Internship Progress Summary Report

Name: *Pranav Singh Puri*

Department: *Call Center Analysis*

Project: *AST reduction and Customer Experience Enhancement*

Internship duration: *12-06-2025 - 12-07-2025*

Internship Title: Data Analysis Intern

Reporting to: *Sandeep Sir*

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EXECUTIVE SUMMARY OF THE WORK (Till 30th of June)

- Internship Overview

  During my internship at RR Kabel, I have contributed to enhancing customer experience analytics by analyzing call center performance data, automating interaction insights, and supporting chatbot optimization. My role combined data analysis, audio processing, and AI model improvement to support business decisions and system refinements.

- ***Tools, Technologies & Skills Used***

Languages: Python (pandas, scikit-learn, librosa)

Tools: Microsoft Excel, Power BI, Jupyter Notebook

Techniques: Audio feature extraction, data preprocessing, call segmentation, machine learning

Skills Gained: Exploratory data analysis, call classification, pattern recognition, anomaly detection, automation scripting

- ***Key Contributions***

1. Analyzed monthly call center data across campaigns and durations to detect trends and performance issues
2. Performed audio analysis on customer-agent conversations to identify speech patterns, sentiment cues, and response timing
3. Identified and documented edge cases in chatbot performance to support NLP system improvement

Date: 13 June 2025 to 17 June 2025

Task Summaries

- Conducted a comprehensive analysis of RR Kabel's monthly call center data, including over 54,000 customer interactions.
- Segmented data by call status (answered/dropped), campaign ID, agent ID, and vendor code to uncover operational patterns.
- Evaluated customer engagement across multiple campaigns, highlighting high-volume drivers such as *Luminous_helpline_1* and *RR_CABLE_HINDI*.
- Assessed agent-level performance using external CSV summaries, identifying key efficiency metrics and variance across users.
- Investigated dropped call patterns and campaign-wise follow-up behavior to determine service responsiveness.

- Performed initial-level analysis of audio recordings between customers and agents to detect response dynamics and conversational effectiveness.
- Identified edge cases and logic breakdowns within chatbot interactions for escalation and resolution.
- Created detailed visual summaries (call heatmaps, boxplots, histograms) to support insights with quantifiable evidence.

Key Achievements

- Delivered a structured analysis framework that enabled targeted performance reviews at campaign and agent levels.
- Identified and visualized call traffic peaks (10 AM–1 PM) and drop-off zones (post 5 PM), guiding staffing and scheduling recommendations.
- Highlighted inefficiencies in dropped call response times, uncovering long-tail delays exceeding 400 minutes in certain campaigns.
- Automated multiple reporting steps, reducing manual processing using Python and Excel-based scripting.
- Surfaced campaign-specific strengths and weaknesses, supporting data-driven decision-making across the customer service function.

Issues Faced & Resolutions

- Encountered missing or inconsistent values in key fields (e.g., campaign IDs, vendor codes); resolved through structured data cleaning using pandas in Python.
- Noted difficulty in correlating dropped call behavior with follow-up response timing; addressed by generating a consolidated dataset and temporal alignment scripts.

- Found outliers and skewed distributions in response and call durations; used statistical techniques to isolate and normalize these for clearer interpretation.
- Required unification of multiple data sources (CSV summaries, Excel logs, system exports); resolved by designing a reproducible data merge and analysis pipeline.

