Flight Delays and Cancellations

Flight delay has become widespread all over the world. Flight delays are causing many losses to passengers, airlines, & airports. Understanding the reasons that lead to delay will help to overcome the losses resulting from delays.

This paper will investigate the major reasons for delay in USA in 2015.

Objective:

Investigating the reasons for delay in USA.

Data:

The on-time performance of US domestic flights operated by large air carriers in 2015.

Questions:

1. **Which airlines or airports have the worst delays?**
2. **What causes the delay?**
3. **What is the role of geographical locations in delay due to weather?**
4. **Does the airtime have a role in delays?**

Investigation:

1. **Which airlines or airports have the worst delays?**
   First of all, we need to know which airlines have the most delays. When comparing the average time of delay per airline. Sprint Airlines has the highest average time of delay about 35 minutes in average. Figure 1

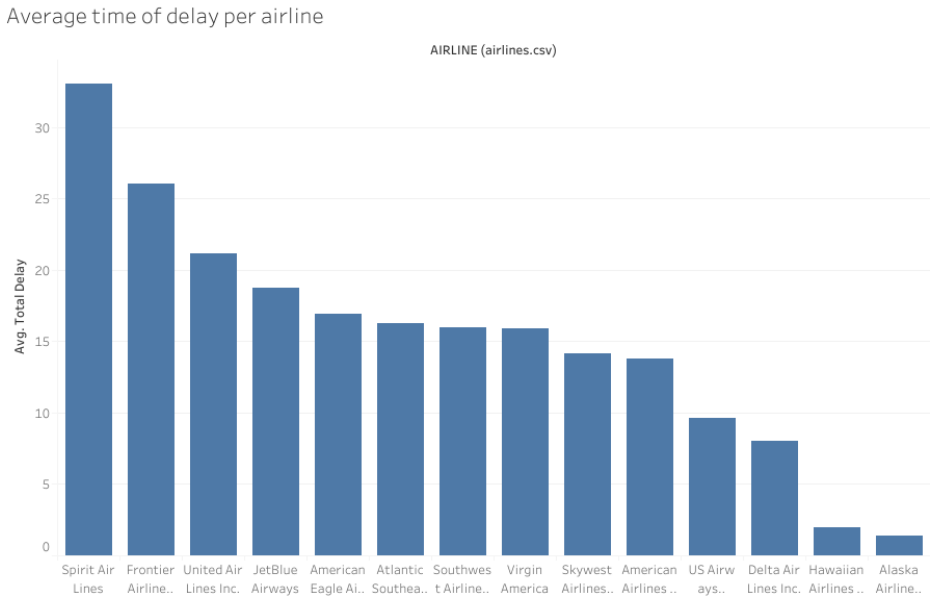

Figure 1

Does Sprint Airlines have the most frequent delays?

