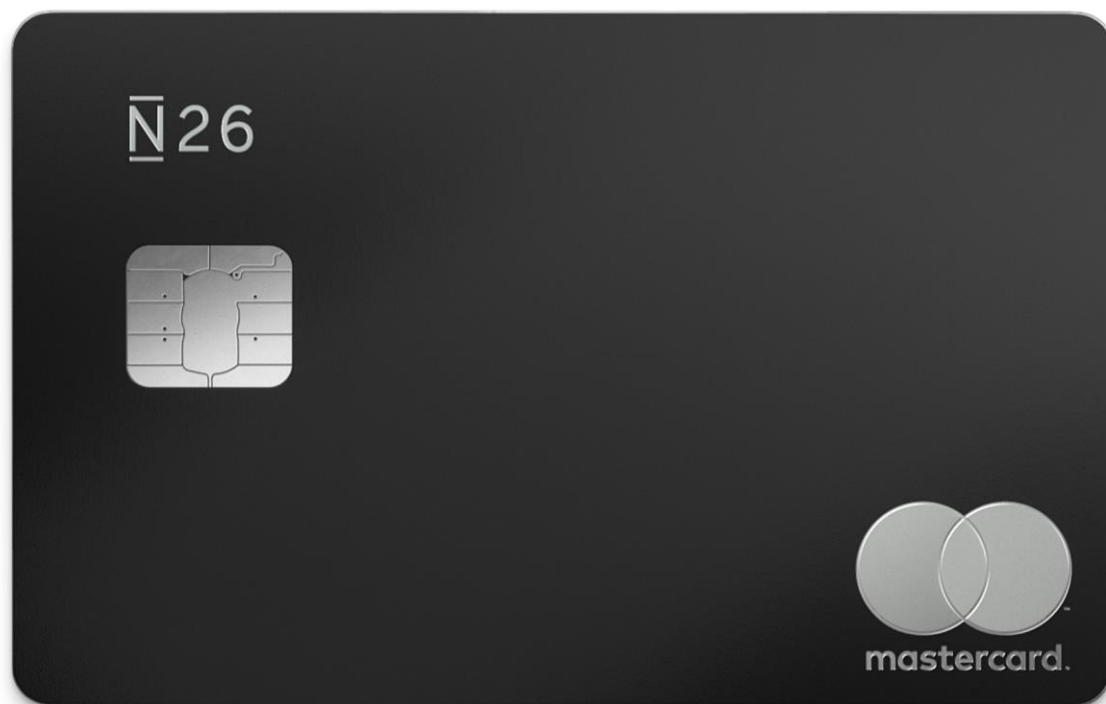# PHYTON
N26 – CUSTOMER SERVICE

Anderson Cruz

02.02.2022

1. Create 4 (four) KPI.

   - Average Service Time (AST).

   - Average Waiting Time (AWT).

   - Average Customer Satisfaction Score (ACSAT).

   - Agent Satisfaction (AAS).

2. Other questions.

   - More than 10 analysis comparing different columns.

   - Determine number of members of staff per day, next 7 days.

   - Create weekly leader-boards, **Top5** in-house, using 4 KPY.

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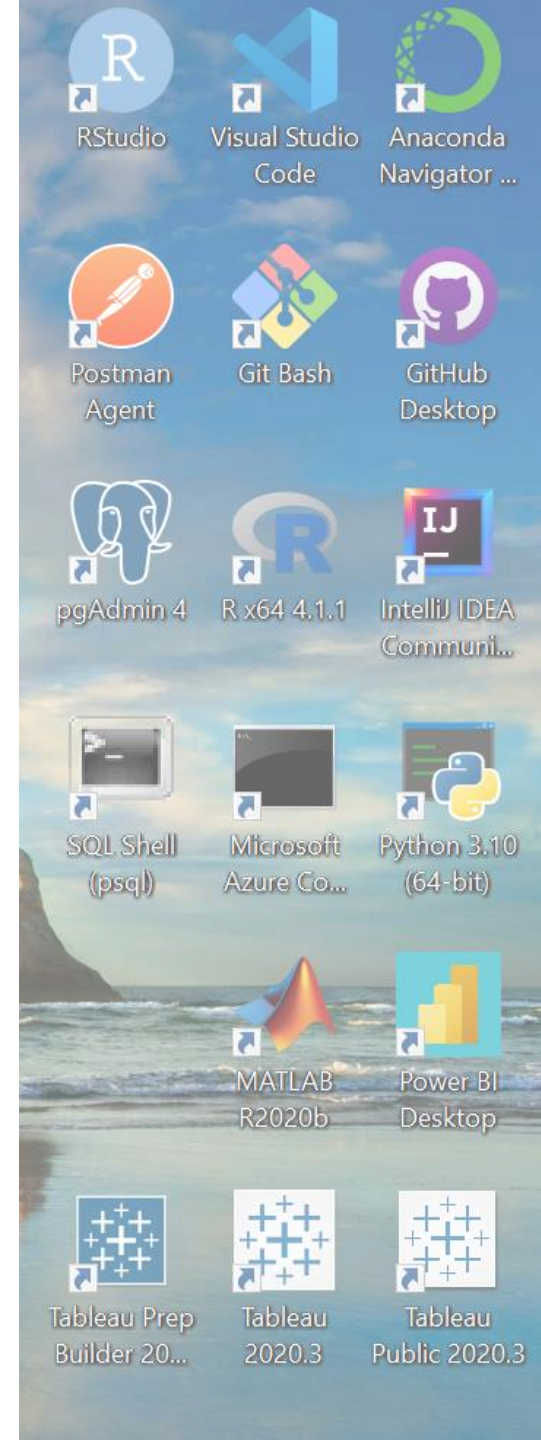
- Read, Exploring Data, Missing Data, Type of Data

