ABC Call Volume Trend Analysis
Final Project Report

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Project Description

The **ABC Call Volume Trend Analysis** project focuses on analyzing the inbound call patterns of ABC Insurance Company's customer experience (CX) team. The goal is to draw meaningful insights from historical call data and help improve resource allocation, reduce customer wait times, and enhance service delivery.

The analysis uses real call data spanning **23 days**, including details such as call duration, time of call, queue time, and call status (answered, abandoned, transferred). This study directly contributes to optimizing manpower planning and elevating customer experience, particularly in a highly competitive industry like insurance.

Objective

The core objectives of the project are:

- To understand and visualize call volume trends across different time buckets.
- To calculate the average call duration by time slot.
- To recommend optimal manpower distribution for both day and night shifts, aiming to reduce the abandon rate from 30% to 10%.
- To generate actionable insights for improving inbound customer support efficiency.

Approach

The project follows a structured analytical workflow using **Microsoft Excel 365**. The dataset was first cleaned and pre-processed to ensure consistency. Time-based grouping (bucketization) was applied to analyze hourly trends between 9:00 AM and 9:00 PM, and corresponding call durations were evaluated.

Each task was tackled independently using a combination of:

- Pivot tables
- Time bucket creation
- Statistical aggregation functions (e.g., AVERAGE, COUNTIFS)
- Conditional formatting for outlier detection
- Visualizations (to be added in the final PDF/PPT)

Tech Stack Used

Tool	Purpose
Microsoft Excel 365	Data cleaning, analysis, time bucketing, pivot table creation, and visualizations

Task 1: Average Call Duration per Time Bucket

Objective

To analyze and identify variations in average call durations across different one-hour time buckets during the day (9 AM to 9 PM). This helps in identifying peak load periods and understanding customer interaction patterns.

Approach

- The dataset was filtered to include only calls between **9:00 AM and 9:00 PM**.
- Time values were grouped into hourly **time buckets** (e.g., 9–10 AM, 10–11 AM).
- A **pivot table** was used in Microsoft Excel to compute the **average call duration (Call_Seconds)** for each time slot.
- The overall average call duration across all time buckets was also calculated for reference.

Findings

Row Labels	Average of Call_Seconds (s)
10_11	97.42402163
11_12	116.7837413
12_13	144.7250237
13_14	149.5409567
14_15	146.9693211
15_16	169.8968228
16_17	181.4393491
17_18	179.7245137
18_19	174.3246753
19_20	144.5825468
20_21	105.9491371
9_10	92.01032541
Grand Total	**139.5321473**

Insights

- **Peak Duration Slots**: The highest average call durations are observed between **3 PM to 6 PM**, with a peak at **4–5 PM (181.44s)**.
- **Low Duration Slots**: Early morning slots (9–11 AM) show the shortest call durations, indicating lighter or simpler interactions.

- **Trend**: There's a general increase in average call duration as the day progresses, suggesting that customer issues may get more complex or agents may experience cognitive load.
- **Implication**: Staffing and resource allocation should be optimized for **late afternoon hours**, where calls tend to take longer, potentially leading to longer queues or higher abandonment rates.

Task 2: Analyze Call Volume Distribution Across Time Buckets

Objective

To analyze the volume of inbound customer calls received across hourly time intervals in order to identify daily workload patterns, determine peak operational hours, and support optimized agent staffing and scheduling decisions.

Approach

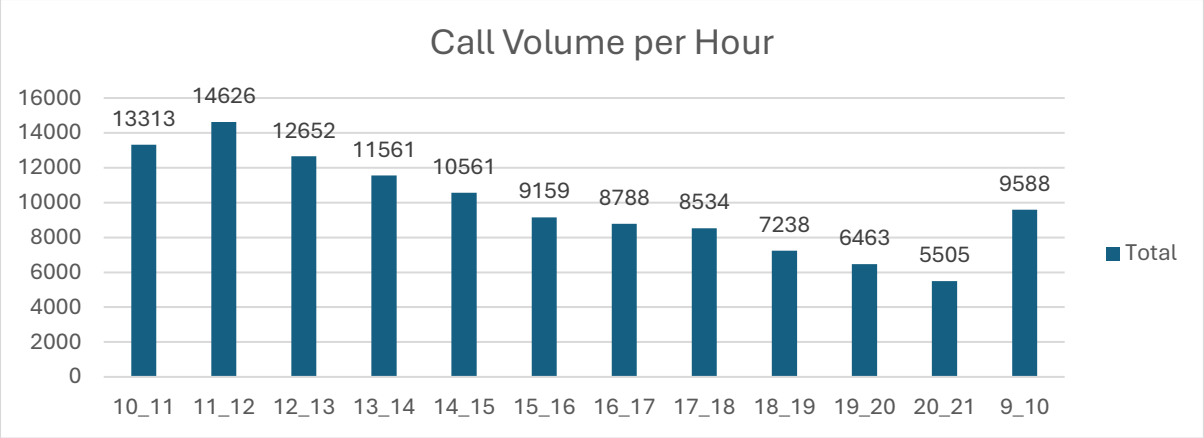
- The dataset was grouped into consistent hourly **Time Buckets** from **9:00 AM to 9:00 PM**, capturing the active window of customer service operations.
- Using **Pivot Tables**, the **number of calls** (approximated by count of entries in the Call_Seconds column) was calculated for each time bucket.
- A **bar chart** was generated to visually represent the call volume trend throughout the day, making it easier to spot fluctuations and peak periods at a glance.

