

ABC Call Volume Trend Analysis

Excel Sheet:

https://docs.google.com/spreadsheets/d/1xW6a39M_o52SC5A4C5EZE_Msiak59E853/edit?usp=sharing&ouid=107365393175079460343&rtpof=true&sd=true

Project Description:

This project aims to analyze a dataset containing information about call trends in a company's customer care. The goal is to gain insights about trends in calls received, such as average call duration, call volume analysis, distribution of calls across various time buckets, and employee distribution according to call volume.. The data provided has various missing or null Data, our task is to handle those missing values appropriately, by either deleting or imputing these data. We utilize various excel features such as pivot tables and charts to better represent data. We find trends in call volume and employee distribution by implementing various methodologies and formulae and visualization techniques in Excel. Thus, by employing statistics and Excel formulas, we will extract meaningful conclusions to help understand how to better utilize manpower in handling the call volumes across various time buckets.

Approach:

As an individual working on this project, I followed a structured approach to analyze data about Call volume and Employees. I began by carefully examining the provided database and familiarizing myself with its structure and columns. I tried to find columns which had the most significance in the dataset. I handled missing values by eliminating columns which had most empty cells, and were not significant. And imputed data into cells that were necessary for analysis. Then, I utilized Excel fundamentals to retrieve the necessary information for each task, employing appropriate functions and statistical methods. I focused on data accuracy and quality throughout the project, ensuring reliable results. By leveraging my Excel skills and maintaining a systematic workflow, I successfully executed the project and created a comprehensive report that fulfilled the objectives of providing marketing insights and investor metrics.

Tech-Stack Used:

For this project, I utilized Microsoft Excel as the primary software tool.

Data Cleaning:

Given Data had various missing values, for better analysis of the data, we had to handle these missing values.

We found missing values by using following formulae:

=COUNTIF(B:B,"#N/A")

=COUNTBLANK(Table1[Wrapped_By])

Output:

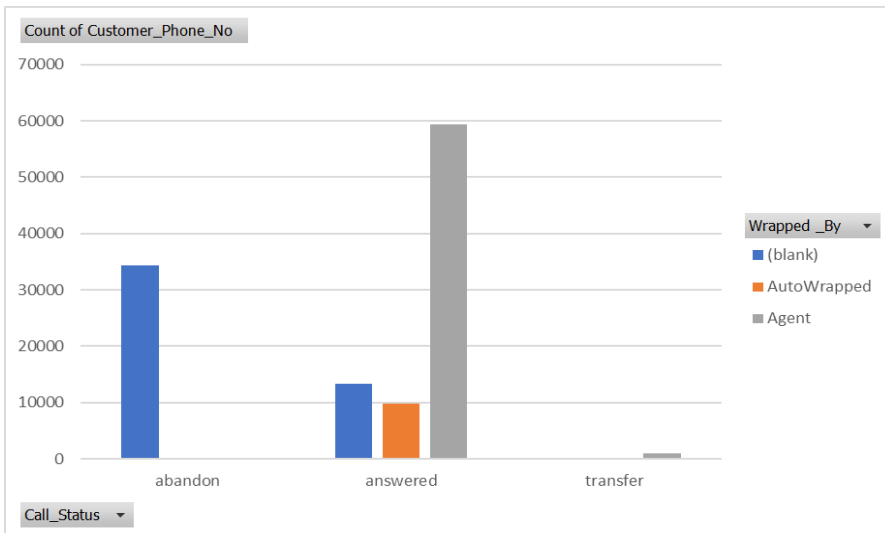
Columns	No. of null or N/A
Agent_ID	34198
Customer_Phone_No	34198
Queue_Time(Secs)	0
Date_&_Time	0
Time	0
Time_Bucket	0
Duration(hh:mm:ss)	0
Call_Seconds (s)	0
Call_Status	0
Wrapped_By	47877
Ringing	0
IVR_Duration	0

As there is a lot of missing data in Wrapped_By column we begin by handling these values.

We create a pivot table to understand the data.

Count of Customer_Phone_No Column Labels				
Row Labels	(blank)	AutoWrapped	Agent	Grand Total
abandon	34403			34403
answered	13362	9715	59375	82452
transfer	112		1021	1133
Grand Total	47877	9715	60396	117988

As we can see here most of the blank values are in abandon calls. To better understand the data we visualize it using Bar Chart



As most of the calls answered and transferred are by agent we check with the call_status column and impute appropriate values in the Wrapped_By column. We impute value Agent, if call is answered or transferred, else abandon.

