

# Analyzing Customer Satisfaction Trends in 2022

## Introduction:

This notebook aims to analyze customer satisfaction trends across various regions, products and case owners during first quarter of the year 2022. The provided dataset consists of several attributes, including customer satisfaction scores, product information and case details. The objective of this analysis is to identify factors contributing to a downward trend in the Overall Technician Satisfaction rating starting in January and to provide actionable recommendations to improve these ratings.

## Data Loading, Transformations and Initial Inspection:

To begin our analysis, we load the customer satisfaction dataset into a Spark DataFrame from AWS S3. We perform some necessary data transformations to standardize certain fields, ensuring consistency in our analysis. For example, country names are unified and the language of the Issue\_Resolved field is standardized to English. These transformations will help in the subsequent analysis, particularly in regional and issue resolution impact studies.

After performing these transformations, we print the schema of the DataFrame to understand the data types of each column. Finally, the first 10 rows of the dataset are displayed to inspect the data structure, giving us an overview of the key attributes available for our analysis.

```
# Import data from s3 AWS
df = spark.read.option("sep", ",") \
    .option("header", True) \
    .option("inferSchema", True) \
    .csv("s3n://humber-lfb-databricks-class-files/midterm_helpdesk.csv")
# "sep" is used to specify the delimiter of CSV file, "header" is used to specify the first row is a header, and "inferSchema" is used to automatically infer the schema

# Display the updated DataFrame
display(df)
```

Table							
	Client_ID	Main_Product	Number_Users	Case_Number	Overall_Technician_Satisfaction	Recommend_Friend_Colleague	Issue
1	FARME12	Epic Cloud	29	3841693	4	4	No
2	ONECA01	Epic Cloud	39	3973271	8	8	Yes
3	EMERA02	TAM Cloud	5	3846734	10	10	Yes
4	NFPCA01	Epic Cloud	960	3972845	10	10	Yes
5	AZALE01	TAM Cloud	12	3842761	10	10	Yes
6	PALL-01	Epic Cloud	55	3973280	10	10	Yes
7	REEDW02	Epic Cloud	43	3846783	10	10	Yes
8	BRYSO02	Epic Cloud	104	3973321	9	9	Yes
9	HARBI01	Epic Cloud	24	3846791	10	10	Yes
10	GRANI04	Epic Cloud	33	3973363	10	10	Yes
11	CBIGR01	Epic Cloud	12	3846871	10	10	Yes
12	LOMAN01	Epic Cloud	63	3973405	10	10	Yes
13	JOHNS31	Epic Cloud	18	3846843	10	10	Yes
14	MACLE06	Epic Cloud	13	3973536	10	7	Yes
15	REEDW02	Epic Cloud	43	3844319	10	10	Yes

1,170 rows

```
#To check the schema of the data
df.printSchema()
```

```
root
|-- Client_ID: string (nullable = true)
|-- Main_Product: string (nullable = true)
|-- Number_Users: integer (nullable = true)
|-- Case_Number: integer (nullable = true)
|-- Overall_Technician_Satisfaction: integer (nullable = true)
|-- Recommend_Friend_Colleague: integer (nullable = true)
|-- Issue_Resolved: string (nullable = true)
|-- First_Time_Support_Contacted: string (nullable = true)
|-- Created_Date: date (nullable = true)
|-- Case_Owner: string (nullable = true)
|-- Category: string (nullable = true)
|-- Sub_Category: string (nullable = true)
|-- Support_Tier: string (nullable = true)
|-- City_state: string (nullable = true)
|-- Country: string (nullable = true)
|-- Billing_Country: string (nullable = true)
```

#### # Transformations

```
from pyspark.sql.functions import when
```

```
# Replace "United States" with "USA" in the Country column
```

```
df = df.withColumn("Country", when(df.Country == "United States", "USA").otherwise(df.Country))
```

```
# Replace "Oui" with "Yes" and "Non" with "No" in the Issue_Resolved column
```

```
df = df.withColumn("Issue_Resolved", when(df.Issue_Resolved == "Oui", "Yes").otherwise(df.Issue_Resolved))
```

```
df = df.withColumn("Issue_Resolved", when(df.Issue_Resolved == "Non", "No").otherwise(df.Issue_Resolved))
```