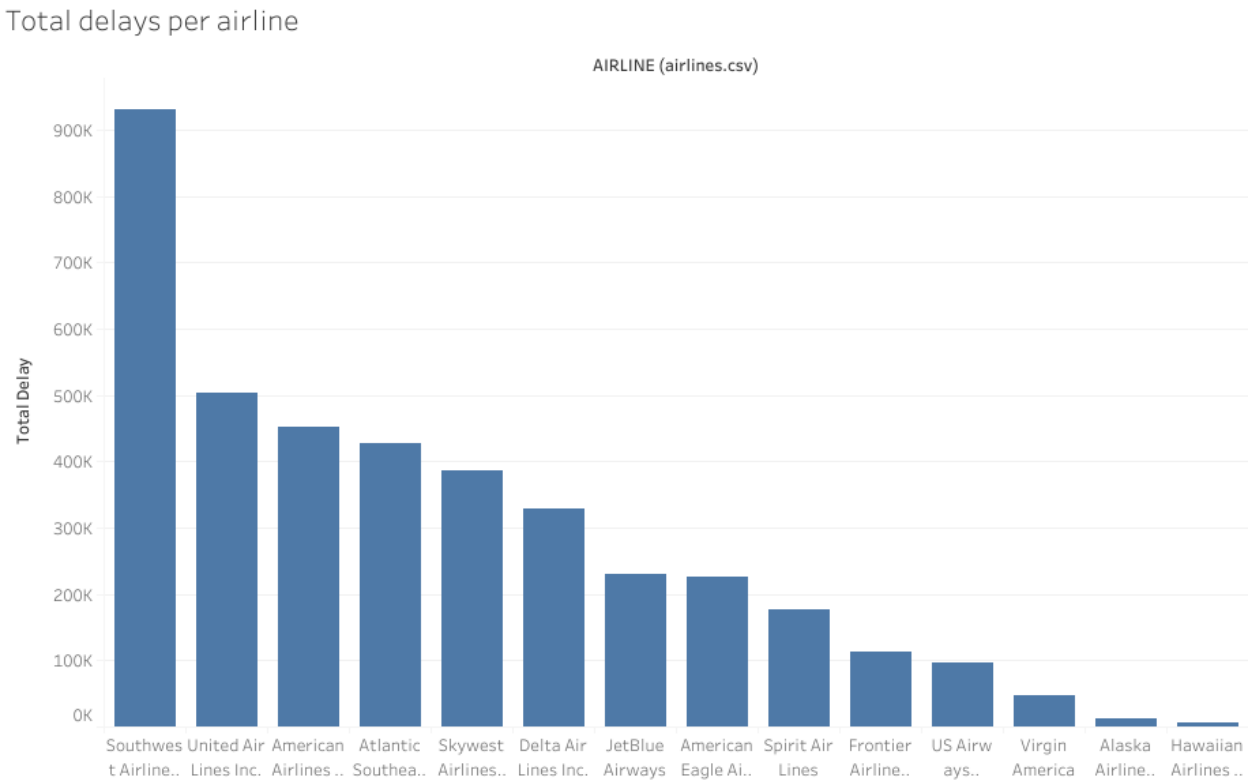

Figure 2

It is clear that Southwest airlines has the highest total delays by far.

Also, in the same time, as shown in Figure 3, Chicago O'Hare International Airport is the highest airport that causes delays.