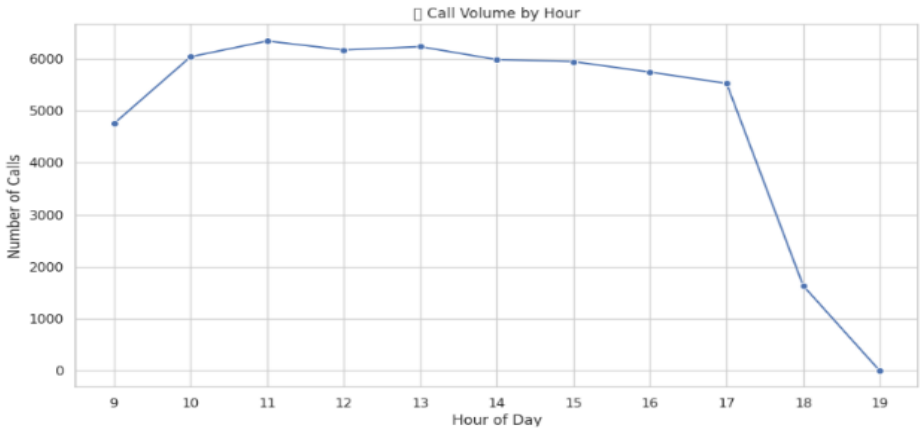
Tools & Technologies Used

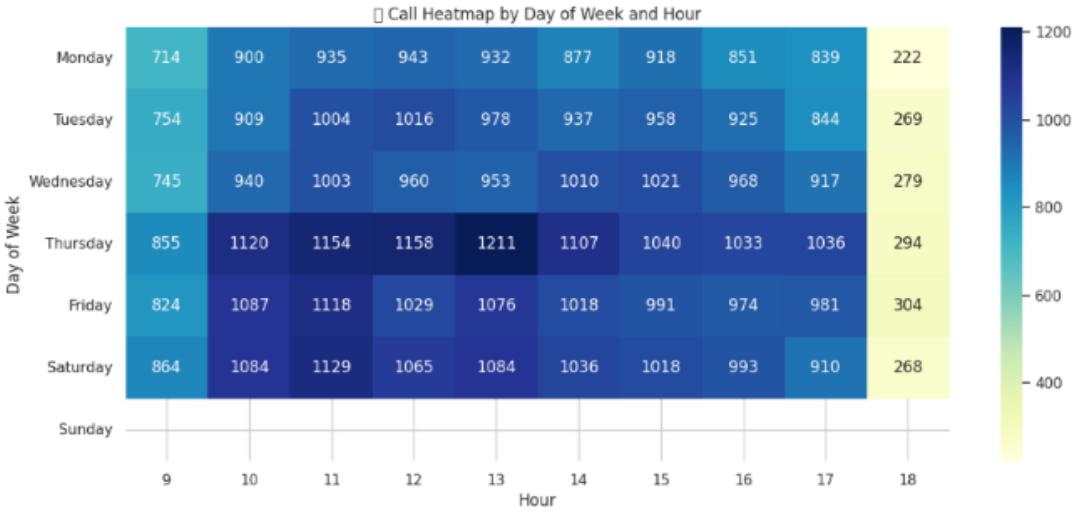
- **Data Analysis**: Python (pandas, numpy), Microsoft Excel
- **Visualization**: Matplotlib, Seaborn
- **Audio Analysis**: Librosa, Scipy (for basic feature extraction)
- **Data Sources**: Daily call logs, campaign and agent performance summaries, dropped call reports

Outcome / Output

- Produced a multi-dimensional call center performance report ready for senior stakeholder review.
- Enabled visibility into operational inefficiencies and campaign-level response effectiveness.
- Supported the identification of systemic and behavioral trends to improve future customer interaction strategies.

References Graphs





Date: 17 June 2025 to 18 June 2025

Project / Task Summaries

- Conducted detailed analysis of customer-agent call recordings to evaluate service quality, communication patterns, and system performance.
- Identified breakdowns in information collection, script adherence, and escalation procedures through case-by-case log reviews.
- Audited major and minor operational inefficiencies across 9+ call instances, documenting recurring issues and probable causes.
- Proposed actionable solutions for enhancing call center workflows across three implementation phases—short-, mid-, and long-term.

- Developed a recommendation framework involving smarter scripting, automation, agent empowerment, and multilingual expansion.

