A

Data Analytics

Project on

ABC Call Volume Trend Analysis

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By

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Project Description

Project Overview: The "Call Volume Trend Analysis" is a data analytics project that aims to provide valuable insights into the inbound call trends of ABC, a company operating in the insurance sector. As a data analyst, my task is to analyze the provided dataset containing information about incoming calls and derive meaningful conclusions to optimize the customer experience and improve workforce planning.

Business Understanding: ABC operates in a highly competitive market, where advertising plays a crucial role in attracting and retaining customers. The first impression of the business is formed through advertising efforts, and the company's analytical skills are essential in identifying cost-effective media platforms to convert audiences into customers.

The CX team's role is vital as they handle inbound customer support calls. The team's goal is to attract, engage, and delight customers, ultimately turning them into loyal advocates for the business. The project's focus is to understand call volume trends and optimize workforce allocation to enhance customer satisfaction and reduce call abandonment rates.

About the Dataset:

The dataset for the "Call Volume Trend Analysis" project contains 115,406 rows and consists of the following columns:

1. Agent_Name: The name of the call center agent who handled the call.

2. Agent_ID: Unique identifier for each call center agent.

3. Customer_Phone_No: Phone number of the customer who made the inbound call.

4. Queue_Time(Secs): The time, in seconds, the customer had to wait in the queue before connecting with an agent.

5. Date_&_Time: The date and time of the incoming call.

6. Time: The time of the day when the call was received.

7. Time_Bucket: Categorization of time into specific buckets (e.g., 1-2, 2-3) for analysis.

8. Duration(hh:mm:ss): The total duration of the call in hours, minutes, and seconds format.

9. Call_Seconds(s): The duration of the call in seconds.

10. Call_Status: Indicates whether the call was abandoned, answered, or transferred.

11. Wrapped_By: Information about the agent who handled the call after it was transferred.

12. Ringing: Time spent ringing before the call was answered by an agent.

13. IVR_Duration: Duration of the Interactive Voice Response (IVR) interaction, if applicable.

This dataset provides comprehensive information about inbound calls received by the CX team. The various columns will be utilized to analyze call volume trends, average call duration, and manpower planning for improved customer experience and call center efficiency.

The dataset for the "Call Volume Trend Analysis" project contains 115,406 rows of data, covering a span of 23 days. It provides detailed information about inbound calls received by the CX team during this period. The dataset includes time buckets, which categorize the data into specific time intervals (e.g., 9-10, 10-11) for easier analysis and visualization.

The dataset's columns offer valuable insights into various aspects of the inbound calls, such as agent information, customer phone numbers, queue times, call date and time, call duration, call status, and more. These data points will be leveraged to conduct a comprehensive analysis to understand call volume trends, average call duration, and plan manpower allocation effectively to enhance customer experience and reduce call abandonment rates.

Approach

1. Data Understanding: First, we will examine the dataset containing information about inbound calls received by the CX team over 23 days. We'll review the columns, such as agent names, call duration, call status, and more, to understand the data.

2. Average Call Duration: We'll calculate the average duration of all incoming calls for each time bucket. This will help us identify if specific time periods have longer or shorter call durations.

3. Call Volume Analysis: To understand call patterns, we'll create a chart or graph showing the total number of calls received in each time bucket. This visualization will help identify peak call hours.

4. Manpower Planning: We aim to reduce the call abandonment rate from 30% to 10%. By calculating the minimum number of agents required in each time bucket, we'll ensure that at least 90 out of 100 calls are answered promptly.

5. Night Shift Manpower Planning: We'll address the issue of no agents available at night by proposing a manpower plan for each time bucket. The goal is to keep the maximum abandon rate at 10% and provide a better customer experience.

6. Insights and Recommendations: Based on the analysis, we'll derive valuable insights into call trends, customer behaviour, and agent efficiency. These insights will help make data-driven decisions to optimize workforce allocation and enhance customer satisfaction.

