QUESTION:

What is the correlation between the air transport movement, EU and UK passengers - are we able to accurately predict the number of passengers in future years through their travel behaviour?

ABSTRACT:

I investigated underlying relationships between the EU, UK and air transport movement and predict future values. I used correlation, time series analysis and it displayed a strong positive correlation along and projected increasing values over time. However, the forecast was not able accurately predict the number of passengers.

INTRODUCTION:

The main goal of this investigation is to find out the behaviour and vacation habits of the EU and UK travellers throughout the years and predict it in a time series analysis. The main focus was to compare the number of passengers from these countries and understand how they behave through each quartile and ultimately predict the number of passengers in the future – whether it be lower or higher.

DATA AND METHODS:

I initiated my investigation by using correlation in order to find any underlying relationship between air transport movements, UK and EU travellers.

Afterwards, a scatter graph was created– I created a column for UK and EU(UK and EU passengers) and compared it with air transport movements to find a line of best fit.

I made the UK and EU travellers as a base column for prediction and also included Quarter, and Year in order to stimulate my time series analysis.

Most of my methods heavily involved a time series analysis so I added columns such as Moving Average, Trend, Seasonal Variation, Forecast and Projection which were all necessary to create an additive time series. In addition, created a table to find the average seasonal variation so it could be used for the projection of my time series

I found my values for projection by using the $Y = MX + C$ ($Y = 53335X + 7511983$) formula. I established this formula by finding the slope and intercept of the trend(Y) and observation number(X) columns.

FINDINGS:

A crucial finding in this investigation is that EU and UK travels are strongly correlated (0.784) – this implies that whenever people from the UK Market travels the EU market acts similarly.

	Air Transport Movements	UK	EU
Air Transport Movements	1		
UK	0.818	1	
EU	0.975	0.748	1

I tested a separate correlation between the UK and EU column and airport transport movement and resulted in a 0.982 correlation coefficient. Therefore, the more people from UK and EU travel, there will be more transport movement which makes this relationship a causation.

	Air Transport Movements	EU and UK
Air Transport Movements	1	
EU and UK	0.982140847	1

To enhance my argument, the scatter graph came with an r² value of 0.964, proving that the data is a suitable fit. This is because the slope value is 0.005 and is multiplied by much bigger values which is why the trendline continues to increase.
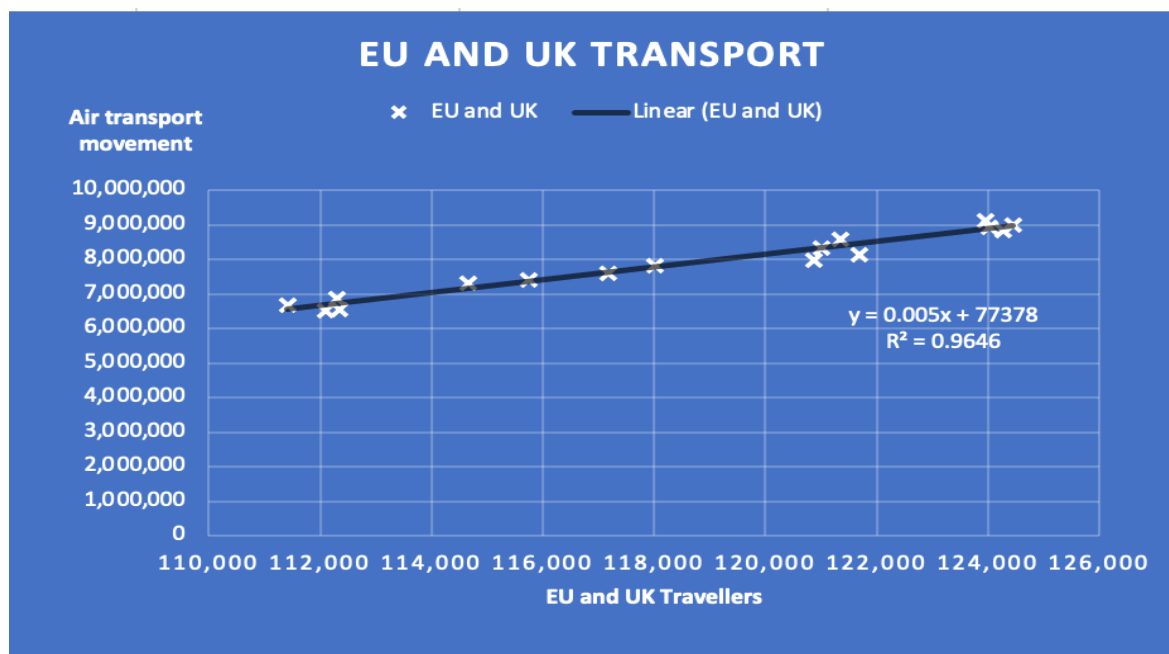
I fully understood the travel behaviours after observing each quarter of 2015-2018; For example in 2015, the 1st quarter seasonal variation peaks (-1,224,973) but produces negative SV during the 2nd(436,259) and 3rd Quarter, and rises in the 4th Quarter which could contribute as to why we have an additive time series. Moreover, the data displays the average number of people will avoid travelling during summer and spring.