Key Achievements

- Diagnosed systemic flaws in call center operations such as over-reliance on static scripts, poor escalation handling, and agent miscommunication.
- Identified quality gaps between junior and senior staff based on real interaction analysis highlighting the need for differentiated training.
- Proposed a dynamic call guidance system and live knowledge assistant to support contextual and consistent agent responses.
- Designed a red alert system to prioritize critical calls (e.g., electrical faults), improving response to urgent cases.
- Outlined a long-term strategy to build a 24/7 CX Command Center for real-time performance and sentiment monitoring.

Issues Faced & Resolutions

- **Issue**: Ineffective and robotic agent responses due to rigid scripting.
  Resolution: Recommend implementing adaptive call flows with real-time logic-based guides.
- **Issue**: Unstructured information collection and long hold times during calls.
  Resolution: Advocate use of on-screen cues and product ID-based information retrieval.
- **Issue**: Poor handling of complaints by junior staff and inconsistent escalation processes.
  Resolution: Suggest structured training programs and automated escalation protocols.
- **Issue**: System malfunctions (e.g., recordings continuing after disconnection, automated hang-ups).
  Resolution: Highlighted need for technical system audits and robust call handling software.
- **Issue**: Lack of customer education on post-call procedures.
  Resolution: Propose post-call SMS/email summaries and agent cue cards for consistent instructions.

Tools / Technologies Used or Recommended

- **Call Analysis**: Manual log review, qualitative assessment, timestamp-based mapping.
- **Automation Tools**: Voicebot integration for L1 queries, smart ACW (After-Call Work) via transcription AI.
- **Agent Support**: Google Sheets / Notion-based dynamic cheat sheets, embedded chatbot assistants (e.g., Chatbase).
- **Performance Tracking**: Real-time dashboards displaying KPIs like AHT, CSAT, FCR.
- **Cultural Localization**: Language-specific agent training and empathy coaching modules.

Outcome / Output

- Delivered a comprehensive service quality audit supported by real-case call evaluations.
- Defined a structured plan for operational enhancement across timelines (1 week to multi-quarter).
- Produced clear and actionable documentation for system upgrades, staff training, and workflow redesign.

Date – 19 June 2025 to 22 June 2025

Project / Task Summaries

- Conducted end-to-end analysis of 10 customer service call recordings using an audio intelligence system built on acoustic and emotional features.
- Extracted and interpreted data from three primary datasets:
    - Model predictions with emotion, urgency, and anomaly scores.
    - Raw and engineered acoustic features (energy, pitch, silence, jitter, etc.).
    - A filtered list of high-priority calls for manual quality assurance.
- Performed advanced visualization and dimensionality reduction (UMAP, PCA, t-SNE) to understand clustering and behavior of calls based on audio characteristics.

- Delivered comprehensive insights into customer emotion, agent stress signals, anomaly patterns, and misalignment between risk and triage decisions.

Key Achievements

- Identified that **70% of calls were emotionally angry**, signaling friction-heavy customer experiences.
- Highlighted that **only 2 calls were flagged as high priority**, revealing a systemic under classification of urgent interactions.
- Mapped **anomaly patterns using pitch, energy, silence**, and found emotional subtlety (sadness with silence) as stronger anomaly indicators than energy alone.
- Developed a **priority analysis dashboard**, enabling visibility into gaps between emotion, urgency, and response prioritization.
- Demonstrated explainability of the model by linking feature distributions (e.g., pitch_std, silence_ratio) with emotional categories.

Issues Faced & Resolutions

- **Issue**: Angry calls frequently misclassified as medium priority, risking delays in critical follow-up.
  Resolution: Recommended alignment of emotion, urgency, and anomaly thresholds for better triaging.
- **Issue**: Anomaly detection flagged only 1 out of 10 calls, missing several long and agitated interactions.
  Resolution: Suggested multi-feature anomaly fusion and expanded labeling for model retraining.
- **Issue**: Low average emotion prediction confidence (0.482) implies mixed emotion states or model uncertainty.
  Resolution: Identified need for emotion model fine-tuning with multi-label or soft classification.
- **Issue**: Lack of escalation protocol for emotionally complex or prolonged calls.
  Resolution: Proposed QA-based manual review queue built from composite scores and emotional context.

