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# ABC Call Volume Trend Analysis

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## Description

ABC Call Volume Trend Analysis is a project that focuses on analysing the dataset of a Customer Experience (CX) Inbound calling team for 23 days. The project aims to calculate the average call duration for incoming calls, visualise the call volume trends over time, and propose a manpower plan to reduce the abandon rate. By utilising Excel tools and considering factors like time buckets and agent availability, the project seeks to enhance the customer experience and optimise the efficiency of the call centre operations for ABC company in the insurance industry.

## Approach

- Data Exploration and Preparation:**
  - ❖ Explore the dataset of the Customer Experience (CX) Inbound calling team.
  - ❖ Clean the data by handling missing values and duplicates.
  - ❖ Format time-related variables for analysis.
- Calculate Average Call Duration:**
  - ❖ Group incoming calls into time buckets.
  - ❖ Calculate the average call duration for each time bucket.
- Visualise Call Volume Trends:**
  - ❖ Create a simple chart or graph to show the total number of calls over time.
  - ❖ Choose a suitable time interval (e.g., hourly) for plotting.

4. **Propose Manpower Plan to Reduce Abandon Rate:**

- ❖ Determine the current abandon rate (approximately 30%).
- ❖ Calculate the minimum number of agents needed in each time bucket to answer at least 90 calls out of 100.

5. **Address Night-time Calls:**

- ❖ Account for customer calls during the night-time interval (9 pm to 9 am) with no available agents.
- ❖ Assume a certain percentage of day-time calls are also made at night (e.g., 30%).
- ❖ Propose a plan to handle night-time calls while maintaining a maximum abandon rate of 10%.
- ❖ Distribute available agents across day and night time buckets.

## Tech-Stack Used: MS Excel

**Easy Data Organization:** Excel provides a structured and organised format for storing and managing data. It offers rows and columns that can be labelled and sorted, allowing for efficient data organisation.

**Data Analysis Capabilities:** Excel offers a range of functions and formulas that enable data analysis and calculations. It allows users to perform statistical analysis, create charts and graphs, apply filters, and generate insights from the data.

**Visual Representation of Data:** Excel offers powerful visualisation capabilities through charts, graphs, and conditional formatting. It helps in presenting data in a visually appealing and easily understandable format, aiding in data-driven decision-making.

**Widely Accepted Standard:** Excel has become a standard tool for data analysis and reporting in many organisations. It is widely used and accepted, making it easy to share and exchange data with colleagues and stakeholders.

## Insights

### 1. Longer Conversation

Customers make longer conversations during 10-11, 18-19, 19-20, 20-21 for an average of 3 minutes & 23 seconds.

Customers stay longer durations on calls between 20-21 & 16-17.

### 2. Duration in Which Most Calls are Coming

Duration in which most calls are coming between is 10-11 and 11-12.

Most calls are answered between 12-13 & 13-14.

### 3. Number of Employees Required

There are 57 employees required to answer the 90% of received calls in the 9am-9pm shift and 17 employees required in the 9pm-9am shift.

## Results

Throughout making the whole project we found the time duration in which customers made longer conversations. We also found the time duration in which most calls are coming. Along with that we found the number of employees required in two different shifts.

