

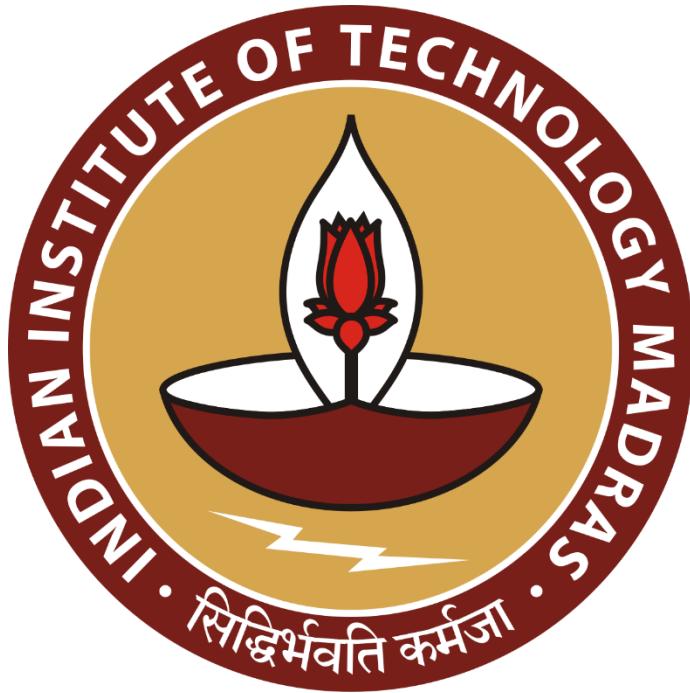
# **Enhancing Operational Efficiency and Cost Savings through Process Optimization at Prajwal Steel and Thibak Agency.**

**A Mid-term Submission for the BDM capstone Project**

Submitted by

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# **Enhancing Operational Efficiency and Cost Savings through Process Optimization at Prajwal Steel and Thibak Agency.**

## **1 Executive Summary and Title**

The organization in focus operates as a B2B entity and serves as an authorized distributor for [SHREE TNB POLYMERS LIMITED](#). Its primary mission is to manage inventory and ensure a consistent supply chain to its affiliated dealers.

SHREE TNB POLYMERS LIMITED, the parent company, specializes in a comprehensive range of plastic piping solutions. By granting distribution rights to local distributors, the company aims to mitigate storage and inventory costs that might otherwise be elevated at the factory location. In exchange, the distributor or agency receives a predetermined profit margin as stipulated by the company.

However, the agency encounters numerous challenges that influence its operational efficiency and profitability. These challenges encompass credit system complications, price volatility, transportation logistics for dealers, sales seasonality, stock shortages, unpredictable demand, inventory optimization struggles, and mismatches between customer requirements and available products. These issues not only impede the organization's effectiveness but also present risks to customer satisfaction and the overall growth of the business.

To address the challenges faced by the organization, a multifaceted approach is necessary. My objective is to devise practical solutions that will enhance the overall performance of the agency. These strategies will include the utilization of data-driven insights, comprehensive credit analysis, and the implementation of demand forecasting techniques.

## **2 Organization Background**

[Prajwal Steel Hardware and Thibak Agency](#), a distribution firm specializing in TNB Polymers' products, has positioned itself as a cost-competitive entity in the market. Under the leadership of owner Prakash More and management by Prajwal More, the company has evolved from its inception as a retail business in December 2020 to a significant distributor.

In June 2021, the agency formed a strategic partnership with TNB for distribution, a substantial milestone in its corporate journey. The company's expertise lies in three specific product categories: Drip Irrigation products, Sprinkler products, and PVC pipes. Holding the third position in market share, the agency has maintained consistent profitability, as evidenced by its upward sales trend.

The company's growth ambitions are further reflected in its financial projections, expecting a turnover increase from 55 lakhs to 1 crore in the fiscal years 2022-23 to 2023-24. In alignment with this growth, there are plans to expand the storage space from 3,000 square feet to 7,000 square feet, reinforcing the agency's commitment to scaling its operations and enhancing its presence in the industry.

