Data-Driven Strategies for Enhancing Petrol Bunk Performance

A Proposal Report for the BDM Capstone Project

Submitted by

Name: Rojesh

Roll number: 21f3002660

IITM Online BS Degree Program,

Indian Institute of Technology, Madras, Chennai

Tamil Nadu, India, 600036

Contents

1 Executive Summary and Title

The project focuses on the Indian Oil Fuel Station located at 105-F, Palayamkottai Road West, Millerpuram, Tuticorin. The business is B2C and deals in the segment of selling Petrol, diesel, Xtramile petrol, and Lubricants directly to consumers at fuel stations.

The major business issues that the organization is facing are related to a very nominal profit due to a large number of inventory oils and analysis of Sales of Oils (petrol, Diesel, Xtramile). The issues will be addressed by analyzing the data via statistical methods, data visualization tools (Excel and Python), and advanced analytics techniques to identify trends, patterns, and potential areas for improvement.

The expected outcome helps the organization would be helping them understand the sales pattern of different kinds of oils. reduce the money blockage in terms of inventory, which helps increase the organization's profitability.

2 Proof of Originality of Data

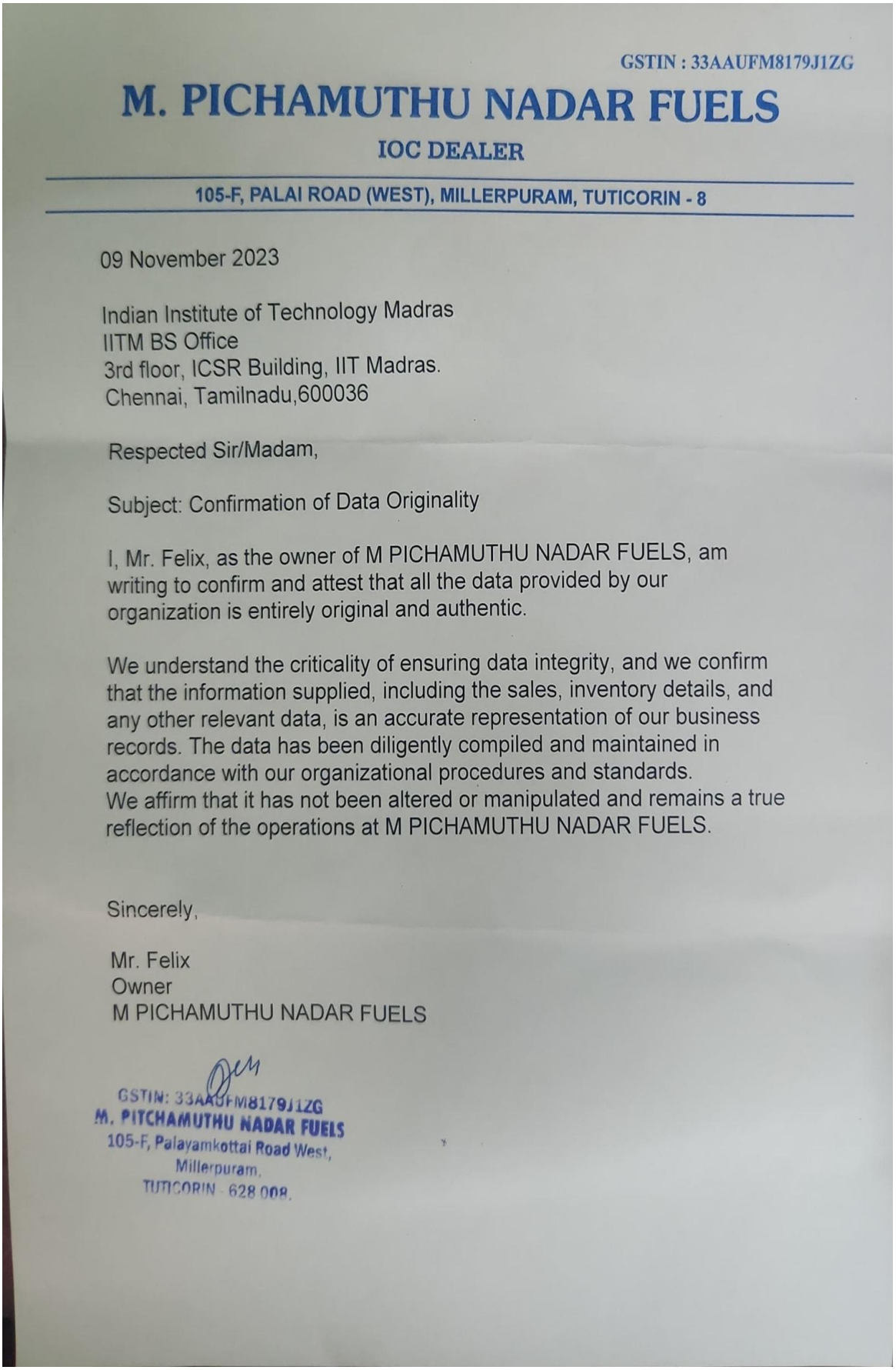
The Video Link to the conversation with the owner