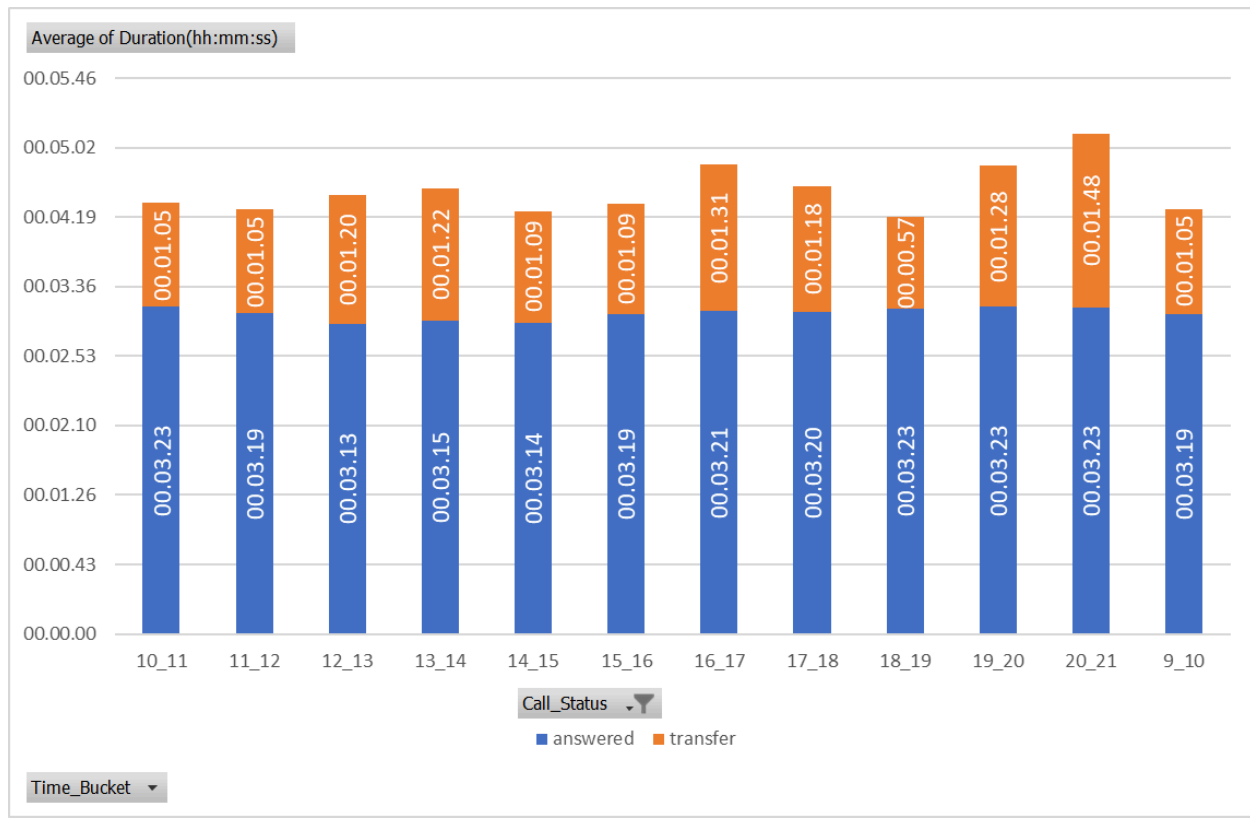
This has helped me to learn calculated fields in pivot tables and calculating the number of employees required within a given time bucket and a given distribution.

# REPORT

1. The average call time duration for all incoming calls received by agents (in each Time\_Bucket) is given below-

Time Buckets	answered	transfer	Grand Total
10_11	00.03.23	00.01.05	00.03.23
11_12	00.03.19	00.01.05	00.03.19
12_13	00.03.13	00.01.20	00.03.11
13_14	00.03.15	00.01.22	00.03.13
14_15	00.03.14	00.01.09	00.03.12
15_16	00.03.19	00.01.09	00.03.16
16_17	00.03.21	00.01.31	00.03.18
17_18	00.03.20	00.01.18	00.03.18
18_19	00.03.23	00.00.57	00.03.20
19_20	00.03.23	00.01.28	00.03.22
20_21	00.03.23	00.01.48	00.03.23
9_10	00.03.19	00.01.05	00.03.19
<b>Grand Total</b>	<b>00.03.19</b>	<b>00.01.16</b>	<b>00.03.17</b>

This can be represented graphically-



From the above graph we can say that they make longer conversations during 10-11, 18-19, 19-20, 20-21 for an average of 3 minutes & 23 seconds.

Customers stay longer durations on calls between 20-21 & 16-17.

2. The total number of calls coming from different time buckets is shown below-

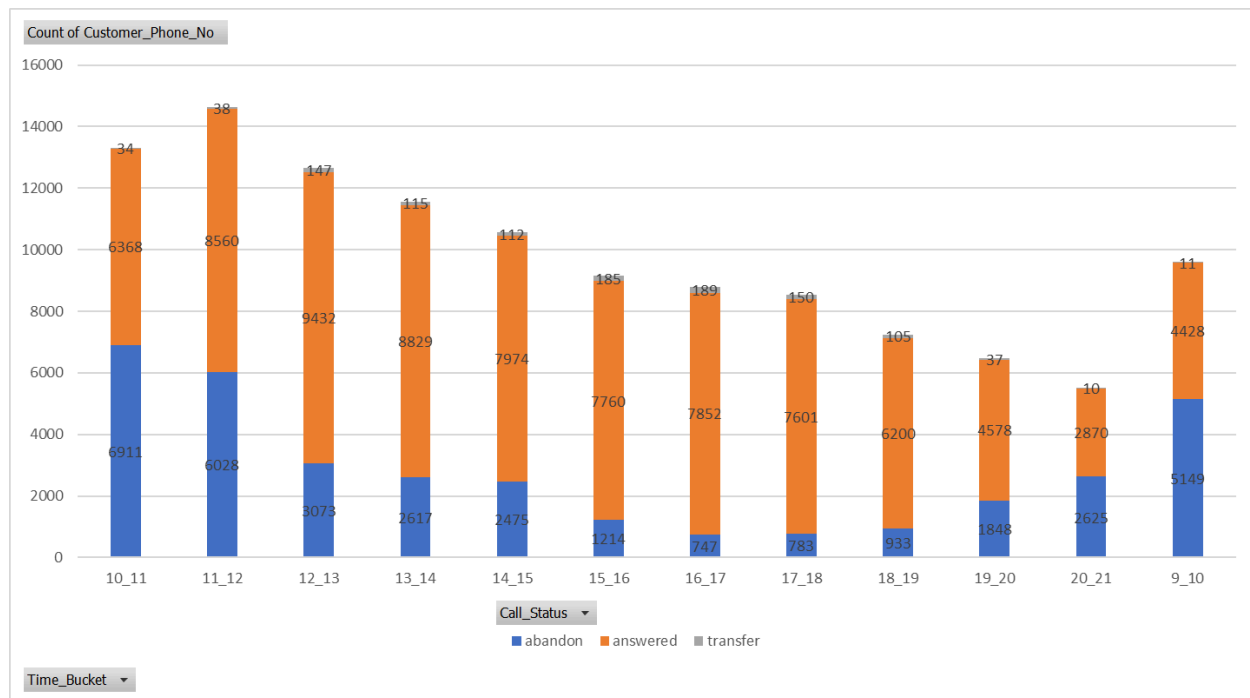
The below table shows number of calls coming with their status for different time bucket