- Merge the 3 datasets, **contacts, specialists, surveys.**

```python
df_m1 = pd.merge(df_contacts, df_surveys[['contact_id','csat','agent_satisfaction','issue_resolved']],
left_on='id', right_on='contact_id', how='left')
df = pd.merge(df_m1, df_specialists[['id','full_name']],
left_on='id', right_on='id', how='left')

df.head()
```

- Create new columns.

```python
df['service_time'] = df['wait_time']+df['handle_time'] #serive time
#df['year'] = pd.DatetimeIndex(df['initiated_date']).year #year
#df['month'] = pd.DatetimeIndex(df['initiated_date']).month #month
df['week'] = pd.DatetimeIndex(df['initiated_date']).week #week
df['day'] = pd.DatetimeIndex(df['initiated_date']).day #day
df['weekday'] = pd.DatetimeIndex(df['initiated_date']).weekday #weeday
```

- **Table 1**: time analysis and specialist by day.
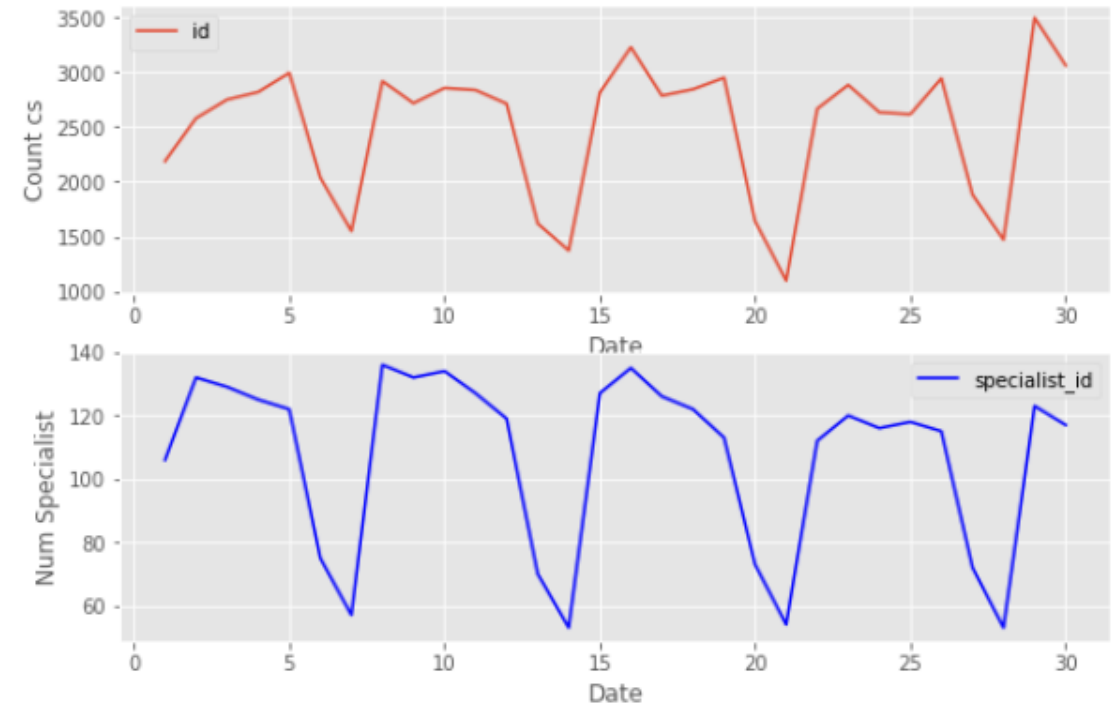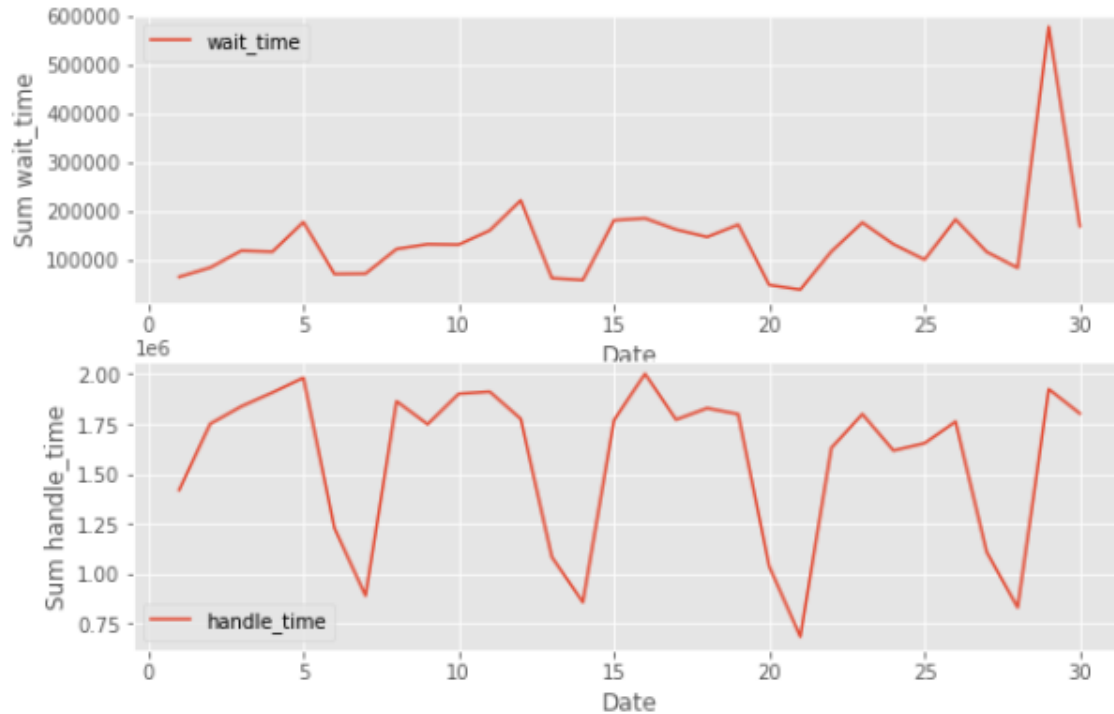
- There was a considerable increase at the end of the month in total service time.