Formula:

=IF(I7="abandon","abandon","Agent")

Agent ID column also had missing values where call were abandoned, so we replaced #N/A with abandon.

00:00:00	0.00	abandon	abandon	YES	00:00:17
00:01:05	65.00	answered	Agent	YES	00:00:22
00:03:00	180.00	answered	AutoWrapped	YES	00:00:22
00:01:48	108.00	answered	Agent	YES	00:00:22
00:03:06	186.00	answered	Agent	YES	00:00:22
00:04:03	243.00	answered	AutoWrapped	YES	00:00:19
00:04:10	250.00	answered	Agent	YES	00:00:19

Microsoft Excel

All done. We made 34198 replacements.

OK

Find and Replace

Find what: #N/A

Replace with: abandon

Options >>

Replace All Replace Find All Find Next Close

Thus, we got our cleaned Data.

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
1000042	98502XXXXX	2	01-01-2022	9.00 9_10		00:01:36	96.00	answered	Agent	YES	00:00:16
1000004	80595XXXXX	0	01-01-2022	9.00 9_10		00:02:20	140.00	answered	Agent	YES	00:00:26
1000065	70202XXXXX	0	01-01-2022	9.00 9_10		00:01:25	85.00	answered	AutoWrapped	YES	00:00:16
1000055	96104XXXXX	1	01-01-2022	9.00 9_10		00:01:31	91.00	answered	Agent	YES	00:00:25
1000021	82001XXXXX	0	01-01-2022	9.00 9_10		00:02:45	165.00	answered	Agent	YES	00:00:23
abandon	96424XXXXX	13	01-01-2022	9.00 9_10		00:00:00	0.00	abandon	abandon	YES	00:00:16
1000055	96737XXXXX	79	01-01-2022	9.00 9_10		00:01:25	85.00	answered	AutoWrapped	YES	00:00:13
abandon	96392XXXXX	60	01-01-2022	9.00 9_10		00:00:00	0.00	abandon	abandon	YES	00:00:17
1000042	90820XXXXX	52	01-01-2022	9.00 9_10		00:01:05	65.00	answered	Agent	YES	00:00:20
1000065	97410XXXXX	62	01-01-2022	9.00 9_10		00:03:00	180.00	answered	AutoWrapped	YES	00:00:44
1000004	70076XXXXX	52	01-01-2022	9.00 9_10		00:01:48	108.00	answered	Agent	YES	00:00:15
1000021	82505XXXXX	89	01-01-2022	9.00 9_10		00:03:06	186.00	answered	Agent	YES	00:00:16
abandon	97232XXXXX	120	01-01-2022	9.00 9_10		00:00:00	0.00	abandon	abandon	YES	00:00:40
1000055	96392XXXXX	45	01-01-2022	9.00 9_10		00:01:40	100.00	answered	AutoWrapped	YES	00:00:42
1000042	97471XXXXX	55	01-01-2022	9.00 9_10		00:01:15	75.00	answered	AutoWrapped	YES	00:00:19
abandon	77082XXXXX	16	01-01-2022	9.00 9_10		00:00:00	0.00	abandon	abandon	YES	00:00:18
abandon	95255XXXXX	44	01-01-2022	9.00 9_10		00:00:00	0.00	abandon	abandon	YES	00:00:17
1000004	79725XXXXX	88	01-01-2022	9.00 9_10		00:04:03	243.00	answered	AutoWrapped	YES	00:00:15
1000049	98344XXXXX	46	01-01-2022	9.00 9_10		00:04:10	250.00	answered	Agent	YES	00:00:19
1000050	96873XXXXX	64	01-01-2022	9.00 9_10		00:03:28	208.00	answered	Agent	YES	00:00:48
1000042	79899XXXXX	52	01-01-2022	9.00 9_10		00:02:34	154.00	answered	Agent	YES	00:00:26
1000065	95754XXXXX	67	01-01-2022	9.00 9_10		00:02:07	127.00	answered	AutoWrapped	YES	00:00:45
1000055	70546XXXXX	64	01-01-2022	9.00 9_10		00:03:11	191.00	answered	AutoWrapped	YES	00:00:40
1000021	97050XXXXX	47	01-01-2022	9.00 9_10		00:03:23	203.00	answered	Agent	YES	00:00:25
abandon	89680XXXXX	120	01-01-2022	9.00 9_10		00:00:00	0.00	abandon	abandon	YES	00:00:25
1000059	99954XXXXX	75	01-01-2022	9.00 9_10		00:02:30	150.00	answered	AutoWrapped	YES	00:00:21
1000016	90074XXXXX	71	01-01-2022	9.00 9_10		00:04:13	253.00	answered	Agent	YES	00:00:20
abandon	96048XXXXX	65	01-01-2022	9.00 9_10		00:00:00	0.00	abandon	abandon	YES	00:00:17
1000042	99971XXXXX	27	01-01-2022	9.00 9_10		00:00:44	44.00	answered	Agent	YES	00:00:16
1000065	63523XXXXX	36	01-01-2022	9.00 9_10		00:01:27	87.00	answered	Agent	YES	00:00:17
1000050	99824XXXXX	36	01-01-2022	9.00 9_10		00:01:16	76.00	answered	AutoWrapped	YES	00:00:17

