

ABC Call Volume Trend Analysis

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Project Description:

The ABC Call Volume Trend Analysis project aims to:

- Analyze the trend in call volume for the ABC company
- Collect data on the number of calls received over a specified period of time
- Use statistical methods to identify any patterns or trends in the data
- Make recommendations to the ABC company on how to improve their call volume and customer service
- Provide insight on the factors that may be impacting call volume and ways to address them to improve customer satisfaction

Additionally, the project will also help to improve manpower planning in order to minimize the abandon rate by:

- Identifying the times of day and days of the week when call volume is highest
- Providing valuable information on when the most staff should be scheduled to handle calls
- Helping to ensure that there are enough staff available to handle the volume of calls during peak times
- Reducing the likelihood of customers being placed on hold or hanging up before reaching a representative
- Using the project's findings to adjust staffing levels in real-time to minimize abandon rate

The data collected and analyzed in this project will be used to optimize the call center's efficiency and service quality by:

- Providing a better understanding of customer needs and behaviors
- Optimizing the call center's efficiency and service quality.



Approach:

- To successfully carry out this project we are going to use **SIX STEP** of Data Analysis Process i.e (Ask, Prepare, Process, Analyze, Share, Act)
- Ask step include asking right set of question which justify goal and give motivation to carry out analysis
- We have following Objective (reasons) to justify goal of this project.
 - Calculate the average call time duration for all incoming calls received by agents (in each Time_Bucket).
 - Show the total volume/ number of calls coming in via charts/ graphs.
 - 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 minimum number of agents required in each time bucket so that at least 90 calls should be answered out of 100.)
 - 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 same 10%.

- Prepare: We have data in excel format which need to first clean, transform and load into correct format to make it suitable for analysis purpose.
- This step includes selecting right data, tools, data source to make project successful
- Process: Data we have in excel format we need to clean data such as removing null values, identifying data type, removing outliers which affect the analysis.
- Analyze: We are using excel itself which come with inbuilt statistical formulae and visualization tool to analyze data to draw insight.
- Share: we are showing data obtain from analysis in the form of row and column as well as chart wherever required for better and easy understanding.
- Act: Step include taking decision based on insight opt from this project.

Tech-Stack Used:

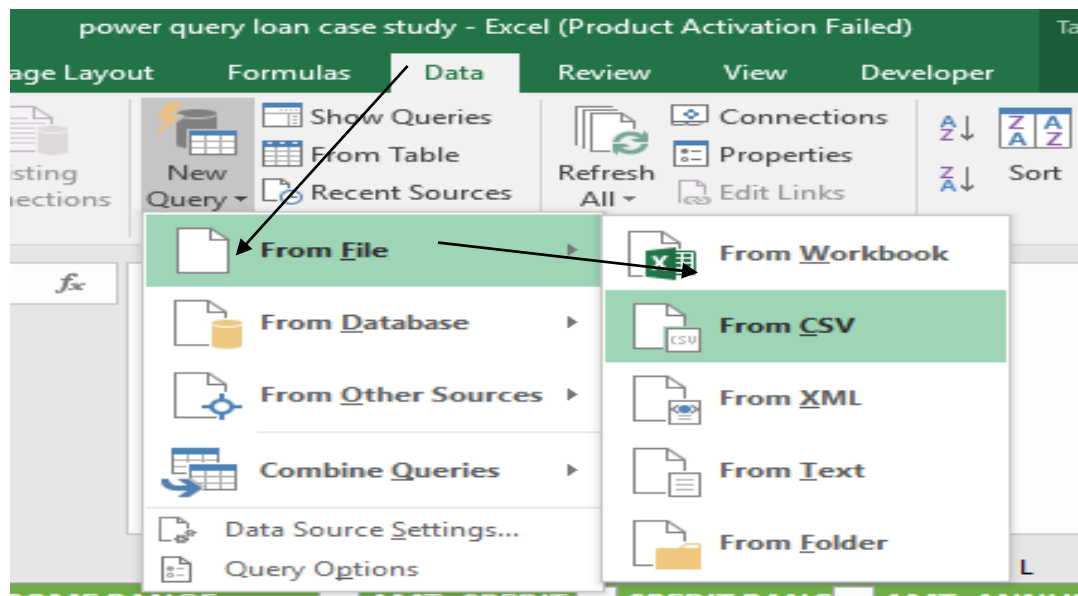
- In this project we are going to perform medium level complex analysis using excel pivot, formulae, chart are suitable tool to carry out analysis without investing in high technology.
- Excel is not suitable for large dataset so it is advice to use good BI tool for large dataset for better analysis.