Tech-Stack Used – MS Excel 2021

The project "Call Volume Trend Analysis" utilizes Microsoft Excel 2021 as the primary tech stack. MS Excel is employed for data import, cleaning, and preparation. It uses formulas, PivotTables, and charts for analysis and visualization. MS Excel's user-friendly interface makes it ideal for efficient data analytics in this project.

- **Pivot Tables and Pivot Charts**
- **Data Visualization**
- **Arithmetic Operations**

Data Analytics Tasks:

1. **Average Call Duration:** Determine the average duration of all incoming calls received by agents. This should be calculated for each time bucket.

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

Solution:

Call_Status	answered	
Row Labels ▾	**Average of Call_Seconds (s)**	
10_11	203.33	
11_12	199.26	
12_13	192.89	
13_14	194.74	
14_15	193.68	
15_16	198.89	
16_17	200.87	
17_18	200.25	
18_19	202.55	
19_20	203.41	
20_21	202.85	
9_10	199.07	
Grand Total	**198.6227745**	

Pivot Table
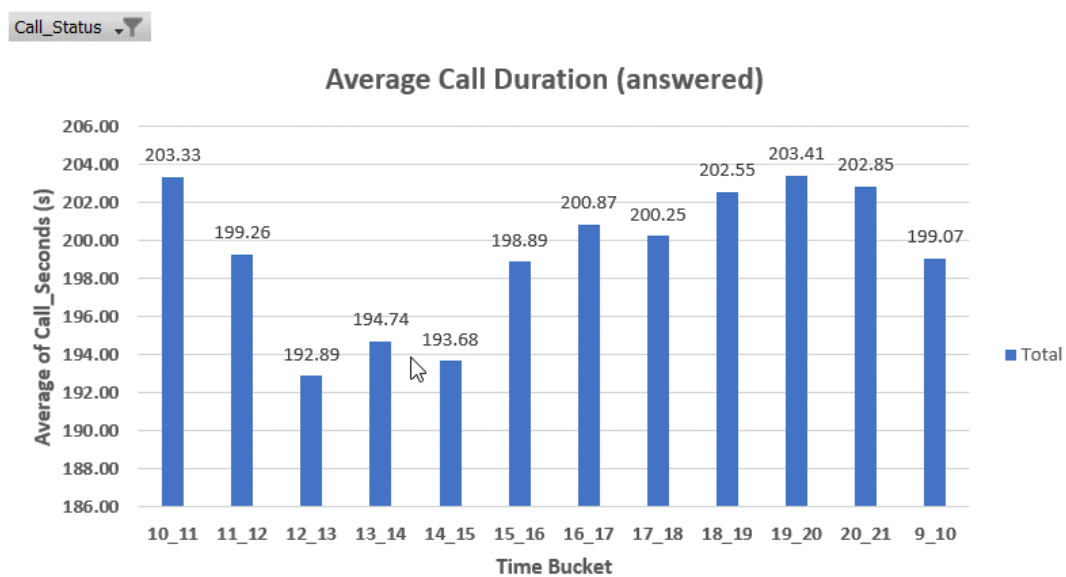
Column Chart

Insight

- The maximum average call duration is of time bucket **7pm – 8 pm**, which is **203.41 seconds.**

- Overall, it could be seen that an average call with a customer lasts for more than **3 minutes** of time. Averages around **3 minutes and 20 seconds** approximately.

2. **Call Volume Analysis:** Visualize the total number of calls received. This should be represented as a graph or chart showing the number of calls against time. Time should be represented in buckets (e.g., 1-2, 2-3, etc.).

   Task: Create a chart or graph that shows the number of calls received in each time bucket?