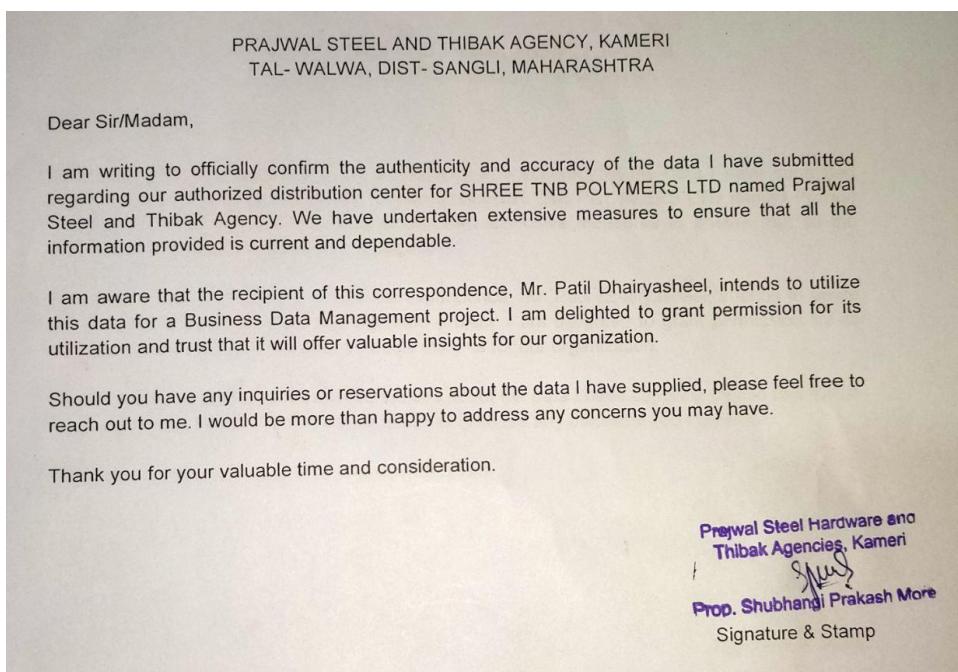
### **3 Objectives**

- 3.1 The objective is to analyze the variables influencing the sales of equipment and to utilize this analysis for forecasting future demand.
- 3.2 Based on these insights, we will formulate recommendations regarding the optimal timing and quantity of equipment orders for the upcoming year, with the aim of reducing unnecessary inventory.
- 3.3 Furthermore, we will enhance inventory management practices by leveraging the identified demand patterns. This will enable us to fine-tune inventory levels, thereby minimizing situations where stock is unavailable, aligning supply more closely with demand, and ensuring a more efficient utilization of resources.

### **4 Proof of originality of Data**

**Photographs :- [link](#) ,Video:- [link](#)**

#### **Letter from organization**



## 5 Metadata

The shop maintains its data in three different forms:

### Stock (Excel) Sheet:

The Excel sheet serves as an additional source of stock data, although it is only updated at the end of each month. While it may provide a snapshot of stock levels, it may not capture real-time changes. However, it can still provide insights into monthly trends and sales patterns.

### Sundry Creditors Diary:

The Sundry Creditors Diary is a crucial source for understanding the credit owed to dealers and the payment timeline. Analyzing this data will allow us to assess credit management efficiency and identify any potential issues that may impact cash flow and financial stability.

### DC (Delivery Challan) Book:

The DC book contains raw bills related to orders and purchases from dealers. It provides valuable information on the quantity, type, and timing of purchases. Analyzing this data will help identify patterns in customer orders and determine the demand for different products.

