# ABC Call Volume Trend Analysis: Final Project-4

By: Arpan Sharma(Data Analytics Trainee)

Project Description:-

ABC call Volume Trend Analysis project is about finding trends and insights about the dataset of Inbound calls of a ABC company from the insurance category. In this project, I have used the Call_Volume_Trend_Analysis provided by trainity and drawn some conclusions. I have provided insights to topics and answered the questions asked by the management team. I have used Google Spreadsheets and Microsoft Excel for data analytics and data visualisation.

Approach:-

Firstly, I have used the basics of the data analytics process to clean the raw data and ask questions from cleaned data. Then, I have used data wrangling to make small data frames for relevant insights to answer all the possible questions. Finally, I combined all the results into an interactive visual dashboard using excel(Glimpse shown below).
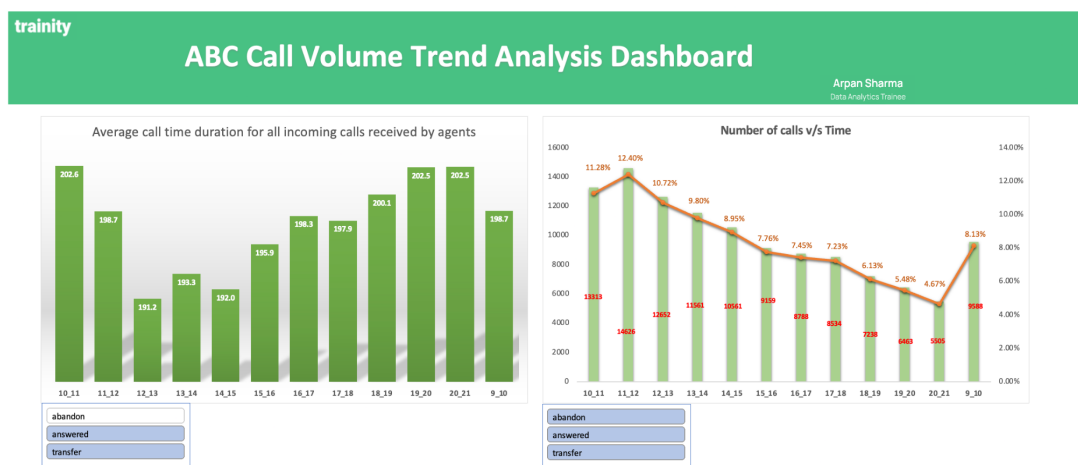
Link:-https://docs.google.com/spreadsheets/d/1Q6VO2k5CgeX1eULKqus_GIDT2J9-7iNG/edit?usp=share_link&ouid=115806434238999159358&rtpof=true&sd=true

Tech-Stack Used:-

I have used the web based application "**Google Sheets**" which is part of google online docs and "**Microsoft Excel for Mac version 16.70"** for performing various functions on spreadsheets. Both of these software provide ease of work and make data sharing and real time tracking very easy.

Project Insights:-

The dataset has only one table named Call_Volume_Trend_Analysis:

Table Name	No. of Rows	No. of Columns
Call_Volume_Trend_Analysis	117988	13

Table Details:

Column Name	Description
Agent_Name	Assigned name of Agent
Agent_ID	Assigned ID number to agent
Customer_Phone_No	Phone number of the Customer
Queue_Time(Secs)	Queue time in seconds
Date	Date of call
Time	Time of call
Time_Bucket	Time bucket of 1 hour interval
Duration(hh:mm:ss)	Duration of call in hh:mm:ss format
Call_Seconds (s)	Duration of call in seconds
Call_Status	Status of call (Abandoned/Transfers/Answered)
Wrapped _By	Called wrapped by Agent or automatically
Ringing	Call ringing
IVR _Duration	Duration of Interactive voice response (IVR)