- See seasonality on weekends in all indicators.

- There were no significant differences between the weeks.

- **Table 2:** time analysis and specialist by weekday.

	id	wait_time		handle_time		specialist_id
	count	sum	mean	sum	mean	nunique
weekday						
0	14094	1059232.0	75.154818	8607216.0	697.618415	192
1	14483	742710.0	51.288585	9104423.0	715.925375	188
2	11034	540430.0	48.978612	7128501.0	724.220360	184
3	11124	520785.0	46.845822	7301509.0	731.614128	186
4	11611	751007.0	64.691791	7319287.0	718.986935	182
5	7182	294984.0	41.078401	4460386.0	702.755002	163
6	5486	249659.0	45.524982	3264341.0	702.310886	130

- As shown in the previous chart, on average the values follow a logic of reduction on weekends and increase during the week.

- **Table 3**: time analysis and specialist by hour
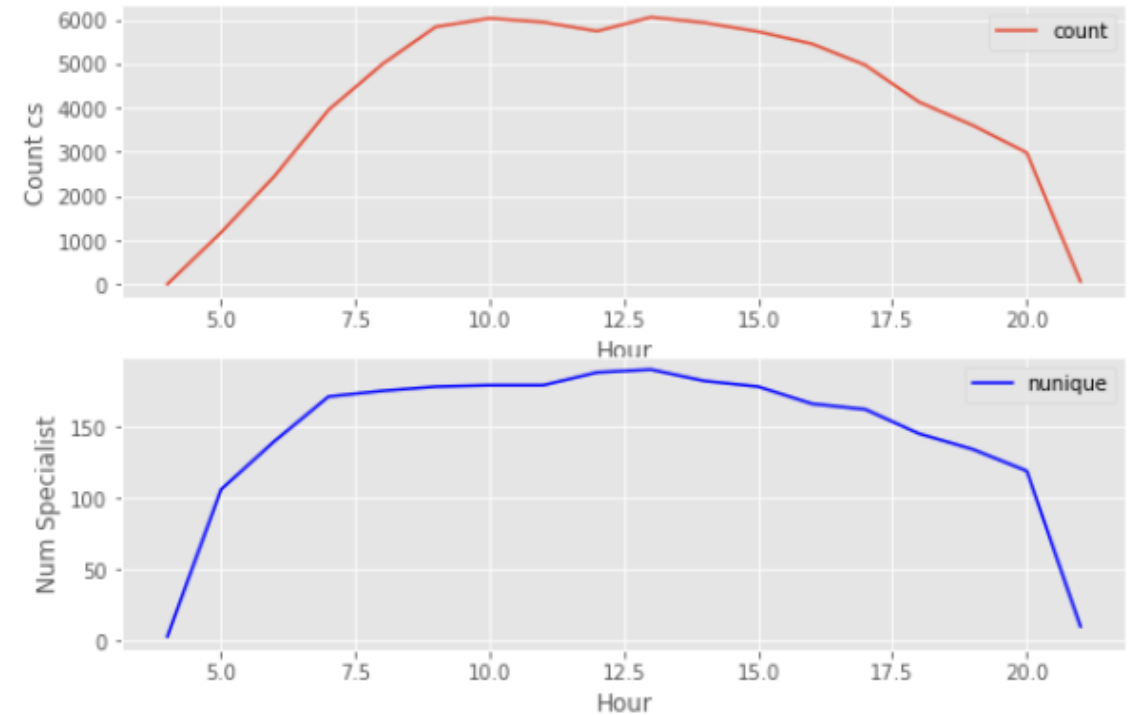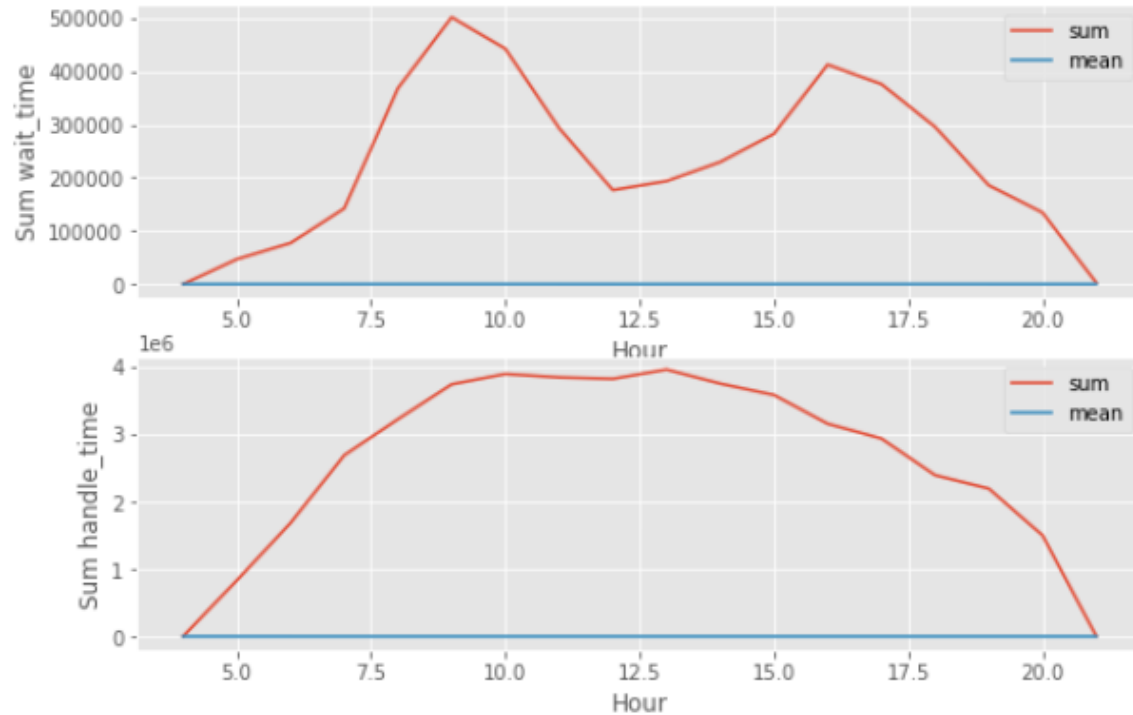
- On average, the values follow a logic of reduction at the beginning of the day and at the end of the day.

