**Objective Questions**

1. **What is the total no. of attributes present in the data?**

The dataset contains 15 attributes:ID Ticket ,Date of Ticket ,Employee ID, Agent ID, Agent Name, Request Category, Issue Type, Severity ,Severity Score, Priority, Resolution Time, Satisfaction Rate, performance, phase(Before/After Tools) and Age.

1. **Which columns have inconsistent or missing values, and what is the count of such values?**

The dataset was reviewed for missing or inconsistent values using filters and blank checks. No missing values were found across any of the attributes; all columns are complete, making the dataset clean and ready for analysis.

However, a few **data quality issues** were identified and corrected:

1. **Severity Column** – Contained minor spelling errors in some categories (e.g., “Mayor” instead of “Major”). These were corrected to maintain consistency.
2. **Agent Sheet (Full Name Column)** – Some agent names included unnecessary periods (e.g., “Javier D.” instead of “Javier D”), which could create duplicate entries during grouping. The periods were removed for standardization.

After these corrections, the dataset is consistent, reliable, and ready for pivot table and chart analysis.

1. **What is the average daily ticket volume over time?**

The average daily ticket volume was calculated using a Pivot Table grouped by date. Across the entire dataset, the IT team handles an average of **53 tickets per day**. Daily volumes vary, with peak days showing significantly higher ticket loads

1. **What is the distribution of ticket categories (e.g., Login Access, System, Software)?**

|  |  |
| --- | --- |
| **Row Labels** | **Count of ID Ticket** |
| Hardware | 9733 |
| Login Access | 29193 |
| Software | 19570 |
| System | 39002 |
| **Grand Total** | **97498** |

1. **How many tickets has each agent handled?**

|  |  |
| --- | --- |
| **Row Labels** | **Count of ID Ticket** |
| A. Trejo | 1949 |
| Alberto Casillas | 1974 |
| Alberto Gastelum | 1889 |
| Aldo Carrillo | 1966 |
| Alfonso Barraza | 1984 |
| Alfredo Barreras | 1920 |
| Armando Sierra | 1890 |
| Aurelio Tanori | 2027 |
| Barbara Grijalva | 2003 |
| Barraza Alberto | 1988 |
| Darwin E. | 1945 |
| Diana Rojo | 1927 |
| Eduardo Luna | 1920 |
| Elena Velez | 2021 |
| Enrique Montiel | 1938 |
| Estuardo Ocaño | 1935 |
| EstuardoTorres | 1942 |
| Eva Cardenas | 1943 |
| Flores Sierra | 1963 |
| Galindo Guadalupe | 1991 |
| Griselda Galindo | 1856 |
| Guadalupe Hernandez | 1915 |
| Guadalupe Torrico | 1987 |
| Guadalupe Villanueva | 1958 |
| Isela Leyva | 1968 |
| Javier D. | 1897 |
| Jesus Contreras | 2026 |
| Jesus Pacheco | 1931 |
| JesusGrajeda | 1968 |
| Leon Lourdes | 1961 |
| Lopez Moran. | 1956 |
| Lorena | 1966 |
| Luis Arguello | 1929 |
| Luis Torres | 1913 |
| Marisol Piedrahita | 1960 |
| Mata Lucero | 1969 |
| Melinda | 2007 |
| Miller Gaviria | 1892 |
| Nurio Zepeda | 1946 |
| Orci Carlos | 1926 |
| Parra Luna | 1963 |
| Ramon Macias | 1949 |
| Reyna Santacruz | 1897 |
| Rosa Olguin | 1950 |
| Sandra Lujan | 1906 |
| Segura Garcia | 1931 |
| Silvia Morales | 1974 |
| Velasquez Jose | 1949 |
| Willyberto Gonzales | 2000 |
| Yomaira Agudelo | 1933 |
| **Grand Total** | **97498** |

1. **How can you extract the domain from the email addresses in the IT Agents sheet?**

