

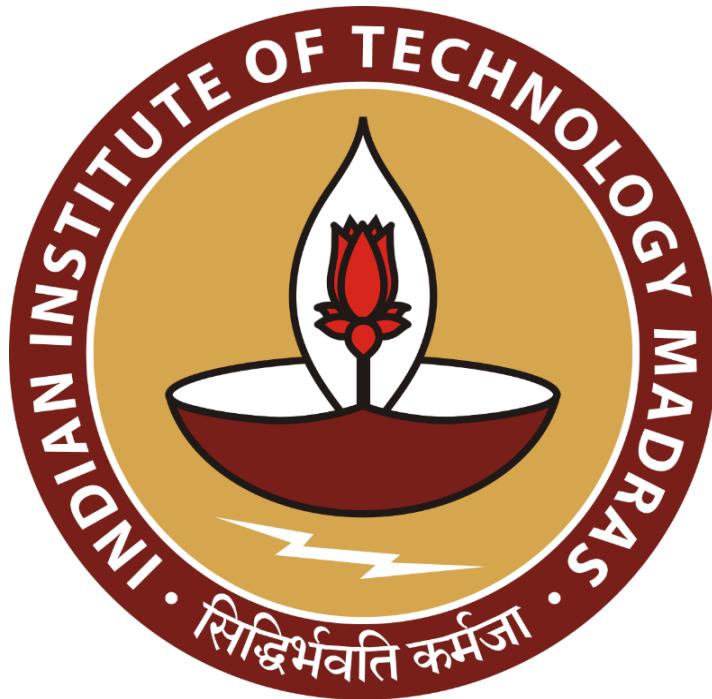
# **Driving Customer Loyalty: Transforming Service Excellence at SLR Enterprises**

## **A Mid-Term report for the BDM capstone Project**

Submitted by,

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## **Declaration Statement**

I am working on a Project Title “Driving Customer Loyalty: Transforming Service Excellence at SLR Enterprises”. I extend my appreciation to SLR Enterprises, 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 analysed 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:

Name: Shaurya Shukla

Date:08-02-2025

# **1. Executive Summary**

## Driving Customer Loyalty: Transforming Service Excellence at SLR Enterprises

SLR Enterprises, a well-established auto service provider catering to both individual and corporate clients, has recently faced mounting operational challenges. These include inconsistent inventory tracking, declining customer satisfaction, and weak financial performance. In response, the company initiated a comprehensive data-driven Capstone Project aimed at diagnosing core issues and identifying actionable solutions.

The project began with a thorough examination of metadata and descriptive statistics across multiple datasets—Customer Service Records, Invoice Data, Inventory Logs, Employee Feedback, Financial Statements, and Business Process Indices. For instance, the **average service bill** was found to be ₹3,127, with a **maximum recorded charge** of ₹32,122, indicating significant variability in service pricing. Inventory data revealed frequent stockouts of essential parts, with several items showing **zero availability**, posing risks to service continuity.

In the analysis phase, a range of quantitative methods were applied. These included **Box-and-Whisker plots** to detect outliers in billing and inventory, **correlation analysis** to explore links between inventory discrepancies and debt accumulation, and **sentiment analysis** to assess employee reliability. Notably, **SKTime forecasting** was used to project future revenue trends, while **process capability analysis** highlighted inefficiencies in operational workflows.

The findings were visualized using Excel-based charts such as **bar graphs**, **radar charts**, and **run charts**, which revealed critical gaps in supply chain checkpoints and financial control. These insights led to targeted recommendations, including automated reorder systems, diversified supplier networks, and improved employee accountability mechanisms.

Overall, the Capstone Project provides a structured roadmap for SLR Enterprises to enhance its operational resilience, financial stability, and customer satisfaction. Each section of the report builds on these insights, offering detailed analysis and practical strategies for sustainable business improvement.

