ABC CALL VOLUME TREND ANALYSIS

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Project Description

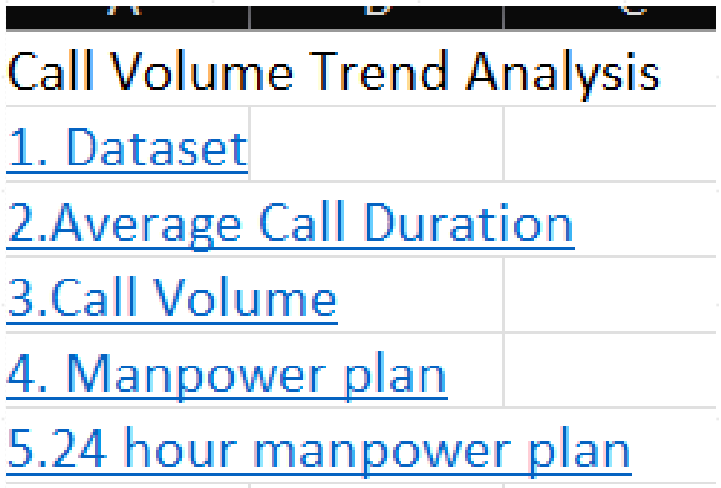
- This project aimed to analyze the call volume trends of ABC over a given time period to uncover patterns, peaks, and areas for optimization. The goal was to better understand customer behavior, peak call times, and any seasonality that may affect call volume. By leveraging data-driven insights, the project sought to improve resource allocation and enhance customer service efficiency.

Approach

- **Data Collection & Cleaning:**
- Collected historical call data including timestamps, call duration, and call types (inbound/outbound).
- Cleaned the data to handle any missing values, duplicates, and inconsistencies.
- **Feature Engineering:**
- Created new features such as time of day, day of the week, and month from the call timestamps to assist with analysis.
- **Data Analysis:**
- Visualized call volumes over time using line graphs and moving averages to smooth out fluctuations.
- Identified peak call hours and seasonal patterns by segmenting the data into various time periods (daily, weekly, monthly).
- Checked for correlations between call volume and external factors (e.g., marketing campaigns or product launches).
- **Trend and Forecasting:**
- Applied trend line fitting (linear regression) to visualize long-term trends.
- Used decomposition techniques to separate the data into trend, seasonal, and residual components.
- Forecasted future call volumes using time series models.

Tech – Stack Used

- **Microsoft Excel 2022:**
- Excel was used for the entire analysis process, including data cleaning, categorization, visualization, and trend analysis.
- Functions used: Pivot tables, conditional formatting, line graphs, and moving averages for insights into call volume trends.
- This is the link to the excel file

