

*"Improving Operational Efficiency and Customer Experience in
an RO Machine Store"*

A Midterm report for the BDM capstone Project

Submitted by

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Mid-Term Submission

Improving Operational Efficiency and Customer Experience in an RO Machine Store

1. Executive Summary

Rudra Enterprises is a local RO water purifier store located in **Shalimar Garden Extension 2, Sahibabad**, founded by **Mr. Manoj Sharma** in **2005**. The store specializes in both **B2B and B2C sales**, offering **RO machine units, water refills, and repair/maintenance services**. Over nearly two decades, the shop has built a strong customer base, mainly relying on repeat customers for service and maintenance.

Despite its longstanding presence, **sales have declined in recent years** due to increasing competition, operational inefficiencies, and stock management challenges. The business primarily earns revenue from two key areas:

1. **RO Machine Sales:** Selling **2-15 RO units per month**, with an average **profit margin of ₹1,500-₹2,000 per unit**.
2. **RO Services & Maintenance:** Generating **₹600-₹850 per service**, with frequent service requests from previous customers.

The store operates with **handwritten records**, making financial tracking and inventory management difficult. This report is based on an **in-depth analysis of these records**, combined with **interviews with Mr. Manoj Sharma and market research**. Using **Excel and Python**, sales trends, customer behavior, and financial patterns were examined to identify improvement areas.

The goal of this analysis is to provide **data-driven recommendations** that can help **optimize stock levels, streamline operations, and improve customer engagement**, ultimately **reviving sales and boosting profitability**.

2. Proof of Originality of the Data

- **Data Source:** Handwritten records from the shop [link](#)
 - **Photographs of the Store:** [Link](#)
 - **Link:** [Letter from Oraginsation](#)
 - **Link:** [Video Interaction](#)
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3. Metadata

- **Business Name:** Rudra Enterprises
- **Owner:** Manoj Sharma
- **Location:** Shalimar Garden Extension 2, Sahibabad
- **Industry:** Retail – RO Machine Sales & Services
- **Established:** 2005
- **Number of Employees:** 3 (Technician, Sales Manager, Labour)
- **Annual Turnover:** Approx. 3,80,000
- **Data Sources:** Manual records, sales transactions, customer feedback
- **Data Format:** CSV (Comma-Separated Values) and Excel/Sheets (XLSX)
- **Data Collection Period:** January 1, 2024 – December 31, 2024 (Yearly Analysis) & March 1, 2024 – July 31, 2024 (Trend Analysis)
- **Total Records Analyzed:** 102
- **Unique Customers Served:** 84
- **Unique Addresses Recorded:** 96
- **Purpose of Data Collection:** To analyze sales performance, customer trends, and profitability for operational improvement.

Contents of the Data

- **Date:** Day of sale/service.
- **Month:** Month of sale/service.
- **Customer Name:** Name of the customer (if available).
- **Service Type:** Installation, maintenance, or spare part replacement.
- **RO Brand:** Brand of the RO unit (e.g., Aqua, Swift).
- **Quantity:** Number of units sold or services provided.
- **Total Amount:** Revenue generated after selling an item or service.
- **Profit:** Profit generated by selling an item or service.

Columns	Data Type
Date	Date
Month	String
RO Brand	String
Service type	String
Quantity	Numeric
Total Amount	Numeric
Profit	Numeric

Link: [Sales Data](#)

Here's the table showing the monthly sales trends from March to July based on data:

Month	RO Brand	Service Type	Quantity	Total Amount (₹)	Profit (₹)
March	Aqua	Maintenance	1	2,500	1,500
	Swift	Spare Part Replacement	1	1,700	1,000

April	Aqua	Installation	4	31,299	6,597
		Spare Part Replacement	2	2,450	1,344
	Swift	Installation	1	5,999	1,499
		Maintenance	1	2,045	1,500
May	Aqua	Installation	4	26,497	6,897
		Spare Part Replacement	1	1,004	927
	Swift	Installation	8	51,998	13,197
		Maintenance	1	1,244	661
		Spare Part Replacement	1	1,000	593
June	Aqua	Installation	1	7,500	1,599
		Spare Part Replacement	2	1,946	1,070
	Swift	Installation	4	26,900	6,396
		Maintenance	5	8,571	4,254
		Spare Part Replacement	5	4,949	2,724
July	Aqua	Installation	1	6,000	1,799
		Maintenance	2	3,355	2,174
		Spare Part Replacement	5	5,788	3,678
	Swift	Installation	1	8,000	1,499
		Maintenance	3	4,883	2,763
		Spare Part Replacement	3	3,957	2,176

