Group #16

CUSTOMER COMPLAINT TRACKING

Complex Engineering Activity (CEA)

Course: Application of Information and Communication
Technologies (AICT)

Course Code: MCT-107L

Instructor: Engr. Syed Muhammad Umer

Session: Fall 2025

**Department of Mechanical, Mechatronics and Manufacturing
Engineering**

University of Engineering & Technology Lahore (Faisalabad Campus)

Term Project – Complex Engineering Activity (CEA)

Course: Application of Information and Communication Technologies (AICT)
Course Code: MCT-107L
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Semester: 1st | Session: 2025

Project Overview
Each group will design and document an ICT-based information system addressing a real-world problem (e.g., attendance management, patient records, smart parking, inventory control, online booking). Students will create and analyse datasets, simulate system workflows, and justify design decisions using the ICT tools covered in the laboratory. Each project is unique and qualifies as a Complex Engineering Activity (CEA).

Required Tools
- Overleaf – LaTeX-based final report
- GitHub – Version control and project repository
- DBMS concepts – Database schema and sample SQL queries
- Google Sheets – Dataset creation, analysis, and simulation
- Canva – System diagram and project presentation
- Mendeley – Reference management and citations

Registration-Number-Based Project Allocation
The first group member's registration number determines the project configuration.
Format: 2025-MCT-ABC (A, B, C are the last three digits).

Rule 1 – Project Domain (Digit B)
- 0 – Library Management System
- 1 – Hospital / Patient Record System
- 2 – School Attendance / LMS
- 3 – Transportation / Vehicle Log
- 4 – Inventory / Warehouse Management
- 5 – Customer Complaint Tracking
- 6 – Event Management & Registration
- 7 – Smart Parking / Campus Access
- 8 – Hostel / Accommodation Management
- 9 – Online Booking / Appointment System

Rule 2 – Dataset Size (Digit A)
Dataset size in Google Sheets = A × 10 records (e.g., A = 3 → 30 records, A = 8 → 80 records).

Rule 3 – Required Analysis (Digit C)

- 0 – Pivot table + Pie chart
- 1 – Line chart + Conditional formatting
- 2 – Forecast simulation (trendline)
- 3 – Dashboard creation
- 4 – VLOOKUP + MATCH
- 5 – DBMS schema + SQL queries
- 6 – Time-series simulation
- 7 – Comparison charts + Advanced filtering
- 8 – Multi-sheet system with cross-sheet formulas
- 9 – Mini Management Information System (MIS)

Project Tasks

- Problem identification and justification
- ICT system design and architecture
- Dataset creation and analysis in Google Sheets
- Basic DBMS schema design
- Documentation in Overleaf with Mendeley citations
- Version control and submission via GitHub

Deliverables

- GitHub repository link
- Google Sheets dataset and analysis
- Canva system diagram or infographic
- Final LaTeX report (Overleaf PDF)
- Group viva and presentation

Evaluation Criteria

Projects will be evaluated based on problem understanding, system design, quality of analysis, effective use of ICT tools, documentation quality, and viva/presentation performance.

Final Report Structure (Overleaf)

1. Title Page
2. Introduction
3. Problem Definition
4. Literature Review
5. Proposed System
6. Dataset and Analysis
7. DBMS Schema
8. System Diagram (Canva)
9. Results
10. Conclusion
11. References

Evaluation Rubric – Term Project (CEA)   **Total Marks: 50**

Component	Assessment Criteria	Marks	Description
Problem Identification & Objectives	Problem relevance, clarity, justification	3	Clearly defined real-world problem with well-stated objectives aligned to ICT and CEA requirements.
System Design & Architecture	System structure, workflow, diagrams	3	Logical ICT system design with clear architecture, data flow, and well-designed Canva diagrams.
DBMS Design	Schema, ER diagram, SQL queries	3	Appropriate database schema with ER diagram and relevant sample SQL queries.
Dataset & Analysis (Google Sheets)	Dataset size, formulas, charts, simulation	3	Correct dataset size as per registration rule, accurate formulas, charts, dashboards, or simulations.
Use of ICT Tools	Overleaf, GitHub, Canva, Mendeley	8	Effective and correct use of all required ICT tools with proper integration.
Report Quality (Overleaf)	Structure, clarity, formatting, citations	10	Well-structured LaTeX report with clear writing, professional formatting, and correct references.
Viva & Presentation	Understanding, communication, contribution	10	All group members demonstrate clear understanding and explain their work confidently.