- **Table 4:** channel analysis

	id	wait_time		handle_time		specialist_id
	count	sum	mean	sum	mean	nunique
channel						
call	7900	219689.0	27.808734	1147795.0	145.290506	96
chat	67114	3939118.0	58.705186	46037868.0	791.667979	193

chat a higher volume of attendance in all indicators.

- **Table 5:** Tag analysis

	id	wait_time		handle_time		specialist_id
	count	sum	mean	sum	mean	nunique
cs_tag						
account_closure	1428	45183.0	31.640756	1127374.0	789.477591	183
aml	1481	45497.0	30.720459	1033872.0	698.090479	178
atm	1271	46263.0	36.398899	1138716.0	895.921322	175
card_activation	2849	104506.0	36.681643	2198869.0	772.345978	184
card_delivery	2597	93644.0	36.058529	2190297.0	843.395071	176

longer service time on the **card_activation** and **card_delivery**

- **Table 6**: language analysis

contact_language	id count	wait_time sum	wait_time mean	handle_time sum	handle_time mean	specialist_id nunique
de	10664	413216.0	38.759591	7046645.0	735.174231	70
en	17008	1289191.0	75.816925	12874010.0	854.054000	149
es	5428	606843.0	111.819237	2815257.0	718.544410	25
fr	27882	1175994.0	42.186612	18548806.0	743.975854	91
it	7748	535640.0	69.132679	4996615.0	792.107641	31

specialist emphasis on the number of agents in English. Highest average of agents in Spanish

- **Table 7:** In house Analysis

is_inhouse	id count	wait_time sum	wait_time mean	handle_time sum	handle_time mean	specialist_id nunique
False	44243	1688034.0	38.154559	32261179.0	729.874415	122
True	30771	2470773.0	80.329443	14924484.0	682.980231	80

lower number **of in-house** agents. Longer customer wait time for in-house agents.

- **Table 8**: specialist analysis

	id	agent_satisfaction	csat	wait_time	handle_time
count	202.000000	190.000000	190.000000	202.000000	201.000000
mean	371.356436	8.472730	8.126578	39.209192	715.880569
std	630.019072	0.773572	0.822195	30.678614	217.221334
min	1.000000	6.000000	5.333333	0.000000	9.425641
25%	192.000000	7.982558	7.652592	24.038442	600.423313
50%	329.500000	8.522321	8.193064	31.915091	729.603681
75%	454.750000	8.990385	8.607685	44.143654	847.691023
max	8901.000000	10.000000	10.000000	274.107692	1453.000000

- little variability among **specialists**

- **Table 9**: Survey x Date

	id	agent_satisfaction	csat
count	30.000000	30.000000	30.000000
mean	2500.466667	8.422362	8.096720
std	619.276983	0.184564	0.186170
min	1096.000000	7.952381	7.732143
25%	2076.500000	8.279640	7.994933
50%	2735.500000	8.413195	8.094181
75%	2879.000000	8.562632	8.195282
max	3501.000000	8.772358	8.449367

- It is observed in the table that there is no significant variability between the **days of the month**.

- **Table 10**: Survey x Weekday

weekday	id	agent_satisfaction	csat
0	14094	8.490622	8.104640
1	14483	8.296875	7.956250
2	11034	8.408673	8.077530
3	11124	8.351477	8.111975
4	11611	8.383041	8.058480
5	7182	8.434783	8.100334
6	5486	8.571046	8.227882

- It is observed in the table that there is no significant variability between the days of the week.

- **Table 11**: Survey x hour

	id	agent_satisfaction	csat
count	30.000000	30.000000	30.000000
mean	2500.466667	8.422362	8.096720
std	619.276983	0.184564	0.186170
min	1096.000000	7.952381	7.732143
25%	2076.500000	8.279640	7.994933
50%	2735.500000	8.413195	8.094181
75%	2879.000000	8.562632	8.195282
max	3501.000000	8.772358	8.449367

- It is observed in the table that there is no significant variability between the hours of the day.

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- **Table 12**: Survey x Channel

channel	id	agent_satisfaction	csat
call	7900	9.179894	8.947090
chat	67114	8.378071	8.041503

chat It is observed in the table that there is no significant variability between the channels.

with the exception of some tags, **chat/call e kyc_acceptance**, the others do not have considerable variability between the means.

- **Table 13**: Survey x CS Tag

cs_tag	id	agent_satisfaction	csat
account_closure	1428	7.200000	6.413333
aml	1481	NaN	NaN
atm	1271	8.527132	8.248062
card_activation	2849	9.022989	8.758621
card_delivery	2597	8.454545	8.152893
card_reorder	2364	9.081851	8.690391
chargeback	2912	8.216867	7.909639
chat/call_problems	4814	6.478261	7.130435
confirmations/statements	2493	9.006689	8.812709
contact_data	6747	9.239329	8.879573
ct/missing_ct	2898	8.314879	8.076125
e_commerce	7509	8.670688	8.425814
kyc_acceptance	899	6.395062	5.666667
kyc_issue	4270	7.320796	6.780973
login	4533	7.679083	7.309456
not_tagged	15435	8.160000	8.040000
other	4612	8.099398	7.792169
sign_up	2759	8.035503	7.443787
standing_order	1995	8.069892	7.806452
terms/conditions	1148	8.069307	7.910891