◆ Insights:

For Importing or cloning data in excel there are two way

1. By using power query

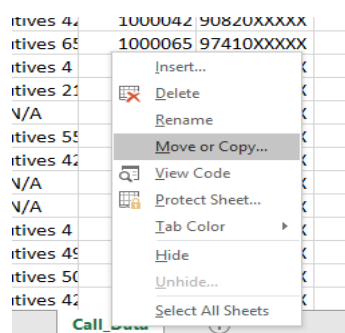
- a. Open blank excel workbook click on data tab refer below Image to load data using power query.



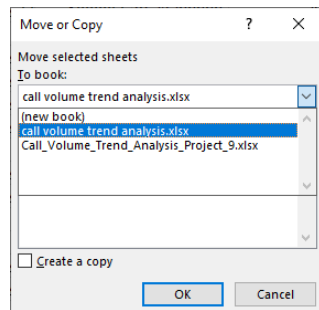
- b. Select file format accordingly from the folder where data is stored
- c. Power query change the data type of columns according to data present in column

2. By copying sheet to other workbook using Move or Copy command

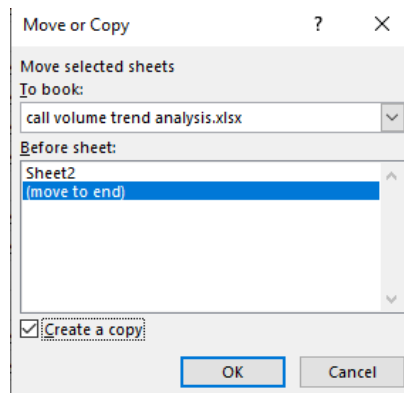
- a. Open excel workbook containing data and one blank workbook
- b. Right Click on sheet containing data select move and copy option



- c. From to book select (new book) or the open workbook in which you want to copy the data



- d. Click on select move to end click on create copy
e. Check the create copy option and click on ok



Brief about data

Total number of columns=13

Total number of original record=117989

Columns info:

Agent_Name: self-explanatory

Agent_ID: Id of agent

Queue_Time:

duration for which customer have to wait before they get connected to an agent

Time : time at which call was made by customer in a day

Time_Bucket:

time has been group by 1 Hr. of time interval e.g. if call made by customer at 9:30am it group into 9-10am and so on.

Duration: duration for which a customer and executives are on call

Call_Seconds: duration converted into seconds

call status:

(Abandon-hand up by customer before it connected to agent), (answered-answer by agent), (transferred-transfer to other department or other agent)

Wrapped by: agent and AutoWrapped

Ringing: Yes

IVR_Duration:

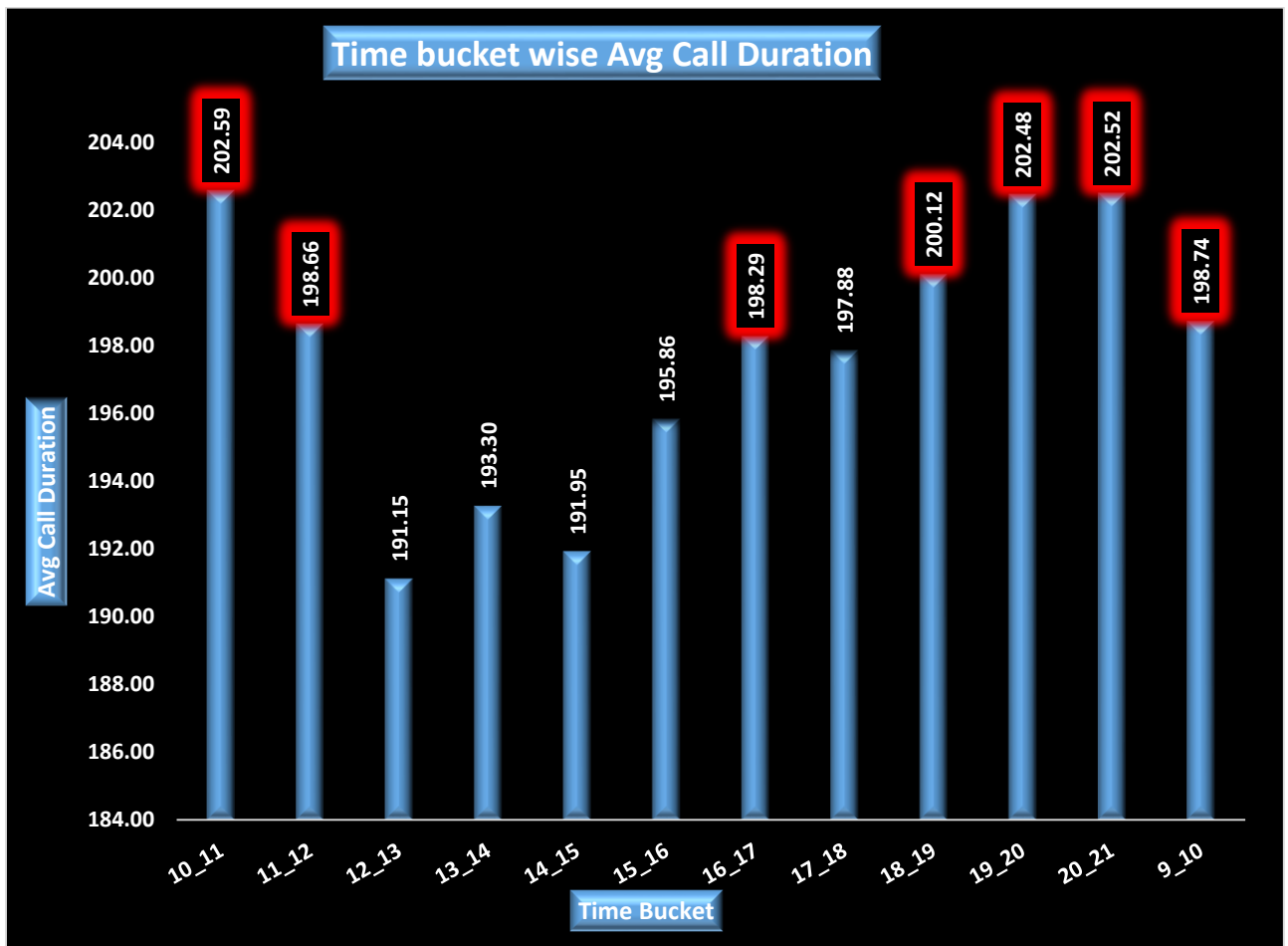
Interactive Voice Response (IVR) is an automated phone system technology that allows incoming callers to access information via a voice response system of pre-recorded messages without having to speak to an agent, as well as to utilize menu options via touch tone keypad selection or speech recognition to have their call routed to specific departments or specialists.

Agent_Name & Agent_ID provide the same type of information we can keep any one and drop other

Agent_Name	#N/A
Row Labels	Count of Agent_ID
abandon	34198
Grand Total	34198

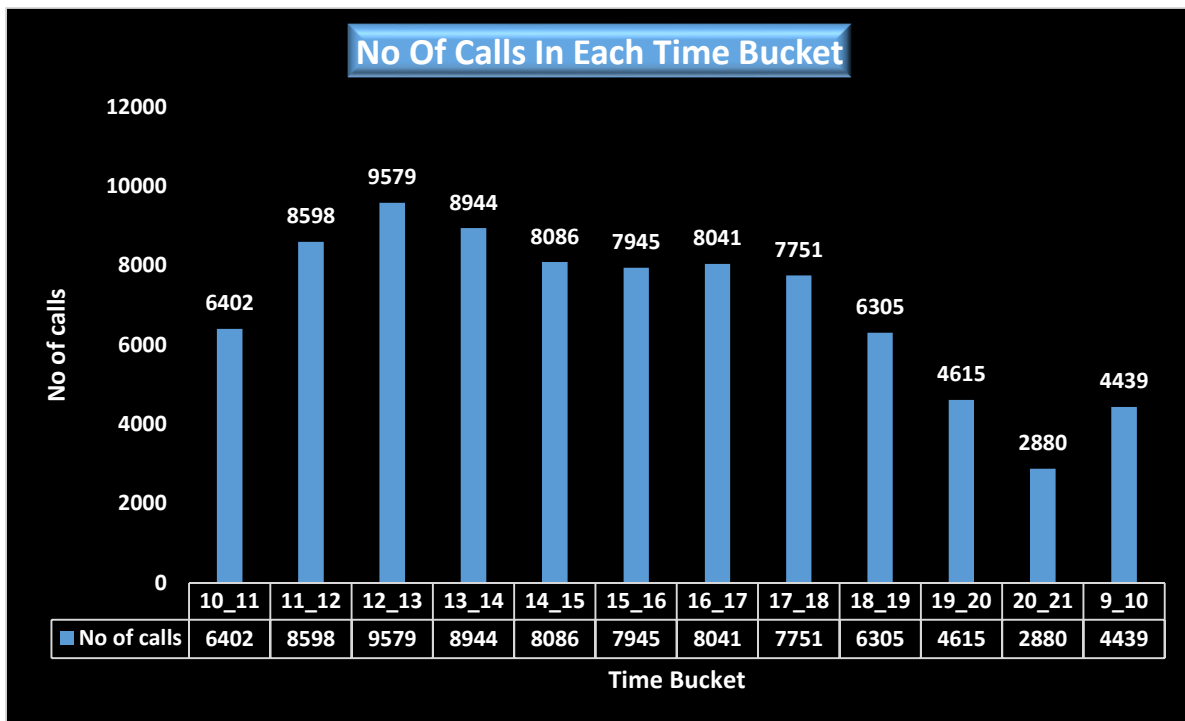
If we see there is only null values in Agent_Name and Agent_ID column where call status is abandon Its valuable information so we don't drop this row with missing values.