To extract the domain from email addresses in the IT Agents sheet, the formula  
=SUBSTITUTE(RIGHT([@Email],LEN([@Email])-FIND("@",[@Email])),".com","") was used. This isolates the text after the ‘@’ symbol and replace “.com” with blank, giving the domain

1. **How can you find the full name of an agent given their Agent ID?**

To find the full name of an agent given their Agent ID, lookup functions can be used. For example,  
=VLOOKUP([@[Agent ID]],IT\_Agents[[#All],[Agent ID]:[Full Name]],2,0)returns the agent’s full name by matching the ID in the IT

1. **What is the count of each issue type (e.g., IT Error, IT Request)?**

|  |  |
| --- | --- |
| **Row Labels** | **Count of ID Ticket** |
| IT Error | 24278 |
| IT Request | 73220 |
| **Grand Total** | **97498** |

1. **What is the daily average resolution time for tickets?**

The daily average resolution time was calculated using a Pivot Table with ticket dates as rows and resolution time as the average value. The overall daily average resolution time across all tickets is approximately **4.6 days**. By date, resolution time varies between 4.2 and 5.1 days, depending on workload and ticket category

1. **How has the volume of tickets changed over time?**

|  |  |
| --- | --- |
| **Row Labels** | **Count of ID Ticket** |
| Jan | 7242 |
| Feb | 7901 |
| Mar | 8228 |
| Apr | 7937 |
| May | 8121 |
| Jun | 8141 |
| Jul | 8070 |
| Aug | 8489 |
| Sep | 8219 |
| Oct | 8495 |
| Nov | 8254 |
| Dec | 8401 |
| **Grand Total** | **97498** |

1. **What is the average age of the IT agents?**

The IT Agents sheet shows an average agent age of approximately **40 years**, indicating a moderately experienced workforce.

1. **Is there a correlation between the severity of issues and the resolution time?**

The correlation coefficient between issue severity and resolution time is **-0.0405**. This value is very close to **0**, indicating that there is no meaningful linear relationship. Surprisingly, the severity of an issue does not strongly influence how long it takes to resolve.

1. **How many categorical columns are there in the data? [Search about categorical and continuous data, and try to answer this question]**

The dataset contains **11 categorical columns** and **8 numerical columns**.

# Subjective Questions

## Q1. Should investment be used to hire more IT agents, improve training programs, or upgrade ticket management software?

### Approach (Criteria & Constraints):

Analyzed workload distribution, agent performance, and ticket tool effectiveness. Compared priority vs severity alignment to identify tool inefficiencies.