Let's see sample of each of these

## 1. STOCK (EXCEL) SHEET

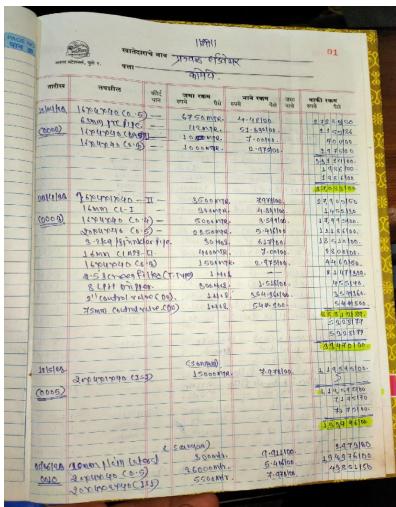
1	LLDPE FLAT EMITTING PIPE 16MM 0.3MM 4 LPH 40CM (1500 mtr )	23500		-1000	-1500		
2	LLDPE FLAT EMITTING PIPE 16MM 0.2MM 4 LPH 40CM (1000 mtr )	88000					
3	LLDPE FLAT EMITTING PIPE 16MM 0.4MM 4 LPH 40CM (1000 mtr )	14000			-5000		
4	LLDPE FLAT EMITTING PIPE 16MM 0.5MM 4 LPH 40CM (750 mtr )	6750		-6750		20000	
5	LLDPE FLAT EMITTING PIPE 20MM 0.3MM 4 LPH 40CM (1000 mtr )	27000					
6	LLDPE FLAT EMITTING PIPE 20MM 0.5MM 4 LPH 40CM (500 mtr )	23250			-2250	750	
7	LLDPE FLAT EMITTING PIPE 16MM CLASS II 4 LPH 40 CM ( 500mtr )	27500		-6000			
8	LLDPE FLAT EMITTING PIPE 20MM CLASS I 4 LPH 40 CM ( 500mtr )	26000			-3500		-15000
9	LLDPE EMITTING PIPE 16 MM CLASS II 4 LPH 40 CM ( 300mtr )	10800					
10	LLDPE LATERAL PIPE 16 MM CLASS II ( 300mtr )	4500		-100	-400	10000	
11	LLDPE EMITTING PIPE 16 MM CLASS I 4LPH 40 CM ECO ( 300mtr )	1800			-300		
12	HDPE SPRINKLER PIPE 75MMMX 3.2 KG	121				-30	
13	FOOT BATTEN ASSEMBLY WITH QAC 75MM	41					
14	RISER PIPE 20MM OD x 1000MM LONG	45					
15	PUMP CONNECTING NIPPLE WITH QAC 75MM	5					
16	BEND WITH QAC 75 MM	7					
17	TEE WITH QAC 75MM	7					
18	END PLOUGH WITH QAC 75MM	12					
19	SPRINKLER NOZZLE 20MM	41					
20	2" CONTROL VALVE AUTOMAT DU	35				-1	
21	75MM CONTROL VALVE AUTOMAT DU	24				-1	
22	2.5" SCREEN FILTER T TYPE ( 40M3/HR )	3				-1	
23	3" SCREEN FILTER T TYPE ( 50M3/HR )	3					-1
24	2.5" SEMI AUTOMATIC FILTER (30M3/HR) 120 MESH	4					
25	PRESSURE GAUGE 2"						
26	16MM GROMMET	3770					
27	16MM TAKEOFF	1500					
28	16MM JOINER	2200					
29	16MM ENDCAP	1500					
30	TAKEOFF 20MM	4300					
31	20MM JOINER	1300					-100
32	ENDCAP 20MM	400					
33	16MM TEE						
34	SCREEN FILTER (30M3/HR 2.5" METAL )						
35	3" SU PVC BALL VALVE 90MM	7					
36	LLDPE FLAT EMITTING PIPE 20 MM 0.4MM 4LPH 40 CM ( 750mtr )	28500				750	

Sheet1

Accessibility: Good to go

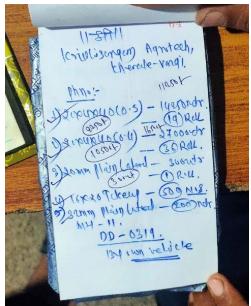
- This stock excel sheet has 64 items listed , in rows . Additional can be added as needed.
- Each row maintains the quantity of stock received as well as sold.
- Columns in yellow denote the refill of inventory , received from the factory on a particular date.
- For each row , name , inward stock , outward stock and final stock is maintained.
- This is maintained by the manager of the organization.