Solution:

Row Labels ▾	Count of Customer_Phone_No
10_11	13313
11_12	14626
12_13	12652
13_14	11561
14_15	10561
15_16	9159
16_17	8788
17_18	8534
18_19	7238
19_20	6463
20_21	5505
9_10	9588
Grand Total	**117988**

Pivot Table: Total number of calls received per Time Bucket
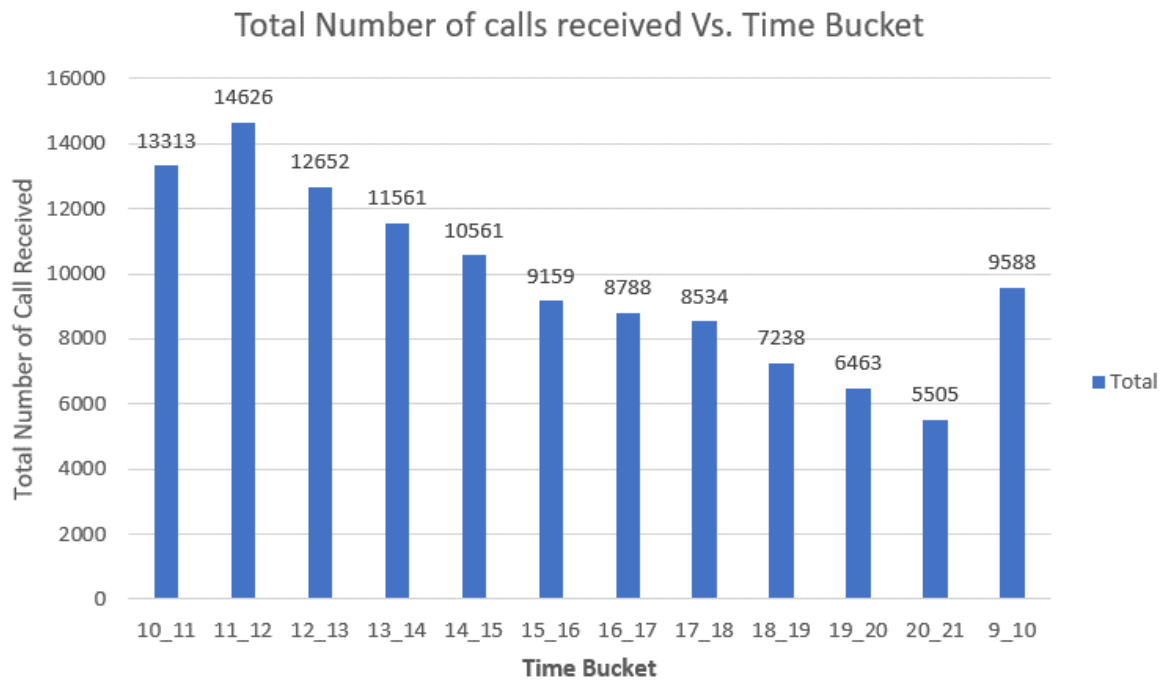
Column Chart

Insight

- The Time between **11am – 12pm** saw the **most calls**, indicating it to be the **busiest** hour for inbound customer calls, with **14626** received calls.
- Generally, the time period between **10 am till 3 pm** saw large number of calls throughout the shift.
- As the day proceeds, the numbers of calls received starts decreasing. **8pm – 9pm** saw the **least** number of calls.

3. **Manpower Planning:** The current rate of abandoned calls is approximately 30%. Propose a plan for manpower allocation during each time bucket (from 9 am to 9 pm) to reduce the abandon rate to 10%. In other words, you need to calculate the minimum number of agents required in each time bucket to ensure that at least 90 out of 100 calls are answered.

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

Solution:

Assumptions:

To carry out the manpower planning, we will work with the following assumptions:

- An agent works for 6 days a week.

- On average, each agent takes 4 unplanned leaves per month.

- An agent's total working hours are 9 hours, with 1.5 hours dedicated to lunch and snacks in the office.

- On average, an agent spends 60% of their total actual working hours (i.e., 60% of 7.5 hours) on calls with customers/users.

- The total number of days in a month is 30.