### Reference (Pivot/Chart):

|  |  |  |  |
| --- | --- | --- | --- |
| **Row Labels** | **Average of Resolution Time (Days)** | **Average of Satisfaction Rate** | **Count of ID Ticket** |
| A Trejo | 5.32 | 3.59 | 1949 |
| Alberto Casillas | 4.30 | 4.42 | 1974 |
| Alberto Gastelum | 3.71 | 4.40 | 1889 |
| Aldo Carrillo | 4.55 | 3.78 | 1966 |
| Alfonso Barraza | 5.00 | 3.04 | 1984 |
| Alfredo Barreras | 4.29 | 3.67 | 1920 |
| Armando Sierra | 5.34 | 4.36 | 1890 |
| Aurelio Tanori | 4.51 | 4.41 | 2027 |
| Barbara Grijalva | 4.23 | 4.44 | 2003 |
| Barraza Alberto | 5.24 | 4.19 | 1988 |
| Darwin E | 4.06 | 4.36 | 1945 |
| Diana Rojo | 3.64 | 4.60 | 1927 |
| Eduardo Luna | 4.41 | 4.15 | 1920 |
| Elena Velez | 5.38 | 3.62 | 2021 |
| Enrique Montiel | 4.64 | 4.44 | 1938 |
| Estuardo Ocano | 5.52 | 3.98 | 1935 |
| EstuardoTorres | 4.90 | 4.09 | 1942 |
| Eva Cardenas | 4.72 | 4.41 | 1943 |
| Flores Sierra | 4.75 | 3.99 | 1963 |
| Galindo Guadalupe | 3.66 | 4.47 | 1991 |
| Griselda Galindo | 5.32 | 4.28 | 1856 |
| Guadalupe Hernandez | 4.56 | 4.38 | 1915 |
| Guadalupe Torrico | 3.67 | 4.36 | 1987 |
| Guadalupe Villanueva | 4.80 | 3.63 | 1958 |
| Isela Leyva | 3.65 | 4.22 | 1968 |
| Javier D | 4.06 | 4.49 | 1897 |
| Jesus Contreras | 5.55 | 4.34 | 2026 |
| Jesus Pacheco | 4.60 | 3.66 | 1931 |
| JesusGrajeda | 3.60 | 4.47 | 1968 |
| Leon Lourdes | 3.71 | 4.34 | 1961 |
| Lopez Moran | 4.78 | 3.64 | 1956 |
| Lorena | 5.51 | 3.63 | 1966 |
| Luis Arguello | 3.70 | 3.82 | 1929 |
| Luis Torres | 3.92 | 4.20 | 1913 |
| Marisol Piedrahita | 3.83 | 4.44 | 1960 |
| Mata Lucero | 5.45 | 4.34 | 1969 |
| Melinda | 4.37 | 4.40 | 2007 |
| Miller Gaviria | 4.73 | 3.99 | 1892 |
| Nurio Zepeda | 5.41 | 3.61 | 1946 |
| Orci Carlos | 4.32 | 3.67 | 1926 |
| Parra Luna | 4.87 | 3.85 | 1963 |
| Ramon Macias | 5.45 | 4.20 | 1949 |
| Reyna Santacruz | 3.85 | 3.91 | 1897 |
| Rosa Olguin | 5.32 | 4.32 | 1950 |
| Sandra Lujan | 5.20 | 3.60 | 1906 |
| Segura Garcia | 3.72 | 4.46 | 1931 |
| Silvia Morales | 4.89 | 4.12 | 1974 |
| Velasquez Jose | 4.52 | 3.69 | 1949 |
| Willyberto Gonzales | 4.26 | 4.38 | 2000 |
| Yomaira Agudelo | 3.82 | 4.17 | 1933 |
| **Grand Total** | **4.55** | **4.10** | **97498** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Count of ID Ticket** | **Column Labels** |  |  |  |  |
| **Row Labels** | **0 - Unassiged** | **1 - Low** | **2 - Mid** | **3 - High** | **Grand Total** |
| 0 - Unclassified | 115 | 80 | 55 | 106 | 356 |
| 1 - Minor | 626 | 549 | 407 | 676 | 2258 |
| 2 - Normal | 26826 | 15282 | 14468 | 32080 | 88656 |
| 3 - Major | 1434 | 614 | 713 | 2075 | 4836 |
| 4 - Urgent | 409 | 169 | 202 | 612 | 1392 |
| **Grand Total** | **29410** | **16694** | **15845** | **35549** | **97498** |

### Insights:

- Hiring: Each agent manages about 1,950 tickets annually, with workload distributed fairly. This indicates delays are caused more by category-specific complexities rather than understaffing. Hiring additional agents may only marginally improve resolution speed but would add long-term cost.  
- Training: Six underperformers show resolution times above 5 days and satisfaction below 4.0. Improving their skills would raise overall efficiency and satisfaction more effectively than hiring.  
- Software: Priority vs severity mismatches show that high-severity issues are not always prioritized correctly. This creates inefficiencies where urgent tickets wait longer than low-severity requests, leading to customer dissatisfaction.

### Recommendations:

1. Launch structured training programs targeting underperformers in technical troubleshooting and communication.  
2. Enhance the ticket management system by enforcing rules to align severity and priority, with auto-escalation for critical issues.  
3. Rely on short-term contract staff during seasonal peaks (Aug–Dec) instead of permanent hires, reducing costs while managing surges.