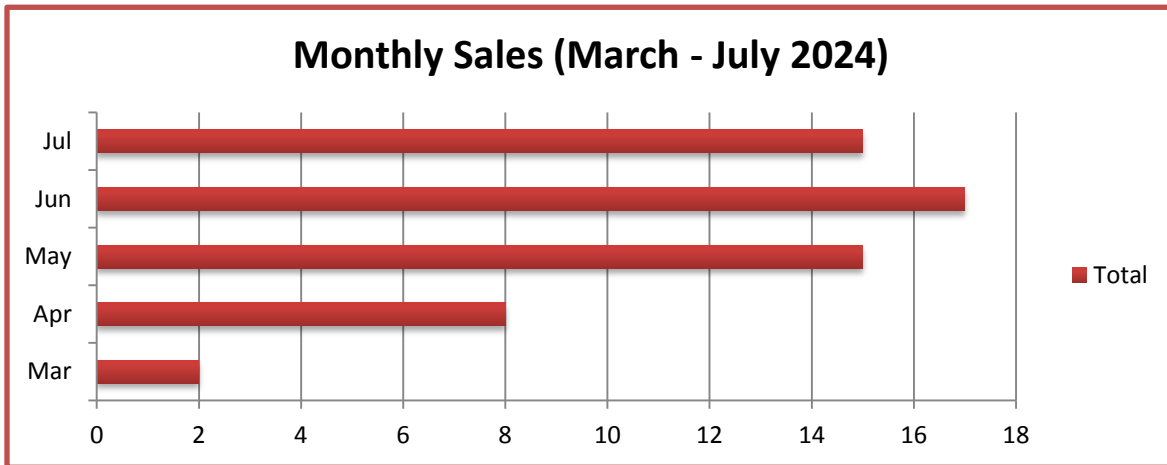
The primary objective of this analysis is to **examine monthly sales trends, evaluate profitability, and identify operational inefficiencies**. Through this, the study aims to provide data-driven recommendations for optimizing **inventory management, enhancing service quality, and improving overall profitability**.

This metadata overview serves as a foundation for understanding the dataset, ensuring its efficient utilization for business improvement and strategic decision-making. The insights derived from this analysis will aid Rudra Enterprises in **refining stock management, addressing customer concerns, and implementing effective marketing strategies**.

3. Descriptive Statistics

1. Sales Trends (March–July 2024):

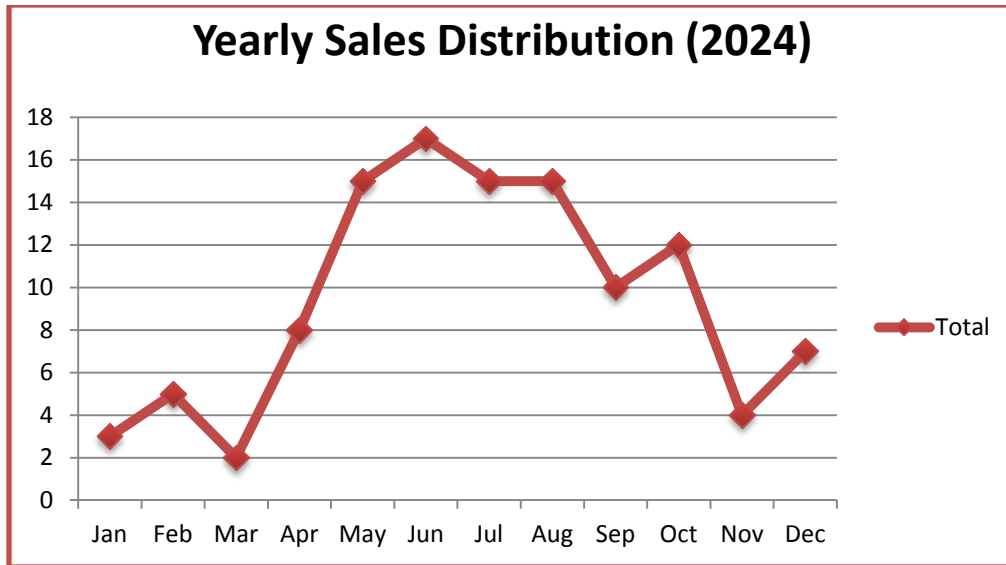
Row Labels	Sum of Quantity
Mar	2
Apr	8
May	15
Jun	17
Jul	15
Grand Total	57



2. Yearly Trends (2024):

- **Highest Sales Period:** Summer months (May–August)
- **Lowest Sales Period:** Winter months (December–February)
- **Consistent Service Requests:** Maintenance remains steady across all months.