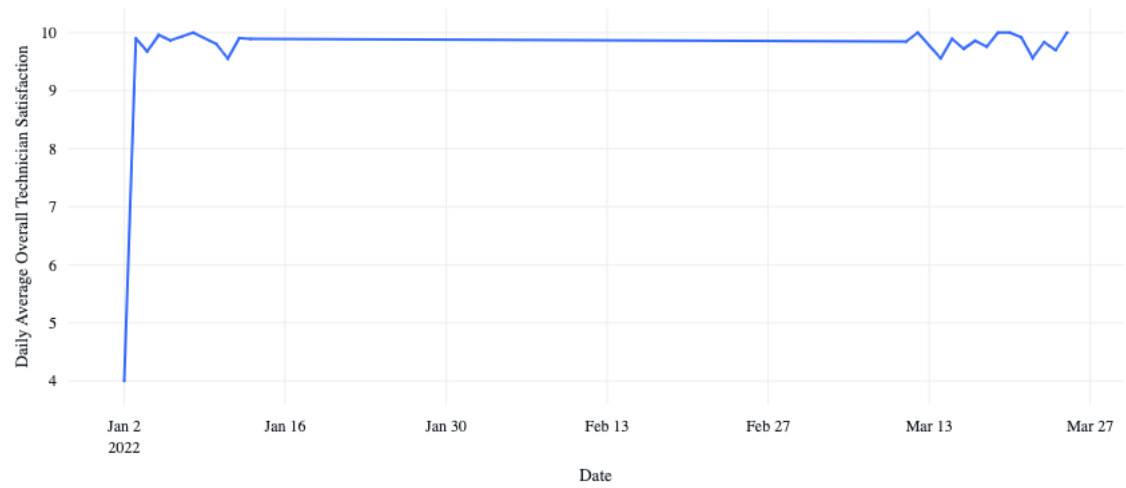
```
# Display the updated DataFrame
```

```
display(df)
```

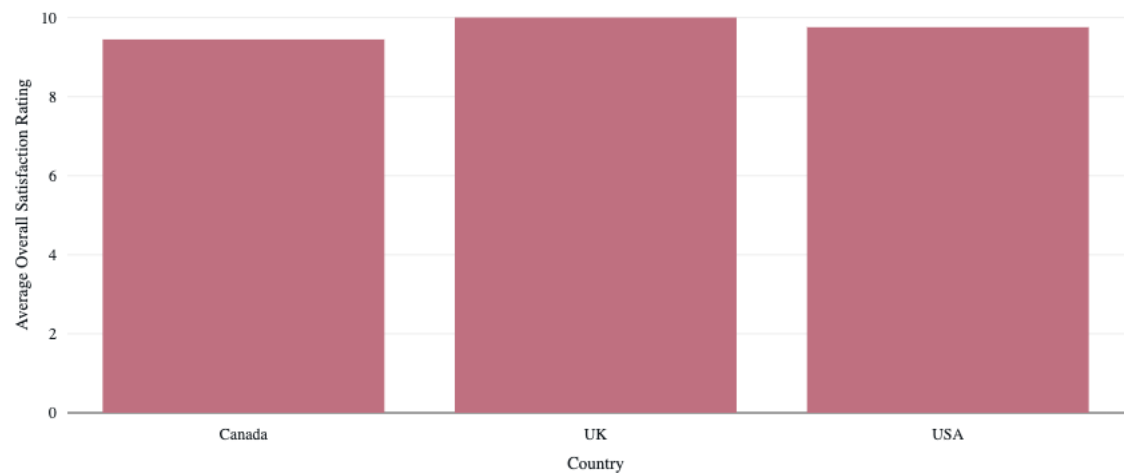
Table	Overall Technician Satisfaction over Time		Average Satisfaction by Country		Issue Resolution Impact		
	Client_ID	Main_Product	Number_Users	Case_Number	Overall_Technician_Satisfaction	Recommend_Friend_Colleague	Issue_Resolved
1	FARME12	Epic Cloud	29	3841693	4	4	No
2	ONECA01	Epic Cloud	39	3973271	8	8	Yes
3	EMERA02	TAM Cloud	5	3846734	10	10	Yes
4	NFPCA01	Epic Cloud	960	3972845	10	10	Yes
5	AZALE01	TAM Cloud	12	3842761	10	10	Yes
6	PALL-01	Epic Cloud	55	3973280	10	10	Yes
7	REEDW02	Epic Cloud	43	3846783	10	10	Yes
8	BRYSO02	Epic Cloud	104	3973321	9	9	Yes
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15	REEDW02	Epic Cloud	43	3844319	10	10	Yes