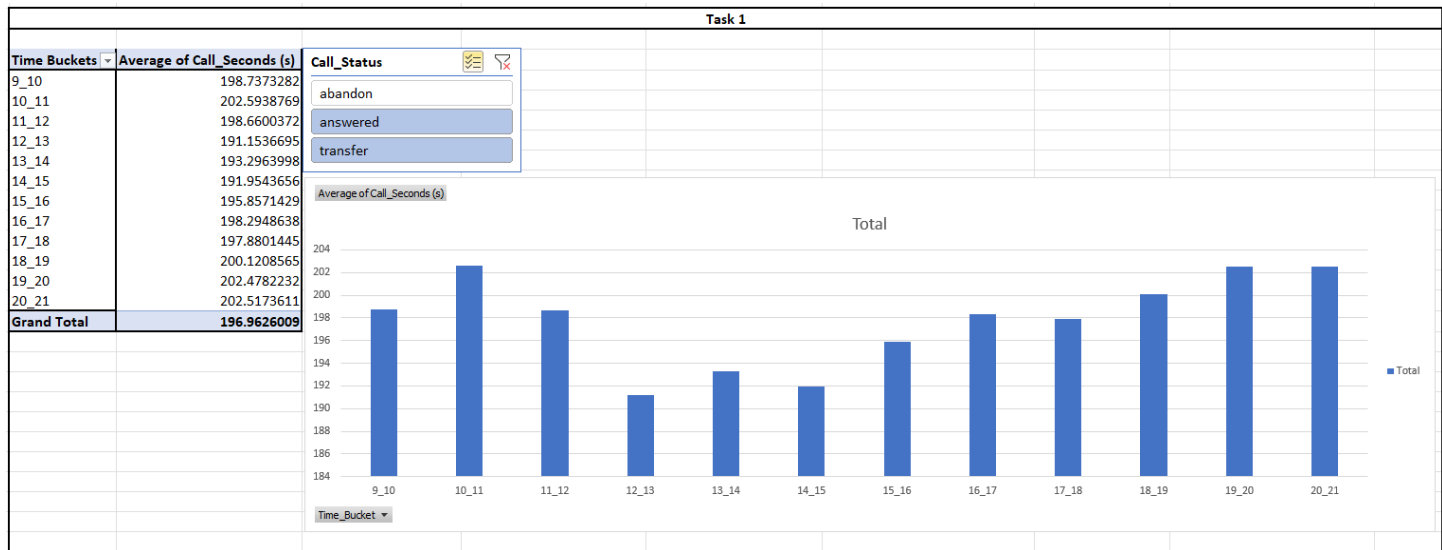
Insights:

Question 1: What is the average duration of calls for each time bucket?

To find the average duration of calls for each time bucket, we can create a pivot table, we select time bucket as row and the average of call duration in seconds as the field value. We get the following Table.

Time Buckets	Average of Call_Seconds (s)
9_10	198.7373282
10_11	202.5938769
11_12	198.6600372
12_13	191.1536695
13_14	193.2963998
14_15	191.9543656
15_16	195.8571429
16_17	198.2948638
17_18	197.8801445
18_19	200.1208565
19_20	202.4782232
20_21	202.5173611
Grand Total	196.9626009

We can visualize this on a column chart and also create a slicer to visualize the data according to various filters. We only need the average duration for calls received by the agent, so we have selected answered and transferred in filter.