Important Grading Notes
All group members must participate in the viva.
The project must qualify as a **Complex Engineering Activity (CEA)**.
Plagiarism will result in **zero marks**.
Missing any required ICT tool will lead to **marks deduction**.
Late submissions will not be accepted.

Contents

INTRODUCTION

Modern-day businesses require fast and accurate feedback mechanisms to avoid data loss, delays, and missed improvement opportunities. To solve these issues, this project proposes an **ICT-based** system for efficient, end-to-end management of customer complaints.

By utilizing **Google Sheets**, this system enables the management to digitally record complaints and analyze patterns in real-time. By forecasting future trends from existing data, the system allows for proactive, data-driven decision-making.

PROBLEM DEFINITION

Many organizations still rely on outdated, manual methods, such as paper registers or unstructured emails, to manage complaints. While functional at low volumes, these methods create *"data silos"* that are difficult to retrieve and impossible to analyze collectively.

As volume grows, these outdated methods become bottlenecks. They prevent the management from identifying patterns and ultimately lead to slow responses that damage customer satisfaction. To address these challenges, a structured **ICT-based** system is essential. By centralizing and automating data on a single platform, this system improves accuracy, speed, and transparency of work. This digital transition transforms raw complaint data into actionable insights, ensuring the organization remains efficient, scalable, and customer-focused.

LITERATURE REVIEW

The evolution of *"Customer Complaint Tracking"* has transformed from traditional manual logs to integrated **ICT** frameworks. A modern complaint tracking system is based on a strong **Database Management System** (**DBMS**). According to [3], relational databases maintain data integrity and minimize redundancy in organizational workflows. By moving away from flat files or paper logs to **SQL-based** architectures, systems can ensure that every complaint is unique, traceable, and easily retrievable for management audits.

Categorizing complaints into domains such as *"Late Delivery"* or *"Technical Issue"* is vital to root-cause analysis. According to [2], any effective system needs data classification to identify the *"friction points"* in customer journey.

ICT systems are becoming more proactive. *Predictive CRM* applies statistical models to predict trends. [1] describes how time-series analysis and linear trendlines simulate future workloads from historical data. Applied to complaint volumes, these methods derive the variability required to predict surges and make staffing or infrastructure adjustments prior to a degradation of service levels.

In other words, the integration of a structured back-end (**SQL**), a data-processing layer (**Google Sheets**), and a predictive model (trendlines) aligns with current engineering standards for developing complex information systems.

PROPOSED SYSTEM

The proposed *"Customer Complaint Tracking"* system is an **ICT-based** solution designed to modernize feedback management from entry to forecasting. The workflow begins with structured data entry in **Google Sheets**, where raw complaints are categorized by attributes such as *"Customer Type"* and *"Date"*.
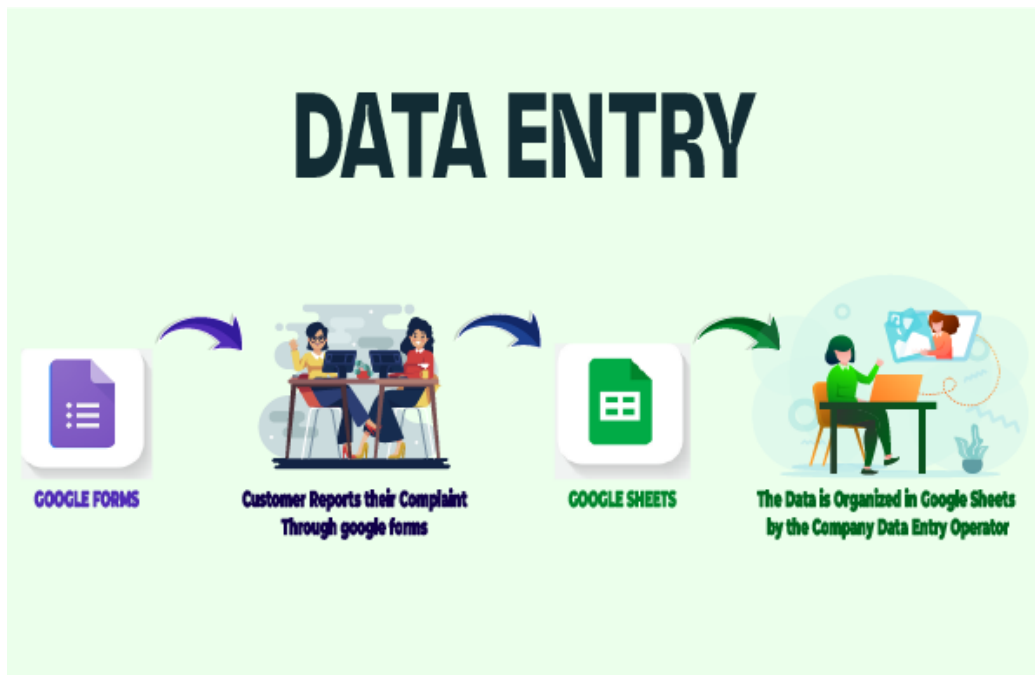