## **2. Sundry Creditors diary**



- This register encompasses details regarding the credit extended to various dealers along with the corresponding outstanding amounts.
  - Each individual page presents the subsequent information pertaining to the respective dealer.
    - Dealer's Name.
    - Date of Sale Transactions.
    - Quantity of Items Sold and Their Value.
    - Total Transaction Value.
    - Outstanding Amount.

### **3. DC (Delivery Challan) Book:**



- This is a raw register which maintains data about a single transaction .
  - It contains date, quantity of items and amount to be paid and in some bills mode of transportation is also mentioned.

The organization has shared us 2 years of stock register data and credit data of available dealers.

Follow the link below to see the raw data:

[https://drive.google.com/drive/folders/1p\\_XTx7x8V\\_RCdDBYATgBWwt9UoxVHMvw?usp=sharing](https://drive.google.com/drive/folders/1p_XTx7x8V_RCdDBYATgBWwt9UoxVHMvw?usp=sharing)

## Pre-processing:

We performed some pre-processing steps, such as replacing null values with zeros and properly filling in columns that were left blank in the inventory , then we corrected the format of dates.

To begin with, we separated the data that denotes refill and sale from the main excel sheet. We named it as

Inward and outward files. On some days there are multiple entries pertaining to different dealers, we clubbed them together to form a single entry on the same date.

Snapshot of Inward\_22\_23.xlsx

ITEM DESCRIPTION	01-11-2022	02-06-2022	03-08-2022	23-03-2022	08-09-2022	17-10-2022	20-11-2022	01-11-2022	19-04-2022
LLDPE FLAT EMITTING PIPE 16MM 0.3MM 4 LPH 40CM (1500 mtr )									30000
LLDPE FLAT EMITTING PIPE 16MM 0.2MM 4 LPH 40CM (1000 mtr )		35000			100000	50000			
LLDPE FLAT EMITTING PIPE 16MM 0.4MM 4 LPH 40CM (1000 mtr )			20000						
LLDPE FLAT EMITTING PIPE 16MM 0.5MM 4 LPH 40CM (750 mtr )	10500			45000					
LLDPE FLAT EMITTING PIPE 20MM 0.3MM 4 LPH 40CM (1000 mtr )						30000			
LLDPE FLAT EMITTING PIPE 20MM 0.5MM 4 LPH 40CM (500 mtr )	10000	5000	13000			30000		50250	
LLDPE FLAT EMITTING PIPE 16MM CLASS II 4 LPH 40 CM ( 500mtr )	15000	10000			36000	2000	10000		
LLDPE EMITTING PIPE 16 MM CLASS II 4 LPH 40 CM ( 300mtr )	15000	10000	10000		36000	2000	20000	15000	
LLDPE LATERAL PIPE 16 MM CLASS II ( 300mtr )	3000								
			3000				7500	1000	
LLDPE EMITTING PIPE 16 MM CLASS I 4LPH 40 CM ECO ( 300mtr )									
HDPE SPRINKLER PIPE 75MMMX 3.2 KG					240				
FOOT BATTEN ASSEMBLY WITH QAC 75MM					64				
RISER PIPE 20MM OD x 1000MM LONG					64				
PUMP CONNECTING NIPPLE WITH QAC 75MM					8				
BEND WITH QAC 75 MM					8				

