated by **"Ridomil Gold (Fungicide)"**, which is the top performing product which alone contributing **10%** of total revenue. The next largest contributors are **"Sumiprint (Insecticide)", Simodis (Insecticide)", Systiva (Fungicide)** whose contribution towards total revenue are **7%, 5%, 5%** respectively.
  - The **B-Class,** which makes up the next **15%** of revenue, **includes "Tag Gun (3%)", "Double (2%)", "Isabion (2%)", "Poushak (2%).** These categories, while not as dominant as those in A-Class, still play a significant role in supporting overall revenue

and ensuring a well-rounded product mix.

- The **C-Class** segment, contributing the bottom **5%** of total revenue which consists of **Indofil M45, Agromin Gold**. Therefore, most of the high contributing products are **fungicide, insecticide** as seen in the larger blue **segments A**. **Herbicide** has **moderate sized** contribution while products under **plant nutrition** are relatively **small contributor** on total revenue.
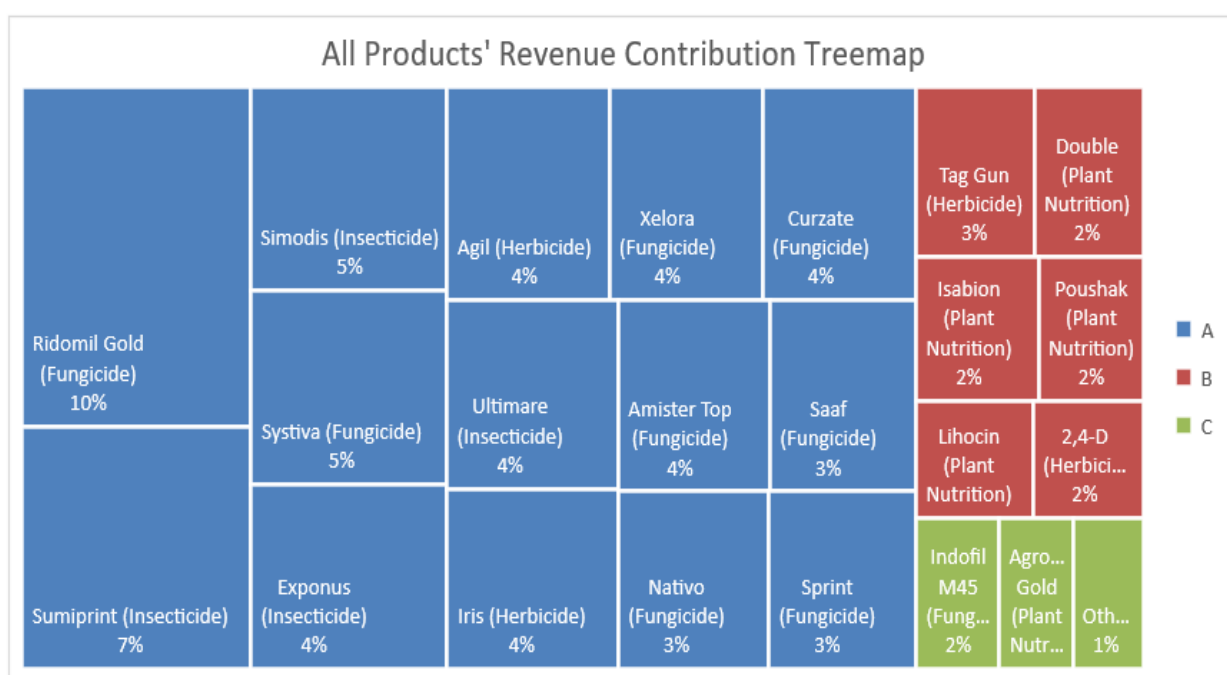

Fig 2: ABC Analysis Treemap - Revenue Contribution by Product (Nov'24-Apr'25)

- **Key Insights:**
  - This analysis demonstrated that by focusing **inventory management, promotions, procurements efforts**, we can maximize revenue and efficiency on the top **A-Class** products which are **mainly fungicides and insecticides**.
  - As **B-class and C-class** products are fewer impacting products on revenue, we can stock less which will save owners' **time space and working capitals**.
  - Smaller, low-contributing products in plant nutrition (**C-class**) could benefit from **targeted cross-selling** with **high-performing A-class products**, since customers are likely to purchase a mix product.