Figure 1: Data Entry in Google Sheets

The structured data is then processed and analyzed by the system. In this context, forecast simulation is also done in **Google Sheets** using *"trendlines"*.
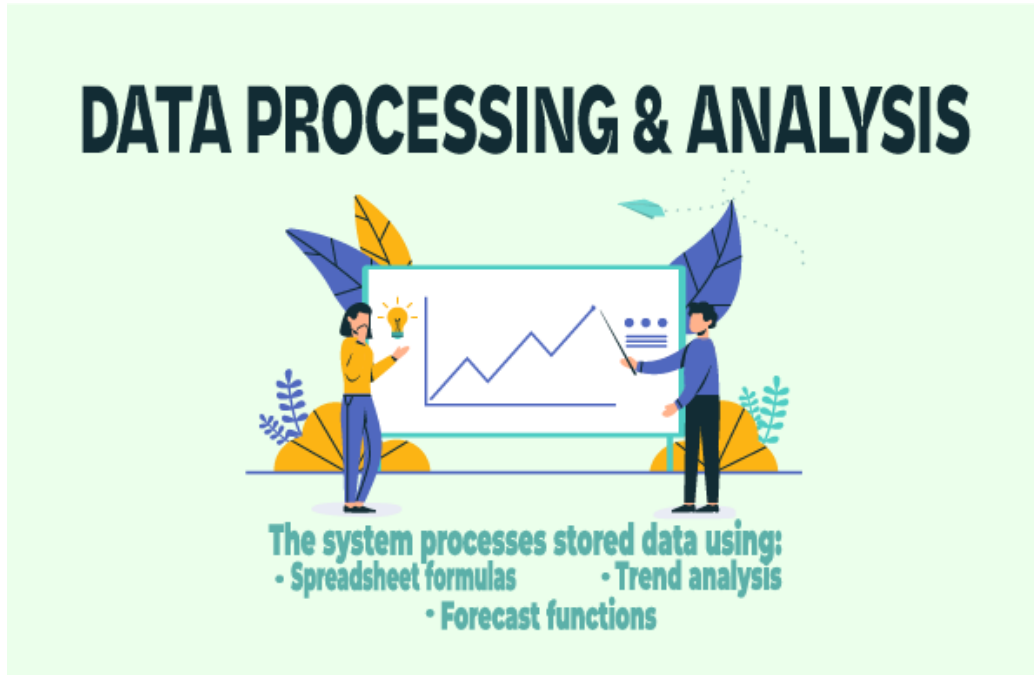
Figure 2: Data Processing by the system

This data is then migrated to some strong **MySQL-based** environments, such as **SQLFiddle** or **DB Fiddle**, where a structured schema and various queries ensure unique and organized records.

After execution of queries in **SQLFiddle**, entire project is submitted on **GitHub** and managed through it. As a centralized repository of the proposed system, **GitHub** hosts all **SQL** scripts, datasets and **LaTeX** source files while maintaining version control of the project as well.

The final output is presented through a well-structured, high quality **LaTeX** report, made in **Overleaf**. It provides a professional interface for reviewing performance of the system.

This system involves the use of various **ICT-based** tools which ensures that the human error associated with manual tracking is significantly reduced.

DATASET & ANALYSIS

In this chapter, we dive deeper into how empirical data is utilized in an attempt to validate a *"Customer Complaint Tracking System"*, followed by a statistical analysis of this data used in forecasting future trends. This serves as a projection of a genuine service demand. For creating a dataset based on empirical data and simulating forecasts, we use **Google Sheets** as our go-to **ICT-based** tool.

Following the project guidelines for selecting the dataset size, a total of 10 unique complaint records are generated. The dataset includes the following parameters: *Date, Complaint ID, Complaint Category* (includes *Late Delivery, Billing Issues*, and *Service Downtime*), *Customer Type* (includes *Individual* and *Corporate*), *Resolution Time* (in days), *Number of Complaints* (per Date), and *Goal*.