1,170 rows

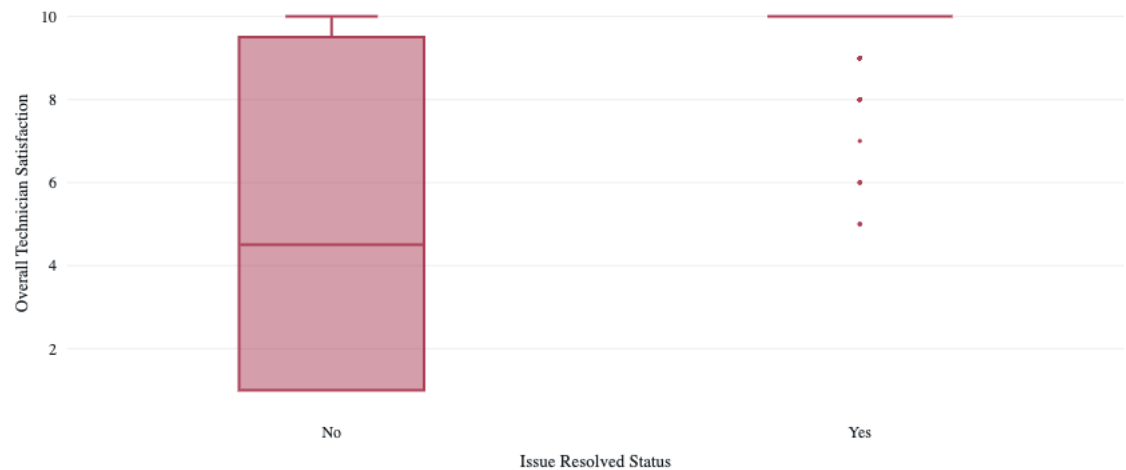
Overall Technician Satisfaction Over Time



Average Satisfaction by Country



Issue Resolution Impact



Overall Technician Satisfaction over Time:

The line chart illustrates the trend of Overall Technician Satisfaction from January 2, 2022 to March 25, 2022. The daily average score started at 4, rising sharply to 9.9 the next day and remaining above 9.5 for most of the period. Notable peaks occurred on January 8, March 12, 19, 20 and 25, where satisfaction reached 10. The score remained stable at approximately 9.8 between January 13 and March 11.

Average Satisfaction by Country:

The regional analysis shows that Canada has the lowest average satisfaction rating of 9.4, followed by the USA, i.e., 9.75. The UK has the highest average satisfaction rating of 10.

This suggests that additional focus is needed in Canada and the USA to improve satisfaction levels.

Issue Resolution Impact:

**Resolved Issues:** Median satisfaction score is 10, with most clients showing high satisfaction and some outliers.

**Unresolved Issues:** Median satisfaction score is 4.5, with a broad range from 1 to 10 but no significant outliers.

Resolved issues correlate with higher satisfaction scores, suggesting a need to improve resolution rates.

```
df.createOrReplaceTempView("temp_view") # create a temporary view
```

```
%sql
SELECT * FROM temp_view
LIMIT 10
```