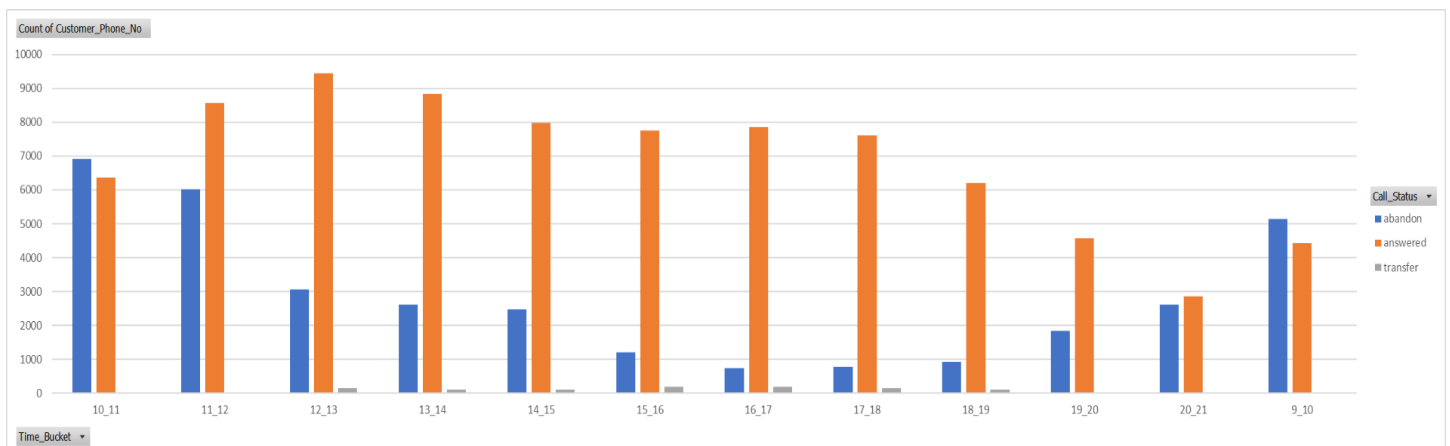
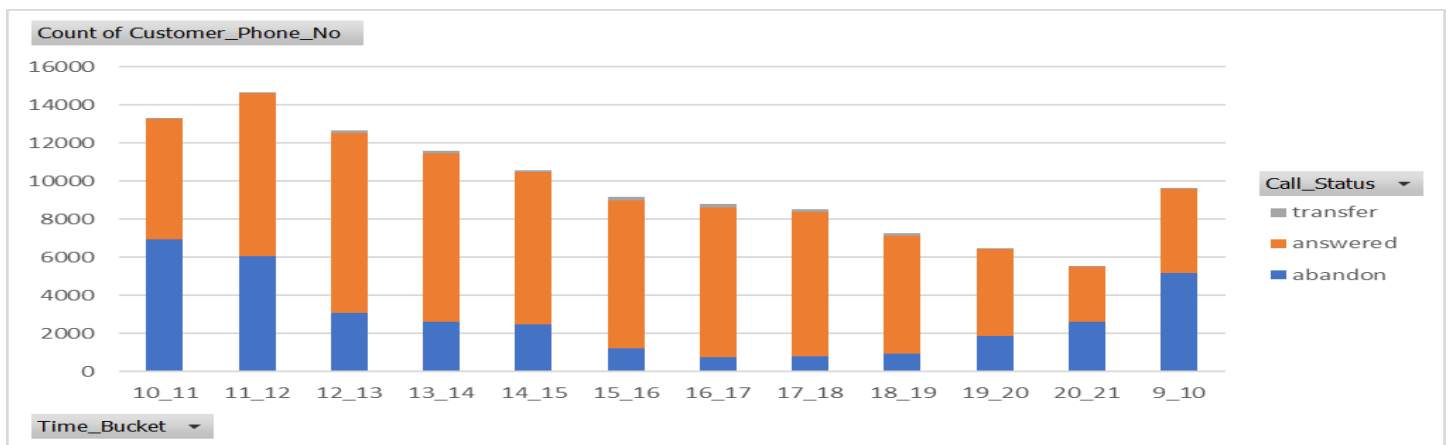
Question 2: Can you create a chart or graph that shows the number of calls received in each time bucket?