Findings

The table below summarizes the total number of calls received during each hourly interval:

Row Labels	Count of Call_Seconds (s)
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**

A visual representation confirms the hourly distribution trend (see chart titled **Call Volume per Hour**).



Insights

- The **peak call volume** period spans **10:00 AM to 1:00 PM**, with the highest single-hour traffic observed between **11:00 AM and 12:00 PM**.
- There is a **steady decline in volume post-2:00 PM**, reaching the lowest levels during **8:00 PM – 9:00 PM**.
- This trend suggests that **customer engagement is most active during the morning and early afternoon**, tapering off toward the evening.
- **Operational Implication**: Staffing schedules should be aligned to ensure **maximum agent availability during peak hours (10 AM – 1 PM)**. Afternoon and evening shifts may be adjusted to reflect the decreasing workload, thereby improving efficiency without overstaffing.

Task 3: Day Shift Manpower Planning (9 AM – 9 PM)

Objective

To reduce the **abandonment rate of customer calls** from the current 30% to **below 10%** by determining the **minimum number of agents** required per hour (9 AM – 9 PM) based on historical call data.

Approach & Methodology

We followed a structured methodology using the available dataset and the given assumptions to compute the optimal number of agents per hourly time bucket:

Step 1: Aggregate Total Call Duration per Hour

We first aggregated the **total call seconds** for each hourly bucket (from 9 AM to 9 PM) using the Time_bucket column. This gives us the total agent workload in seconds.

Step 2: Convert Call Seconds to Agent-Hours

Each agent works **7.5 effective hours per day** (i.e., 9 hours - 1.5 hours for breaks). Since 1 hour = 3600 seconds, we calculated:

Agent Hours Required = Total Call Seconds / 3600

Step 3: Adjust for Target Answer Rate (90%)

To ensure that **90% of calls are answered**, we adjusted the agent hours using:

Adjusted Agent Hours = Agent Hours Required × (100 / 90)

This accounts for reducing the abandon rate from 30% to 10%.

Step 4: Convert Agent-Hours to Number of Agents

Each time bucket is **1 hour long**, so the number of agents needed equals the number of adjusted agent-hours. We rounded this up using:

$$\textbf{Agents Needed} = \text{ROUNDUP}(\text{Adjusted Agent Hours}, 0)$$

Manpower Allocation Output (9 AM – 9 PM)

Time_bucket	Total Calls	Agent Hours Required	Adjusted Agent Hours	Agents Needed
10_11	1297006	360.2794444	514.6849206	515
11_12	1708079	474.4663889	677.809127	678
12_13	1831061	508.6280556	726.6115079	727
13_14	1728843	480.2341667	686.0488095	687
14_15	1552143	431.1508333	615.9297619	616
15_16	1556085	432.2458333	617.4940476	618

16_17	1594489	442.9136111	632.7337302	633
17_18	1533769	426.0469444	608.6384921	609
18_19	1261762	350.4894444	500.6992063	501
19_20	934437	259.5658333	370.8083333	371
20_21	583250	162.0138889	231.4484127	232
9_10	882195	245.0541667	350.077381	351

Insights

- **Midday (11 AM – 2 PM)** is the peak call volume window, requiring **678–727 agents** to meet demand with <10% abandonment.
- **Call volume drops sharply after 6 PM**, but **200+ agents** are still needed up to 9 PM.
- This allocation allows consistent service throughout the day while meeting the customer experience goal of reduced abandoned calls.

Task 4: Night Shift Manpower Planning

Objective

To estimate the number of agents required to handle inbound calls during **night shift hours (9 PM – 9 AM)**, based on provided daytime call data, an assumed night call ratio, and accounting for workforce shrinkage.