Row Labels	Sum of Quantity
Jan	3
Feb	5
Mar	2
Apr	8
May	15
Jun	17
Jul	15
Aug	15
Sep	10
Oct	12
Nov	4
Dec	7
Grand Total	113

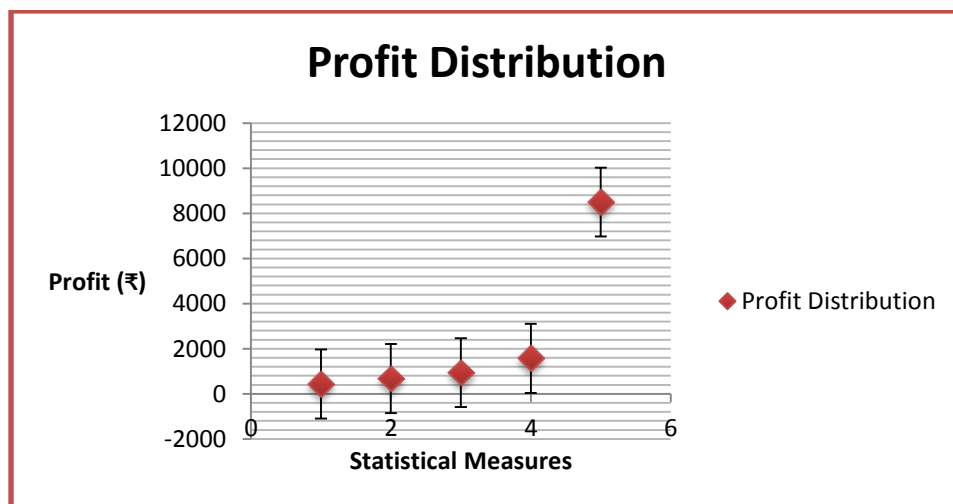


3. Customer Complaints:

Complain Type	Percentage
Water Flow Issues	55.00%
Float Valve Malfunction	35.00%

4. **General Service Profit:** 850 per service

5. **RO Unit Profit:** 1500-2000 per unit



6. RO Brand Distribution:

RO Brand	Sales/Services
Aqua	56
Swift	57

Here is the updated **Descriptive Statistics Table** based on your Excel data:

Measure	Total Amount (₹)	Profit (₹)	Quantity Sold
Mean	₹3,738.15	₹1,213.72	1.11
Median	₹1,948.00	₹940.50	1.00
Mode	₹7,500	₹1,799	1
Standard Deviation	₹3,832.07	₹891.46	0.51
Minimum	₹541.00	₹440.00	1.00
Maximum	₹30,000.00	₹8,500.00	5.00
Skewness	3.43 (Positive)	5.57 (Positive)	5.82 (Positive)
Kurtosis	20.56 (High)	44.10 (High)	38.25 (High)

Key Observations:

- **Total Amount & Profit show a strong positive skew**, meaning some high-value transactions are inflating the average.
- **Quantity Sold has an extremely high kurtosis**, indicating rare instances of bulk purchases.
- **Mode for Total Amount is ₹7,500**, meaning this is the most frequently occurring sale value.

5. Detailed Explanation of Analysis Process/Method

5.1. Data Collection and Structuring

The data was collected from sales records, customer complaints, and service details. It was structured into a tabular format to ensure ease of analysis.

- **Spreadsheets (Excel)** were used to store and manage raw data, perform calculations, and generate pivot tables.
- **Categorization of Data:** Data was classified based on months, service types, RO brands, and financial aspects (sales, profit, and turnover).

5.2. Analytical Methods Used

a. Time-Series Analysis

- This method was used to track trends over time (March to July, and yearly from January to December).
- Helps in identifying **seasonal demand**, sales peaks, and slow periods.
- Essential for predicting future trends and making informed stocking decisions.

b. Descriptive Statistical Analysis

- Measures like **mean, median, mode, standard deviation, skewness, and kurtosis** were computed using Python (Pandas and NumPy).
- These help in understanding the central tendencies, spread of data, and outliers.

c. Pivot Tables & Data Aggregation

- Used in Excel to summarize total sales, profit, and service requests by month and brand.
- Helps in quick identification of high-revenue months and best-selling RO brands.

d. Qualitative Analysis (Customer Complaints)

- Common customer issues (water flow, float valve malfunctions) were categorized to identify major pain points.
- This aids in optimizing after-sales service and inventory planning.