https://drive.google.com/file/d/1lpjDT0tnUQKyhKeSzOy8AsJkl9EfFBPe/view?usp=drive_link

The Data in Excel:

https://docs.google.com/spreadsheets/d/1gOSNtpHhqgZU7sgvhdzWIHel_QLyQxRa/edit?usp=drive_link&ouid=113291411130470985069&rtpof=true&sd=true

Letter of Authorization:



GSTIN : 33AAUFM8179J1ZG

M. PICHAMUTHU NADAR FUELS

IOC DEALER

105-F, PALAI ROAD (WEST), MILLERPURAM, TUTICORIN - 8

09 November 2023

Indian Institute of Technology Madras
IITM BS Office
3rd floor, ICSR Building, IIT Madras.
Chennai, Tamilnadu,600036

Respected Sir/Madam,

Subject: Confirmation of Data Originality

I, Mr. Felix, as the owner of M PICHAMUTHU NADAR FUELS, am writing to confirm and attest that all the data provided by our organization is entirely original and authentic.

We understand the criticality of ensuring data integrity, and we confirm that the information supplied, including the sales, inventory details, and any other relevant data, is an accurate representation of our business records. The data has been diligently compiled and maintained in accordance with our organizational procedures and standards.
We affirm that it has not been altered or manipulated and remains a true reflection of the operations at M PICHAMUTHU NADAR FUELS.

Sincerely,

Mr. Felix
Owner
M PICHAMUTHU NADAR FUELS

GSTIN: 33AAUFM8179J1ZG
M. PITCHAMUTHU NADAR FUELS
105-F, Palayamkottai Road West,
Millerpuram,
TUTICORIN - 628 008.

3 Metadata

The format of the records they maintain appears as follows.

Things the dataset contains:

- **Date:** The date on which the inventory and sales data were recorded.
- **Tank 1 and 2 DIP:** Fuel dipping can detect water and pollutants in your fuel storage tanks.
- **Opening Stock (MS and XP):** The initial quantity of different fuel types (e.g., MS - Motor Spirit, XP - Xtramile Petrol) available in stock at the beginning of the day.
- **Purchase (MS and XP):** The quantity of each fuel type purchased each day
- **Opening Meter Reading:** The bunk I am working with has 4 MS pumps and 4 XP pumps.
- **Sales (MS and XP):** The quantity of each fuel type sold during the same time frame.
- **Cumulative Sales (MS and XP):** The running total of sales for each fuel type from the beginning of the month.

The Cleaned Data looks like:

- Date
- Opening Stock (MS and XP)
- Purchase (MS and XP)
- Sales (MS and XP)
- Cumulative Sales (MS and XP)

The Data is similar for both petrol and Diesel.

