

# ABC Call Volume Trend Analysis

## Project Description:

The attached dataset spans **23 days** of inbound calls received by ABC, a company operating in the insurance sector. This dataset includes various details such as the **agent's name** and **ID**, **queue time** (the duration a customer had to wait before being connected to an agent), **time of the call**, **call duration**, and the **call status** (whether it was abandoned, answered, or transferred).

A Customer Experience (CX) team plays a crucial role in the success of a company. They analyze customer feedback and data, derive insights from it, and share these findings across the organization. The CX team is responsible for a broad range of tasks, including managing customer experience programs, handling internal communications, mapping customer journeys, and managing customer data.

In today's world, several AI-powered tools are used to enhance the customer experience. These tools include Interactive Voice Response (IVR), Robotic Process Automation (RPA), Predictive Analytics, and Intelligent Routing.

One of the key roles within a CX team is that of the customer service representative, also known as a call center agent. These agents handle a variety of support services, including email, inbound calls, outbound calls, and social media support.

Inbound customer support, which is the focus of this project, involves managing incoming calls from existing or prospective customers. The ultimate goal is to engage, satisfy, and delight customers, turning them into loyal advocates for the business.

## Approach:

### 1.) Data Cleaning

#### 1. Identifying and Handling Null Values:

- Used the COUNTBLANK function to find null values. The Wrapped\_By column had **47,877 nulls**.
- Replaced nulls in Wrapped\_By:
  - If call\_status was abandoned, replaced with Abandoned Call.
  - If answered or transferred, replaced with the mode i.e Agent.

#### 2. Handling #NA Values in agent\_name and agent\_id:

- Both columns had **34,198 #NA values**, which were found to correspond to abandoned calls. These values were retained as they were not abnormal.

Blanks	0	0	0	0	0	0	0	0	0	0	47877	0	0
	Agent_Name	Agent_ID	Customer_Phone_No	Queue_Time(Secs)	Date_&_Time	Time	Time_Bucket	Duration(hh:mm:ss)	Call_Seconds(s)	Call_Status	Wrapped_By	Ringing	IVR_Duration
	Executives 42	1000042	98502XXXXX	2	01-01-2022	9.00	9_10	0:01:36	96.00	answered	Agent	YES	0:00:16
	Executives 4	1000004	80595XXXXX	0	01-01-2022	9.00	9_10	0:02:20	140.00	answered	Agent	YES	0:00:26
	Executives 65	1000065	70202XXXXX	0	01-01-2022	9.00	9_10	0:01:25	85.00	answered	AutoWrapped	YES	0:00:16
	Executives 55	1000055	96104XXXXX	1	01-01-2022	9.00	9_10	0:01:31	91.00	answered	Agent	YES	0:00:25
	Executives 21	1000021	82001XXXXX	0	01-01-2022	9.00	9_10	0:02:45	165.00	answered	Agent	YES	0:00:23
	#N/A	#N/A	96424XXXXX	13	01-01-2022	9.00	9_10	0:00:00	0.00	abandon		YES	0:00:16

## 2.) Finding Insights:

- Conducted a detailed analysis of key metrics such as **call duration**, **call volume** across different time buckets, and **abandon rates**.
- Based on these analyses, valuable insights were derived such as **peak times for call volume** and **additional manpower requirements** to reduce the abandon rate to **10%**.

## 3.) Report Creation:

- Consolidated the findings into a comprehensive report that outlines the **current call volume trends**, the **impact of staffing** on the **abandon rate**, and the **manpower plan for each time bucket** (including night shift).