Snapshot of outward\_22\_23.xlsx

A	B	C	D	E	F	G
Date	25-01-2022	10-02-2022	14-02-2022	07-03-2022	19-03-2022	25-03-2022
LLDPE FLAT EMITTING PIPE 16MM 0.3MM 4 LPH 40CM (1500 mtr )	0	0	0	0	0	0
LLDPE FLAT EMITTING PIPE 16MM 0.2MM 4 LPH 40CM (1000 mtr )	0	0	0	0	0	0
LLDPE FLAT EMITTING PIPE 16MM 0.4MM 4 LPH 40CM (1000 mtr )	0	0	0	4000	0	0
LLDPE FLAT EMITTING PIPE 16MM 0.5MM 4 LPH 40CM (750 mtr )	0	0	0	0	0	0
LLDPE FLAT EMITTING PIPE 20MM 0.3MM 4 LPH 40CM (1000 mtr )	0	0	0	0	0	0
LLDPE FLAT EMITTING PIPE 20MM 0.5MM 4 LPH 40CM (500 mtr )	0	0	0	0	500	0
LLDPE FLAT EMITTING PIPE 16MM CLASS II 4 LPH 40 CM ( 500mtr )	5000	10500	3500	0	500	0
LLDPE FLAT EMITTING PIPE 20MM CLASS I 4 LPH 40 CM ( 500mtr )	0	1000	0	0	500	1500
LLDPE EMITTING PIPE 16 MM CLASS II 4 LPH 40 CM ( 300mtr )	0	0	0	0	0	0
LLDPE LATERAL PIPE 16 MM CLASS II ( 300mtr )	0	0	0	0	0	0
LLDPE EMITTING PIPE 16 MM CLASS I 4LPH 40 CM ECO ( 300mtr )	0	0	0	0	0	0
HDPE SPRINKLER PIPE 75MMMX 3.2 KG	0	0	0	0	0	0
FOOT BATTEN ASSEMBLY WITH QAC 75MM	0	0	0	0	0	0

And similarly inward\_23\_24 and outward\_23\_24 were created.

Prices extracted from company documents and then rounded to the nearest.Snapshot provided

LLDPE FLAT EMITTING PIPE 16MM 0.3MM 4 LPH 40CM (1500 mtr )	4998
LLDPE FLAT EMITTING PIPE 16MM 0.2MM 4 LPH 40CM (1000 mtr )	1923
LLDPE FLAT EMITTING PIPE 16MM 0.4MM 4 LPH 40CM (1000 mtr )	4031
LLDPE FLAT EMITTING PIPE 16MM 0.5MM 4 LPH 40CM (750 mtr )	3395
LLDPE FLAT EMITTING PIPE 20MM 0.3MM 4 LPH 40CM (1000 mtr )	3927
LLDPE FLAT EMITTING PIPE 20MM 0.5MM 4 LPH 40CM (500 mtr )	4465
LLDPE FLAT EMITTING PIPE 16MM CLASS II 4 LPH 40 CM ( 500mtr )	3880
LLDPE FLAT EMITTING PIPE 20MM CLASS I 4 LPH 40 CM ( 500mtr )	4465
LLDPE EMITTING PIPE 16 MM CLASS II 4 LPH 40 CM ( 300mtr )	2532
LLDPE LATERAL PIPE 16 MM CLASS II ( 300mtr )	2463
LLDPE EMITTING PIPE 16 MM CLASS I 4LPH 40 CM ECO ( 300mtr )	1626
HDPE SPRINKLER PIPE 75MMMX 3.2 KG	617
FOOT BATTEN ASSEMBLY WITH QAC 75MM	466
RISER PIPE 20MM OD x 1000MM LONG	135
PUMP CONNECTING NIPPLE WITH QAC 75MM	261
BEND WITH QAC 75 MM	173
TEE WITH QAC 75MM	255
END PLOUGH WITH QAC 75MM	71
SPRINKLER NOZZLE 20MM	366
2" CONTROL VALVE AUTOMAT DU	374
75MM CONTROL VALVE AUTOMAT DU	515

Note above tables only represent a few rows from cleaned data. Follow the link below to see the entire data.

[https://drive.google.com/drive/folders/1WBzhtAFqUP2gi0H9GrU3FKbfYNZ7eVL2?usp=drive\\_link](https://drive.google.com/drive/folders/1WBzhtAFqUP2gi0H9GrU3FKbfYNZ7eVL2?usp=drive_link)

After a comprehensive consultation with the agency's owner, we have categorized the entire collection of items into four major groups.