- **Table 14**: Survey x Language

contact_language	id	agent_satisfaction	csat
de	10664	8.555276	8.115578
en	17008	8.675836	8.397026
es	5428	7.804124	7.532646
fr	27882	8.353755	8.015810
it	7748	8.112676	7.788732

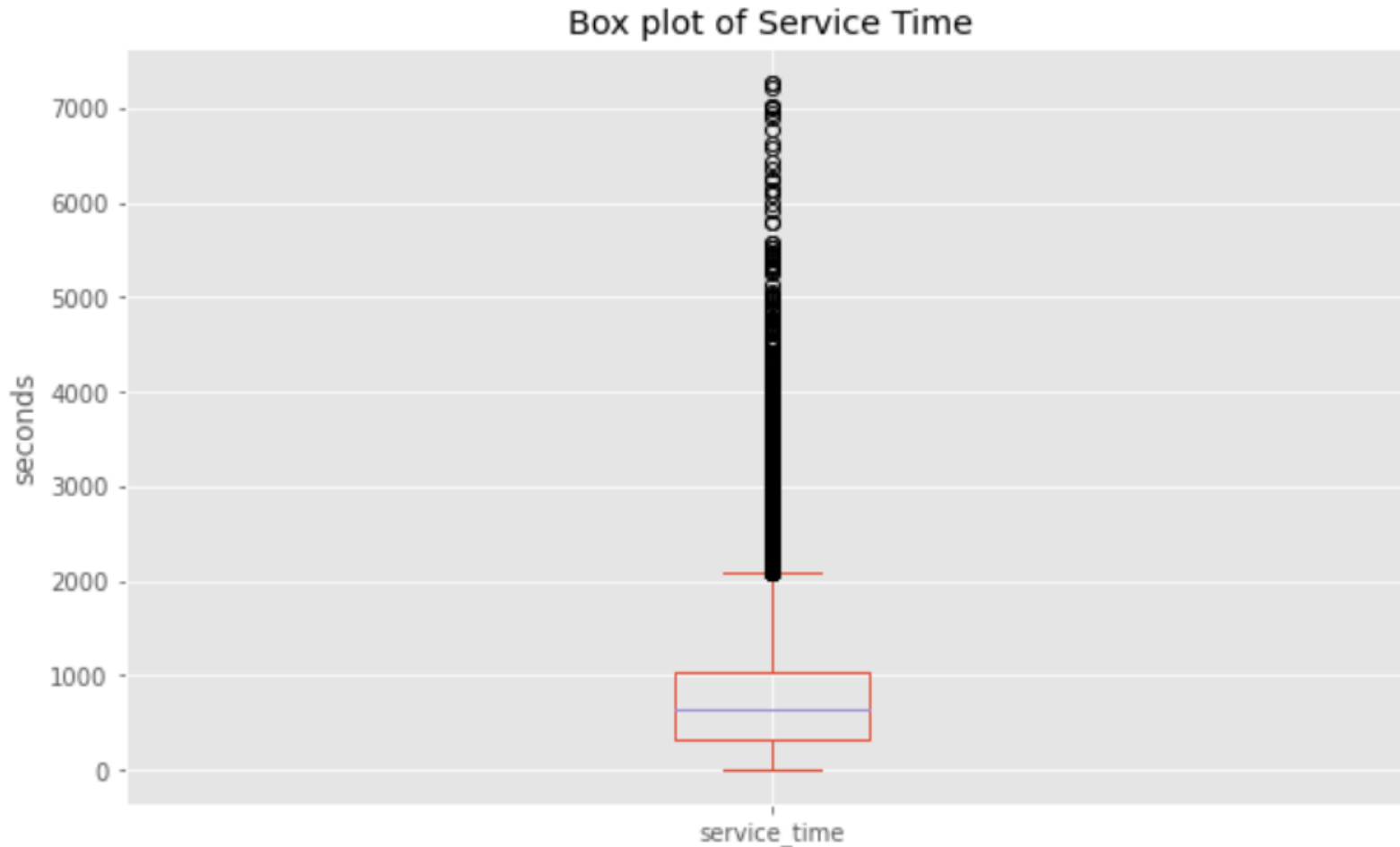as seen in one of the tables, the longer waiting time was reflected in the low score in **Spanish.**

- **Table 15**: Survey x In House

is_inhouse	id	agent_satisfaction	csat
False	44243	8.405067	8.072588
True	30771	8.415405	8.082291

In-house It is observed in the table that there is no significant variability.

- **Average Service Time (AST)**

Box plot of Service Time

	service_time
count	66053.000000
mean	755.546379
std	613.376504
min	0.000000
25%	325.000000
50%	630.000000
75%	1027.000000
max	7281.000000