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



Call_Status	(answer,transwer)
Row Labels	Average of Call_Seconds (s)
12_13	191.15
13_14	193.30
11_12	198.66
14_15	191.95
16_17	198.29
15_16	195.86
17_18	197.88
10_11	202.59
18_19	200.12
19_20	202.48
9_10	198.74
20_21	202.52
Grand Total	196.9626009

2. Show the total volume/ number of calls coming in via charts/ graphs [Number of calls v/s Time].



- For the time bucket of 9_10, 10_11, 18_19, 19_20, 20_21 number of calls are less but the avg duration of calls is high
- For the time bucket 12_13, 13_14, 14_15, 15_16 no of call is high but time avg call duration is low it might be case that executive working in this time bucket have good knowledge of customer queries.
- Executive working in 9_10, 10_11, 18_19, 19_20, 20_21 time bucket required some additional training so they can reduce the avg call duration and improve customer satisfaction.
- As avg call duration less same executive can attend multiple call in that time which increase the productivity and required less number of employee as result less expenditure on the employment cost

3. 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 minimum number of agents required in each time bucket so that at least 90 calls should be answered out of 100.)

Time bucket	Count of Time_Bucket	Abandon call	Average of Call duration	Abandon call %
10_11	13313	6028	202.59	45.28%
11_12	14626	6911	198.66	47.25%
12_13	12652	5149	191.15	40.70%
13_14	11561	3073	193.30	26.58%
14_15	10561	2625	191.95	24.86%
15_16	9159	2475	195.86	27.02%
16_17	8788	1848	198.29	21.03%
17_18	8534	1214	197.88	14.23%
18_19	7238	933	200.12	12.89%
19_20	6463	783	202.48	12.12%
20_21	5505	747	202.52	13.57%
9_10	9588	2617	198.74	27.29%
Grand Total	117988	34403	2373.54	29.16%

As we can see current abandon rate is approximately 30%.

To reduce the abandon rate to 10%, we need to ensure that at least 90 calls are answered out of 100. To calculate the minimum number of agents required in each time bucket, we need to take into account the current call volume and abandon rate.

We can use the **Erlang C formula** to calculate the number of agents required in each time bucket. The formula is:

Agents = (Calls * (Abandonment rate + Average Handle Time)) / (3600 * Service level)

Where:

- Calls is the number of calls received in each time bucket
- Abandonment rate is the current abandon rate in each time bucket
- Average Handle Time is the average time taken to handle a call
- Service level is the target service level (in this case, 90%)

Here's the calculation for each time bucket:

- 10_11: $(13313 * (0.452790506 + 202.59)) / (3600 * 0.9) = 834.30$ agents
- 11_12: $(14626 * (0.4725147 + 198.66)) / (3600 * 0.9) = 898.92$ agents
- 12_13: $(12652 * (0.40697123 + 191.15)) / (3600 * 0.9) = 748.03$ agents
- 13_14: $(11561 * (0.265807456 + 193.30)) / (3600 * 0.9) = 690.67$ agents
- 14_15: $(10561 * (0.248556008 + 191.95)) / (3600 * 0.9) = 626.49$ agents
- 15_16: $(9159 * (0.270226007 + 195.86)) / (3600 * 0.9) = 554.42$ agents
- 16_17: $(8788 * (0.210286755 + 198.29)) / (3600 * 0.9) = 538.41$ agents
- 17_18: $(8534 * (0.142254511 + 197.88)) / (3600 * 0.9) = 521.58$ agents
- 18_19: $(7238 * (0.128903012 + 200.12)) / (3600 * 0.9) = 447.34$ agents
- 19_20: $(6463 * (0.121151168 + 202.48)) / (3600 * 0.9) = 404.13$ agents
- 20_21: $(5505 * (0.135694823 + 202.52)) / (3600 * 0.9) = 344.32$ agents
- 9_10: $(9588 * (0.272945348 + 198.74)) / (3600 * 0.9) = 588.92$ agents