## Q2. Which agents need additional training based on their performance metrics?

### Approach (Criteria & Constraints):

Selected agents with resolution time >5 days and CSAT <4.0 as underperformers.

### Reference (Pivot/Chart):

|  |  |  |  |
| --- | --- | --- | --- |
| **Row Labels** | **Average of Satisfaction Rate** | **Average of Resolution Time (Days)** | **Count of ID Ticket** |
| A Trejo | 3.6 | 5.32 | 1949 |
| Elena Velez | 3.6 | 5.38 | 2021 |
| Estuardo Ocano | 4.0 | 5.52 | 1935 |
| Lorena | 3.6 | 5.51 | 1966 |
| Nurio Zepeda | 3.6 | 5.41 | 1946 |
| Sandra Lujan | 3.6 | 5.20 | 1906 |
| **Grand Total** | **3.7** | **5.39** | **11723** |

### Insights:

- Six agents (A. Trejo, Elena Velez, Estuardo Ocaño, Lorena, Nurio Zepeda, Sandra Lujan) average 3.6 CSAT vs 4.1 team avg and 5.3 days resolution vs 4.6 avg.  
- These agents contribute to recurring escalations and slower ticket closure rates. Their performance drags down the team’s averages and reduces employee satisfaction across the company.

### Recommendations:

1. Create a performance improvement program with monthly monitoring to track progress.  
2. Pair low performers with top performers for mentorship and practical guidance.  
3. Use coaching on knowledge base usage to reduce repeated escalations. If there’s no measurable improvement within 90 days, consider reassigning roles or termination.

## Q3. Do certain categories of requests have longer resolution times?

### Approach (Criteria & Constraints):

Compared average resolution times across all ticket categories.

### Reference (Pivot/Chart):

|  |  |
| --- | --- |
| **Row Labels** | **Average of Resolution Time (Days)** |
| Hardware | 7.63 |
| Login Access | 0.31 |
| Software | 5.24 |
| System | 6.62 |
| **Grand Total** | **4.55** |

### Insights:

- Hardware tickets take the longest (7.6 days), followed by System (6.6 days). These categories account for nearly half of all tickets, making them the main bottlenecks.  
- Software tickets are moderate (5.2 days), while Login tickets are resolved almost instantly (0.3 days).  
- The data indicates that bottlenecks are category-driven, not evenly spread across all issues.

### Recommendations:

1. Assign specialized and experienced agents to Hardware and System issues.  
2. Invest in diagnostic and monitoring tools that can automatically detect common failures.  
3. Automate repetitive requests like password resets and OS patches, which frees up resources for more complex problems.

## Q4. How effective are current software tools in managing IT tickets?

### Approach (Criteria & Constraints):

Analyzed before/after resolution times, compared priority vs severity, and tracked year-wise resolution and satisfaction trends.

### Reference (Pivot/Chart):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Count of ID Ticket** | **Column Labels** |  |  |  |  |
| **Row Labels** | **0 - Unassiged** | **1 - Low** | **2 - Mid** | **3 - High** | **Grand Total** |
| 0 - Unclassified | 115 | 80 | 55 | 106 | 356 |
| 1 - Minor | 626 | 549 | 407 | 676 | 2258 |
| 2 - Normal | 26826 | 15282 | 14468 | 32080 | 88656 |
| 3 - Major | 1434 | 614 | 713 | 2075 | 4836 |
| 4 - Urgent | 409 | 169 | 202 | 612 | 1392 |
| **Grand Total** | **29410** | **16694** | **15845** | **35549** | **97498** |

### Insights:

- Resolution times barely changed post-tool implementation (4.58 → 4.53 days), and satisfaction remained flat at 4.1.  
- Severity vs Priority mismatches reveal inefficiencies where critical tickets are misclassified, delaying response.  
- Year-over-year comparison confirms stability, but no significant uplift in performance or user satisfaction.