Date	Complaint ID	Customer Type	Complaint Category	Resolution Time(Days)	Number of Complaints	Goal
01-Jan-2025	C-001	Individual	Late Delivery	1	59	5
08-Jan-2025	C-002	Individual	Damaged Product	2	55	5
15-Jan-2025	C-003	Corporate	Billing Issue	2	36	5
22-Jan-2025	C-004	Individual	Poor Support	3	48	5
29-Jan-2025	C-005	Corporate	Service Downtime	4	31	5
05-Feb-2025	C-006	Individual	Late Delivery	2	26	5
12-Feb-2025	C-007	Corporate	Billing Issue	3	22	5
19-Feb-2025	C-008	Individual	Product Quality	3	19	5
26-Feb-2025	C-009	Corporate	Service Downtime	5	10	5
05-Mar-2025	C-010	Individual	Poor Support	4	10	5
06-Mar-2025					4.5	5
07-Mar-2025					5.6	5
08-Mar-2025					4.87075658	5
09-Mar-2025					5.005588994	5

Figure 3: Dataset in Google Sheets

To simulate a predictive forecast, a linear regression analysis is performed using **Google Sheets**. A trendline is plotted against the *"Number of Complaints"* over time to see how the system is moving. The trendline indicates a slope, suggesting that the number of complaints changes as the system matures.

By extending the trendline, the system predicts the number of complaints for the next operational week, allowing the management to prepare resources.

A performance benchmark, i.e. *"Goal"*, is also established to check how efficient the system is. It demonstrates how **ICT-based** tools can be used to monitor *Key Performance Indicators* in an engineering context
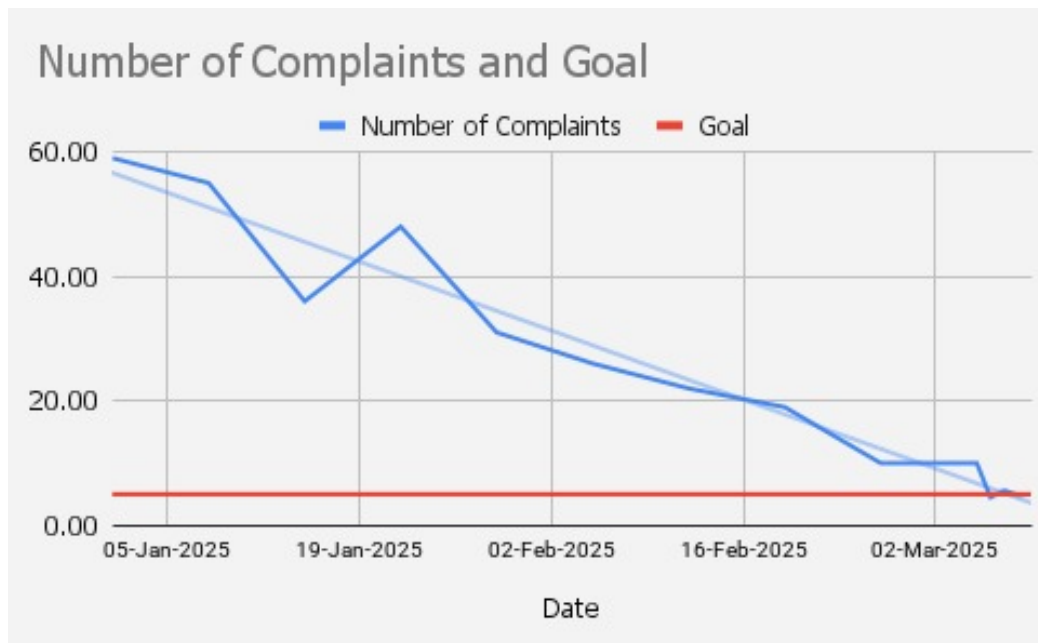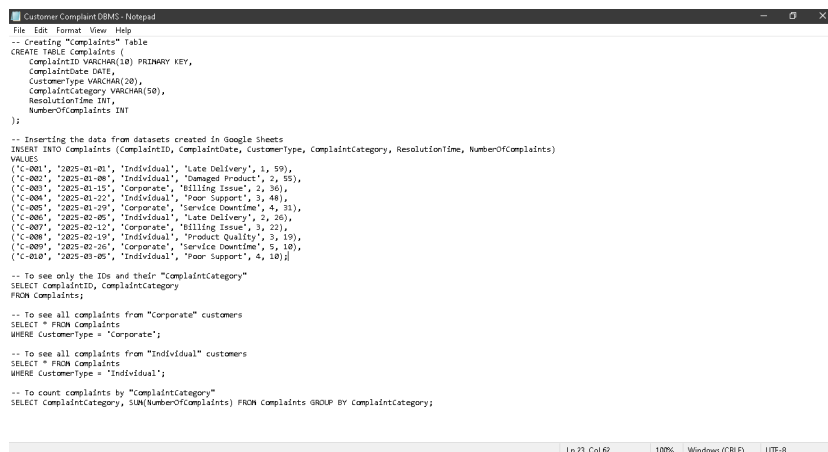
Figure 4: Trendline Chart

DBMS SCHEMA

In this chapter, we see how the **DBMS Schema** of the proposed system is constructed. For constructing the **DBMS Schema**, the records from the dataset created in **Google Sheets** are imported into a **SQL-based** environment and are carefully organized into tables using various **SQL** commands and statements accordingly. In this way, the data from **Google Sheets** also gets stored in the schema.