## Tech Stack used

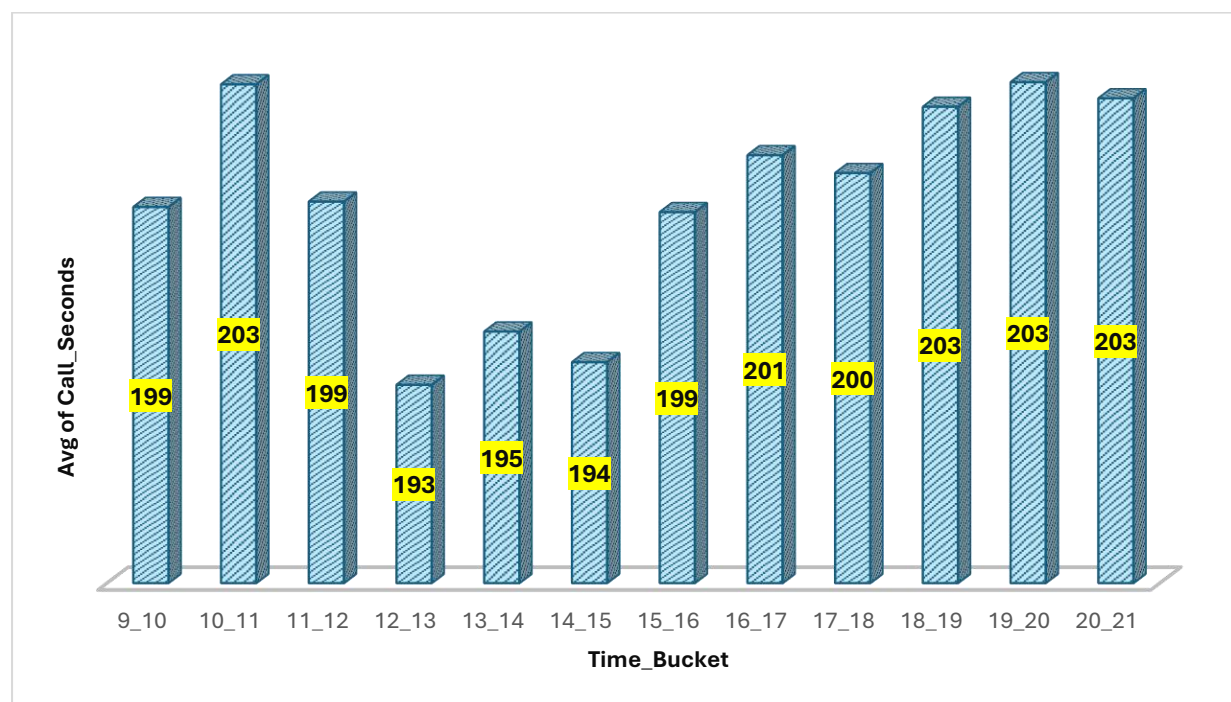
The project was carried out using **Excel**, which was essential for data cleaning, analysis, and visualization. I used tools like **CountBlank** to identify missing or null values and then applied appropriate replacements. **Pivot tables** were leveraged to analyze the call volume across different time buckets, and various functions helped calculate key metrics such as average call duration and required manpower. The final report included visual representations of call trends and insights into staffing needs, providing a clear strategy for improving customer experience and reducing call abandonment.

## INSIGHTS

**1.) Average Call Duration:** Determine the average duration of all incoming calls received by agents. This should be calculated for each time bucket.

**Your Task:** What is the average duration of calls for each time bucket?

Call_Status	answered
Time_Bucket	Average of Call_Seconds (s)
9_10	199
10_11	203
11_12	199
12_13	193
13_14	195
14_15	194
15_16	199
16_17	201
17_18	200
18_19	203
19_20	203
20_21	203
<b>Grand Total</b>	<b>199</b>



- **Consistent Call Duration:** Average call duration remains stable across time buckets, ranging from **193 to 203 seconds**.
- **Peak Duration (10-11):** Call duration peaks at **203 seconds** during evening hours, possibly due to more complex inquiries.
- **Lower Duration (12-15):** Shorter call durations of **193-195 seconds** in the afternoon, indicating quicker queries.
- **Overall Average:** The overall average is **199 seconds**

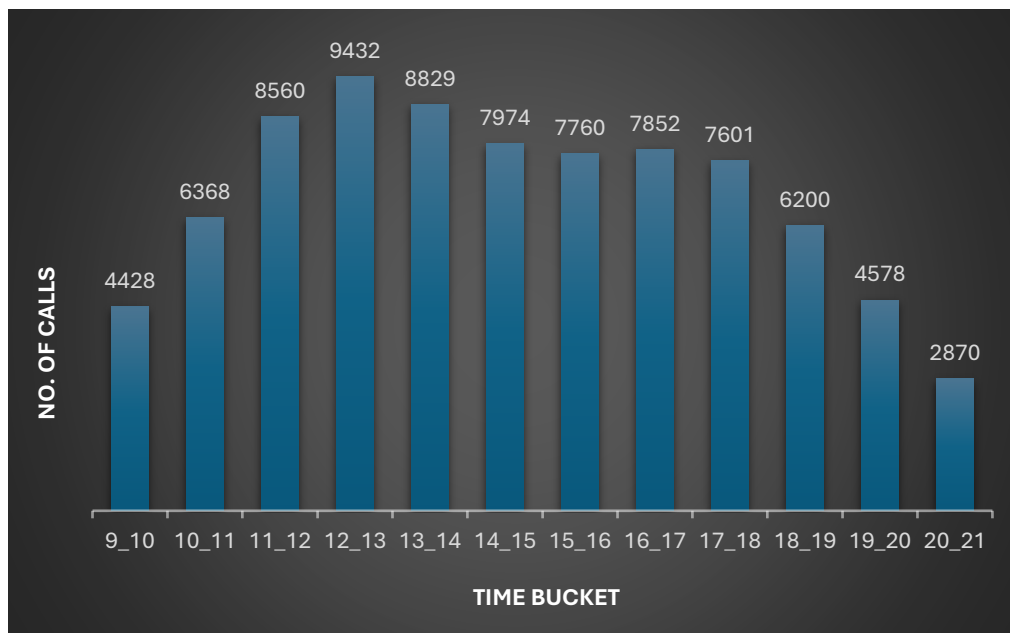
**2.) Call Volume Analysis:** Visualize the total number of calls received. This should be represented as a graph or chart showing the number of calls against time. Time should be represented in buckets (e.g., 1-2, 2-3, etc.).