- **Average Waiting Time (AWT)**

Box plot of Wait Time
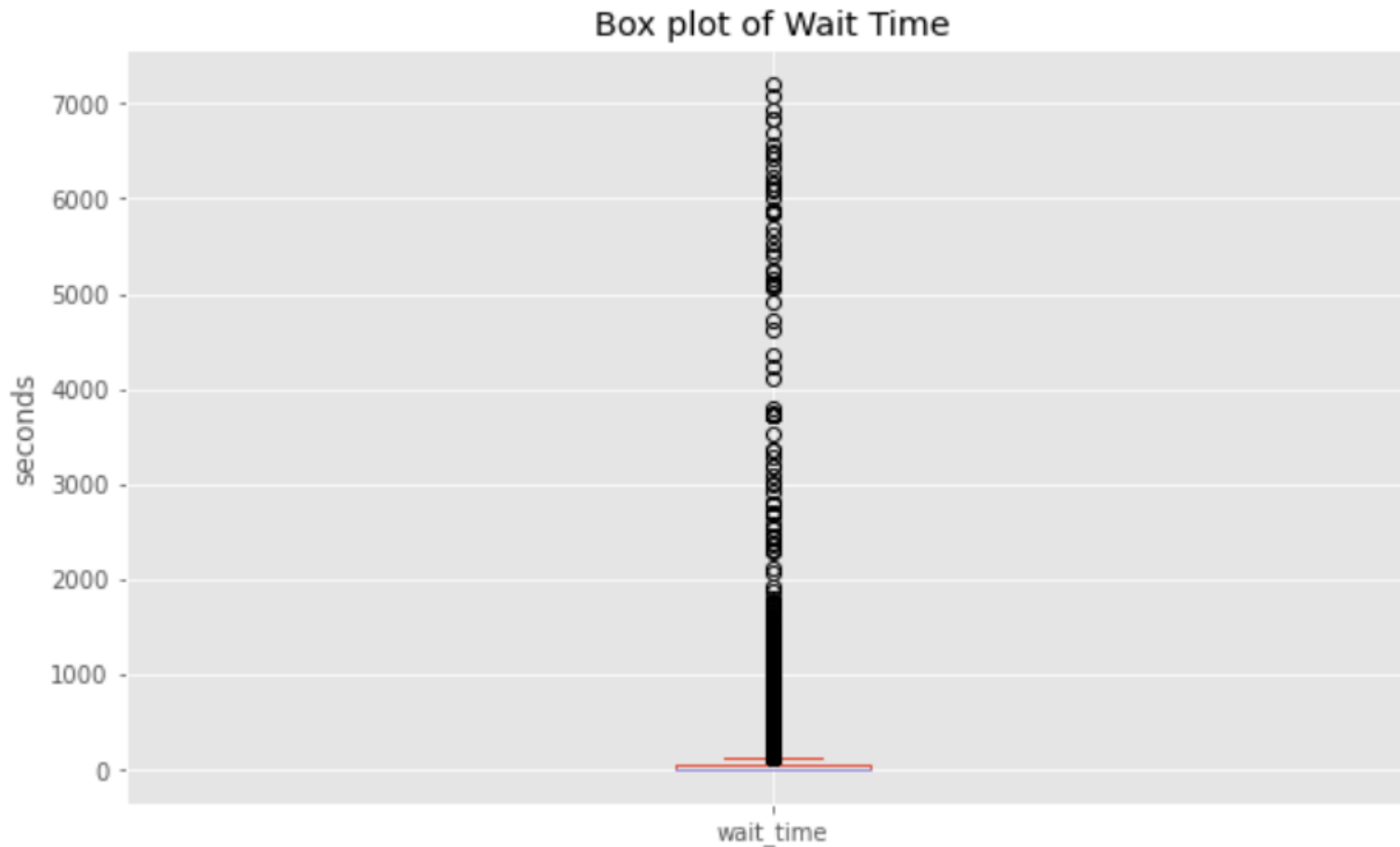
	wait_time
count	75000.000000
mean	55.450760
std	181.312835
min	0.000000
25%	4.000000
50%	5.000000
75%	53.000000
max	7212.000000

- **Average Customer Satisfaction Score (ACSAT) and Agent SatisfaCtion (AAS)**

Box plot Survey
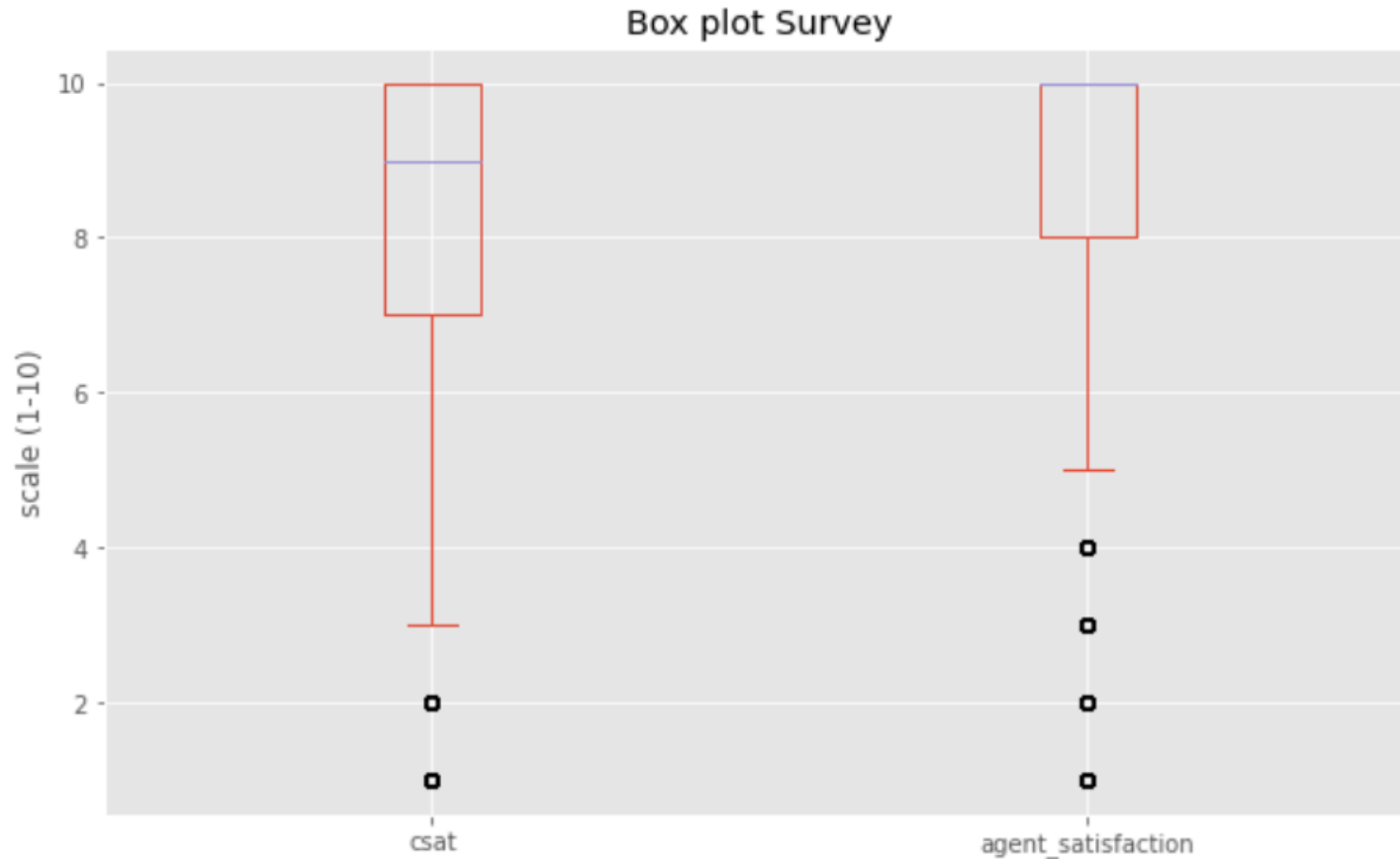
	csat	agent_satisfaction
count	5032.000000	5032.000000
mean	8.075517	8.408188
std	2.792047	2.698586
min	1.000000	1.000000
25%	7.000000	8.000000
50%	9.000000	10.000000
75%	10.000000	10.000000
max	10.000000	10.000000