3.4 Category Wise Profit Margin

Bar graph has been used to analyze profit margin of top performing products under each pesticide category.

- **Key Findings:**
  - **Ridomil Gold** is the top revenue (**Rs 4,66,900**) and profit (Rs **2,05,030**) earing product in Fungicide category as well as amongst all products irrespective of category whose profit margin share is around **44%**.
  - **Sumiprint** is the next top revenue (**Rs 3,33,286**) and profit (Rs **1,18,987**) earing product amongst all products whose profit margin is around **37%.**
  - **Curzate, Ultimate, Agil,** their revenue are Rs **1,95,974**, **Rs 1,93,720** and **Rs 2,06,728** respectively but their profit margin are **Rs 48,270, Rs 13,900, Rs 36,100**. Those are fewer generating profits but high sales.
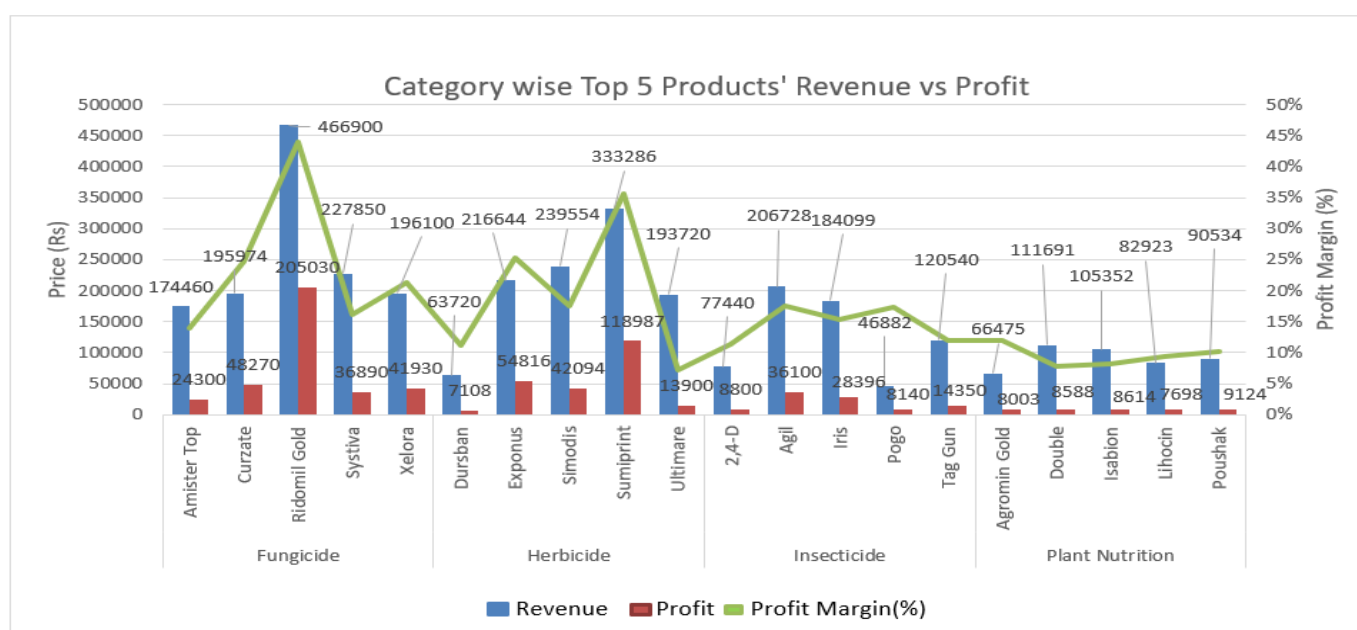
Fig 3: Comparative Analysis of Revenue, Profit and Profit Margin by Product Category

- **Key Insights:**
  - From the above figure, we can observe high revenue do not guarantee high profitability where several leading revenue products like **Curzate, Agil, Ultimate, Iris** have significantly lower profit bars, underscoring the need to focus on profit margins, not just sales volume.
  - There is large gap between revenue and profit. This needs to look carefully as these likely suffer from high costs, aggressive discounting or inefficient pricing and represent opportunities for cost reduction or margin improvement.