Sample Data:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Date	Opening Stock			Purchase			Sales			Cummulative Sales		
2		MS	XP	Total	MS	XP	Total	MS	XP	Total	MS	XP	Total
3	1	13169	14197	27366			0	2364	290	2654	2364	290	2654
4	2	10774	13911	24685	8000		8000	2812	141	2953	5176	431	5607
5	3	15994	13780	29774			0	2387	142	2529	7563	573	8136
6	4	13588	13668	27256			0	2725	310	3035	10288	883	11171
7	5	10819	13382	24201			0	2503	399	2902	12791	1282	14073
8	6	8303	12987	21290			0	2542	369	2911	15333	1651	16984
9	7	5800	12644	18444	12000		12000	2157	460	2617	17490	2111	19601
10	8	15637	12200	27837			0	2266	408	2674	19756	2519	22275
11	9	13381	11809	25190			0	2497	187	2684	22253	2706	24959
12	10	10849	11640	22489			0	1768	204	1972	24021	2910	26931
13	11	9075	11454	20529			0	2396	302	2698	26417	3212	29629
14	12	6686	11171	17857	8000		8000	2721	167	2888	29138	3379	32517
15	13	12025	11029	23054			0	2899	136	3035	32037	3515	35552
16	14	9188	10993	20181			0	2318	327	2645	34355	3842	38197
17	15	6890	10685	17575	8000		8000	1945	441	2386	36300	4283	40583
18	16	13007	10259	23266			0	2784	260	3044	39084	4543	43627
19	17	10172	10017	20189			0	2395	69	2464	41479	4612	46091
20	18	7775	9966	17741	8000		8000	2403	455	2858	43882	5067	48949
21	19	13460	9532	22992			0	2419	371	2790	46301	5438	51739

4 Descriptive Statistics

Total Fuel Sold = 1596266 liters

Total Petrol Sold = 1043642 liters

Avg Petrol Sales per Day = 2859 liters

Avg Petrol Sales per Month = 86970 liters

SD of Petrol Sales per Month = 5183 liters

Total Diesel Sold = 552624 liters

Avg Diesel Sales per Day = 1514 liters

Avg Diesel Sales per Month = 46052 liters

SD of Diesel Sales per Month = 3943 liters

Summary:

The analysis of the sales data reveals some insights into the sales of Petrol and Diesel Sold in the Bulk. On analyzing the 1-year data of the Fuel Bunk, I could say that the sale of Petrol is twice the Diesel Sales. The maximum single-day sale in the analysis period for Petrol is on December 25 with a sale of 3810 liters and for Diesel, it is on June 14 with a sale of 3996 liters. The month with the highest sale of Petrol was August with 92709 liters and the Highest Sale of Diesel was on Month June with 53685 liters. Approximately 90 the percent of the petrol sold in Motor Spirit.

Guiding the fine-tuning of operational strategies, optimization of the product range, and directing focused marketing initiatives, the analysis holds strategic significance. Leveraging high-performing fuel products and understanding customer preferences, the Indian Oil Fuel Station can fortify its competitive stance and attain continuous growth.

5 Detailed Explanation of Analysis Process

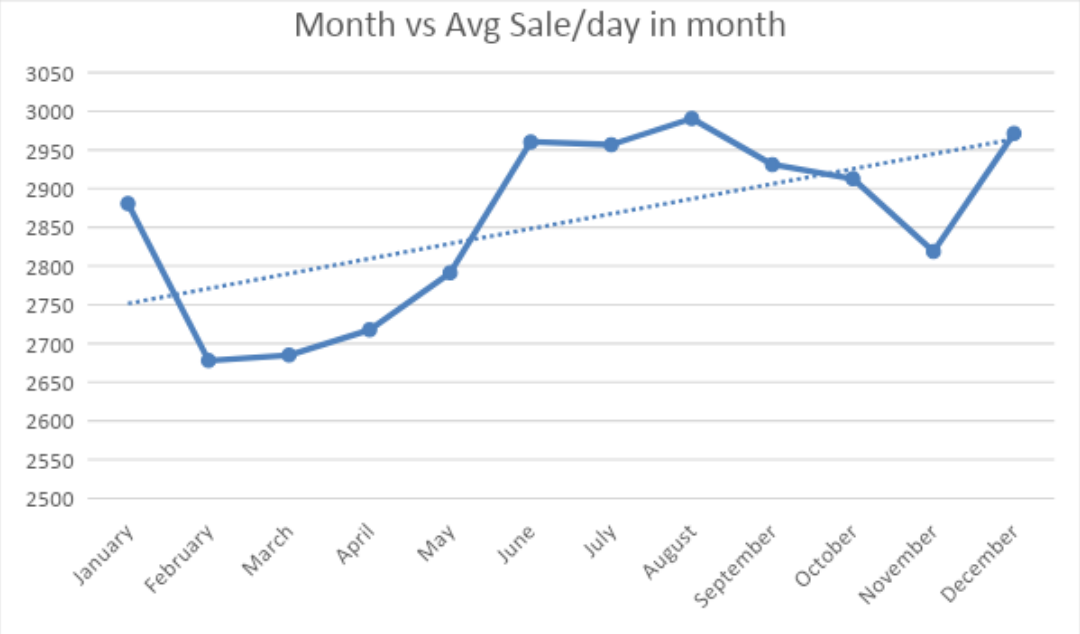
The data provided was 12 months of data on the sales and inventory details which is in the pen and paper format. The primary analytical instrument used is Microsoft Excel and Python.