### Recommendations:

1. Reconfigure software to automatically align severity and priority.  
2. Introduce AI-driven triaging and routing to optimize ticket distribution.  
3. Train agents to fully utilize advanced features such as auto-suggestions and the knowledge base.

## Q5. How has the performance of the IT support team changed over time?

### Approach (Criteria & Constraints):

Compared year-wise resolution times, satisfaction, and ticket volumes, plus category-wise ticket performance.

### Reference (Pivot/Chart):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Row Labels** | **2016** | **2017** | **2018** | **2019** | **2020** | **Grand Total** |
| Hardware | 1272 | 1523 | 1844 | 2161 | 2933 | 9733 |
| Login Access | 3910 | 4526 | 5672 | 6426 | 8659 | 29193 |
| Software | 2617 | 2946 | 3735 | 4407 | 5865 | 19570 |
| System | 5252 | 5920 | 7703 | 8496 | 11631 | 39002 |
| **Grand Total** | **13051** | **14915** | **18954** | **21490** | **29088** | **97498** |

### Insights:

- Ticket volumes increased steadily, peaking in Aug–Dec, stressing the system.  
- Resolution times remained stable (~4.6 days), though delays appeared in June and during peak loads.  
- Satisfaction plateaued at 4.1, dipping slightly during high-volume months.  
- Hardware and System tickets remain the weakest categories over time.

### Recommendations:

1. Add seasonal staff or contractors in peak months.  
2. Maintain year-round training cycles to improve consistency.  
3. Assign senior agents and automated tools to high-delay categories to prevent long-term bottlenecks.

## Q6. If we invest more in tech (hardware, software, etc.), will it improve ticket resolution times and employee satisfaction?

### Approach (Criteria & Constraints):

Compared resolution times, CSAT, and ticket counts across categories.

### Reference (Pivot/Chart):

|  |  |  |
| --- | --- | --- |
| **Row Labels** | **Average of Resolution Time (Days)** | **Average of Satisfaction Rate** |
| Hardware | 7.63 | 4.1 |
| Login Access | 0.31 | 4.1 |
| Software | 5.24 | 4.1 |
| System | 6.62 | 4.1 |
| **Grand Total** | **4.55** | **4.1** |

### Insights:

- System (39,002 tickets, 40% of volume) and Hardware (9,733 tickets) are the categories causing the biggest delays.  
- Login tickets, though high in volume (29,193), resolve in 0.3 days and don’t need further investment.  
- CSAT flat at 4.1 indicates that without improvements in Hardware/System handling, satisfaction will not rise.

### Recommendations:

1. Invest in real-time monitoring for system performance to proactively address outages.  
2. Provide remote diagnostic tools for hardware troubleshooting.  
3. Automate login/software tickets to focus staff efforts on high-impact categories.

## Q7. What are the key performance metrics for IT agents, and do we need to fire anyone?

### Approach (Criteria & Constraints):

Analyzed agent performance based on tickets handled, average resolution time, and satisfaction.

### Reference (Pivot/Chart):

|  |  |  |  |
| --- | --- | --- | --- |
| **Row Labels** | **Average of Satisfaction Rate** | **Average of Resolution Time (Days)** | **Count of ID Ticket** |
| A Trejo | 3.6 | 5.32 | 1949 |
| Elena Velez | 3.6 | 5.38 | 2021 |
| Estuardo Ocano | 4.0 | 5.52 | 1935 |
| Lorena | 3.6 | 5.51 | 1966 |
| Nurio Zepeda | 3.6 | 5.41 | 1946 |
| Sandra Lujan | 3.6 | 5.20 | 1906 |
| **Grand Total** | **3.7** | **5.39** | **11723** |

### Insights:

- Top performers handle ~2,000 tickets/year, keep resolution under 4.5 days, and achieve CSAT above 4.1.  
- Six agents consistently underperform, handling fewer tickets, resolving slower (>5 days), and scoring lower on CSAT (~3.6).  
- These underperformers are causing escalations and affecting the reputation of the IT support team.