Figure 5: SQL Script

Beyond storage, it enables queries that extract actionable insights from organized data. For instance, summing the *"Number of Complaints"* by **"Complaint Category"** identifies the most frequent issues, allowing management to prioritize specific operational improvements.

ComplaintCategory	SUM(NumberOfComplaints)
Late Delivery	85
Damaged Product	55
Billing Issue	58
Poor Support	58
Service Downtime	41
Product Quality	19

Figure 6: Counting Number of Complaints by Complaint Category

Similarly, queries that allow the system to divide the dataset by *"Customer Type"* help the management with the dilemma of whether to prioritize complaints from corporate companies or those from individual retail customers.

ComplaintID	ComplaintDate	CustomerType	ComplaintCategory	ResolutionTime	NumberOfComplaints
C-001	2025-01-01	Individual	Late Delivery	1	59
C-002	2025-01-08	Individual	Damaged Product	2	55
C-004	2025-01-22	Individual	Poor Support	3	48
C-006	2025-02-05	Individual	Late Delivery	2	26
C-008	2025-02-19	Individual	Product Quality	3	19
C-010	2025-03-05	Individual	Poor Support	4	10

Figure 7: Complaints from Individual Customers

ComplaintID	ComplaintDate	CustomerType	ComplaintCategory	ResolutionTime	NumberOfComplaints
C-003	2025-01-15	Corporate	Billing Issue	2	36
C-005	2025-01-29	Corporate	Service Downtime	4	31
C-007	2025-02-12	Corporate	Billing Issue	3	22
C-009	2025-02-26	Corporate	Service Downtime	5	10

Figure 8: Complaints from Corporate Customers

Another sample query retrieves *"Complaint ID"* and *"Complaint Category"* to isolate specific attributes. This enables administrators to conduct targeted audits of the dataset and generate high-level summaries efficiently.

ComplaintID	ComplaintCategory
C-001	Late Delivery
C-002	Damaged Product
C-003	Billing Issue
C-004	Poor Support
C-005	Service Downtime
C-006	Late Delivery
C-007	Billing Issue
C-008	Product Quality
C-009	Service Downtime
C-010	Poor Support

Figure 9: Complain IDs and Complain Categories

SYSTEM DIAGRAM

The workflow diagram of the proposed system provides a clear roadmap for how the project acheives its analytical objectives.

Figure 10: System Workflow Diagram

RESULTS

In this chapter, we discuss about the results that we got from the *"Customer Complaint Tracking"* system. Through the execution of the **DBMS schema** and analytical queries, the system successfully showed its ability to manage high-integrity data and retrieve specific segments of information quickly. Statistical analysis in **Google Sheets**, using trendlines, proved that the system can forecast future surges and identify service patterns.

By identifying recurring faults and automatically updating trends, the system confirms the impact of improvements in real-time. This successful integration of data entry, storage, and predictive visualization confirms that the proposed system meets all the requirements of a **Complex Engineering Activity (CEA)**.

CONCLUSION

The development of the *"Customer Complaint Tracking System"* has successfully integrated **ICT-based** tools into service management, serving as a comprehensive application of the core principles of **AICT**.

By coordinating **ICT-based** tools, such as **GitHub**, **Google Sheets**, and **Overleaf**, along with **DBMS concepts**, this project demonstrates a unified workflow for complex engineering tasks. The ability to simulate future trends using historical data validates the project as a decision-support system rather than a simple record-keeping tool.

Ultimately, this project concludes that the efficiency of an organization depends upon feedback analysis. It fulfills all requirements of a **Complex Engineering Activity (CEA)**.

REFERENCES

[1] Rob J Hyndman and George Athanasopoulos. "Forecasting: principles and practice". In: (2018).

[2] Robert Johnston and Sandy Mehra. "Best-practice complaint management". In: *Academy of Management Perspectives* (2002).

[3] Kenneth C Laudon and Jane Price Laudon. "Management information systems: Managing the digital firm". In: (2004).