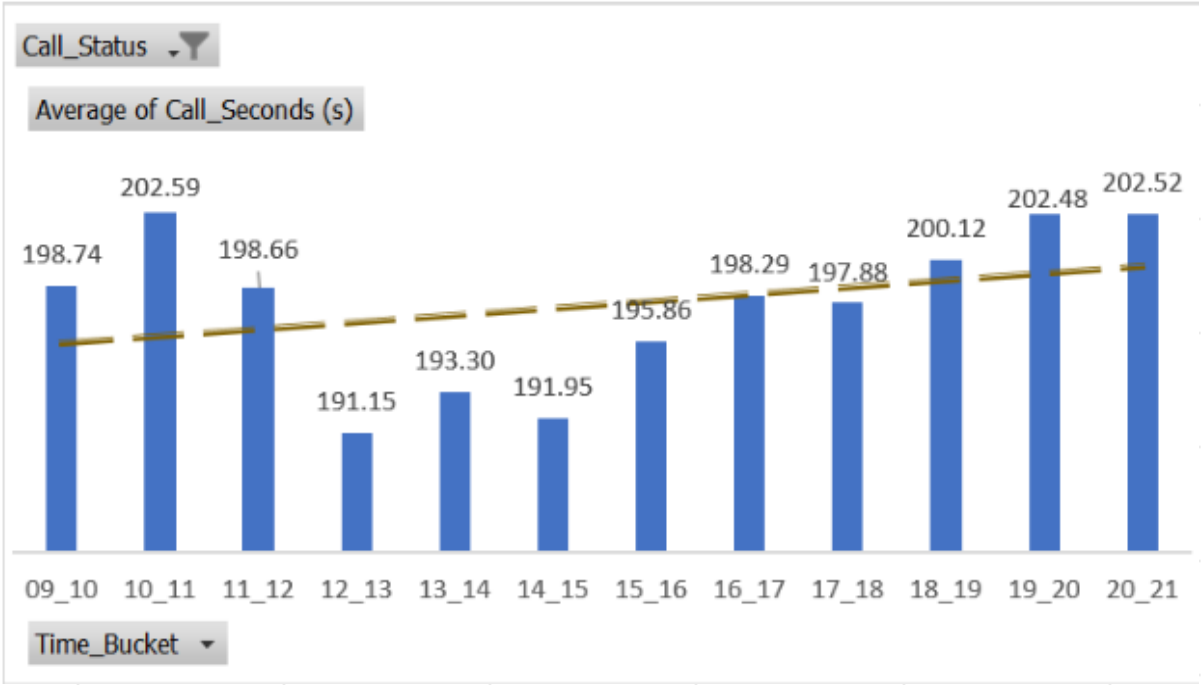


Insight

- Peak Call Times:
- Peak call periods were observed between 9 AM and 12 PM, as well as 4 PM to 6 PM, on weekdays.
- Call volume was significantly lower on weekends, with the busiest days typically falling mid-week.
- Seasonality:
- Seasonal trends showed higher call volumes during certain months, particularly November and December, possibly related to promotional events or business cycles.
- Operational Efficiency:
- The analysis suggested that staffing levels could be better aligned with peak call hours, enabling more efficient resource allocation.