Cleaning the Data:-

Removing Duplicates:
- I have used an inbuilt function in MS Excel software to remove duplicates as seen in figure below.
- From the menu bar select DATA —-> then from the toolbar ribbon select Remove Duplicates —>Then select my list has headers option and select all the columns —> then finally press ok —-> finally it will remove all duplicated values and show the number of duplicates that were found.
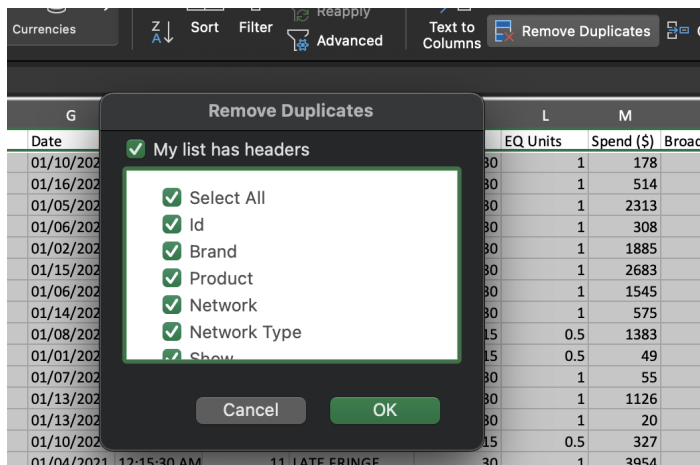

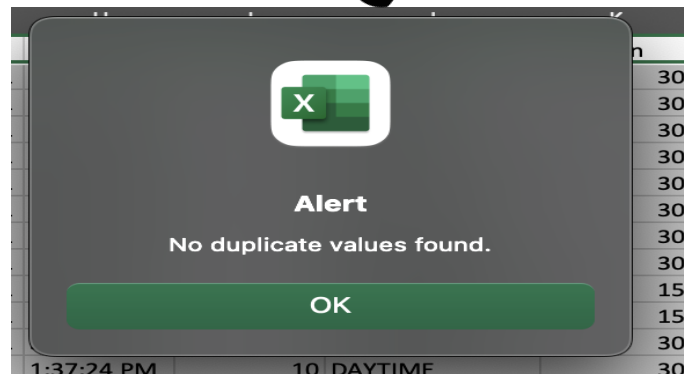Fig: Selecting all columns for removing duplicate
   criteria.

Fig: No duplicate values found in dataset

A. **Calculate the average call time duration for all incoming calls received by agents (in each Time_Bucket).**

Approach - I used pivot table to calculate the average of the Call_Seconds(s) column in the values section for each Time_Bucket in Rows Section. Then used the Call_status column to filter out the abandoned calls. Below is the pivot result grid that is obtained.

Call_Status	(Multiple Items)
Row Labels	**Average of Call_Seconds (s)**
10_11	202.6
11_12	198.7
12_13	191.2
13_14	193.3
14_15	192.0
15_16	195.9
16_17	198.3
17_18	197.9
18_19	200.1
19_20	202.5
20_21	202.5
9_10	198.7
Grand Total	**197.0**