3.5 Inventory Optimization

This analysis will illustrate the sales demand forecasting for all four category pesticides data for next **2 months** based on **22-week period data**. This demand furcating graph contains **actual sales data**, **7 days moving average, forecasted future value**, upper bound and lower bound with **95% confidence interval** which help to assess the recent performance, model stability with safer stock level during uncertain demand.

- **Key Findings:**
  - Weekly sales (blue line) for **Fungicide, Insecticide, Herbicide and Plant Nutrition** are fluctuated in this range **(45, 250), (41, 250), (52, 210) and (45, 150)** units in the first 21 weeks, with most recent data showing a decline sales trend dips sharply after **week 17** and stabilizes at lower levels approaching **week 21**. where ever sales peak occurs in **W8, W11, W17** for all products.
  - The **7 days moving average** (blue dotted line) follows the **actual sales** closely but gradually trends downward, reflecting smoothing of short-term peaks and troughs and confirming the overall dip in recent performance.
  - The forecasted sales (red line, weeks 23-30) shows a continuous and significant downward trend for all products but for Herbicide, there is noticeable cyclic pattern, possibly indicating seasonal or promotional effects and there is slight increase in demands around **101 units next 2 months (Apr'25-May'25)**.
  - For Fungicide and Insecticide, there is a steady decline in sales from **week 1 to week 5**. whereas forecasting of sales for both are falling around **25-35 unit** and **85-95** units' range respectively in upcoming weeks (**Apr'25-May'25**).
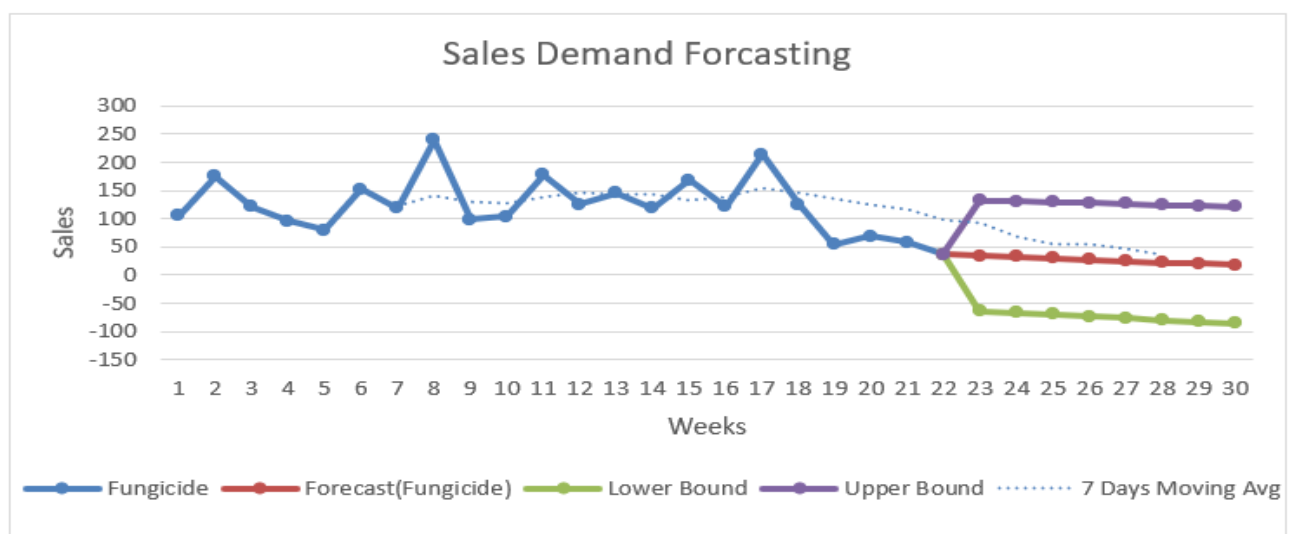