- **Average Customer Satisfaction Score (ACSAT) and Agent Satisfaction (AAS)**
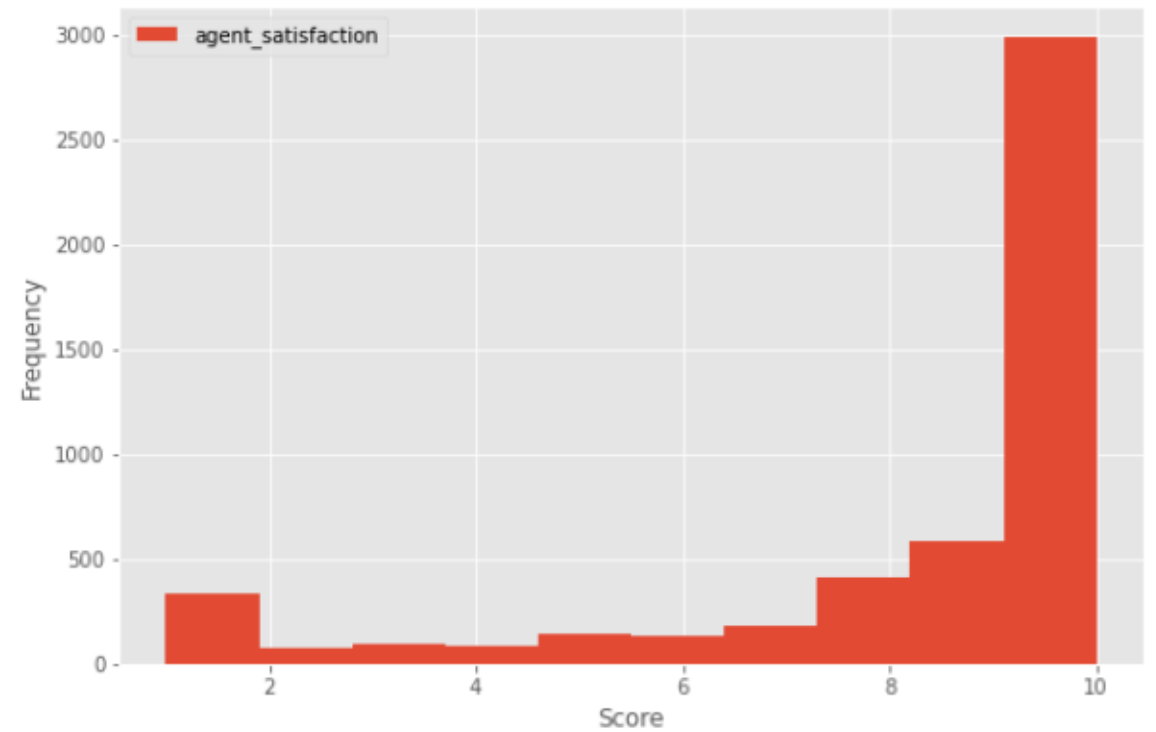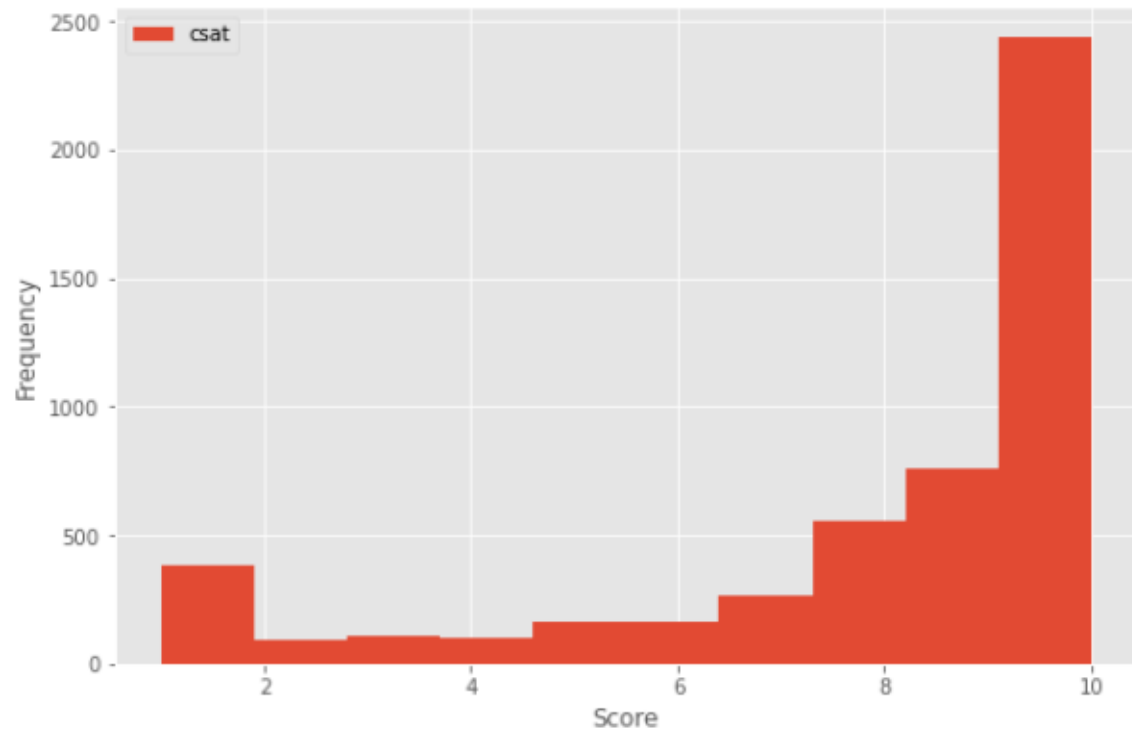
- **Members of staff will be needed per day of the week for the next 7 days**