5.3. Justification for Method Selection

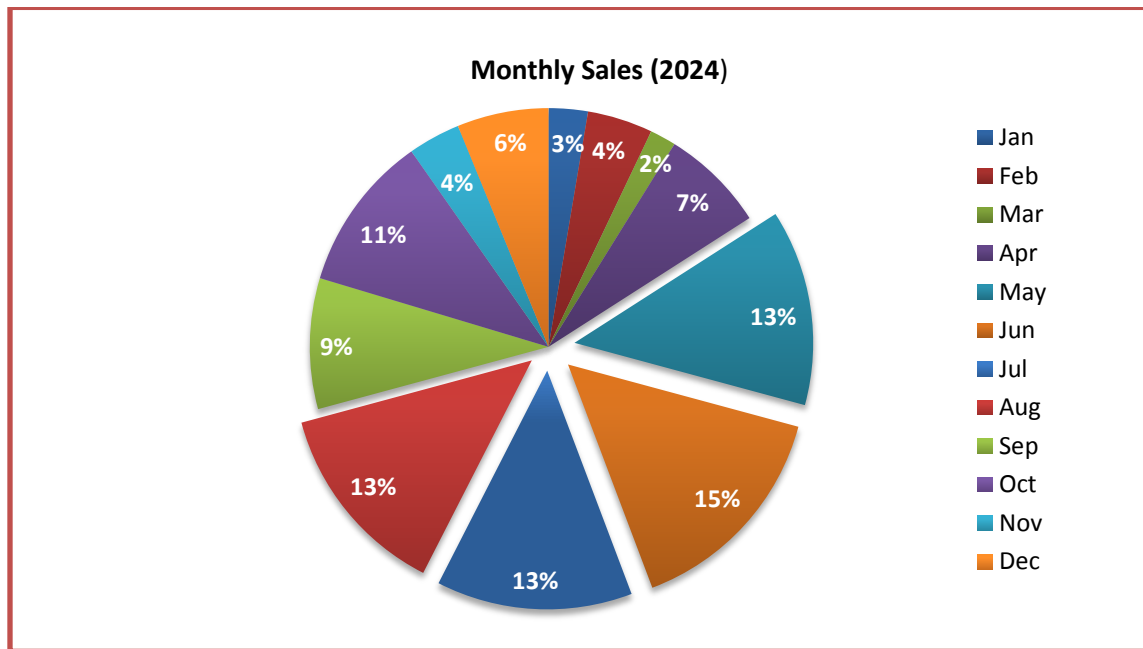
- **Time-series analysis** is superior for tracking financial and business performance over time.
- **Descriptive statistics** provide an accurate overview of sales and profitability.
- **Pivot tables** allow quick and dynamic summarization.
- **Qualitative analysis** helps in understanding customer service needs beyond numerical data.
- The combination of these methods ensures **a balanced, data-driven, and practical approach** to business optimization.

6. Results and Findings

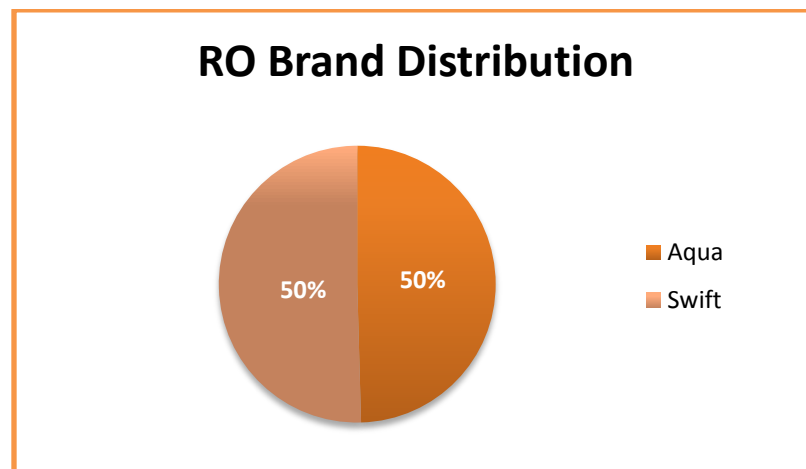
Key Observations:

1. Sales Trends:

- **Peak sales/services months (May–August 2024):** May, June, July and August (15, 17, 15 and 15 RO units sold)
- **Seasonal drop:** Lower sales in winter months.
- **Yearly trends (2024):** Higher sales in summer, steady service requests year-round.
- **Service Demand Consistency:** Maintenance and repair services are steady across months.