Fig 4: Sales Demand Forecasting of Fungicide for next 2 months (Apr'25-May'25)
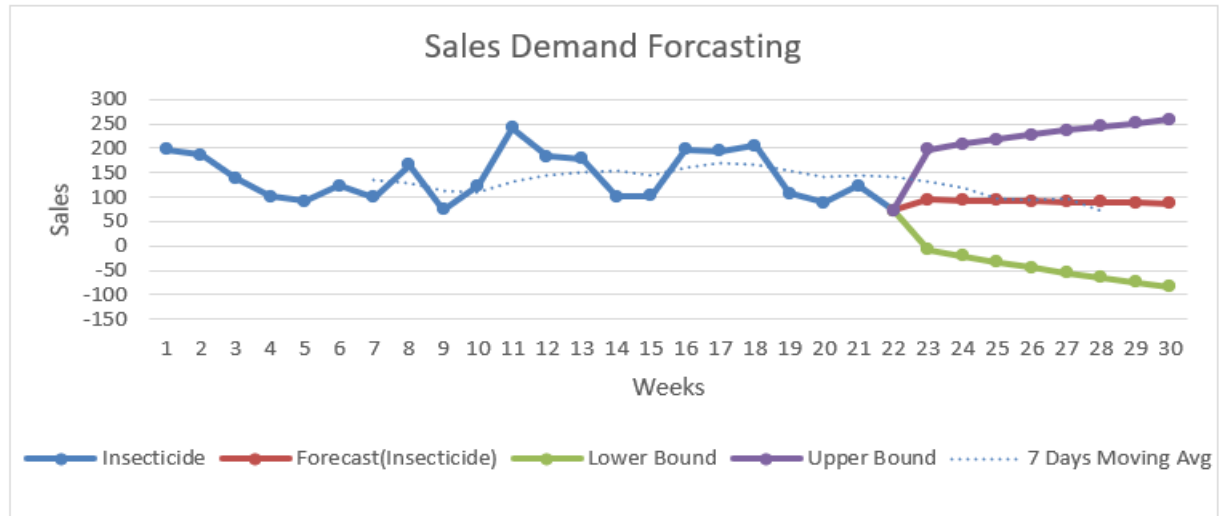
Fig 5: Sales Demand Forecasting of Insecticide for next 2 months (Apr'25-May'25)
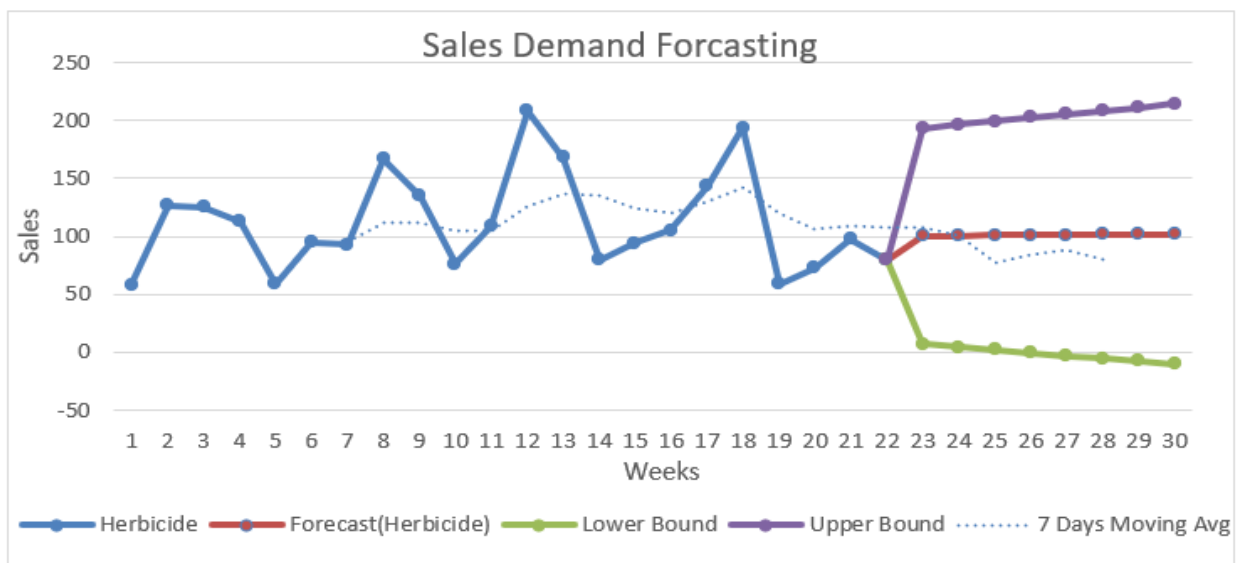