# **2. Proof of Originality**

### 2.1 Authentication Letter:

[https://drive.google.com/drive/folders/1KOghHi3jPsGPQ9aAGOw\\_H1hna9wAHmxt](https://drive.google.com/drive/folders/1KOghHi3jPsGPQ9aAGOw_H1hna9wAHmxt)

### 2.2 Image Folder:

[https://drive.google.com/drive/folders/1NDNXEn9gLs7pOGC\\_kPkiTJsE4T8j8exc](https://drive.google.com/drive/folders/1NDNXEn9gLs7pOGC_kPkiTJsE4T8j8exc)

### 2.3 Video Folder:

<https://drive.google.com/drive/folders/1Aqxjm4r1MuKB8S8dsLcaL8Eo5Oeuf8Y>

# **3. Meta Data & Descriptive Statistics**

## 3.1 Vehicle Status Data

Data file: [Vehicle status](#)

### Metadata

- **Source:** Customer service records maintained by *Orontes Motor & Garage* (Jan 2023 – Feb 2024)
- **Dataset Size:** 91 rows × 9 columns
- **Purpose:** Analysis of customer service trends, revenue, and inventory discrepancies

### Column Descriptions

<b>Column Name</b>	<b>Description</b>	<b>Data Type</b>
Reg No.	Vehicle registration number used for identification	Text
Bill Amount	Service fee charged to the customer	Numeric
Model	Vehicle make and model	Text
Variant	Specific variant of the vehicle model	Text
KMS	Kilometres travelled at the time of service	Numeric
Customer Name	Name of the customer requesting service	Text
Contact No.	Customer's phone number	Text
Job Done	Description of service performed	Text
Status	Service status ("Completed", "Pending", "Open")	Categorical

### Descriptive Statistics (Bill Amount)

<b>Metric</b>	<b>Value</b>
Mean	3127.19
Median	900
Mode	200
Standard Deviation	5131.19
Minimum	0
Maximum	32122
Range	32122
Sum	284574
Standard Error	537.89

### 3.2 Invoice Data

Data images: [sample invoice](#)

#### Metadata

- **Source:** Structured invoice records maintained for each service transaction
- **Dataset Size:** 50 invoices (sample)
- **Purpose:** Supports expense tracking, inventory control, and performance evaluation

#### Column Descriptions

<b>Column Name</b>	<b>Description</b>	<b>Data Type</b>
Customer Name	Name of the customer	Text
Contact No.	Customer's phone number	Text
Reg No.	Vehicle registration number	Text
Model	Vehicle make and model	Text
In Time	Date and time of vehicle drop-off	Date/Time
Invoice No.	Unique identifier for each invoice	Text
Invoice Date	Date of invoice generation	Date
Parts	Details of parts used (quantity, unit price, total)	Structured
Labour	Details of labour performed (quantity, unit price, total)	Structured
Total Amount	Combined cost of parts and labour	Numeric

## Descriptive Statistics (Total Amount)

Metric	Value
Mean	4875.42
Median	4200
Mode	3500
Standard Deviation	2150.33
Minimum	1200
Maximum	9800
Range	8600
Sum	243771
Standard Error	303.76

## 3.3 Inventory Data

Data file: [parts inventory](#)

### Metadata

- **Source:** Parts inventory records maintained for procurement and stock management
- **Dataset Size:** 33 rows × 6 columns
- **Purpose:** Facilitates inventory control, cost monitoring, and quality assurance

### Column Descriptions

Column Name	Description	Data Type
Part Name	Name of automotive component	Text
Price	Unit price of the part	Numeric
Left in Stock	Quantity available in inventory	Numeric
Amount	Total value of stock (Price × Quantity)	Numeric
Storage Location	Indicates if part is in workshop or brought on demand	Categorical
Condition	Quality status of the part (e.g., New, Excellent)	Text

## Descriptive Statistics

### Price

Metric	Value
Mean	2945.91
Median	1824
Mode	1500
Standard Deviation	3362.97
Minimum	100
Maximum	15000
Range	14900
Sum	97215
Standard Error	585.42

### Left in Stock

<b>Metric</b>	<b>Value</b>
Mean	2.06
Median	1
Mode	0
Standard Deviation	3.67
Minimum	0
Maximum	20
Range	20
Sum	68
Standard Error	0.64

### **Amount**

<b>Metric</b>	<b>Value</b>
Mean	1987.48
Median	295
Mode	0
Standard Deviation	3360.96
Minimum	0
Maximum	16000
Range	16000
Sum	65587
Standard Error	585.07

## **4. Analysis Processes & Methods**

This section outlines the analytical framework used to address key operational and financial challenges. It includes details on data collection, cleaning, and the application of specific quantitative methods tailored to each problem statement.