Call_Status

Q Search
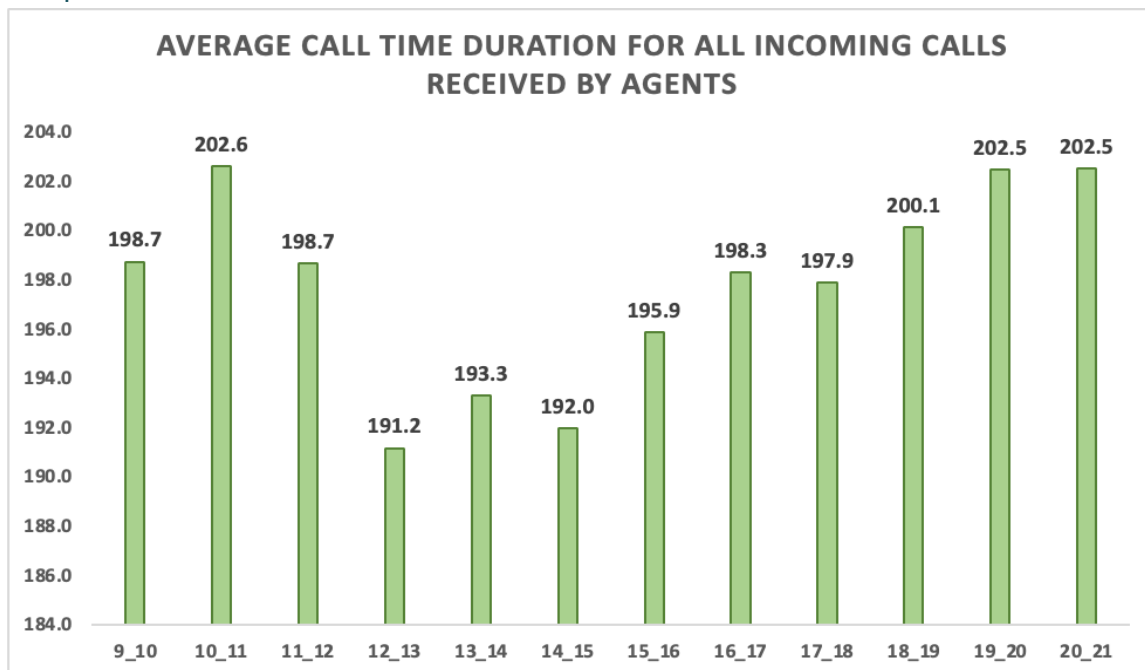
- (Select All)
- abandon
- ✓ answered
- ✓ transfer

Clear Filter

Then I selected the Pivot Table Analyse option from the menu bar and Pivot chart option from the toolbar ribbon to obtain graphical representation of the data as shown below.

Chart representation :-

AVERAGE CALL TIME DURATION FOR ALL INCOMING CALLS RECEIVED BY AGENTS

Conclusion: The overall Average call time duration for all incoming calls received by agents is about 197 seconds. The same is higher (i.e., more than 200 seconds) during 10_11, 18_19, 19_20, & 20_21 time buckets. The call duration is the least for time bucket between 12 noon to 1 pm, that is 191.2 seconds.

B. **Show the total volume/ number of calls coming in via charts/ graphs [Number of calls v/s Time]. You can select time in a bucket form (i.e. 1-2, 2-3, ...)**

Approach - I used pivot table to count the customer_phone_number column and Call_Seconds(s) column as percentage in the values section for each Time_Bucket in Rows Section. Below is the pivot result grid that is obtained.

Row Labels	Count of Customer_Phone_No	Count of Call_Seconds (s)
10_11	13313	11.28%
11_12	14626	12.40%
12_13	12652	10.72%
13_14	11561	9.80%
14_15	10561	8.95%
15_16	9159	7.76%
16_17	8788	7.45%
17_18	8534	7.23%
18_19	7238	6.13%
19_20	6463	5.48%
20_21	5505	4.67%
9_10	9588	8.13%
Grand Total	**117988**	**100.00%**

Then I selected the Pivot Table Analyse option from the menu bar and Pivot chart option from the toolbar ribbon to obtain graphical representation of the data as shown below.