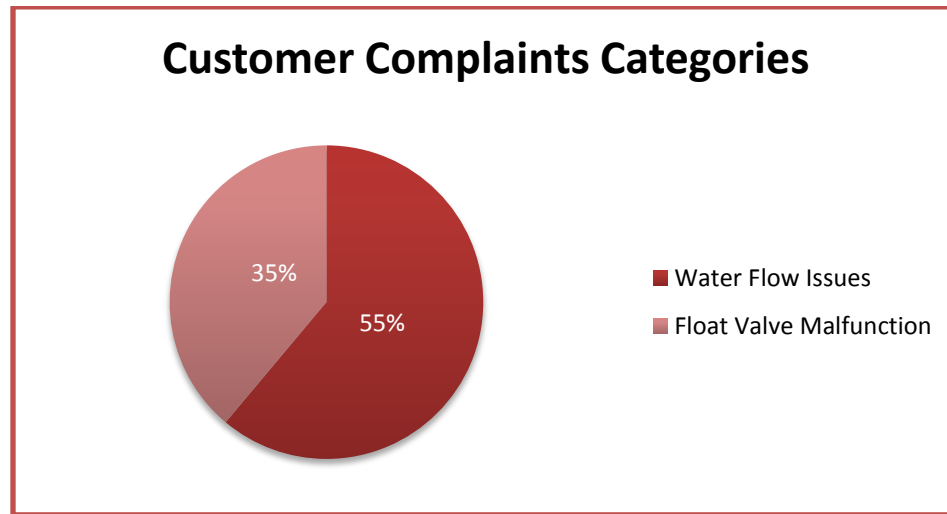


2. RO Brand Distribution:



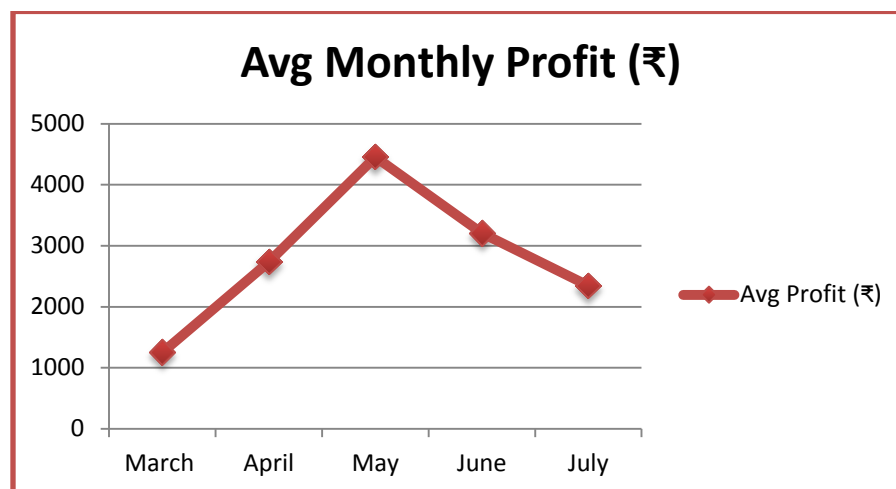
- Both brands have **almost equal market demand**, suggesting balanced customer preferences.
- **No clear dominance**, indicating potential competition between brands.

3. Customer Complaints:



- **55%** of complaints related to water flow issues, indicating potential product quality concerns.
- **35%** of complaints involved float valve malfunctions, suggesting better quality control is needed.

4. Profit Trends:



- **May recorded the highest average profit (₹4455)**, aligning with peak sales.
- **Steady decline after June**, suggesting post-summer demand drop.
- **March had the lowest profits**, indicating weak business performance in that period.
- **Positive Skewness**: High-value transactions are inflating the averages.

- **High Kurtosis:** Extreme transactions occur but are rare.
- **Most Common Sale Value:** ₹7,500 indicating a preferred price range.

5. Inventory Issues:

- Spare parts stock-outs occurred frequently, delaying service.
 - High-demand items were not restocked on time.
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