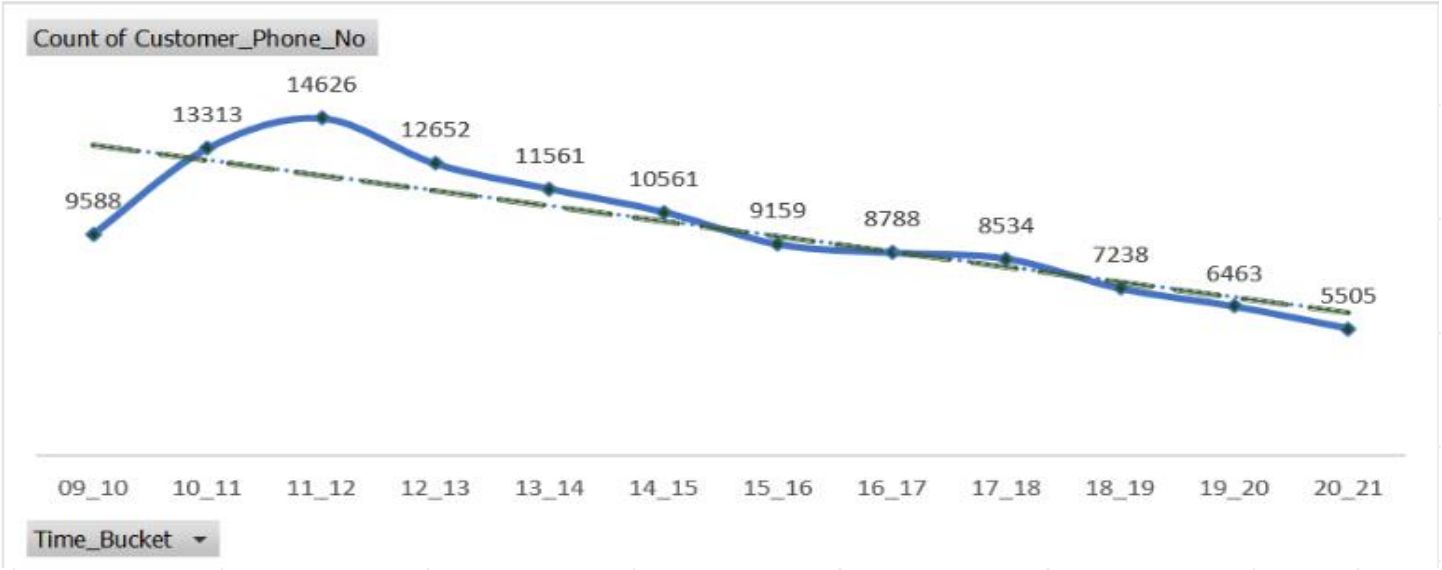
AVERAGE CALL TIME IN EACH TIME BUCKET

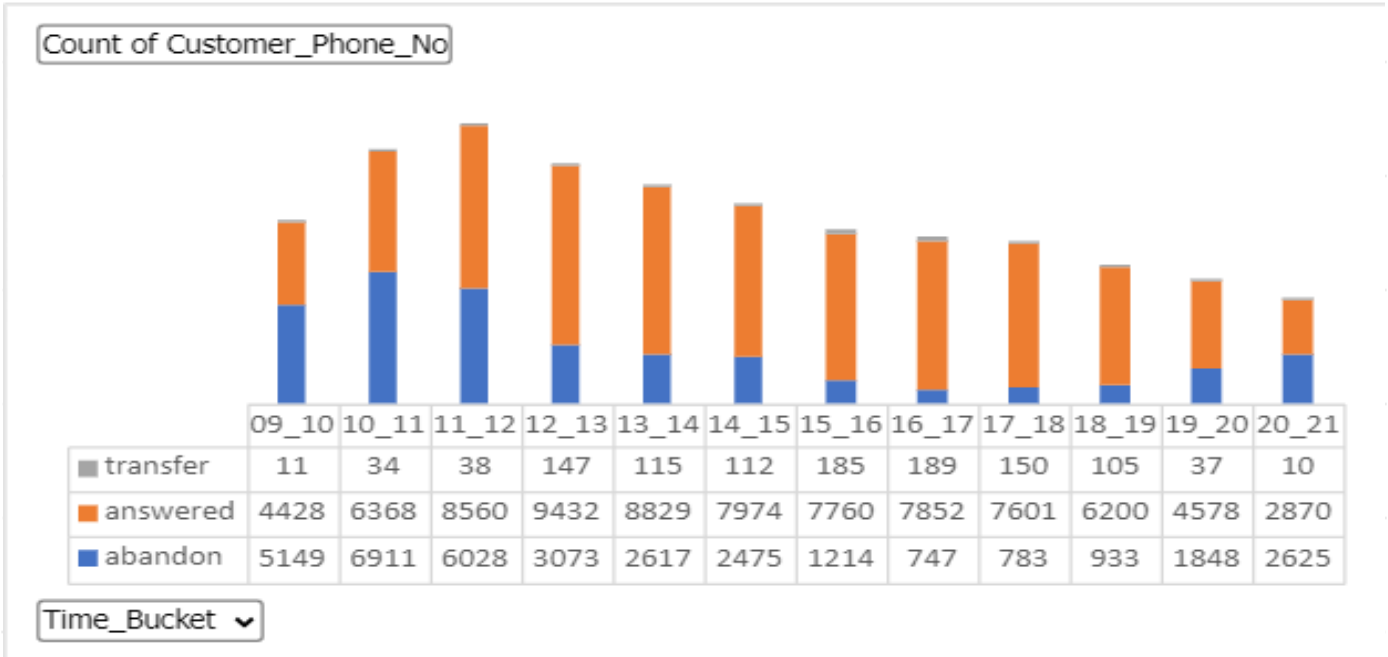
- An Overall Increasing Trend from 9am to 9pm with average duration of 196.96 seconds
- lowest during 12pm to 1pm slot followed by 2pm to 3pm then 1pm to 2pm
- Longest duration during 10am to 11am followed by 8pm to 9pm then 7pm to 8pm
- In morning hours from 9 am to 12 pm and from 6pm to 9pm the call duration is highest



CALL VOLUME

- The Call volume follows a left skewed bell curve, with the 9588 at 9am to 10am peaking at 11 to 12 with 14626 then continuously declining to 5505 in 8pm to 9pm slot
- Overall decreasing trend is followed
- During the initial number of hours large number of calls are abandoned, and during the last hour large number of calls are abandoned in comparison to the call answered
- During the day more than 11 lakhs calls are received.





	09_10	10_11	11_12	12_13	13_14	14_15	15_16	16_17	17_18	18_19	19_20	20_21
transfer	11	34	38	147	115	112	185	189	150	105	37	10
answered	4428	6368	8560	9432	8829	7974	7760	7852	7601	6200	4578	2870
abandon	5149	6911	6028	3073	2617	2475	1214	747	783	933	1848	2625

MANPOWER PLAN

- Given Assumption: An agent work for 6 days a week; On an average total unplanned leaves per agent is 4 days a month; An agent total working hrs is 9 Hrs out of which 1.5 Hrs goes into lunch and snacks in the office. On average an agent occupied for 60% of his total actual working Hrs (i.e 60% of 7.5 Hrs) on call with customers/ users. Total days in a month is 30 days.

Call Status	Count of Customer_Phone_No	percentage
abandon	34403	29.16%
answered	82452	69.88%
transfer	1133	0.96%
Grand Total	117988	100.00%

Total Call Incoming (9am-9pm)	117988
Number of Calls Handled	83585
Gap	34403
Working Hour of Each Agent	9
Average Call Handling Time(s)	196
Occupancy on Average	60%

Call Handling Capacity	99.18367347
minimum agents required	1189.590947
head count required	1586.121262
Man power in each time bucket	132.1767718

Formulae Used	
Call handling Capacity =	$\frac{(\text{working time of agent in seconds})(\text{occupancy})}{(\text{Average Call Handling Time})}$
minimum agents required=	Total Incoming Calls / Call Handling Capacity
Head Count Required=	$\frac{\text{Minimum Agents Required}}{1-\text{Shrinkage}}$
Shrinkage Percentage on an average is 25% so 1-Shrinkage Percentage will be taken as 0.75	

Assumption: An agent work for 6 days a week; On an average total unplanned leaves per agent is 4 days a month; An agent total working hrs is 9 Hrs out of which 1.5 Hrs goes into lunch and snacks in the office. On average an agent occupied for 60% of his total actual working Hrs (i.e 60% of 7.5 Hrs) on call with customers/ users. Total days in a month is 30 days.