Keep in mind that these calculations are based on the assumption that the average handle time and abandon rate remain constant. as other factors such as staff turnover, training, leaves and scheduling can affect the number of agents required we can consider additional 10% buffer

4. 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 same 10%.

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.

- During the time bucket of 9 PM to 10 PM, 3 calls are made by customers on average. To handle these calls with a maximum abandon rate of 10%, 3.3 agents are required.
- During the time bucket of 10 PM to 11 PM, 3 calls are made by customers on average. To handle these calls with a maximum abandon rate of 10%, 3.3 agents are required.
- During the time bucket of 11 PM to 12 AM, 2 calls are made by customers on average. To handle these calls with a maximum abandon rate of 10%, 2.2 agents are required.
- During the time bucket of 12 AM to 1 AM, 2 calls are made by customers on average. To handle these calls with a maximum abandon rate of 10%, 2.2 agents are required.
- During the time bucket of 1 AM to 2 AM, 1 call is made by customers on average. To handle these calls with a maximum abandon rate of 10%, 1.1 agent is required.
- During the time bucket of 2 AM to 3 AM, 1 call is made by customers on average. To handle these calls with a maximum abandon rate of 10%, 1.1 agent is required.
- During the time bucket of 3 AM to 4 AM, 1 call is made by customers on average. To handle these calls with a maximum abandon rate of 10%, 1.1 agent is required.
- During the time bucket of 4 AM to 5 AM, 1 call is made by customers on average. To handle these calls with a maximum abandon rate of 10%, 1.1 agent is required.
- During the time bucket of 5 AM to 6 AM, 3 calls are made by customers on average. To handle these calls with a maximum abandon rate of 10%, 3.3 agents are required.
- During the time bucket of 6 AM to 7 AM, 4 calls are made by customers on average. To handle these calls with a maximum abandon rate of 10%, 4.4 agents are required.

- During the time bucket of 7 AM to 8 AM, 4 calls are made by customers on average. To handle these calls with a maximum abandon rate of 10%, 4.4 agents are required.
- During the time bucket of 8 AM to 9 AM, 5 calls are made by customers on average. To handle these calls with a maximum abandon rate of 10%, 5.5 agents are required.
- In total, 32.5 agents are required to handle the calls during night time bucket with a maximum abandon rate of 10%.
- To account for unplanned leaves, it is recommended to have an additional 10% buffer, bringing the total number of agents required to 35.8. i.e. 36
- With an average of 6 days worked per week, 36 agents working 7.5 hours per day (with 1.5 hours for lunch and snacks), and an average of 60% of time spent on calls, the total manpower required to handle customer calls during night time is 36 agents.