1)LLDPE pipes 2)Joiner Accessories 3)Valve Accessories 4)Filter Accessories

## **Descriptive Statistics:**

During the fiscal year 2022-23, a total of 9 shipments were received between March 23, 2022, and November 20, 2022. The details of the received shipments are as follows:

**LLDPE Pipes:** An average of 90,388.89 meters per shipment was received.

**Joiner Accessories:** An average of 3,622 items per shipment were received.

**Valve Accessories:** Approximately 208.11 items per shipment were received .

**Filter Accessories:** On average, 26.778 items per shipment were received.

In the same fiscal year, the stock was sold over 53 different days, with the following sales statistics:

**LLDPE Pipes:** A total of 621.33 bundles were sold.

**Joiner Accessories:** Approximately 12,400 pieces were sold.

**Valve Accessories:** 1,008 items were sold.

**Filter Accessories:** Around 158 items were sold over the period.

Upon analyzing the stock sold over various dates, the following observations were made:

**Maximum Purchase:** INR 8,21,950.5 was observed on January 31, 2023.

**Minimum Purchase:** INR 84 was observed on July 3, 2022.

**Average Sale:** INR 136,508.8 was observed.

These descriptive statistics offer a comprehensive overview of the data, shedding light on key patterns and trends that can guide future decision-making and strategy.

## **6 Analysis Process**

The exploratory data analysis was conducted using three primary tools: Excel, PowerBI, and Python. The process was structured in a systematic manner, as detailed below:

### **1. Preprocessing:**

The initial preprocessing was executed within Excel to prepare the data for further analysis.

### **2. Trend Analysis:**

**Data Categorization:** The data was first segmented according to specific categories.

**Monthly Aggregation:** A pivot table in Excel was utilized to group dates by month and calculate the total number of products sold for each month.

**Visualization of Trends:** Line graphs were plotted for each category using Excel's inbuilt functionalities to visualize the trends over time.

**Revenue Trend Analysis:** The quantities were crossed with their respective prices, and the results were plotted against dates to ascertain the revenue trend.

### **3. Descriptive Statistics:**

Data was manually categorized, and the sum, maximum, minimum and average was calculated using Excel..

### **4. Creation of Pie Charts**

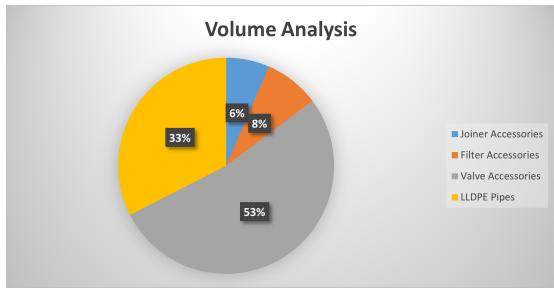
**Pivot Table Generation:** Pivot tables were created for different categories.

**Pie Chart Visualization:** The pie chart was subsequently generated to represent the categorized data.

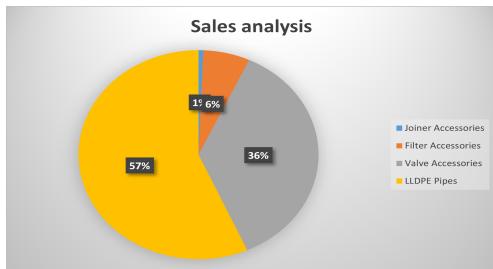
This comprehensive approach facilitated a robust analysis, leveraging the capabilities of Excel, PowerBI, and Python to derive meaningful insights from the data.