**Your Task:** Can you create a chart or graph that shows the number of calls received in each time bucket?

A pivot table was created with **Time\_Bucket** in the rows and **Count of Customer\_Phone\_No** in the values, filtered by **Call\_Status = answered**, to visualize the total number of calls received in each time bucket.

Call_Status	answered
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Time_Bucket	Count of Customer_Phone_No
9_10	4428
10_11	6368
11_12	8560
12_13	9432
13_14	8829
14_15	7974
15_16	7760
16_17	7852
17_18	7601
18_19	6200
19_20	4578
20_21	2870
<b>Grand Total</b>	<b>82452</b>



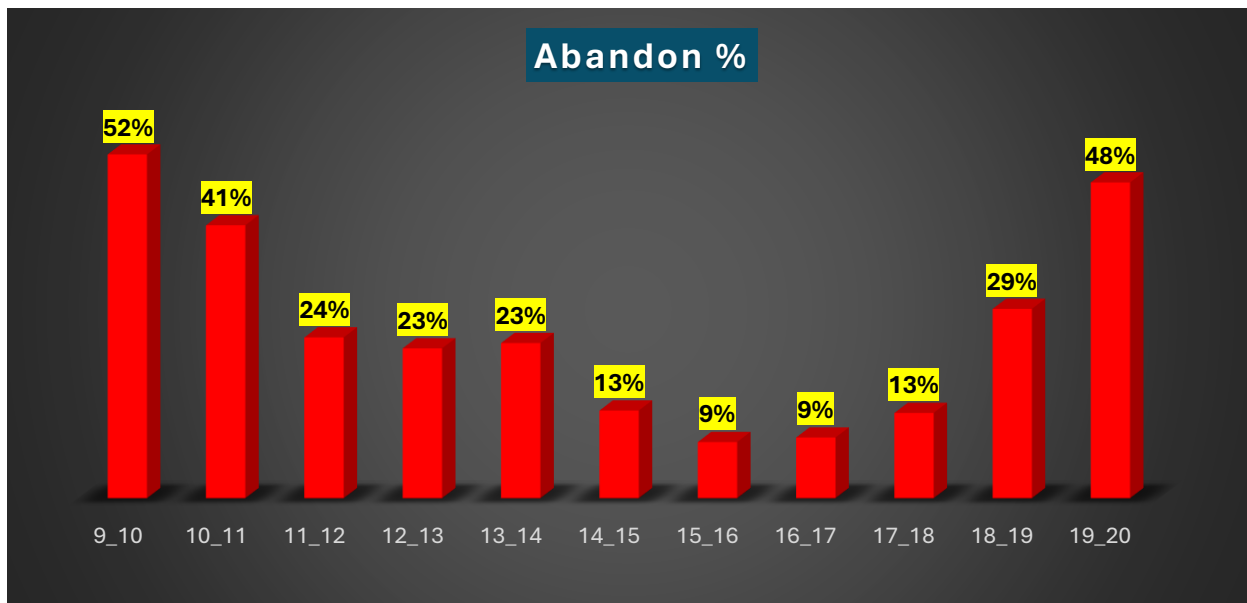
3.) **Manpower Planning:** The current rate of abandoned calls is approximately 30%. Propose a plan for manpower allocation during each time bucket (from 9 am to 9 pm) to reduce the abandon rate to 10%. In other words, you need to calculate the minimum number of agents required in each time bucket to ensure that at least 90 out of 100 calls are answered.