- **Data Cleaning and Selection:** To begin, the original dataset must be cleaned, paying particular attention to important columns like Date, Opening Stock, Purchase, Sales, and Cumulative Sales. The planned analysis did not require the DIP Value or the Testing Values.
- **Transcribing to Digital Format:** Using software tools like Microsoft Excel and Python, the cleaned data had to be transcribed from the pen-and-paper format into a digital version. The data for every month was put into different files or spreadsheets to make management and analysis easier. After being transcribed, the data was verified using Python and Excel to make sure it was accurate and consistent. This entailed looking for any inconsistencies, omitted information, or formatting mistakes.
- **Visualization:** To improve comprehension of sales trends, the investigation involves creating visual representations using Python tools like Matplotlib and Microsoft Excel. A bar chart was created with the X-axis representing "months" and the Y-axis representing "total sales" to show the month-by-month sales for various fuel kinds. This graphs will make it easier to see sales distribution and trends over 12 months and provide information on how each fuel type performed at different times of the year.

- **Insights Derived:** The analysis uncovered pivotal observations. Variations in monthly sales patterns suggested possible consequences for inventory control and fuel-type procurement tactics. Variations in sales across fuel categories highlighted the need for more research into the factors influencing each of their success. Furthermore, these graphic representations provided perceptions into local preferences, making it easier to identify opportunities for customized marketing plans or inventory control adjustments at the Indian Oil Fuel Station.