As we can see that abandon rate is around 30% we need to propose a manpower plan which can help reduce this to 10%

Hence for each bucket we need **132** agents, as call handling capacity is 99 therefore if we multiply them, we get 13068 implying that 132 agents can handle 13068 call per hour. According to previous slide only 2 slots i.e. 10am-11am which receive 13133 calls and 11am to 12pm slot which receive 14626 calls receive more calls than call handling capacity of 132 agents, but the number is not big enough so as to exceed abandon rate by 10%.

24 HOUR MANPOWER PLAN

- Given Assumption: An agent work for 6 days a week; On an average total unplanned leaves per agent is 4 days a month; An agent total working hrs is 9 Hrs out of which 1.5 Hrs goes into lunch and snacks in the office. On average an agent occupied for 60% of his total actual working Hrs (i.e 60% of 7.5 Hrs) on call with customers/ users. Total days in a month is 30 days.

Distribution of 30 calls coming in night for every 100 calls coming in between 9am - 9pm (i.e. 12 hrs slot)											
9pm- 10pm	10pm - 11pm	11pm- 12am	12am- 1am	1am - 2am	2am - 3am	3am - 4am	4am - 5am	5am - 6am	6am - 7am	7am - 8am	8am - 9am
3	3	2	2	1	1	1	1	3	4	4	5

Total Call Incoming (9pm-9am)	30
Working Hour of Each Agent	9
Average Call Handling Time(s)	196
Occupancy on Average	60%

Call Handling Capacity	99.18367347
minimum agents required	0.302469136
head count required	0.403292181
Man power in each time bucket	0.033607682

Formulae Used

Call handling Capacity = $\frac{(\text{working time of agent in seconds})}{(\text{occupancy})(\text{Average Call Handling Time})}$

minimum agents required= $\frac{\text{Total Incoming Calls} * \text{Call Handling Capacity}}{}$

Head Count Required= $\frac{\text{Minimum Agents Required}}{1-\text{Shrinkage}}$

Shrinkage Percentage on an average is 25% so 1-Shrinkage Percentage will be taken as 0.75

When only 30 calls are received we would need just 1 agent
But according to the given question we receive 30 calls at night for every 100 calls received in day

24 HOUR MANPOWER PLAN

Distribution of 30 calls coming in night for every 100 calls coming in between 9am - 9pm (i.e. 12 hrs slot)											
9pm- 10pm	10pm - 11pm	11pm- 12am	12am- 1am	1am - 2am	2am - 3am	3am - 4am	4am - 5am	5am - 6am	6am - 7am	7am - 8am	8am - 9am
3	3	2	2	1	1	1	1	3	4	4	5

Total Incoming Calls in 9am to 9pm	117988
Given that calls betweem 9pm to 9 am is 30% of calls between 9am to 9pm	
Total Incoming calls in 9pm to 9am	35396

Call Handling Capacity	99.18367347
minimum agents required	356.877284
head count required	475.8363786
Man power in each time bucket	39.65303155

Time Bucket	Number of Calls Projected
9_10	3540
10_11	3540
11_12	2360
12_1	2360
1_2	1180
2_3	1180
3_4	1180
4_5	1180
5_6	3540
6_7	4720
7_8	4720
8_9	5899
Grand Total	35396

Formulae Used

Call handling Capacity = $\frac{(\text{working time of agent in seconds})}{(\text{occupancy})(\text{Average Call Handling Time}))}$

minimum agents required= $\frac{\text{Total Incoming Calls}}{\text{Call Handling Capacity}}$

Head Count Required= $\frac{\text{Minimum Agents Required}}{1-\text{Shrinkage}}$

Shrinkage Percentage on an average is 25% so 1-Shrinkage Percentage will be taken as 0.75

Keeping in Mind the previous logic we require 40 agents in each time bucket based on the given data. Call Handling Capacity of 40 agents is 3967, this number is lower to only calls received at 6am-7am , 7am-8am and 8am to 9am but the difference is not much and calls abandon rate would not exceed 10%

RESULT

- The project helped in understanding how to analyZe call centre data and make effective insights.
- Further strengthening of understanding of Charts and Pivot tables in excel.
- The project helped in giving a glimpse of a high stake problem where customer satisfaction and profitability needs to be kept in mind along with how the jobs of people are in balance. The Project helps in understanding how to handle this.