Fig 6: Sales Demand Forecasting of Herbicides for next 2 months (Apr'25-May'25)
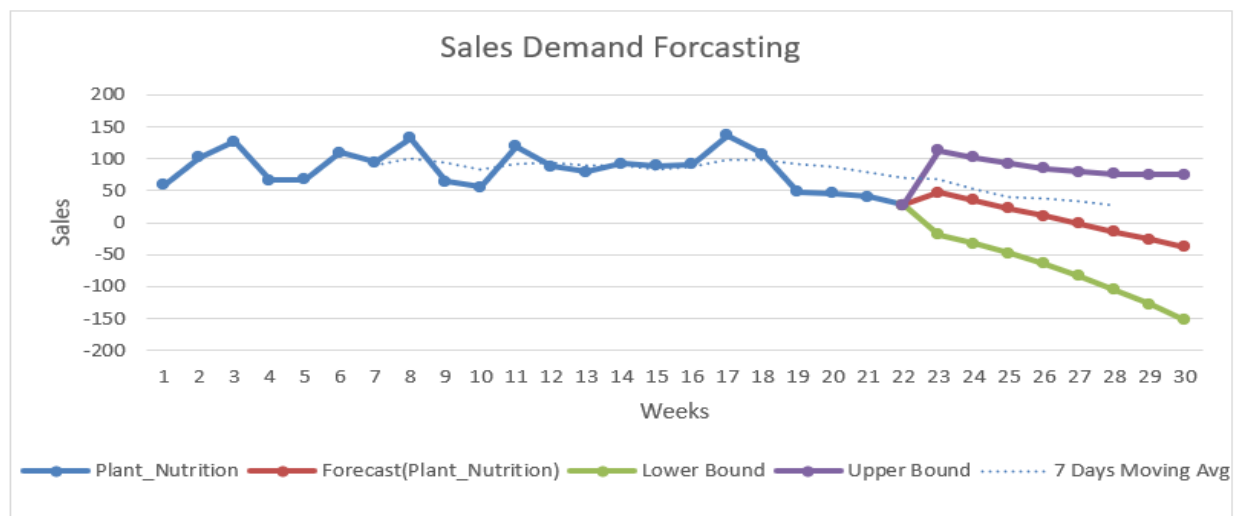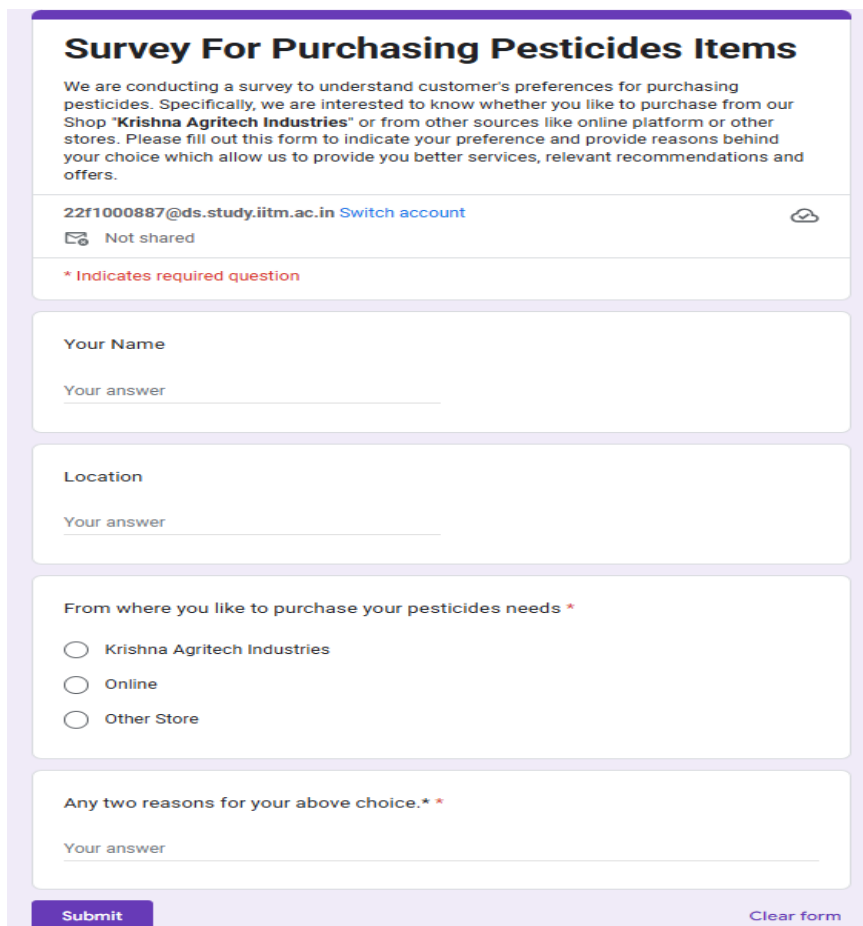