To Create a chart that shows the number of calls received in each time bucket, we first have to create a table which has a count of calls in each time bucket. To do this, we can create a pivot table. Pivot table has time buckets as rows and counts of customer phone numbers as fields, we also select call status as column to better understand trends.

We get following pivot table:

Count of Customer_Phone_No	Column Labels			
Time Buckets	abandon	answered	transfer	Grand Total
10_11	6911	6368	34	13313
11_12	6028	8560	38	14626
12_13	3073	9432	147	12652
13_14	2617	8829	115	11561
14_15	2475	7974	112	10561
15_16	1214	7760	185	9159
16_17	747	7852	189	8788
17_18	783	7601	150	8534
18_19	933	6200	105	7238
19_20	1848	4578	37	6463
20_21	2625	2870	10	5505
9_10	5149	4428	11	9588
Grand Total	34403	82452	1133	117988

From this table we can create Column Charts that show the number of calls received in each time bucket. We create two charts one stacked column chart, and clustered column chart:



Question 3: What is the minimum number of agents required in each time bucket to reduce the abandon rate to 10%?

To find the minimum number of agents required to reduce abandonment rate to 10% first we have to find the current abandonment rate, total number of calls per day and total number of calls to be answered to reduce the rate to 10%.

We create a table which consists of total abandoned call per time bucket, total answered call per bucket and find average calls abandoned and answered per day. From that we find the total number of calls received per day. Thus, we find an abandoned percentage. We find number of calls answered at abandon rate 10% by multiplying total number of call received by 0.9

Table below shows all values discussed above.

Time Buckets	Count of Abandoned calls	Count of Answered Calls	avg abandoned calls per day	avg answered calls per day	Total calls per day	Abandon Percentage	answered calls at 10% abandon
9_10	5149	4428	224	193	417	53.71702638	375
10_11	6911	6368	300	277	579	51.8134715	521
11_12	6028	8560	262	372	636	41.19496855	572
12_13	3073	9432	134	410	550	24.36363636	495
13_14	2617	8829	114	384	503	22.6640159	453
14_15	2475	7974	108	347	459	23.52941176	413
15_16	1214	7760	53	337	398	13.31658291	358
16_17	747	7852	32	341	382	8.376963351	344
17_18	783	7601	34	330	371	9.164420485	334
18_19	933	6200	41	270	315	13.01587302	284
19_20	1848	4578	80	199	281	28.46975089	253
20_21	2625	2870	114	125	239	47.69874477	215