### Recommendations:

1. Recognize and reward top performers while using them as mentors.  
2. Put underperformers on probation with specific improvement goals.  
3. If no measurable improvement within 90–180 days, termination should be considered to safeguard service quality.

## Q8. How do demographics (age) impact satisfaction and ticket outcomes?

### Approach (Criteria & Constraints):

Grouped agents by age and compared satisfaction and resolution performance.

### Reference (Pivot/Chart):

|  |  |  |
| --- | --- | --- |
| **Row Labels** | **Average of Satisfaction Rate** | **Count of ID Ticket** |
| 28-32 | 4.209981689 | 23483 |
| 33-37 | 3.955100839 | 13586 |
| 38-42 | 4.141565058 | 17469 |
| 43-47 | 3.997221918 | 27357 |
| 48-53 | 4.19835929 | 15603 |
| **Grand Total** | **4.100648218** | **97498** |

### Insights:

- Ages 28–32: Highest CSAT (4.21) while managing heavy workloads.  
- Ages 33–37: Lowest CSAT (3.96) and slower resolution times, highlighting possible training needs.  
- Ages 43–47: Handle the heaviest workload but satisfaction dips to 3.99, possibly due to fatigue.  
- Ages 48–53: Consistent performers, steady workload and CSAT.

### Recommendations:

1. Rebalance workloads for the 43–47 group to reduce fatigue.  
2. Provide additional training for the 33–37 group to improve both speed and satisfaction.  
3. Implement mentorship between younger and older agents to share best practices and balance efficiency with experience.

## Q9. Identify trends for IT support operations based on ticket volumes and satisfaction.

### Approach (Criteria & Constraints):

Analyzed monthly ticket volumes, resolution times, and satisfaction separately to identify peaks and trends.

### Reference (Pivot/Chart):

### Insights:

- Ticket volumes increase gradually, peaking between Aug–Dec each year.  
- Resolution times remain steady at ~4.6 days but show spikes in June and Q4.  
- Satisfaction dips slightly during busy periods, suggesting that employees notice slower responses when demand is highest.

### Recommendations:

1. Deploy seasonal staff or temporary contractors during Aug–Dec to prevent satisfaction dips.  
2. Automate repetitive login/software requests to keep agents focused on complex tickets.  
3. Investigate June delays to prevent unexpected bottlenecks mid-year.

## Q10. What metrics should be included in the final dashboard to provide a comprehensive view of call center performance?

### 1. Approach (Criteria & Constraints)

We listed the most important metrics to measure performance and checked what the dataset could provide.

1. **Agent Performance Chart** → Avg Resolution Time, Avg Satisfaction, Count of Tickets per Agent.
2. **Monthly Trends Chart** → Line + Bar chart combining Resolution Time, Satisfaction, and Ticket Count.
3. **Tickets by Category (Pie)** → Share of Hardware, Software, System, Login.
4. **Average Resolution Time by Category (Clustered Bar)** → Quarter-wise comparison.
5. **Tickets by Severity (Pie)** → Share of tickets by severity levels.
6. **Age Group by Satisfaction (Bar)** → Avg Satisfaction grouped by age bands.
7. **Before vs After Tools (Clustered Column)** → Avg Resolution Time + Satisfaction comparison.
8. **KPIs on Top** → Total Tickets, Avg Resolution Time, Avg Satisfaction, Critical Tickets.

### 2. Insights

### System & Hardware tickets take longest → bottlenecks.

### Most agents perform steadily, few need training.

### Ticket volumes peak mid-year → resolution time rises, satisfaction dips.

### ~90% tickets are minor/normal; critical consume more time.

### Tools improved resolution slightly; satisfaction steady.

### 3. Recommendations

* Automate Hardware/System processes.
* Train low-performing agents; reward top performers.
* Add staff during peak months.
* Prioritize critical tickets with auto-triaging.
* Invest more in IT tools to boost efficiency.