**Your Task:** What is the minimum number of agents required in each time bucket to reduce the abandon rate to 10%?

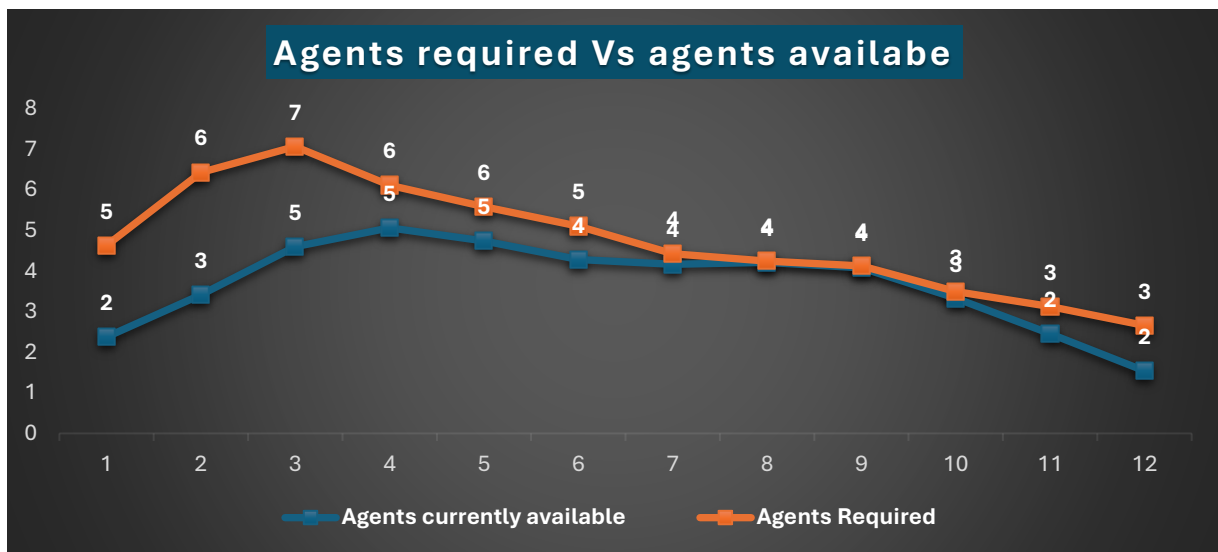
ASSUMPTIONS	
Agents working hour	9
Lunch & Snacks time hours	1.5
Agents on-floor work hour (9-1.5)	7.5
Working Days	6
Month days	30
Unplanned leave days	4
Work days per month	22
Actual working hours	60% of 7.5
Total time spent on call	4.5
Total time spent on call (in seconds)	16200
Dataset given having data of days	23

- Each call takes on average **199 seconds** to answer (as calculated earlier).
- Average number of calls an agent handles per day  
 = Total working seconds per agent / Average call duration  
 = 16200 / 199 = 81
- Average number of calls an agent handles per hour  
 = Calls handled per day / Actual working hours  
 = 81 / 4.5 = 18

This data is for 23 days													
Count of Calls	Call_Status				abandoned calls/day	answered calls/day	Total calls/day	% abandon	% answered	answer calls per day required to acheive 90%	Agents currently available	Agents Required	Mininum Agents Required
Time_Bucket	abandon	answered	transfer	Grand Total									
9_10	5149	4428	11	9588	224	193	417	54%	46%	375	2	5	2
10_11	6911	6368	34	13313	300	277	579	52%	48%	521	3	6	3
11_12	6028	8560	38	14626	262	372	636	41%	59%	572	5	7	2
12_13	3073	9432	147	12652	134	410	550	24%	75%	495	5	6	1
13_14	2617	8829	115	11561	114	384	503	23%	76%	452	5	6	1
14_15	2475	7974	112	10561	108	347	459	23%	76%	413	4	5	1
15_16	1214	7760	185	9159	53	337	398	13%	85%	358	4	4	0
16_17	747	7852	189	8788	32	341	382	9%	89%	344	4	4	0
17_18	783	7601	150	8534	34	330	371	9%	89%	334	4	4	0
18_19	933	6200	105	7238	41	270	315	13%	86%	283	3	3	0
19_20	1848	4578	37	6463	80	199	281	29%	71%	253	2	3	1
20_21	2625	2870	10	5505	114	125	239	48%	52%	215	2	3	1
Grand Total	34403	82452	1133	117988	1496	3585	5130	29%	70%	4617	44	57	13



- **Peak Congestion (9 AM - 12 PM):** Highest abandonment rate (**54% at 9-10 AM**), indicating a need for more agents.
- **Improvement (12 PM - 4 PM):** Abandonment drops below **25%**, showing efficient handling.
- **Optimal Service (4 PM - 7 PM):** Lowest abandonment (**below 10%**), no extra manpower needed.
- **Evening Struggles (7 PM - 9 PM):** Abandonment spikes to **48%**, requiring better staffing.