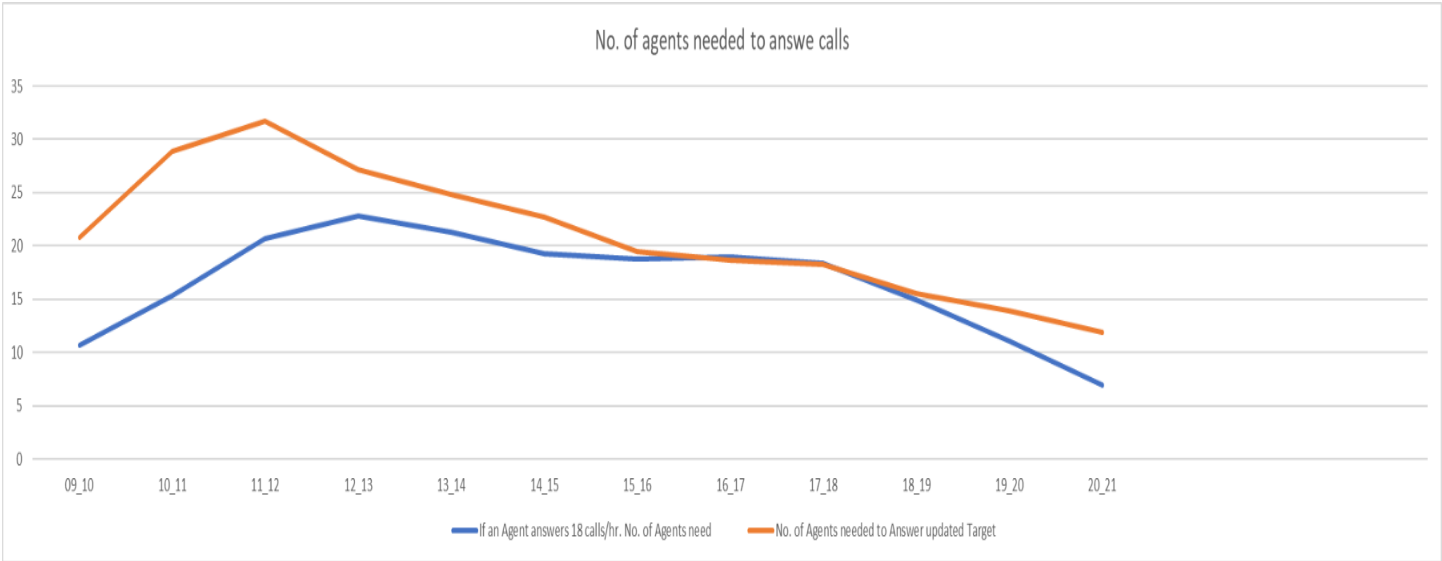
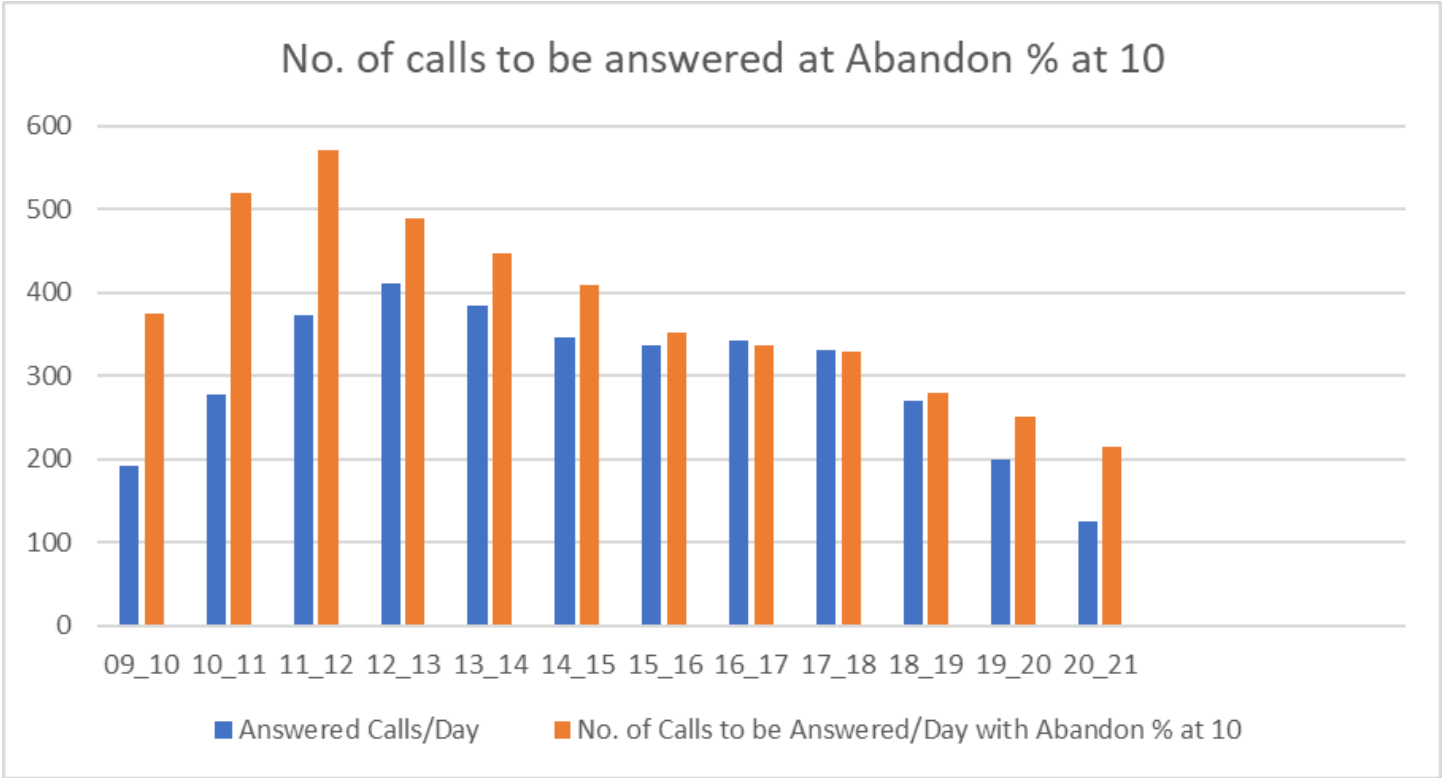
As per the given data, an agent works for 9 hrs per day, of which 1.5 hrs is break. So effectively the agent works 7.5 hrs per day. Which means total working seconds are 16200 seconds. On average a call lasts 199 seconds. Thus, an agent can answer 81 calls per day effectively. And can answer 18 calls per hour.