Chart representation :-
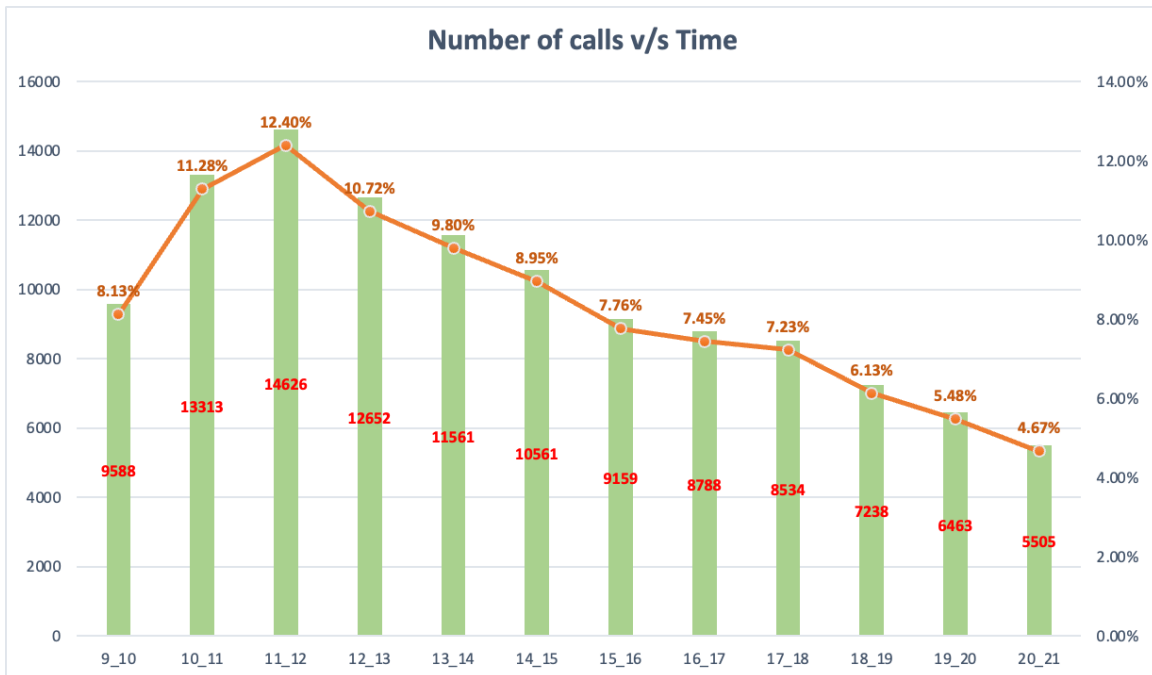
Conclusion :- The call volume increases from 9 AM in each hour bracket till 11_12 time bracket where it is highest at 12.40% of total volume and then continuously dropped to 4.67% in the 20_21 time bracket. Overall it is about 75% calls are received in general working hours that is 9am-5pm slot and rest 25% are received in late evening hours that is from 5pm-9pm.

C. **As you can see, the current abandon rate is approximately 30%. Propose a manpower plan required during each time bucket [between 9am to 9pm] to reduce the abandon rate to 10%. (i.e. You have to calculate the minimum number of agents required in each time bucket so that at least 90 calls should be answered out of 100.)**

Approach - I used pivot table to calculate the number of Customer_Phone_No columns in the values section for each Time_Bucket in Rows Section. Then used the Call_status column to segregate the calls into abandon, answered and transferred calls.

For calculating the average number of calls received in each time bracket I used a pivot table. In pivot table fields i used Time_Bucket in column section, date in rows and count of Customer_Phone_No in values section. Then I used a simple formula (=AVERAGE(H36:H58)) to calculate the average no. of calls per day per time bracket.

For Average call duration I used same pivot table from problem A. Then, to calculate Call Duration in hours with 10% abandon rate i used formula(=(((1-G19)*F19)*H19)/3600). And then divided the total hour of work with average occupancy of 1 agent to calculate the total number of agents required to work.

In the orange dialogue i calculated shrinkage of planned and unplanned leaves using formula (=total off hours/total working hours) and call handling capacity of one agent using formula(=(4.5*3600)/Average Handling Time(AHT))

For calculating login count i calculated number of agents required to answer 90% of the calls that is (=0.9*forecasted calls/call handling capacity of one agent).

For total headcount considering shrinkage I used formula(=login count required/(1-total shrinkage).

Chart representation 1 :-

trainity	Manpower Plan to reduce Abandon Rate	Arpan Sharma
		Data Analytics Trainee

Total working days	365
Total working hours	2737.5
Abandon Rate	10%

	days	hour/day	total hours	shrinkage
Unplanned Leaves	48	7.5	360	13%
offs	52	7.5	390	14%

Forecasted calls	5130
Login Hour	7:30:00
AHT	197
Occupancy	60%

Call Handling Capacity of one agent	82
Login Count Required	56
Total Shrinkage	27%
Total Head Count Required	77