Tools / Technologies Used

- **Machine Learning**: Emotion classification, anomaly detection, call prioritization models

- **Acoustic Feature Extraction**: Energy (RMS), pitch, jitter, shimmer, MFCCs, silence detection
- **Visualization**: UMAP, PCA, t-SNE, boxplots, heatmaps, scatter plots, composite dashboards
- **Data Sources**: `final_analysis_results.csv`, `priority_calls_for_review.csv` (audio metadata and feature sets)
- **Analytics Environment**: Python-based analysis pipeline for model output interpretation and feature visualization

Outcome / Output

- Delivered a **comprehensive audio intelligence audit** that surfaces emotional and behavioral insights from raw call recordings.
- Built a framework to guide **manual QA, agent performance evaluation, and future automation tuning**.
- Exposed critical process gaps in **triage logic and risk assessment**, enabling targeted remediation through model calibration and policy changes.
- Positioned the audio analytics system as a **scalable tool** for proactive customer care escalation and operational efficiency.

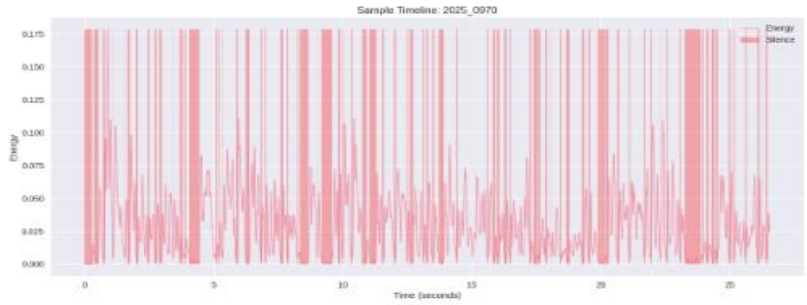
GRAPH REFERENCES

What It Is:

This visualization presents both raw and smoothed energy contours over time for a short audio sample. It also identifies significant peaks in energy, indicating changes in vocal emphasis.

What It Is:

A visualization of raw energy (loudness) and detected silence segments over a 27-second audio call.



Key Analysis:

- *High number of silence segments indicating either pauses between speech or lack of engagement.*

Date – 23 June 2025 to 25 June 2025

Project / Task Summaries

- Reviewed and analyzed the official RR Kabel call center script for **FMEG product complaint handling**.
- Mapped the script against actual agent behavior and real call recordings to identify gaps in consistency, efficiency, and customer experience.
- Evaluated each step of the script—from greeting to closure—along with the corresponding customer interaction challenges and system dependencies.
- Highlighted inefficiencies in how customer data, complaint logging, and reassurances are communicated during service calls.

Key Achievements

- Identified opportunities to reduce Average Service Time (AST) by avoiding unnecessary steps (e.g., re-entering known customer data).
- Proposed enhancements for script logic, especially around data retrieval from Product ID and customer phone number.
- Detected behavioral redundancy (e.g., repeated reassurances) that can frustrate customers and overload agents.
- Recommended moving **critical advisory messages (e.g., privacy guidance)** to the initial call rather than delaying them.
- Uncovered structural gaps in how the script handles **first-call resolution guidance and expectation setting**.

Issues Faced & Resolutions

- **Issue**: Redundant data collection (asking for product and customer info already retrievable via Product ID or phone number).
  Resolution: Suggested integrating backend lookup systems so agents can auto-populate customer/product data from inputs.
- **Issue**: Complaint logging stage causes long holds (~2 minutes), increasing AST and customer irritation.