	specialist_id
week	weekday	
27	0	123
	1	117

	specialist_id
weekday	
0	120.80
1	127.20
2	126.25
3	123.00
4	117.25
5	72.50
6	54.25

```python
# specialist group by weekday
df_weekday = df.groupby(['week','weekday']).agg({
    'specialist_id': "nunique"
    })

df_weekday.head(100)
```
✓ 0.1s

```python
# specialist group by weekday
df_mean = df_weekday.groupby(['weekday']).agg({
    'specialist_id': "mean"
    })

df_mean.head(7)
```
✓ 0.5s

- **Leaderboards: breakdown per week for the top 5 inhouse CS specialists**

```python
df_er= df[df['is_inhouse']==1]
```

```python
def top5(w):
    df_nweek= df_er[df_er['week']==w]
    df_top = df_nweek.groupby(df['specialist_id']).agg({
        'agent_satisfaction': "mean", 'csat': "mean",'wait_time': "mean", 'service_time': "mean"
        })
    df_top = pd.merge(df_top, df_specialists[['id','full_name']],
    left_on='specialist_id', right_on='id', how='left')

    df_top5=df_top.sort_values(by=['agent_satisfaction','csat','service_time','wait_time'],
        ascending=[False, False, True, True],ignore_index=True).head()

    print ("Top5 Specialist: week", w)
    print(df_top5[['full_name','agent_satisfaction','csat','service_time','wait_time']])
    print ("")
```

```python
for w in range(23, 27):
    top5(w)
```

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- **Leaderboards: breakdown per week for the top 5 inhouse CS specialists**

Top5 Specialist: week 23

	full_name	agent_satisfaction	csat	service_time	wait_time
0	Lindsay Lohan	10.0	10.0	412.385714	12.057143
1	Chris Pratt	10.0	10.0	488.315789	3.894737
2	Drake	10.0	10.0	852.204545	25.022727
3	George Clooney	10.0	10.0	1064.969697	30.590909
4	Ellen DeGeneres	10.0	10.0	1144.466667	11.433333

Top5 Specialist: week 24

	full_name	agent_satisfaction	csat	service_time	wait_time
0	Chad Michael Murray	10.0	10.0	381.666667	112.904762
1	Jennifer Lopez	10.0	10.0	397.242424	6.303030
2	Cameron Diaz	10.0	10.0	775.382716	43.962963
3	Paris Hilton	10.0	10.0	814.827586	21.206897
4	Jennifer Lawrence	10.0	10.0	882.867470	30.096386

Top5 Specialist: week 25

	full_name	agent_satisfaction	csat	service_time	wait_time
0	Britney Spears	10.0	10.0	526.344828	29.258621
1	Shia LaBeouf	10.0	10.0	549.708333	13.750000
2	Steven Spielberg	10.0	10.0	551.202703	14.567568
3	Brad Pitt	10.0	10.0	799.575758	55.878788
4	Sarah Geronimo	10.0	10.0	864.593023	81.279070

Top5 Specialist: week 26

	full_name	agent_satisfaction	csat	service_time	wait_time
0	Paul Walker	10.0	10.000000	420.333333	10.666667
1	Marlon Brando	10.0	10.000000	579.500000	8.600000
2	Alyson Hannigan	10.0	10.000000	611.823529	9.960784
3	Ellen DeGeneres	10.0	10.000000	1382.142857	7.142857
4	Blake Lively	10.0	9.666667	1228.409091	28.363636

PHYTON

N26 – COSTUMER SERVICE
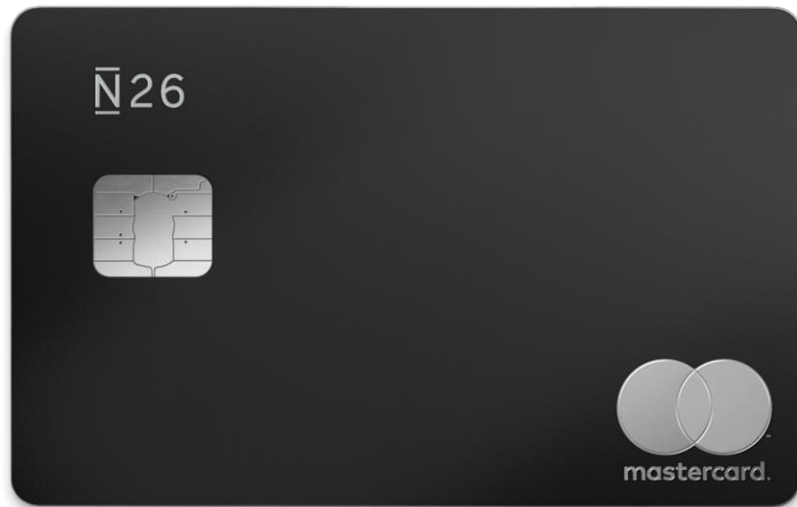
Anderson Cruz

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