Time_Bucket	No. of abandon calls	No. of answered calls	No. of transfer calls	Average No. of Calls per day per time bracket	Abandon Rate	Avergae Call duration	Call Duration in hours with 10% abandon rate	No. of agents required
9_10	5149	4428	11	417	10%	199	21	5
10_11	6911	6368	34	605	10%	203	31	7
11_12	6028	8560	38	636	10%	199	32	7
12_13	3073	9432	147	550	10%	193	27	6
13_14	2617	8829	115	503	10%	195	24	5
14_15	2475	7974	112	459	10%	194	22	5
15_16	1214	7760	185	398	10%	199	20	4
16_17	747	7852	189	382	10%	201	19	4
17_18	783	7601	150	371	10%	200	19	4
18_19	933	6200	105	315	10%	203	16	4
19_20	1848	4578	37	281	10%	203	14	3
20_21	2625	2870	10	239	10%	203	12	3
Grand Total	29.16%	69.88%	0.96%	5130	10%	197	253	56

Conclusion :- Manpower plan is shown in the figure. Total people required to work for the company is 77. Total people active per day needs to be 56. There are currently 65 employees so the company needs to hire 12 more.

D. Let's say customers also call this ABC insurance company in night but didn't get answer as there are no agents to answer, this creates a bad customer experience for this Insurance company. Suppose every 100 calls that customer made during 9 Am to 9 Pm, customer also made 30 calls in night between interval [9 Pm to 9 Am] and distribution of those 30 calls are as follows:

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

Now propose a manpower plan required during each time bucket in a day. Maximum Abandon rate assumption would be the same 10%.

Approach - The call distribution was mentioned in the problem so i converted it into percentage then I used pivot table to calculate the average number of calls received in each time bracket. In pivot table fields i used Time_Bucket in column section, date in rows and count of Customer_Phone_No in values section. Then I used a simple formula (=(AVERAGE('Problem C&D'!T36:T58))*0.3) to calculate the average no. of calls in night shift which was 30% to average calls received during the day shift.

Rest all the formulas are the same as in problem C.

Chart representation 1 :-

Manpower Plan for night shift

trainity

Arpan Sharma
Data Analytics Trainee

Total working days	365
Total working hours	2737.5
Abandon Rate	10%

	days	hour/day	total hours	shrinkage
Unplanned Leaves	48	7.5	360	13%
offs	52	7.5	390	14%

Forecasted calls	1539
Login Hour	7:30:00
AHT	197
Occupancy	60%

Call Handling Capacity of one agent	82
Login Count Required	17
Total Shrinkage	27%
Total Head Count Required	23

Time_Bucket	Calls distribution	Call Distribution(%)	No. of calls Received	Abandon Rate	Avergae Call duration	Call Duration in hours with 10% abandon rate	No. of agents required
21_22	3	10%	154	10%	197	8	2
22_23	3	10%	154	10%	197	8	2
23_24	2	7%	103	10%	197	5	1
24_1	2	7%	103	10%	197	5	1
1_2	1	3%	51	10%	197	3	1
2_3	1	3%	51	10%	197	3	1
3_4	1	3%	51	10%	197	3	1
4_5	1	3%	51	10%	197	3	1
5_6	3	10%	154	10%	197	8	2
6_7	4	13%	205	10%	197	10	2
7_8	4	13%	205	10%	197	10	2
8_9	5	17%	256	10%	197	13	3
Grand Total	30	100%	1539	10%	197	76	17

Conclusion :- Manpower plan for night shift is shown in figure above. Total people required to be hired for night shift is 23 and total people required to work daily in night shift is 17.

Result:-

Insights :-

- The customers call less in the late hours when compared with the general working hours that is 9 AM to 5 PM. So, the company can reduce the number of agents at that time for answering the calls.
- The company needs to hire 12 agents to reduce the abandon rate to 10%.
- The company needs to hire 23 agents to work the night shift with a 10% abandon rate.
- The company can divide agents into three shifts, so that the agents are always available 24/7.
- We found there were few outliers in the call duration data like 40 minutes call in row number 806 And if we had removed those outliers, then the answers would have been different but we left them intact as it can be possible in a real world scenario.

Learning :-

I have answered all the questions asked by the company in this project and explained the result grid and conclusion under the project insights part. While doing the project I applied my learning of statistics and understanding of different functions, pivot tables, conditionals used in spreadsheets.