Work Hours :	9
Break :	1.5
Actual Working Hours :	7.5
Total Working Seconds :	16200
Average Call Time/Agent :	199
Call Capacity of an Agent/day :	81
Call Capacity of an Agent/Hour :	18

We find no. of agents by dividing no. of calls answered by 18 for each time bucket. Similarly we can find agents required to reduce abandonment rate.

Time_Bucket	Answered Calls/Day	If an Agent answers 18 calls/hr. No. of Agents need	No. of Calls to be Answered/Day with Abandon % at 10	No. of Agents needed to Answer updated Target
09_10	193	11	375	21
10_11	277	15	520	29
11_12	372	21	571	32
12_13	410	23	489	27
13_14	384	21	448	25
14_15	347	19	409	23
15_16	337	19	351	20
16_17	341	19	336	19
17_18	330	18	328	18
18_19	270	15	279	16
19_20	199	11	251	14
20_21	125	7	215	12

To better understand the trend we plot clustered column chart to find differences in number of agents, as well as line chart.



Question 4: Propose a manpower plan for each time bucket throughout the day, keeping the maximum abandon rate at 10%.

To create a manpower plan for each time bucket throughout the day, we have to find manpower required at night. As per given information, for per 100 calls that customers make during each time bucket during day, they make 30 calls at night. And distribution of these 30 calls is as below.

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

We find total number of calls made during night, by multiplying total number of calls made an average during day by 0.3

We can find distribution of calls for each time bucket during night by using formula below:

=ROUND(P\$148*[@[Distribution of 30 calls]]/Q\$148,0)

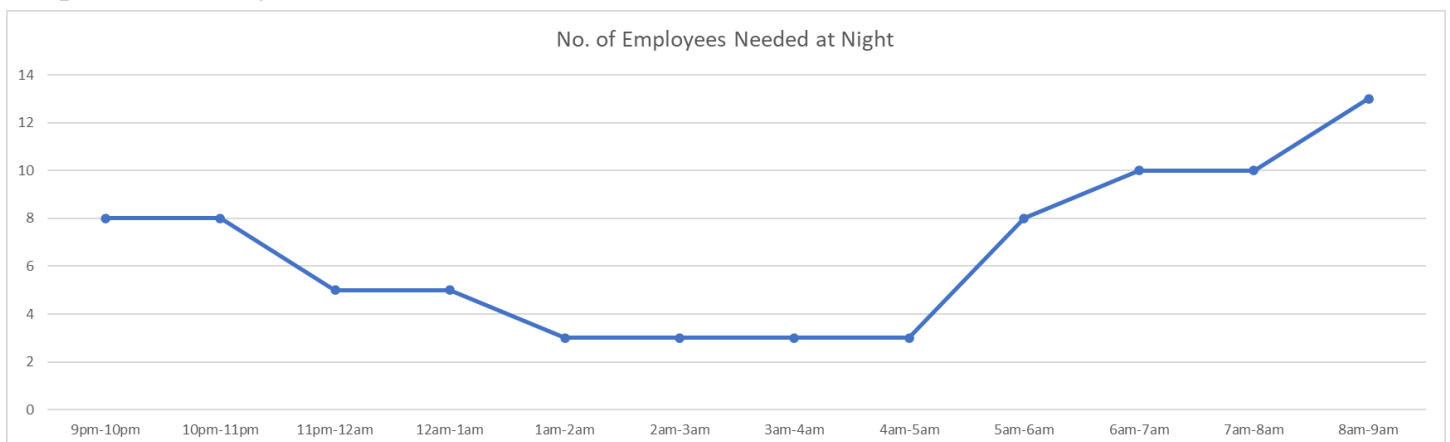
Here, we are multiplying total calls made at night by distribution of calls divided by 30.