Time Bucket	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
<b>Grand Total</b>	<b>34403</b>	<b>82452</b>	<b>1133</b>	<b>117988</b>

Percentage rate	29.16%	69.88%	0.96%
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From the above table we can conclude that nearly 30% of calls are abandoned, 70% calls answered and 1% of calls transferred.

We can represent graphically by,



From the above graph we can conclude that most calls are coming between 10-11 and 11-12.

We can also infer that most calls are answered between 12-13 & 13-14.

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

#### Assumptions

Total working hour of an agent in a day: 9 hrs

On floor working hour: 7.5 hrs

Days agent works in a week: 6 days

Occupancy for calls: 60%

Total time spent on calls:  $7.5 \times 60\% = 4.5$  hrs

First we need to find the sum of time duration in seconds for each date. Then we need to find the sum of time duration in hours by dividing seconds with 3600. Then we will find the number of working agents by dividing the hours with 4.5 (Average duration of working employee). Now, these working agents were able to answer 70% of calls. In order to find employees required for receiving 90% of calls, we need to use this formula-  $(90/70) \times \text{Working Agents}$ . Now we can find new employees needed by finding the difference between required employees and working agents.

Call Hours                      Call Seconds/3600

Working Agents              Call Hours/4.5

Employees Required         $(90/70) \times \text{Working Agents}$

New Employees Needed    Employees Required - Working Agents

Based on the above formulas we created a pivot table below-

Time Buckets	Sum of Call_Seconds (s)	Sum of Sum of call hours	Sum of Workng Agents	Sum of Employees Required	Sum of New Employees Needed
01-Jan	676664	187.96	42	54	12
02-Jan	574003	159.45	35	45	10
03-Jan	812863	225.80	50	64	14
04-Jan	861946	239.43	53	68	15
05-Jan	846798	235.22	52	67	15
06-Jan	829040	230.29	51	66	15
07-Jan	757019	210.28	47	60	13
08-Jan	735444	204.29	45	58	13



09-Jan	541147	150.32	33	42	9
10-Jan	778739	216.32	48	62	14
11-Jan	785717	218.25	49	63	14
12-Jan	709934	197.20	44	57	13
13-Jan	691320	192.03	43	55	12
14-Jan	564227	156.73	35	45	10
15-Jan	556267	154.52	34	44	10
16-Jan	674394	187.33	42	54	12
17-Jan	945615	262.67	58	75	17
18-Jan	796768	221.32	49	63	14
19-Jan	750270	208.41	46	59	13
20-Jan	759613	211.00	47	60	13
21-Jan	639855	177.74	39	50	11
22-Jan	621577	172.66	38	49	11
23-Jan	553899	153.86	34	44	10
<b>Grand Total</b>	<b>16463119</b>	<b>4573.09</b>	<b>1016</b>	<b>1306</b>	<b>290</b>

Average

44

57

13

We have created a pivot table with calculated fields to get the average number of employees required per day to answer 90% of calls. As you can see from the table there are 57 employees required per day on average.

Let's distribute this 57 employees within different time buckets.

We have created another table below to show distribution of average calls per day over different time buckets and average duration of answered and transferred calls over different time buckets. Then, we find the time required to answer 90% of calls and then dividing that time with 4.5 will get the number of employees required. Finally, summing up all the employees required, we would get 57.