## **7 Results and Findings**

### **7.1 Volume Analysis of Sales 22-23:**

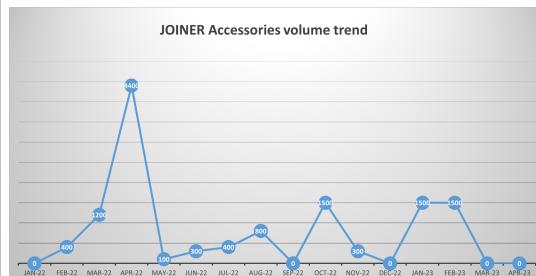
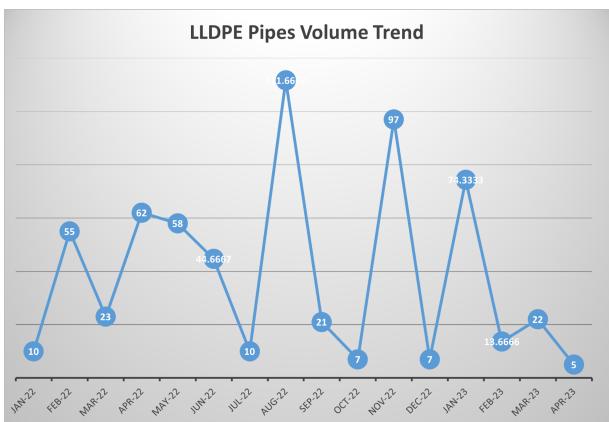


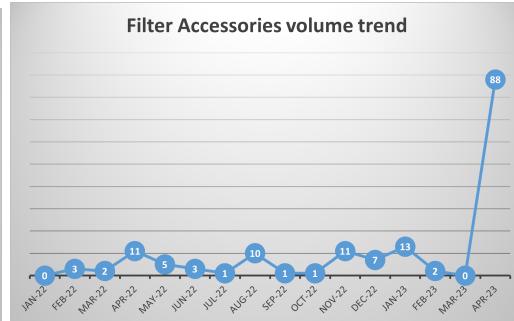
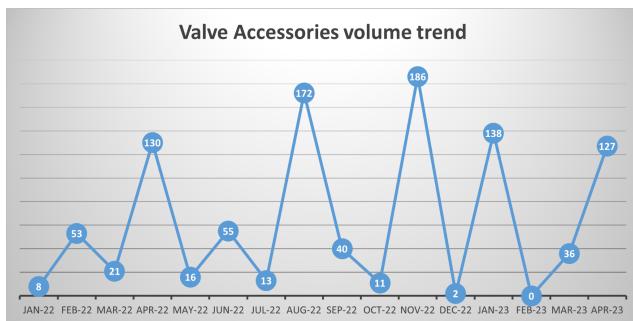
## 7.2 Sales analysis of Sales 22-23:



- The pie charts offer significant insights into the categories that lead in both sales and revenue generation. Considering our constrained inventory capacity, it would be prudent to concentrate our efforts on the top-performing category.
- This focus will aid in prioritizing the constant availability of these items, thereby reducing the likelihood of stockout scenarios.
- To realize this objective, we may strategically reduce the inventory of less significant items, allowing for a more efficient allocation of resources to the categories that demonstrate the highest performance.

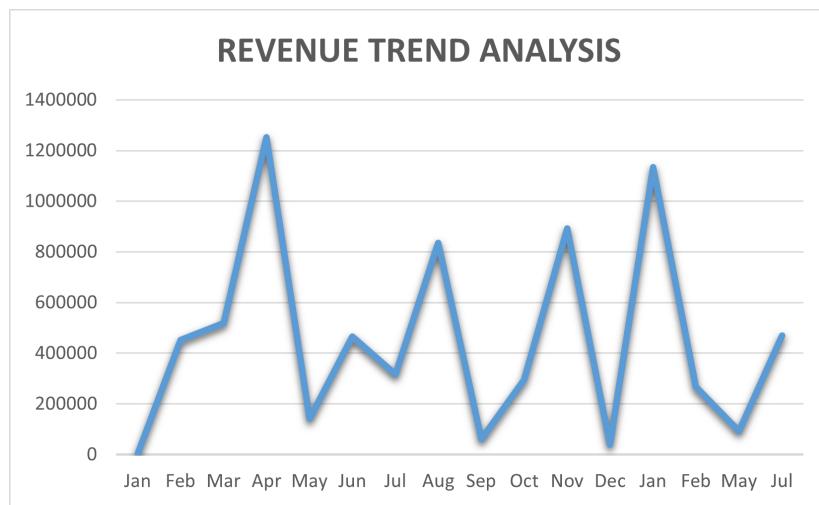
## 7.3 Volume trend analysis for LLDPE Pipes, Joiner accessories, Valve accessories, Filter accessories categories :