Fig 7: Sales Demand Forecasting of Plant Nutrition for next 2 months (Apr'25-May'25)

- **Key Insights:**
  - Above **fig 6 and fig 7** shows **herbicides** has potential for growth (through the upper bound), whereas **Plant Nutrition** shows a clear downtrend and risk.
  - Above **fig. 7** demonstrate that strategic actions like **demand stimulation, optimized inventory management** or **product bundling** could mitigate risks, especially for **Plant Nutrition**.
  - For **Fungicide and Insecticide**, we need to maintain **flexible supply chain** and production scheduled.

3.6 Customer Preference and Survey Results

The survey responses provide insights into the purchasing behavior of customers and their reasons for choosing online platforms versus offline stores.

Fig 8: Google-form through which the survey was conducted

3.6.1 Overview of Responses

The responses indicate a near-even split between customers preferring online platforms and those sticking to offline stores. The top reasons for each choice were analyzed -

- **Krishna Agritech Industries:** Trust, lower price, nearby, good quality, reasonable price.
- **Online Platforms:** Home delivery, variety, availability, offers, discount.
- **Offline Stores**: Better quality and lower prices.
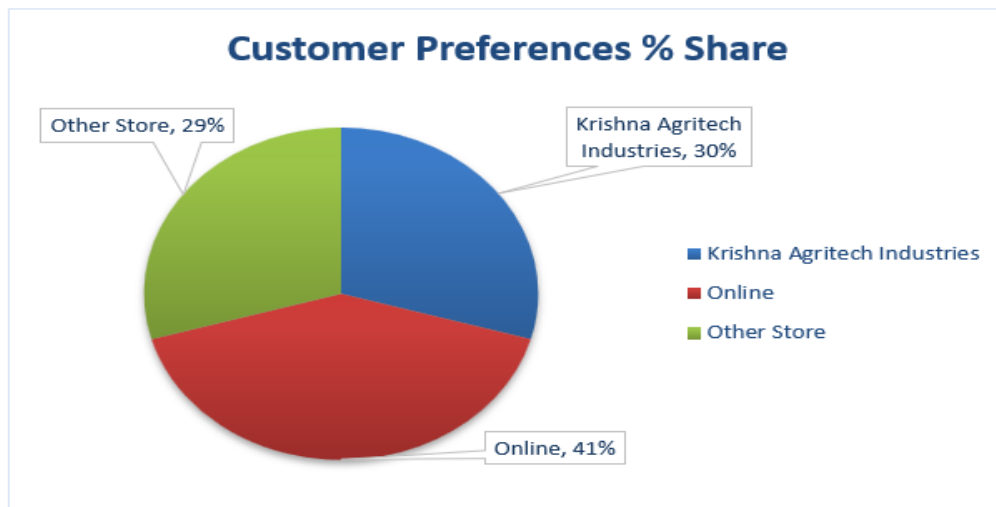