We get following results:

Time_Bucket	No. of Calls to be Answered/Day with Abandon % at 10	Distribution of 30 calls	No. of calls at Night	Time_Bucket(Night)	No. of Employees Needed
09_10	375	3	137	9pm-10pm	8
10_11	520	3	137	10pm-11pm	8
11_12	571	2	91	11pm-12am	5
12_13	489	2	91	12am-1am	5
13_14	448	1	46	1am-2am	3
14_15	409	1	46	2am-3am	3
15_16	351	1	46	3am-4am	3
16_17	336	1	46	4am-5am	3
17_18	328	3	137	5am-6am	8
18_19	279	4	183	6am-7am	10
19_20	251	4	183	7am-8am	10
20_21	215	5	229	8am-9am	13
Total Calls on an average/day	4573				
Total Calls on Night	1372	30	1372		

To find the number of employees, we divided the total number of calls by 18(number of calls an employee can answer per hour).

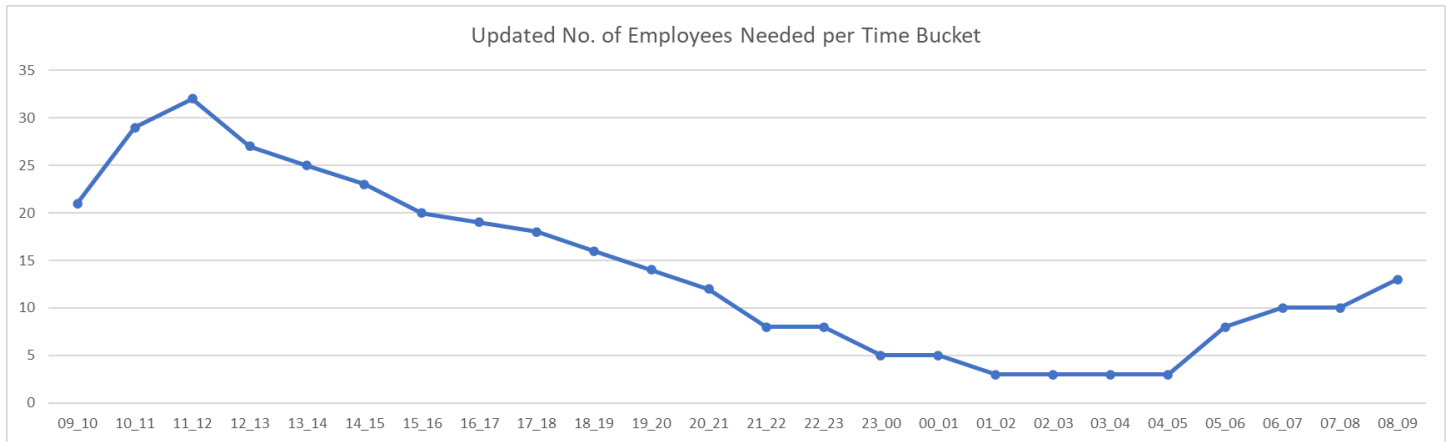
We plot this using a line chart to better visualize the data.



We also combine this data with no. of employees required for abandoned rate at 10% received from previous question and create a combined manpower table.

Updated Time_Bucket	No. of Employees Needed
09_10	21
10_11	29
11_12	32
12_13	27
13_14	25
14_15	23
15_16	20
16_17	19
17_18	18
18_19	16
19_20	14
20_21	12
21_22	8
22_23	8
23_00	5
00_01	5
01_02	3
02_03	3
03_04	3
04_05	3
05_06	8
06_07	10
07_08	10
08_09	13

We create a line Chart of combined Data to visualize manpower distribution for a complete day.



Results:

While working on this project, I have gained a better understanding of Call Volume Trends. I have improved my understanding of Advanced Excel methodologies. By analyzing Customer Experience Call Data, I was able to provide insights on various aspects such as average calls made throughout the day for each time bucket, total number of calls per time bucket, how to reduce abandon rate by increasing manpower, and how manpower distribution would look like for night shift. I was also able to create different visualizations to improve data understanding. This project has helped me enhance my Excel skills, particularly in data visualization and creating pivot tables and charts to derive meaningful insights. It has also improved my ability to interpret data and provide actionable recommendations based on the analysis.