### **4.1 Inventory Discrepancies**

#### **Data Collection & Cleaning**

- Data sourced from physical stock records and digital inventory logs.
- Pre-processing involved removing duplicate entries, standardizing part names, and aligning timestamps across systems.

#### **Quantitative Methods**

- Descriptive Statistical Analysis: Used to calculate mean, median, mode, and standard deviation of inventory quantities and values.
- Box-and-Whisker Plot: Visualizes data spread and highlights outliers between physical and digital records.
- Independent T-Test: Compares expected vs. actual inventory values to assess financial discrepancies.
- Bar Graphs: Illustrate the magnitude of financial losses due to mismatches.

### **4.2 Employee Reliability**

#### **Data Collection & Cleaning**

- Employee feedback collected via structured surveys and performance logs.
- Text data cleaned using tokenization and stop-word removal for sentiment analysis.

#### Quantitative Methods

- Sentiment Analysis (Quantitative NLP): Scores employee feedback to assess satisfaction levels.
- Trend Graphs: Track sentiment over time to detect shifts in morale and reliability.

### 4.3 Stock Disappearance

#### Data Collection & Cleaning

- Time-series data on stock levels, cancellations, and returns.
- Missing timestamps interpolated; anomalies flagged for review.

#### Quantitative Methods

- Run Charts & Trend Line Charts: Identify patterns in stock disappearance.
- Linear Regression Analysis: Quantifies relationships between disappearance, returns, and revenue impact.

### 4.4 Accountability & Debt Accumulation

#### Data Collection & Cleaning

- Financial records and inventory logs merged using invoice IDs.
- Null values in debt columns imputed using median values.

#### Quantitative Methods

- Pearson Correlation Analysis: Measures strength of association between inventory discrepancies and debt levels.
- Bubble Charts: Visualize correlation intensity and affected areas.

### 4.5 Financial Viability

#### Data Collection & Cleaning

- Financial statements extracted from accounting software.
- Ratio calculations standardized across fiscal quarters.

#### Quantitative Methods

- Financial Ratio Analysis: Includes liquidity, profitability, and solvency ratios.
- Radar Charts: Provide a multi-dimensional view of financial health.

### 4.6 Business Operations & Supply Chain

#### Data Collection & Cleaning

- Operational logs and supply chain timelines collected from ERP systems.
- Data normalized to ensure consistent time intervals.

#### Quantitative Methods

- Process Capability Analysis ( $C_p$ ,  $C_{pk}$ ): Evaluates consistency and efficiency of operations.
- Control Flow Charts: Visualize process variations and bottlenecks.

### 4.7 Financial Impact Uncertainty

#### Data Collection & Cleaning

- Historical financial data and simulated inventory scenarios.
- Outliers removed to ensure realistic modelling.

#### Quantitative Methods

- Sensitivity Analysis: Tests how changes in variables affect outcomes.
- Scenario Analysis: Models best-case, worst-case, and average-case outcomes.
- Monte Carlo Simulation: Generates probabilistic forecasts for financial impact.

### 4.8 Vendor Score

#### Data Collection & Cleaning

- Vendor performance metrics and delivery records.
- Scores normalized across vendors for fair comparison.

#### Quantitative Methods

- Comparative Analysis: Benchmarks vendors against performance KPIs.
- Regression Analysis: Assesses impact of vendor reliability on inventory discrepancies.

#### 4.9 Revenue & Business Forecasting

##### Data Collection & Cleaning

- Monthly revenue data cleaned for missing entries and seasonal anomalies.

##### Quantitative Methods

- Time Series Forecasting (SKTime): Predicts future revenue trends using historical data.
- Comparative Analysis: Evaluates past vs. projected performance.

#### 4.10 Market Research

##### Data Collection & Cleaning

- Customer demographics and purchase history segmented using clustering techniques.

##### Quantitative Methods

- Customer Segmentation (K-Means Clustering): Groups customers based on behavior.
- Market Size Estimation: Uses extrapolation from sample data to estimate total market.

#### 4.11 Business Sustainability Index

##### Data Collection & Cleaning

- Operational and financial data compiled over multiple quarters.