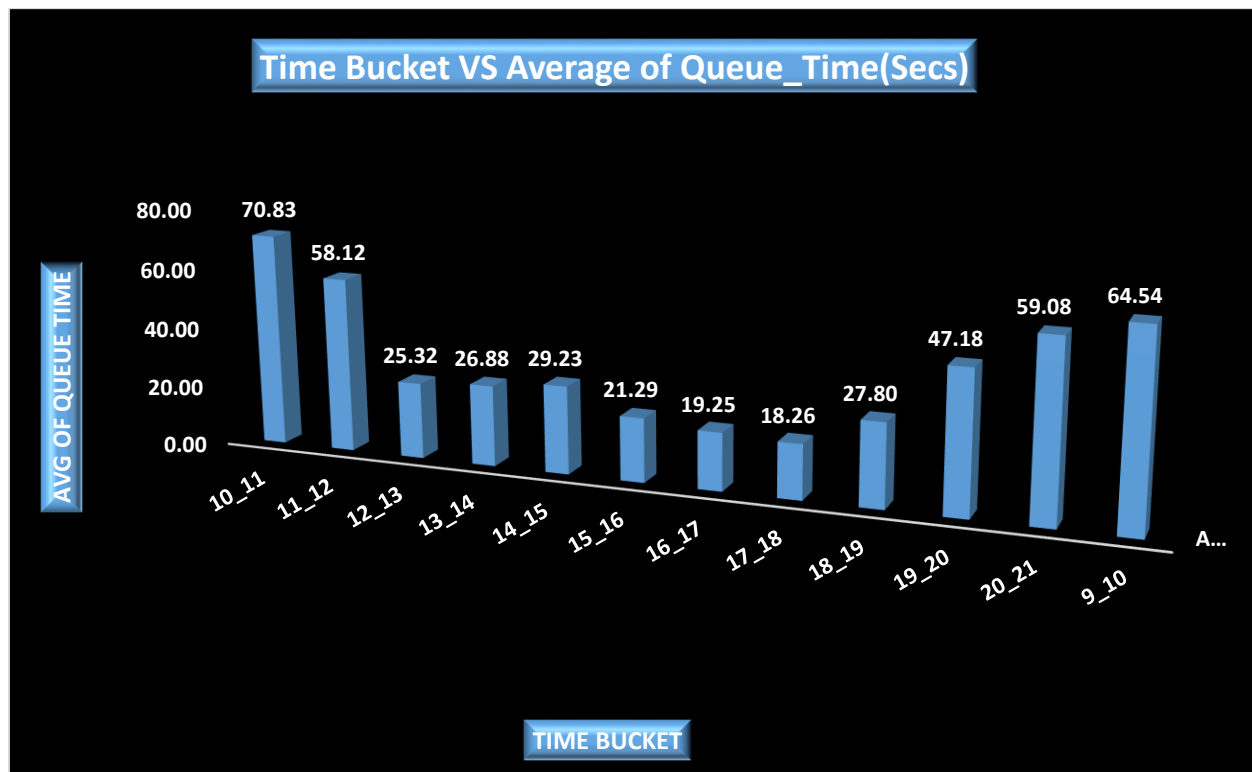
It is important to note that this plan is based on the assumptions provided and the actual number of agents required may vary depending on the actual call volume and abandon rate. Also, it is important to consider the fact that the calls are distributed unevenly across the night time bucket, so the staffing would be done accordingly.

Above manpower planning is done according to time bucket if we consider max call received in night in each bucket = 5 and average max call duration according to data 4 min.

One executive working 7.5hr per day he/she can handle multiple call in single time bucket

Considering break and leave 6 executives can handle night shift.

5. Queue Time analysis for each Time_Bucket



- In morning from 9_10, 10_11, 11_12 and in evening 7-8pm, 8-9pm Queue time is high as compared to other Time_Bucket.
- Number of call received in above Time_Bucket Except 11_12 is also less as compared to other Time_Bucket.
- As average call duration for this Time_Bucket is High as compared to other i.e. Queue Time is high.



Summary:

1.The reasons for a call being abandoned include:

- The customer hanging up out of frustration because they were left waiting too long. This effect will be amplified if the customer is being charged for the call.
- The caller found the solution to their problem on their own and therefore ended the call.

- The customer decided that the call center wouldn't be able to help them with their query so they ended the call.
- The customer was disconnected unintentionally from the call.
- Frustrating IVR menu choices, making it difficult for the caller to get through to an agent.
- Unless there's a technical issue causing calls to be dropped, or customers are struggling through a poorly designed IRV system, callers hanging up out of frustration is typically the main issue that needs addressing.

2. Tactics to improve Call Abandonment Rate:

1. Monitor your current call wait time and number of calls on hold in real-time:

- By monitoring the number of calls currently on hold and your current wait time you can take action when either number reaches a certain threshold. This may include reallocating more of the team to answering calls or trying to wrap up current calls more quickly.

2. Look for general efficiencies to reduce the number of calls:

- Another strategy for reducing overall number of calls is to provide more channels e.g. chat support which may resolve customer issues faster or require the customer to waste less time.
- Be careful not to just make it harder to reach the call center as this is likely to negatively impact your customer satisfaction.

3. Find ways to reduce the time spent on each call:

- Techniques here may include better training, improved tooling, and smarter allocation of calls using automated systems upfront.

4. Improve your agents scheduling:

- Check your agent scheduling against your call data and try to make sure you have most agents allocated when you expect most calls.
- If an event is planned (e.g. a new product release or a pricing change) that's likely to result in a spike of calls, try and anticipate that and arrange schedules accordingly.

If the strategies above fail to make a dent in Call Abandonment Rate, then only remaining option may be to hire more agents.