Fig 9: A pie chart showing the distribution of customer preference percentage share

3.6.2 Thematic Analysis of Customer Responses

- **Krishna Agritech Industries:**
  - **Trust:** Few people still believe in trust and consecutive terms productive results.
  - **Quality:** Customer believe in delivery of quality products.
- **Online Platforms:**
  - **Convenience:** Mostly online shoppers prefer platforms due to home delivery option
  - **Product Variety:** Availability of various items draw a specific customer segment.
- **Other Store:**
  - **Price Sensitivity:** Majority of respondents cited lower price of another offline store. Price is a major factor with customers mentioning lower costs compared to online options.
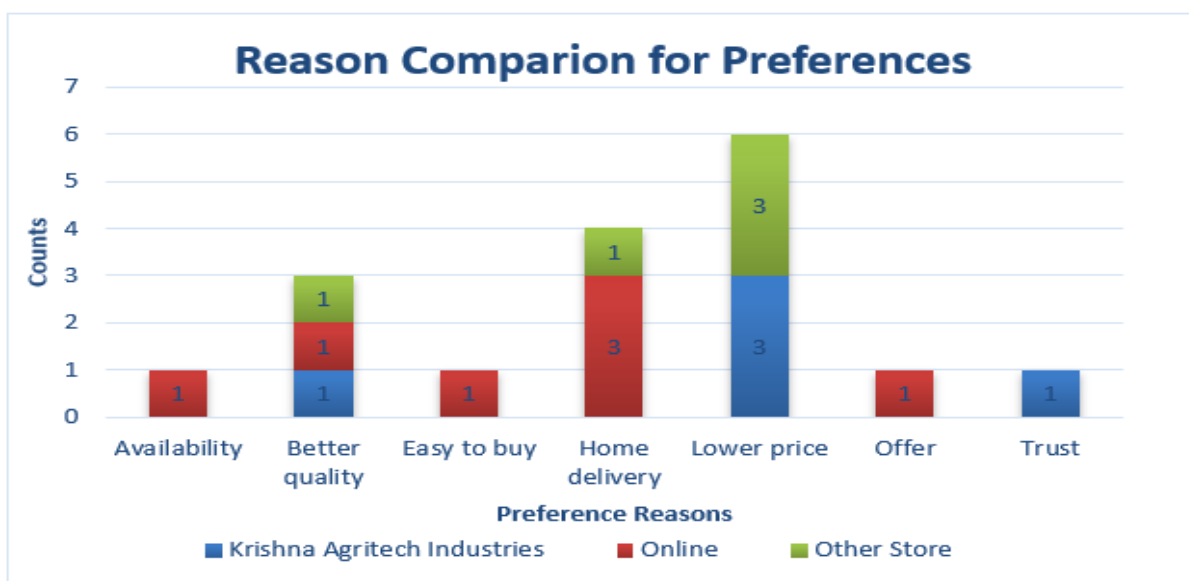
Fig 10: A stacked bar chart for categorizing customer's reasons based on their choice of platform

- **Key Insights:**
  - **Price:** Offline platform has lower price than online platform.
  - **Trust:** Krishna Agritech Industries has a long reputation and trust in local market.
  - **Variety and Home Delivery:** Online Platforms are slightly ahead in offering variety, discounts, offers, promotions and non-seasonal products.

4 Interpretation of Results and Recommendations

4.1 Interpretation of Results

4.1.1 Revenue and Sales Performance Analysis

- **Leading Revenue Contributors:** The analysis highlighted those insecticides—particularly **'Ridomil Gold'** and **'Exponus**' are the dominant contributors to overall revenue and profit at Krishna Agritech. These products combine both high sales volumes and sizable profit margins, underlining their strategic importance for the business.