- **Maximum Manpower Required (9 AM to 12 PM):**

The highest call volume occurs between **9 AM and 12 PM**, requiring the maximum number of agents to handle calls efficiently and reduce the abandon rate.

- **Additional Agents Needed:**

**13 more agents** are required during peak periods (mainly between **9 AM to 12 PM**) to ensure that at least 90% of the calls are answered and reduce the abandon rate.

- **Highest Abandon Rate (9 AM to 12 PM):**

The **highest abandon rate** occurs between **9 AM and 12 PM**, indicating the need for additional resources to handle the higher volume of calls during this time.

- **No Extra Manpower Required (3 PM to 7 PM):**

From **3 PM to 7 PM**, the current number of agents is sufficient, and no extra manpower is needed to handle the call volume.

**4.) Night Shift Manpower Planning:** Customers also call ABC Insurance Company at night but don't get an answer because there are no agents available. This creates a poor customer experience. Assume that for every 100 calls that customers make between 9 am and 9 pm, they also make 30 calls at night between 9 pm and 9 am. The distribution of these 30 calls is as follows:

**Your Task:** Propose a manpower plan for each time bucket throughout the day, keeping the maximum abandon rate at 10%.

Time_Bucket	Distribution of 30 calls
9_10	3
10_11	3
11_12	2
12_13	2
13_14	1
14_15	1
15_16	1
16_17	1
17_18	3
18_19	4
19_20	4
20_21	5
	<b>30</b>

Count of Calls	Call_Status						
Time_Bucket	abandon	answered	transfer	Grand Total	abandoned calls/day	answered calls/day	Total calls/day
9_10	5149	4428	11	9588	224	193	417
10_11	6911	6368	34	13313	300	277	579
11_12	6028	8560	38	14626	262	372	636
12_13	3073	9432	147	12652	134	410	550
13_14	2617	8829	115	11561	114	384	503
14_15	2475	7974	112	10561	108	347	459
15_16	1214	7760	185	9159	53	337	398
16_17	747	7852	189	8788	32	341	382
17_18	783	7601	150	8534	34	330	371
18_19	933	6200	105	7238	41	270	315
19_20	1848	4578	37	6463	80	199	281
20_21	2625	2870	10	5505	114	125	239
<b>Grand Total</b>	<b>34403</b>	<b>82452</b>	<b>1133</b>	<b>117988</b>	<b>1496</b>	<b>3585</b>	<b>5130</b>



## Assumptions and Calculation Process:

### 1. Night Shift Calls:

- For every **100 calls** made between **9 AM and 9 PM**, **30 calls** are made at night between **9 PM and 9 AM**.
- The total number of **daytime calls** (calls between 9 AM to 9 PM) is **5130**.
- Therefore, the total number of **night shift calls** is **30% of 5130**, which equals **1539 night shift calls**.

### 2. Answered Calls:

- **90% of night shift calls** need to be answered, which is:  
 $1539 \times 0.9 = 1385 \text{ calls}$

### 3. Total Time Required for Night Calls:

- Each call takes on average **199 seconds** to answer
- The total time required to answer **1385 calls**:  
 $(1385 \times 199) / 3600$   
 $\approx 76.6 \approx 77 \text{ hours}$ .

### 4. Agents Required for Night Shift:

- Each agent works for **4.5 hours per day** (as calculated earlier).
- The number of agents required to handle 77 hours of work =  
 $77 / 4.5 \approx 17 \text{ agents}$

### 5. Total Agents Required (Day + Night Shifts):

- The **total number of agents required** including the day shift (**57 agents**) and the night shift (**17 agents**) is:  
 $57 + 17 = 74 \text{ agents}$

## RESULTS

Through this project, I analyzed call volume trends and manpower requirements for the inbound customer service team. By performing data cleaning and exploratory analysis, I identified key patterns in call durations, abandonment rates, and peak call times. I determined the optimal number of agents required to reduce abandonment rates to 10% and proposed a manpower allocation plan for both day and night shifts.

The insights gained from this analysis help improve customer experience by ensuring sufficient staffing during peak hours and minimizing missed calls during the night. The results offer valuable recommendations for efficient resource planning and better service delivery.

**Link of Excel file:**

[Click](#)