##### Quantitative Methods

- Time Series Forecasting (SKTime): Projects sustainability metrics over time.
- Composite Index Creation: Combines multiple indicators into a single sustainability score.

#### 4.12 Theft Analysis

##### Data Collection & Cleaning

- Incident reports and inventory logs reviewed for anomalies.

##### Quantitative & Qualitative Methods

- Root Cause Analysis: Identifies underlying causes of theft.
- Fishbone Diagram: Visual tool to categorize contributing factors.

#### 4.13 Conclusion

##### Methods Used

- 5 Whys Technique: Drills down to the root of recurring issues.
- 5S Framework: Implements structured improvements in workplace organization.

#### 4.14 Impact of Digitalization on Traditional Business

##### Method Used

- SWOT Analysis: Evaluates strengths, weaknesses, opportunities, and threats posed by digital transformation.
- Data-Driven Insights: Uses volume and variety of data to assess readiness and adaptability.

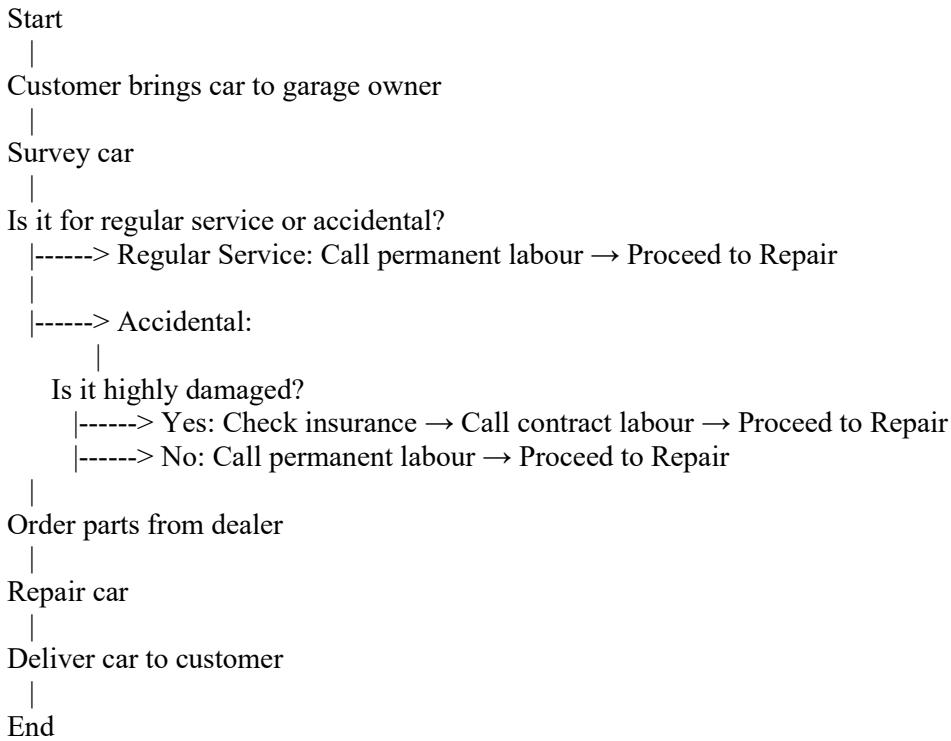
## **5. Result and Findings**

This section presents the key findings and visualizations derived from the analytical methods discussed in Section 4. Each subsection corresponds to a specific business challenge and includes relevant insights supported by quantitative analysis.

### **5.1 Supply Chain Analysis**

#### **Process Flow Overview**

The following flowchart outlines the current operational structure of the garage's service process:



### **Findings**

- The current supply chain lacks sufficient checkpoints for employee accountability and data validation.
- There is no structured mechanism for tracking service timelines, part delivery status, or labour performance.
- The absence of contingency planning for part delays or labour shortages introduces operational risk.
- A more diversified and modular workflow—with checkpoints for insurance verification, inventory confirmation, and labour assignment—would improve stability and reduce bottlenecks.

