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**ABC Call Volume Trend Analysis**

**Final Project Report**

# 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:

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, .

|  |  |
| --- | --- |
| 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):

Apply this for each time bucket using its percentage

**Step 4: Convert Call Seconds to Agent Hours**

**Step 5: Account for Shrinkage**

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

**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.

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>