Resolution: Recommend pre-filling complaint templates and background processing to reduce hold time.

- **Issue**: Reassurance statements repeated instead of offering actionable updates.
  Resolution: Proposed including dynamic updates such as current complaint status, technician assignment, or next steps.
- **Issue**: Privacy advisory (e.g., not sharing OTPs) is shared too late, often during a second call.
  Resolution: Reposition this warning to the **first complaint call**, as part of standard closure dialogue.

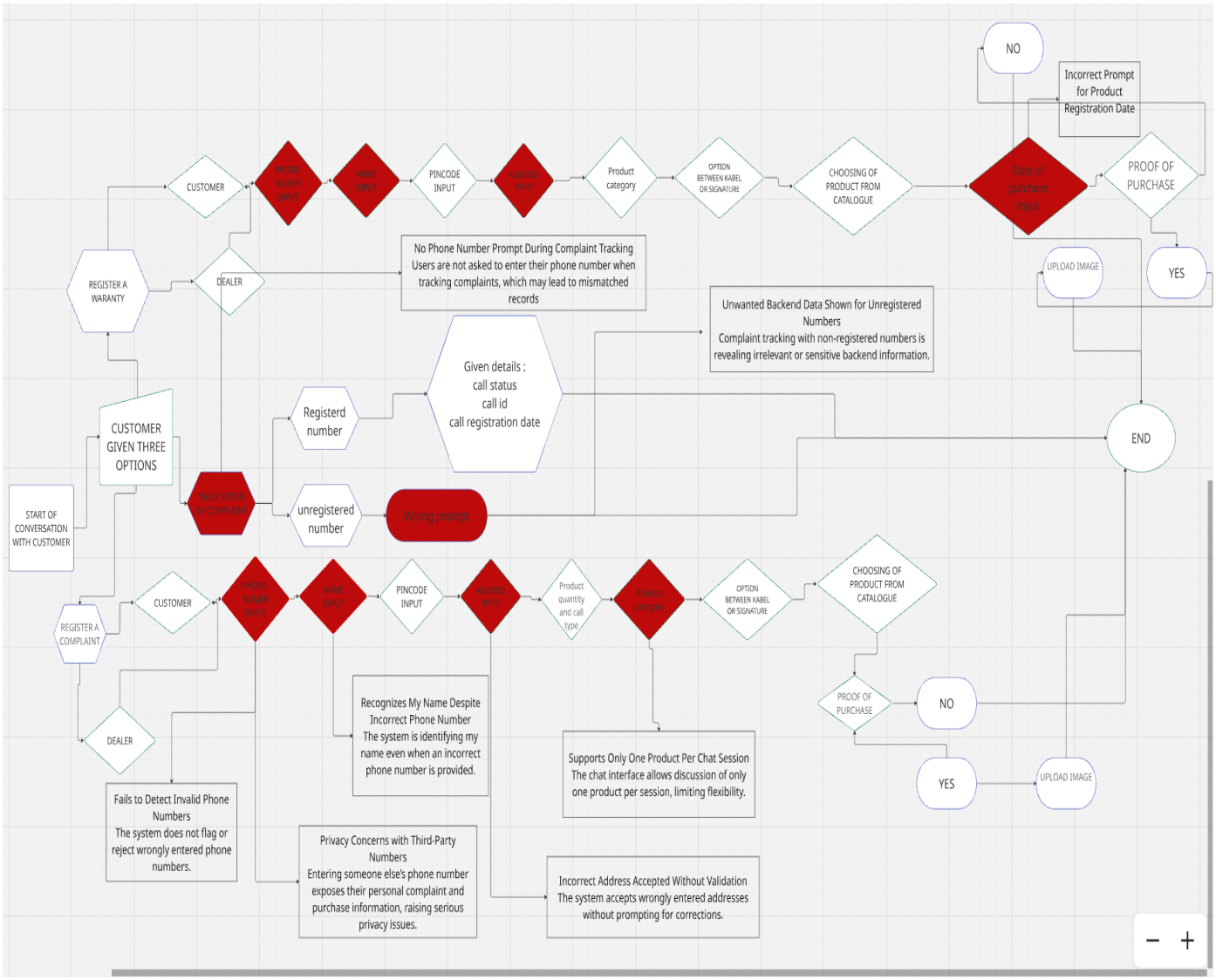
Tools / Technologies Used or Recommended