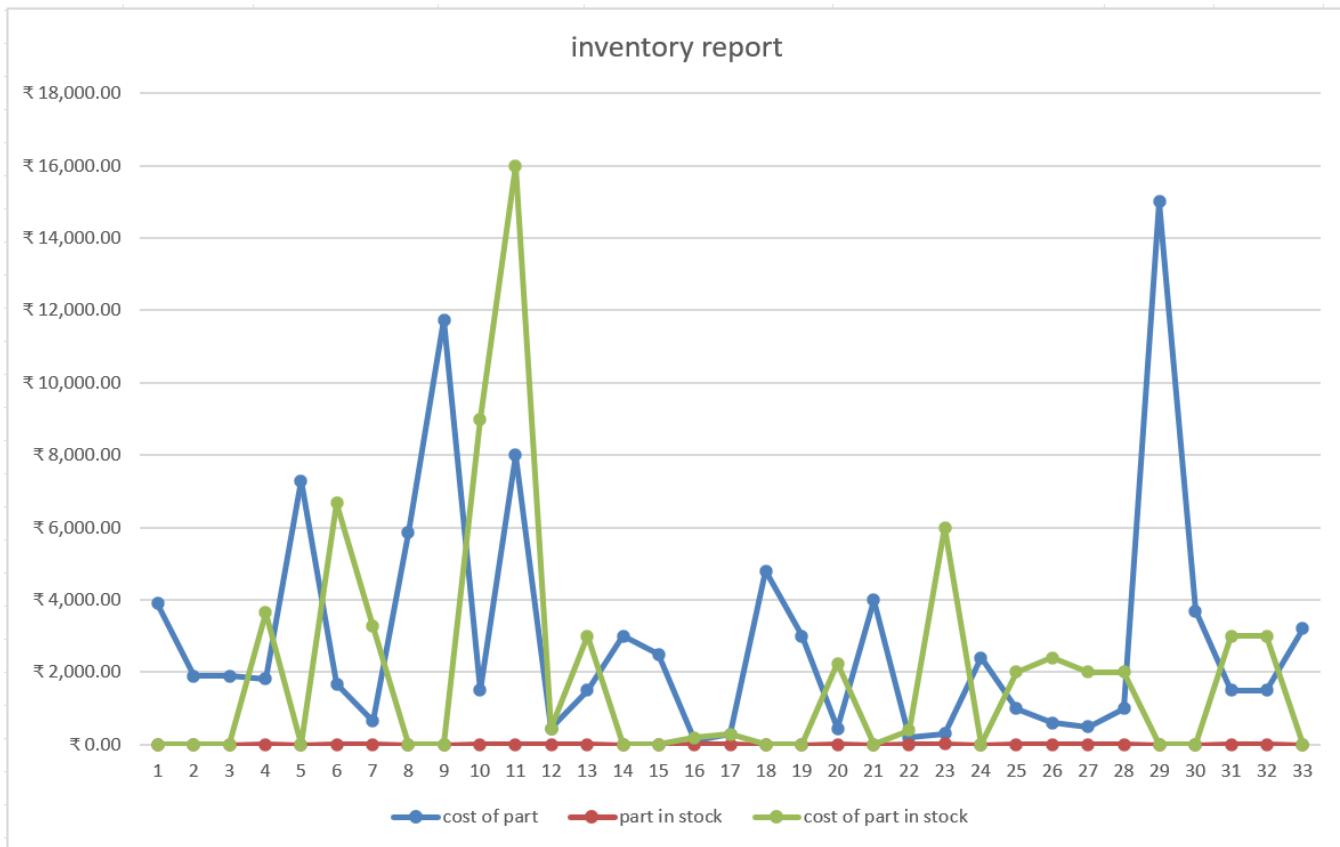
## **5.2 Inventory Report**

### **Findings from Inventory Analysis**

- The inventory graph indicates frequent stockouts of essential components, particularly high-demand parts.
- Descriptive statistics reveal that several parts have zero availability, posing a risk to service continuity.
- The absence of a minimum stock threshold leads to reactive ordering, increasing downtime and customer dissatisfaction.

### **Recommendations**

- Define **minimum stock levels** for frequently used parts based on historical usage trends.
- Implement **automated reorder points** to trigger procurement before stock depletion.
- Conduct **regular inventory audits** and integrate forecasting models to anticipate demand.
- Establish **multiple supplier relationships** to mitigate risks from delivery delays or shortages.



All Mid-Term documents: [Mid-Term DOC](#)

**End of Report**