Observation Number	Year	Quarter	EU and UK passengers	Moving average	Trend	Seasonal Variation	Projection	Forecast	Air Transport Movements
1	2015	1	6,496,774	7,715,116	7,721,747	-1,224,973			112,103
2	2015	2	8,144,431	7,728,378	7,708,172	436,259			121,687
3	2015	3	8,927,376	7,687,967	7,677,111	1,250,265			124,014
4	2015	4	7,291,883	7,666,256	7,681,767	-389,884			114,669
5	2016	1	6,549,821	7,697,279	7,713,392	-1,163,571			112,351
6	2016	2	7,982,786	7,729,506	7,772,814	209,972			120,867
7	2016	3	8,840,533	7,816,123	7,834,776	1,005,758			124,280
8	2016	4	7,415,976	7,853,428	7,874,623	-458,647			115,747
9	2017	1	6,678,727	7,895,817	7,919,890	-1,241,163			111,410
10	2017	2	8,329,256	7,943,964	7,975,599	353,657			121,009
11	2017	3	8,989,753	8,007,235	8,023,783	965,971			124,452
12	2017	4	7,585,533	8,040,331	8,069,857	-484,324			117,168
13	2018	1	6,871,312	8,099,383	8,304,061	-1,432,749			112,314
14	2018	2	8,582,340	8,508,740	8,490,340	92,000	8,471,940		121,345
15	2018	3	9,122,137	8,471,940			8,312,007		123,946
16	2018	4	7,821,742				8,365,342	7,821,742	118,019
17	2019	1					8,418,677	7,081,721	
18	2019	2					8,472,012	8,694,841	
19	2019	3					8,525,347	9,491,318	
20	2019	4					8,578,682	8,094,359	
21	2020	1					8,632,017	7,295,061	
22	2020	2					8,685,352	8,908,181	
23	2020	3					8,738,687	9,704,658	
24	2020	4					8,792,022	8,307,698	

The forecast created followed the same pattern of the SV because it takes the average seasonal variation into consideration.

Quarter	2017	2018	ASV
1	-1,241,163	-1,432,749	-1336956
2	353,657	92,000	222828.7
3	965,971		965970.5
4	-484,324		-484323.6

However, the values did not turn as negative because of high projection values. The projection states that there will be over 8 million passengers, and this is due to the fact that the formula uses a high slope value (M = 53335) and is also reason why the time series is steadily rising.

Time series
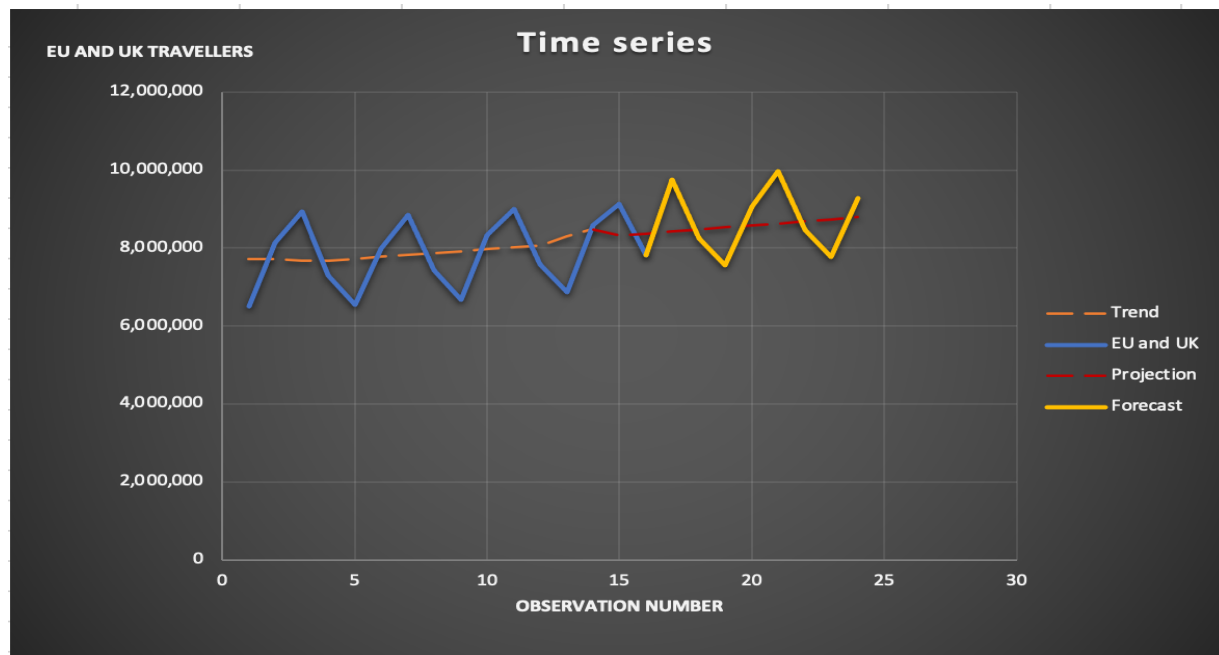
Because of these factors an inaccurate forecast was highly expected. In the projected flights of the 1st quarter in 2020 we expected 9,072,299 passengers but real data displays 1,450,567 passengers and because the number of passengers decreased so did the air movement travel[See figure 4].

Year	Quarter	EU and UK	Air Transport Movements
2018	1	6,871,312	112,314
	2	8,582,340	121,345
	3	9,122,137	123,946
	4	7,821,742	118,019
2019	1	6,932,053	112,693
	2	8,547,031	122,667
	3	8,915,040	123,000
	4	7,907,361	117,773
2020	1	5,495,377	98,966
	2	351,266	18,550
	3	2,214,375	41,625
	4	1,450,567	41,764

CONCLUSION:

In conclusion, UK and EU passengers are heavily correlated along with the air movement travel which was proved in the various comparisons. The more UK passengers travel the EU passengers will do similar and an increase in the air movement travel will also be seen. A certain behaviour we can find from the time series analysis is that people will travel around wintertime and passengers will increase.

However, the forecasted data was completely different to the real data that was shown. The fact that it did not consider any external events such as the COVID-19 pandemic makes this forecast to be extremely inaccurate thus predicting passenger behaviour throughout each quarter was unattainable.