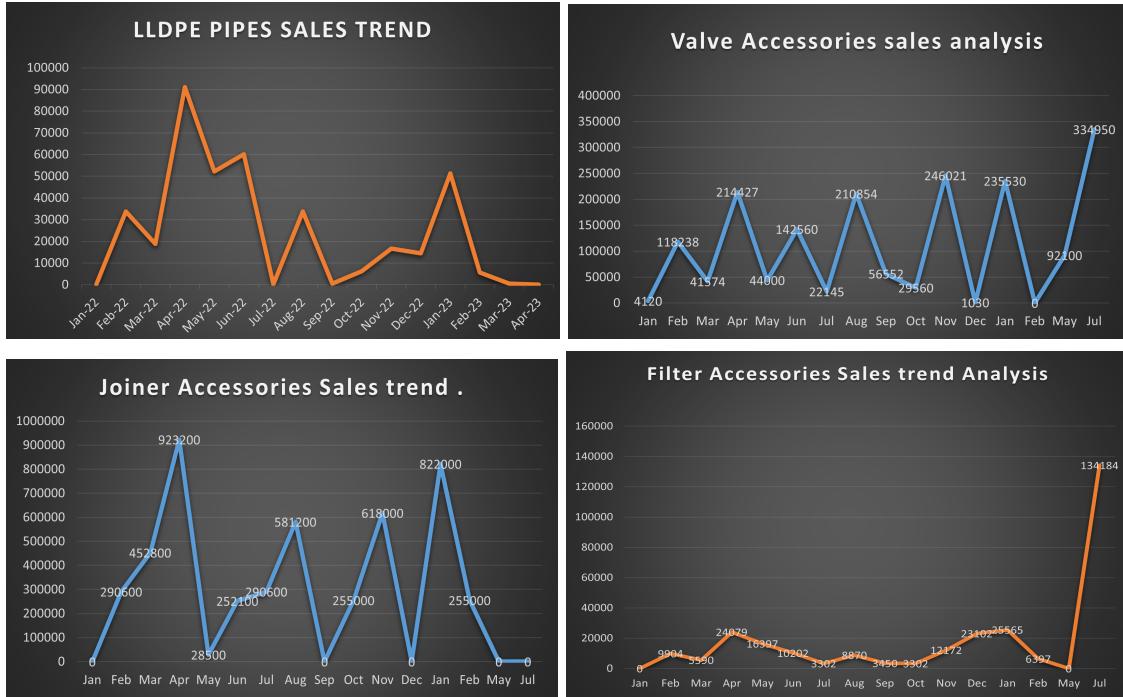
From the above we could conclude that there are significant spikes in the months of July to Dec for Pipes.

#### 7.4 Revenue trend analysis across all categories:



In the trend analysis of revenue spanning all categories, we have identified a significant increase in revenue during the first quarter of the year compared to other quarters.

#### 7.8 Additional graphs for sales trend analysis across for each categories:



## 8 Way Forward

- We've looked at our sales patterns and found some trends. Now, we're ready to dig deeper to understand what's causing them. We'll focus on how change in season affects how well our equipment sells.
- To do this, we're going to analyze the data over time. This will help us give the agency smart advice on how much equipment to buy. By using what we've learned so far and doing more analysis, we want to give the agency useful information.
- This information will help the agency get better at managing their inventory and sales, making sure they match what's happening in the market.
- We're not just looking at stock, though. We're also going to look at how much credit we've given to our dealers. We want to find the dealers who have bought a lot from us, so we can give them special incentives to encourage them to buy more. By using this information wisely, we hope to make the agency's profits better by being smart about costs.