- **CRM Integration**: Phone number & product ID-based auto-fetch of historical complaint and customer data.
- **Knowledge Assistant**: Smart scripting tools (e.g., decision-tree-based scripts or real-time response assistants).
- **Automation**: Background complaint registration to reduce on-call wait times.
- **Training Modules**: Reinforcement learning for agents to improve customer experience handling based on context.

Outcome / Output

- Provided a line-by-line breakdown of the existing script with contextual critique and specific improvement opportunities.
- Delivered a refined script logic framework to improve:
  - **Agent efficiency**
  - **Customer experience**
  - **Resolution speed**
- Enabled integration of customer-centric handling without sacrificing compliance or policy adherence.
- Positioned the findings as a roadmap to evolve call handling from static scripting to dynamic, intelligent support.

Date – 25 June 2025 to 27 June 2025



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Project / Task Summaries

- Mapped the complete chatbot-driven complaint handling workflow from the customer's first interaction through

warranty registration, complaint tracking, and product registration.
- Identified and annotated critical system and UX flaws at each decision node and input field within the chatbot logic.
- Evaluated the logic for input validation, privacy protection, session handling, and prompt accuracy.
- Highlighted failure modes in tracking flow for both registered and unregistered phone numbers.

Key Achievements

- Developed a comprehensive visual representation of the entire chatbot flow, annotated with live system behavior and failure cases.
- Identified **10+ high-impact issues** including incorrect prompt triggers, privacy breaches, unvalidated input handling, and flawed phone number recognition logic.
- Flagged systemic design gaps such as:
    - Chat sessions limited to one product
    - Privacy risks due to third-party phone input acceptance
    - Exposure of backend data when tracking via unregistered numbers
- Suggested improvements that enhance data validation, user privacy, and multi-product handling flexibility.

Issues Faced & Resolutions

- **Issue**: System accepts incorrect or invalid phone numbers and addresses without validation.

Resolution: Recommended implementing real-time input validation rules and confirmation prompts.

- **Issue**: Personal data leakage when entering someone else's number (privacy risk).
  Resolution: Proposed masking and authentication steps before accessing complaint data.
- **Issue**: Wrong prompt triggers (e.g., "date of purchase" input shown incorrectly).
  Resolution: Suggested prompt-logic review and contextual condition testing for all nodes.
- **Issue**: System identifies users by name even when the wrong number is input.
  Resolution: Emphasized secure user verification methods based on combined input (e.g., OTP + phone number).
- **Issue**: Backend data exposed during complaint tracking for unregistered numbers.
  Resolution: Recommended blocking backend access until user verification is complete.

Tools / Technologies Used

- **Process Mapping**: Visual flowchart creation using BPMN-style diagramming tools.
- **Issue Annotation**: Embedded textual overlays to indicate logic failures and UI/UX gaps.
- **System Testing**: Manual walkthrough of chatbot interface across complaint scenarios.
- **Privacy Audit**: Applied basic data protection principles to chatbot inputs and outputs.

Outcome / Output

- Produced a detailed, annotated flowchart highlighting structural and data security risks in the chatbot's logic.
- Delivered a design-level critique that can be used by the product and engineering teams to rework chatbot architecture.
- Created a strong case for implementing multi-step input validation, privacy-preserving workflows, and better session control.
- Positioned this workflow audit as foundational for chatbot redesign and future-proofing of customer support automation.