Table					
	A <sup>B</sup> <sub>C</sub> Client_ID	A <sup>B</sup> <sub>C</sub> Main_Product	1 <sup>2</sup> <sub>3</sub> Number_Users	1 <sup>2</sup> <sub>3</sub> Case_Number	1 <sup>2</sup> <sub>3</sub> Overall_Technician_Satisfaction
1	FARME12	Epic Cloud	29	3841693	
2	ONECA01	Epic Cloud	39	3973271	
3	EMERA02	TAM Cloud	5	3846734	
4	NFPCA01	Epic Cloud	960	3972845	
5	AZALE01	TAM Cloud	12	3842761	
6	PALL-01	Epic Cloud	55	3973280	
7	REEDW02	Epic Cloud	43	3846783	
8	BRYSO02	Epic Cloud	104	3973321	
9	HARBI01	Epic Cloud	24	3846791	
10	GRANI04	Epic Cloud	33	3973363	
10 rows					

```
%sql
Select Case_Owner, Avg_Satis from
(Select Case_Owner,
Avg(Overall_Technician_Satisfaction) as Avg_Satis
from temp_view
Group By Case_Owner)
Order by Avg_Satis desc
limit 5
```

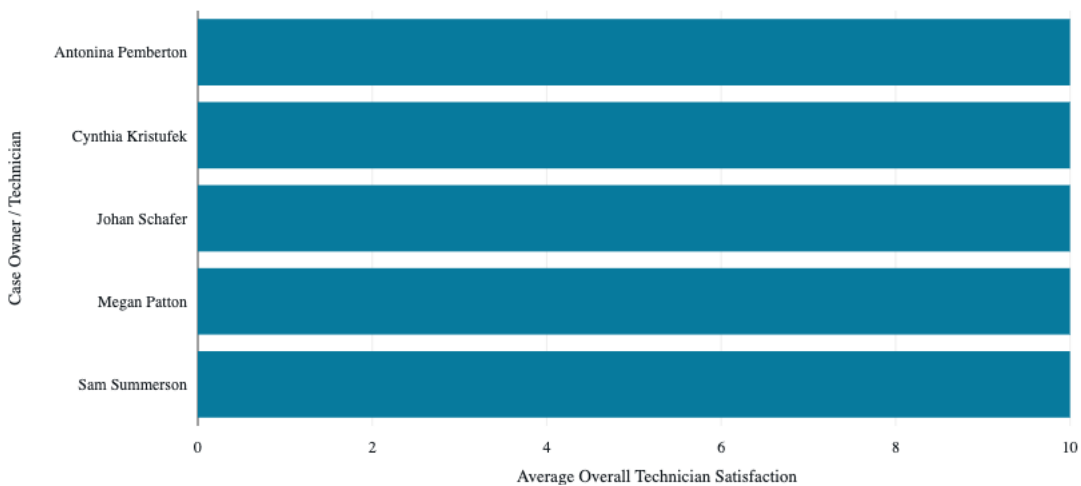
Table Case Owner Analysis



	<sup>A</sup> <sub>C</sub> Case_Owner	<sup>1.2</sup> Avg_Satis
1	Cynthia Kristufek	10
2	Sam Summerson	10
3	Antonina Pemberton	10
4	Johan Schafer	10
5	Megan Patton	10

5 rows

### Case Owner Analysis



### Case Owner Analysis:

The top 5 case owners all have an average satisfaction score of 10:

- Cynthia Kristufek
- Sam Summerson
- Antonina Pemberton
- Johan Schafer
- Megan Patton

This indicates consistent high performance among these technicians.

## **Recommendations:**

### **1. Based upon Regional Analysis, focus on Regions with Lower Satisfaction**

- **Observation:** Canada (9.4) and the USA (9.75) have lower average satisfaction ratings compared to the UK (10)
- **Recommendation:** Investigate and address specific issues in Canada and the USA through surveys or interviews. Implement targeted initiatives such as additional training, resource allocation, mentoring and process improvements tailored to these regions.

### **2. Recognize and Reward Top-Performing Technicians**

- Establish a recognition and reward program for high-performing technicians with monthly or quarterly awards, bonuses, and public recognition, which will help maintain performance and also provide motivation to others.

### **3. Provide Training and Mentorship to Technicians Handling Unresolved Issues based upon Issue Resolution Impact.**

- **Observation:** Cases with clients with unresolved issues by technicians have a median satisfaction score of 4.5, while those with resolved issues have a median satisfaction score of 10.
- **Recommendation:** Share best practices and success stories by implementing training and mentorship programs, where top-performing technicians mentor their peers to improve the overall satisfaction.