Time Bucket	Count of Number of Calls	Proportion	Call Distribution	Average duration for Answered and transferred	Time to attend 90% of calls	Hours	Employees
10_1 1	13313	0.1128 33508	578.826087	202.5938769	105539.9589	29.316655 25	6.51481227 9
11_1 2	14626	0.1239 61759	635.913043 5	198.6600372	113697.458	31.582627 22	7.01836160 5
12_1 3	12652	0.1072 31244	550.086956 5	191.1536695	94636.02625	26.287785 07	5.84173001 5
13_1 4	11561	0.0979 84541	502.652173 9	193.2963998	87444.77002	24.290213 89	5.39782531
14_1 5	10561	0.0895 09103	459.173913	191.9543656	79326.39345	22.035109 29	4.89669095 4
15_1 6	9159	0.0776 26538	398.217391 3	195.8571429	70194.34845	19.498430 12	4.33298447 2
16_1 7	8788	0.0744 82151	382.086956 5	198.2948638	68189.29291	18.941470 25	4.20921561 2
17_1 8	8534	0.0723 29389	371.043478 3	197.8801445	66079.92338	18.355534 27	4.07900761 6

	7238			200.1208565	56679.44709		
18_1		0.0613	314.695652			15.744290	3.49873130
9		45222	2			86	2
19_2	6463	0.0547	281	202.4782232	51206.74264	14.224095	3.16091004
0		76757				18	
20_2	5505	0.0466	239.347826	202.5173611	43624.88111	12.118022	2.69289389
1		57287	1			53	6
9_10	9588	0.0812	416.869565	198.7373282	74562.78925	20.711885	4.60264131
		62501	2			9	2
Grand			5129.91304				56.2458044
Total			3				1

#### 4. Night Shift Manpower Plan:

We know the total average calls coming in 9am to 9pm is 5129.913043 (Explained in video)

Number of calls between 9pm-9am is =  $5129.913043 * 30\% = 1538.973913$

The average of Call duration for answered calls in Seconds is = 198.6227745 (Explained in video)

Time to answer 90% of calls is =  $(1538.973913 * 198.6227745 * 90\%) / 3600 = 76.41881711$  hours

The reason why we don't include abandoned and transferred calls into calculation is, the transferred calls are not answered by the employees.

So, only the average duration of answered calls is relevant to this calculation.

So, the employees required during night =  $76.41881711 / 4.5 = 16.98195936$  i.e. 17

Let's see the distribution of these 17 employees over different time buckets.

For this, we have created a table which shows distribution of 30 calls on 9pm-9am shift over different time bucket from below data-

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

Then we find the proportions of number of calls and distribution of average calls on night shift i.e.  $30\%$  of  $5129.913043 = 1538.973913$  over different time buckets. Then, we multiplied the distribution with the average duration of answered calls i.e.  $198.6227745$  and finally we multiplied the result with  $0.9$  which will show the time required to answer  $90\%$  of calls.

Then, we convert the seconds to hours and divide with  $4.5$  to get the number of employees required. Now, after summing up all the employees we will get an approximate value as  $17$ .

Time bucket	Number of calls	Proportions	Distribution of Number of Calls	Average Time on call	Time to answer 90% of calls	hours	Employees required
9pm-10pm	3	0.1	153.8973913	198.6227745	27510.77416	7.641882	1.698195936
10pm-11pm	3	0.1	153.8973913	198.6227745	27510.77416	7.641882	1.698195936
11pm-12am	2	0.06666667	102.5982609	198.6227745	18340.51611	5.094588	1.132130624
12am-1am	2	0.06666667	102.5982609	198.6227745	18340.51611	5.094588	1.132130624
1am-2am	1	0.03333333	51.29913043	198.6227745	9170.258053	2.547294	0.566065312
2am-3am	1	0.03333333	51.29913043	198.6227745	9170.258053	2.547294	0.566065312
3am-4am	1	0.03333333	51.29913043	198.6227745	9170.258053	2.547294	0.566065312

	1		51.29913043	198.6227745		2.547294	
4am-5a m		0.033333 333			9170.25805 3		0.56606531 2
5am-6a m	3	0.1	153.8973913	198.6227745	27510.7741 6	7.641882	1.69819593 6
6am-7a m	4	0.133333 333	205.1965217	198.6227745	36681.0322 1	10.18918	2.26426124 8
7am-8a m	4	0.133333 333	205.1965217	198.6227745	36681.0322 1	10.18918	2.26426124 8
8am-9a m	5	0.166666 667	256.4956522	198.6227745	45851.2902 7	12.73647	2.83032656
Grand Total	30		1538.973913				16.9819593 6

END