Calculation:

Total effective working hours in a day of an agent = (Agent's total working hours – 1.5 hours for lunch and snacks) x 60%

Total effective working hours in a day of an agent = (9 – 1.5) x 0.60

Total effective working hours in a day of an agent = 7.5 x 0.60

Total effective working hours in a day of an agent = **4.5 hours**

Also,

Converting 4.5 Hours into seconds = 4.5 x 60 x 60 seconds

= **16,200 seconds**

*Note: Total working days = **23 days.**

Manpower Planning with reduction in the abandon rate to 10%								
							Agents per day's effective work in seconds	16200	
23 DAY'S CALL COUNT				1 Day's Call Data				
Time Bucket	Count of Customer_Phone_No	90% CALLS ANSWERED	Time Bucket	1 Days's Answered Call count	Average of Call duration (sec)	1 Day's Total Call duration (sec)	All Call Duration / Agent's per day Work	Agents required (round off)
10_11	13313	11981.7	10_11	520.9	202.59	105539.96	6.5	7
11_12	14626	13163.4	11_12	572.3	198.66	113697.46	7.0	7
12_13	12652	11386.8	12_13	495.1	191.15	94636.03	5.8	6
13_14	11561	10404.9	13_14	452.4	193.30	87444.77	5.4	5
14_15	10561	9504.9	14_15	413.3	191.95	79326.39	4.9	5
15_16	9159	8243.1	15_16	358.4	195.86	70194.35	4.3	4
16_17	8788	7909.2	16_17	343.9	198.29	68189.29	4.2	4
17_18	8534	7680.6	17_18	333.9	197.88	66079.92	4.1	4
18_19	7238	6514.2	18_19	283.2	200.12	56679.45	3.5	4
19_20	6463	5816.7	19_20	252.9	202.48	51206.74	3.2	3
20_21	5505	4954.5	20_21	215.4	202.52	43624.88	2.7	3
9_10	9588	8629.2	9_10	375.2	198.74	74562.79	4.6	5
Grand Total	117988	106189.2		4616.9	197.8	913205.68	56.4	57

**Please refer to the excel file for verifying and understanding the calculations steps.

Procedure Followed:

1. Created a Pivot chart with time bucket as rows and count of Customer_Phone_No as values for the Call count.

2. Calculated the 90% count of total call count for each time bucket shown under column named "90% Calls Answered" to keep abandoned calls to 10% rate.

3. Now, converted this call count to 1 day's count by dividing each value by 23 from the previous column. Kept under "1 Day's Answered Call Count" column.

4. Pulled "average call duration in seconds" from another pivot table, having time bucket in rows, Customer_Phone_No in values, and Call status in filter. Under filter, selected 2 values, which is, "answered" and "transferred".

5. To find "1 Day's Total Call Duration", multiplied "1 Days's Answered Call count" and "Average of Call duration (sec)" values from same time bucket row.

6. Now, divided this value with "Agents per day's effective work in seconds" i.e., **16200** seconds to obtain value of Agents Required and rounded off to get the final result.

7. The total agents required came out to be 57 to reduce the abandon rate to 10%.

Insight

It is found that the minimum number of agents required in each time bucket to reduce the abandon rate to 10% is as follows:

Time Bucket	Agents required
10_11	7
11_12	7
12_13	6
13_14	5
14_15	5
15_16	4
16_17	4
17_18	4
18_19	4
19_20	3
20_21	3
9_10	5
Total	**57**

Thus, **Total number of agents** required is equal to **57**. **Maximum** number i.e., **7 agents** is required for time **10am – 11 am** and **11am – 12 pm**.

4. **Night Shift Manpower Planning:** Customers also call ABC Insurance Company at night but don't get an answer because there are no agents available. This creates a poor customer experience. Assume that for every 100 calls that customers make between 9 am and 9 pm, they also make 30 calls at night between 9 pm and 9 am. The distribution of these 30 calls is 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

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

Solution:

Night Shift Manpower Planning											
								Average Call Duration	197.8	Agents per day's effective work in	16200
Day Shift Data				Night Shift Data							
Day Shift Time Bucket	Count of Customer_Phone_No	90% answer rate	Per Day call count	30% Call Count for the Night Shift	Distribution of 30 calls	Call Distribution in fraction	Night Call Count	Time Bucket for Night	All call duration	All Call Duration / Agent's per day Work	Agents Required for each time bucket at Night (round off)
10_11	13313	11981.7	520.94	156.28	3	0.10	138.5	9pm-10pm	27396	1.7	2
11_12	14626	13163.4	572.32	171.70	3	0.10	138.5	10pm-11pm	27396	1.7	2
12_13	12652	11386.8	495.08	148.52	2	0.07	92.3	11pm-12am	18264	1.1	1
13_14	11561	10404.9	452.39	135.72	2	0.07	92.3	12am-1am	18264	1.1	1
14_15	10561	9504.9	413.26	123.98	1	0.03	46.2	1am-2am	9132.1	0.6	1
15_16	9159	8243.1	358.40	107.52	1	0.03	46.2	2am-3am	9132.1	0.6	1
16_17	8788	7909.2	343.88	103.16	1	0.03	46.2	3am-4am	9132.1	0.6	1
17_18	8534	7680.6	333.94	100.18	1	0.03	46.2	4am-5am	9132.1	0.6	1
18_19	7238	6514.2	283.23	84.97	3	0.10	138.5	5am-6am	27396	1.7	2
19_20	6463	5816.7	252.90	75.87	4	0.13	184.7	6am-7am	36528	2.3	2
20_21	5505	4954.5	215.41	64.62	4	0.13	184.7	7am-8am	36528	2.3	2
9_10	9588	8629.2	375.18	112.55	5	0.17	230.8	8am-9am	45660	2.8	3
Grand Total	117988	106189.2	4616.92	1385.08	30	1					19

Procedure Followed:

1. Started with a pivot table, to find the Call count for each time bucket as done in the problem above.
2. Took out the 90% of the call count values of each time bucket in the adjacent column by multiplying with 0.90.
3. Calculated one day's call count from it by diving it by 23, for each time bucket.

4. Now, for night shift call count values, took out the 30% of these values by multiplying it with 0.30 and displaying it in the adjacent column named as "30% Call Count for the night shift".

5. Placed the distribution of 30 calls adjacent to this column and converted this distribution value in fraction for easier calculation in the column next to it. (for e.g. for distribution value 3, converted it to fraction by dividing it by 30, which gives 0.10.)

6. Now, since we do not require previous time buckets here, therefore multiplied these distribution fraction values with the column total of "30% Call Count for the night shift", which is **1385.08.** This gives us the "Night Call Count" values in the adjacent column.

7. Now, corresponding to each distribution, I created a time bucket column representing night shift time bucket.

8. "All call duration" was calculated by multiplying, "Night Call Count" with "average call_seconds" (mentioned in separate cell above), which is equal to **197.8.** (This value was calculated by first creating a pivot table with time bucket and "average call_seconds". Then, calculating the average of all the values obtained under "average call_seconds" next to each time bucket.)

8. Now, divided this value with "Agents per day's effective work in seconds" i.e., **16200** seconds to obtain value of Agents Required and rounded off to get the final result.

9. This gives us the Agents required for each time bucket throughout the day, keeping the maximum abandon rate at 10% for the night shift.

Insight

Manpower plan for each time bucket throughout the day, keeping the maximum abandon rate at 10% is as follows:

Time Bucket for Night	Agents Required for each time bucket at Night
9pm-10pm	2
10pm-11pm	2
11pm-12am	1
12am-1am	1
1am-2am	1
2am-3am	1
3am-4am	1
4am-5am	1
5am-6am	2
6am-7am	2
7am-8am	2
8am-9am	3
Total	**19**

Total number of agents required for the night shift came out to be **19.** The maximum of **3 agents** would be required from **8am – 9am**.

Summary of Results:

- The maximum average call duration is of time bucket **7pm – 8 pm**, which is **203.41 seconds.**

- The Time between **11am – 12pm** saw the **most calls**, indicating it to be the **busiest** hour for inbound customer calls, with **14626** received calls.

- Generally, the time period between **10 am till 3 pm** saw large number of calls throughout the shift.

- As the day proceeds, the numbers of calls received starts decreasing. **8pm – 9pm** saw the **least** number of calls.

- **Total number of agents** required is equal to **57**. **Maximum** number i.e., **7 agents** is required for time **10am – 11 am** and **11am – 12 pm**.

- Total number of agents required for the night shift came out to be **19.** The maximum of **3 agents** would be required from **8am – 9am**.