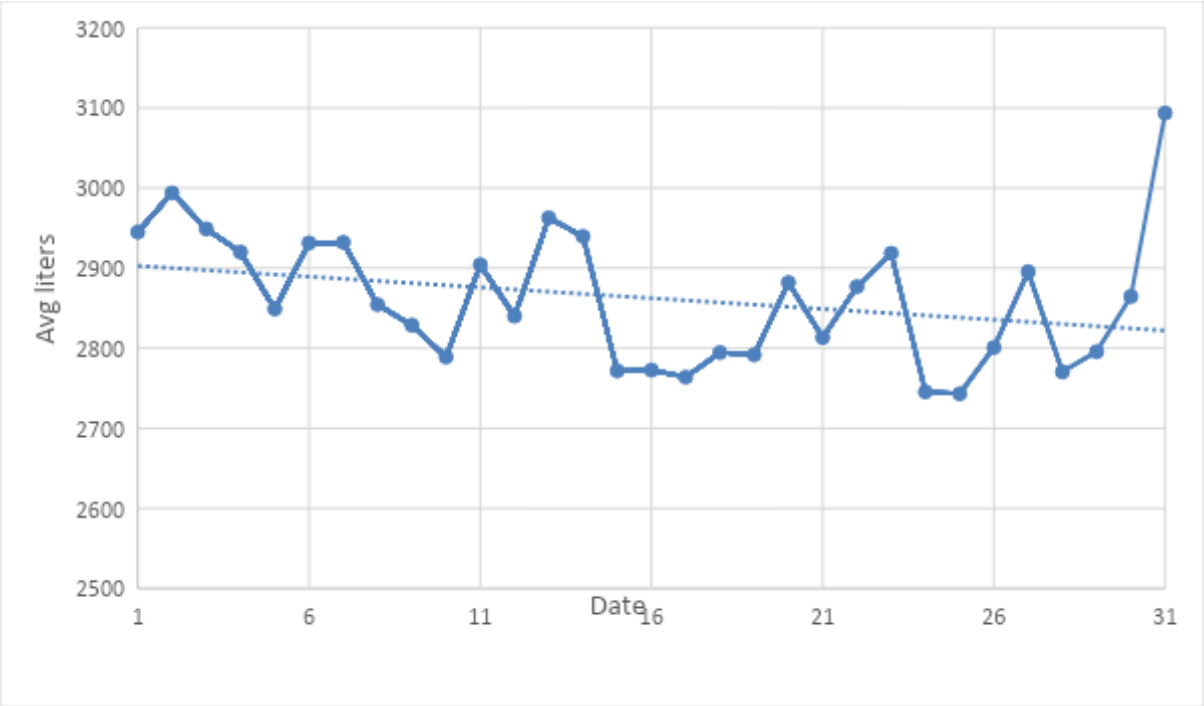
6 Result and Findings

Month Wise Sale:



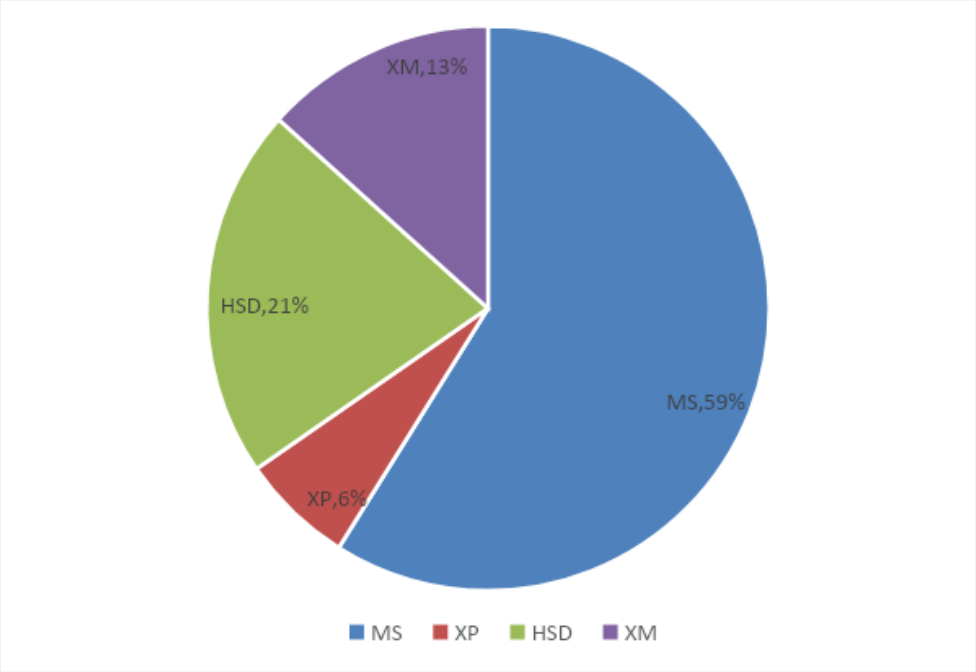
The depicted plot illustrates the average daily sales of petrol within a specific month. The decision to utilize average daily sales was made due to variations in the number of days across different months, ensuring a more equitable comparison. A noticeable trend of increasing sales is observed, particularly with higher sales from June through August. Subsequently, there's a decline in sales noted in November, followed by an upturn in sales during December and January. This analysis unveils a distinct pattern of fluctuating sales across the months, emphasizing peaks and declines, potentially indicating seasonal or periodic variations in petrol sales throughout the year.

Daily Sale analysis:



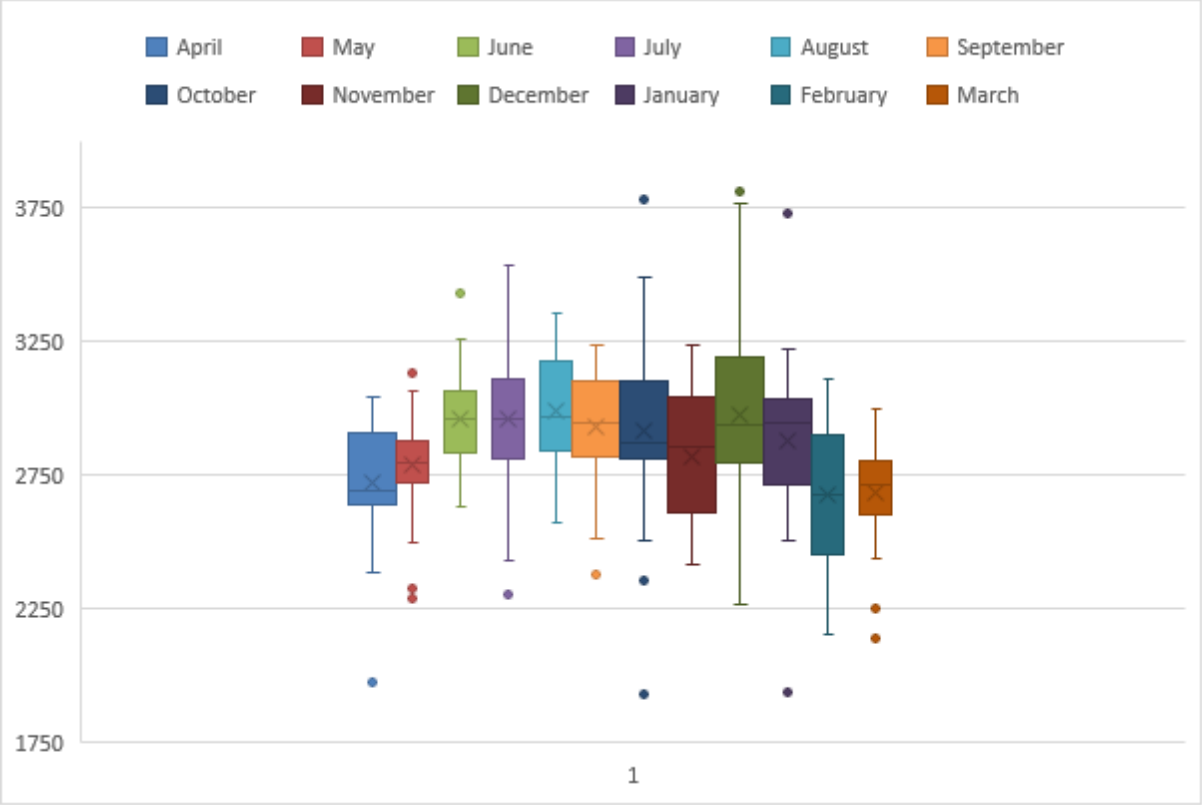
The depicted plot showcases the average daily petrol sales aggregated across all days of each month. In other words, it reflects the combined average sales of petrol on the first day of every month throughout the year, from January 1st to December 1st. The graph displays numerous local maximum and minimum points. Specifically, it shows peaks on the last day of each month followed by sustained high levels in the initial days of the subsequent month. The presence of multiple local minima and maxima indicates a pattern suggesting recurring visits by customers to the fuel station, likely returning every few days or at regular intervals.

Distribution of Fuel Sales:



The presented plot illustrates the sales of various fuel types at the Fuel Station. The fuel varieties include MS (Motor Spirit), XP (Xtrapremium) - both petrol types, and HSD (High-Speed Diesel) and XM (Xtramile) - which represent different diesel types. The graph encompasses days when any specific nozzle is undergoing maintenance. Recent sales data indicates a notable surge in petrol sales, attributing 59% of the total sales. This surge is primarily due to the increasing popularity of BS6 engine-powered vehicles in India. The sale of petrol has become the leading contributor, generating the highest income for the company.

Monthly Variations:



The box-and-whisker plot illustrates the distribution of daily sales in liters across all months, providing a visual representation of the variations and trends in sales volume throughout the year. The plot indicates considerable variability in sales across months, notably with high sales volume observed in December. However, there are noteworthy and promising sales trends observed from August to October. Outlier data points in the graph often coincide with non-working days within each month.

Strategic Roadmap

- Further analyses will be undertaken, including regression for sales projection and SWOT analysis, to evaluate profits, inventory control, and growth opportunities.
- The final submission will encompass a comprehensive analysis, focusing on sales volume, revenue trends, inventory management, and overall profitability.