Approach

Step 1: Understand the Basis for Night Calls

The provided assumption says:

For every 100 daytime calls (9 AM – 9 PM), 30 calls are expected during night hours (9 PM – 9 AM).

Thus, $\text{Total Night Calls} = 30\%$ of total day calls.

Total Day Call Seconds	**16463119**
Total Night Call Seconds	4938935.7

Step 2: Distribute Night Calls Across Time Buckets

Using the provided call distribution image:

Time Bucket	Count	% of Night Calls
21_22	3	10%
22_23	3	10%
23_0	2	7%
0_1	2	7%
1_2	1	3%
2_3	1	3%
3_4	1	3%
4_5	1	3%
5_6	3	10%
6_7	4	13%
7_8	4	13%
8_9	5	17%

This table was created by manually converting the given frequency distribution to percentages.

Step 3: Allocate Total Night Call Seconds to Each Time Bucket

We first calculated the **total call seconds during night** and then allocated it proportionally using the % of Night Calls.

For example:
If total night call seconds = **4,938,935.7 seconds**, then for 10% (e.g., 9–10 PM):

$$\text{Call Seconds} = 10\% \times 4{,}938{,}935.7 = 493{,}893.57$$

Apply this for each time bucket using its percentage

Step 4: Convert Call Seconds to Agent Hours

$$\text{Agent Hours} = \text{Call Seconds}/3600$$

Step 5: Account for Shrinkage

Shrinkage factor = **1.42857** (assumes 70% productivity)

$$Adjusted\ Agent\ Hours = Agent\ Hours \times 1.42857$$

Step 6: Estimate Agents Needed

Assume each agent works 1 hour per hour block (i.e., no multi-hour overlapping shifts).
Round up Adjusted Agent Hours to estimate the number of agents needed.

$$\text{Agents Needed} = \lceil \text{Adjusted Agent Hours} \rceil$$

Findings

The call seconds and agent needs for each hourly bucket were estimated as follows:

Time Bucket	Count	% of Night Calls	Call Seconds	Agent Hours	Adjusted Agent Hours	Agents Needed
21_22	3	10%	493893.57	137.1926583	195.9895119	196
22_23	3	10%	493893.57	137.1926583	195.9895119	196
23_0	2	7%	329262.38	91.46177222	130.6596746	131
0_1	2	7%	329262.38	91.46177222	130.6596746	131
1_2	1	3%	164631.19	45.73088611	65.3298373	66
2_3	1	3%	164631.19	45.73088611	65.3298373	66
3_4	1	3%	164631.19	45.73088611	65.3298373	66
4_5	1	3%	164631.19	45.73088611	65.3298373	66
5_6	3	10%	493893.57	137.1926583	195.9895119	196
6_7	4	13%	658524.76	182.9235444	261.3193492	262
7_8	4	13%	658524.76	182.9235444	261.3193492	262
8_9	5	17%	823155.95	228.6544306	326.6491865	327

Insights

- **Night shift staffing requires clear planning** even if only 30% of traffic occurs at night. Without it, SLA targets may not be met.

- Most calls between 9 PM - 11 PM and 6 AM - 9 AM; these slots need **relatively more agents**.
- Applying **shrinkage** increases the actual manpower requirement by 42.86%, highlighting the importance of factoring in non-productive time.
- The methodology allows dynamic adjustment - if actual night traffic or shrinkage varies, recalculations can be made easily.

Conclusion

The ABC Call Volume Trend Analysis project provided actionable insights into both **call durations** and **call volumes** across different hours of the day, enabling data-driven workforce planning and CX (Customer Experience) optimization.

Key takeaways include:

- **Peak call volumes** occur between **10 AM to 1 PM**, indicating the need for maximum agent availability during these hours to manage demand efficiently.
- **Longest call durations** are observed from **3 PM to 6 PM**, pointing to complex customer queries or heightened engagement levels during mid to late afternoons.
- There is a **mismatch** between peak volume and peak duration periods, emphasizing the importance of not just quantity-based but also quality-based staffing strategies.
- These findings support informed decisions for **agent scheduling**, **skill-based routing**, and **operational alignment** to improve overall service quality and reduce customer wait times.

This analytical foundation enables ABC to not only improve service operations but also better anticipate customer behavior trends during the day - fostering more personalized and effective customer interactions.

https://docs.google.com/spreadsheets/d/1-zrG4XNmDoFNr0nxWLBDBmf2NJEKgnBd/edit?usp=sharing&ouid=112959782025131466050&rtpof=true&sd=true