- A classic ABC pattern is evident, where about **20%** of SKUs (mainly premium insecticides) generate around **80%** of revenue, signifying a strong product concentration that should inform inventory priorities.

- **High Sales Low Revenue Products**: Products like **'Saaf'** demonstrated high units sold but contributed minimally to revenue, largely due to lower margins. This mismatch reveals that high demand does not always translate into high profitability and that pricing or promotional strategies for these products may need reassessment.

4.1.2 Seasonality and Demand Trends

- **Sales Peaks and Dips:** The time-series analysis exposed distinctive seasonal spikes and declines in sales. Demand surges typically aligned with specific agricultural cycles, emphasizing the necessity of forecasting and preemptive stocking

- **Stockouts and Lost Opportunities:** Frequent stockouts during peak periods, especially for key pesticides like **'Exponus'**, resulted in foregone sales and adversely impacted customer satisfaction, creating a risk of customer churn

4.1.3 Customer Preference and Retention

- **Customer Attrition Patterns:** Many customer - including both large-scale farmers and retail buyer- do not return after a single purchase. The main reasons cited were frequent stockouts, lack of personalized engagement, and better offers or convenience found with competitors both online and offline.

- **Purchase Decision Drivers:** The customer survey revealed that shoppers are influenced by a combination of reasonable prices, discounts, variety, trust, convenience, and product quality. While online platforms attract buyers with offers and ease of ordering, many still prefer Krishna Agritech for trust and the assured quality of branded pesticides.

4.1.4 Operational Data and Insights

- **Data Quality and Integration:** Inconsistent, fragmented datasets initially hindered holistic business analysis. After data cleaning and integration, accurate sales, customer, and inventory visualization was achieved - enabling robust operational insights and evidence-based recommendations.

4.2 Recommendations

4.2.1 Dynamic Inventory Optimization

- Prioritize the stocking of high-margin, top-selling insecticides such as **'Ridomil Gold' and 'Exponus'**. Maintain minimum inventory thresholds for these products, especially in anticipation of seasonal demand peaks.

- Use predictive analytics to adjust reorder levels dynamically, reducing both understocking and excessive surplus that leads to waste.

- <u>**Justification:**</u> Maintaining minimum inventory during seasonal peaks helps avoid stockouts and leverages predictable sales patterns for fungicides and herbicides, improving cash flow and reducing waste through data-driven reorder adjustments.

4.2.2 Enhanced Customer Retention Initiatives

- Establish loyalty programs, regular follow-ups, and personalized offers targeting large and returning customers. Utilize purchase history to tailor communication and offers.

- Provide differentiated service, such as expert product advice and exclusive discounts on select products like **'Exponus'**, strengthening competitive advantage and repeat sales.

- <u>**Justification:**</u> Targeting loyal and large customers with personalized offers based on purchase history strengthens relationships and encourages repeat sales.

4.2.3 Competitive Pricing and Value Communication

- Regularly benchmark Krishna Agritech Industries' prices and promotions against leading online and offline competitors to remain attractive, especially for high-volume products.

- Promote unique value propositions such as trust, assured product quality and expert agronomic support, especially for flagship brands like **'Ridomil Gold'** to reinforce customer loyalty.

- <u>**Justification:**</u> Benchmarking prices against competitors maintains market relevance for flagship products which directly supports sales volume.

4.2.4 Continuous Market Feedback

- Continue collecting customer feedback via surveys and point-of-sale interactions, enabling rapid adaptation to changing needs and preferences.

- Use these insights to inform product selection, promotional strategies and service enhancements.

By implementing these data-driven strategies, **Krishna Agritech** can increase inventory efficiency, reduce capital lock in, improve customer satisfaction, drive sustainable growth and profitability in a competitive Agricultural market.

As mentioned by **TA** in **midterm report comment**, I have added **survey analysis** (Refer point 3.6) and **category wise demand forecasting** (Refer point 3.5).

- I have use the following data for my Analysis - **Click here for BDM project data** (Kindly download in your local)

- Following is the link for survey data - **Click here for survey data**

Thank You