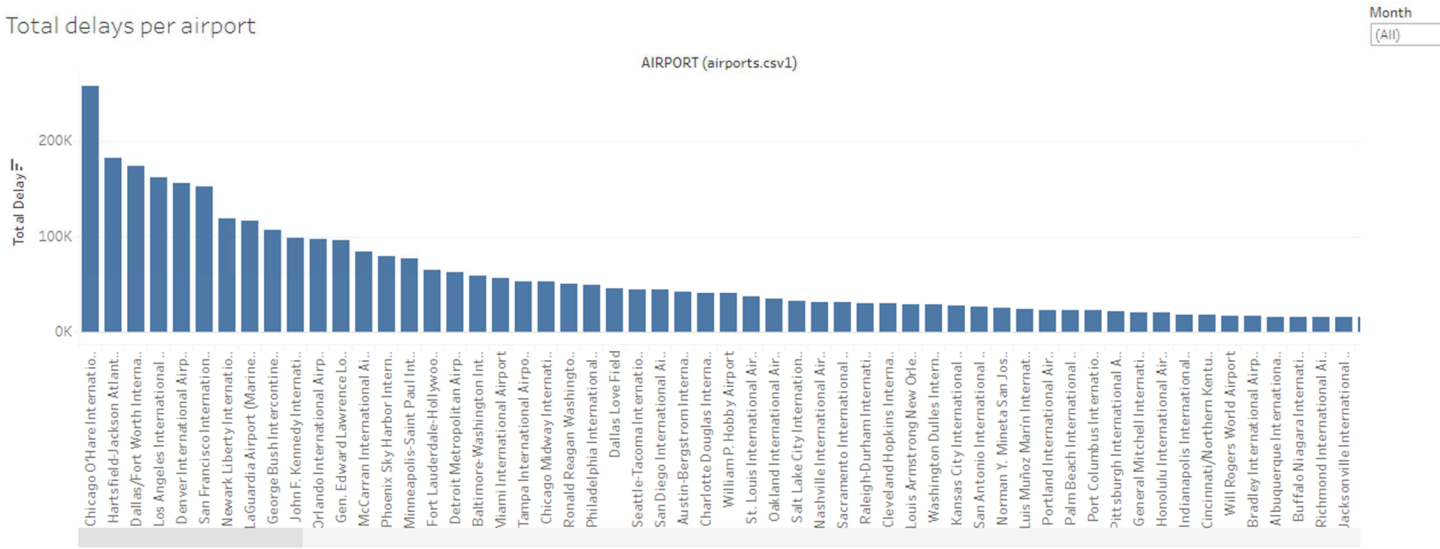

Figure 3

Note: The bar charts are the most appropriate visualization used to compare discrete values together, along with the blue color that is appropriate to such visualization.

2. **What causes the delay?**

Now, we must go deeper to investigate the main causes of delay.

From Figure 4, it is obvious that there are 6 airports are much higher than the rest regarding delays, these airports are:

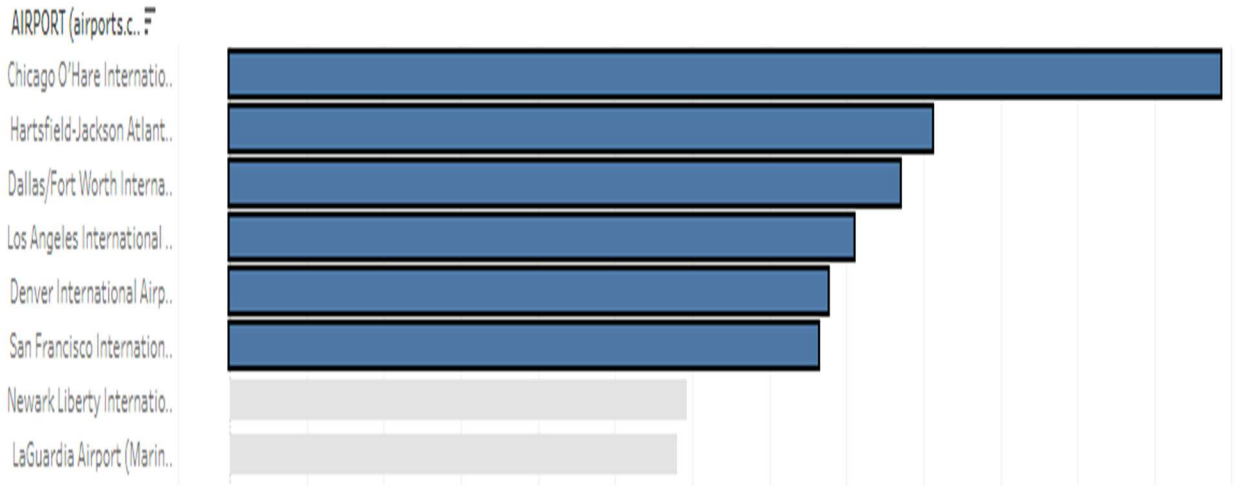

Figure 4

1. Chicago O'Hare International airport
2. Hartsfield Jackson Atlanta Int'l airport
3. Dallas Fort Worth Int'l airport.
4. Los Angeles Int'l airport.
5. Denver Int'l airport
6. San Francesco Int'l airport.

We will investigate the effect of:

1. Airline Delay. (Figure 5)
2. Air system delay. (Figure 6)
3. Late aircraft delay. (Figure 7)
4. Security delay. (Figure 8)
5. Weather delay. (Figure 9)

Through figures 5 to 9, these factors are being compared to see their effect on delay.

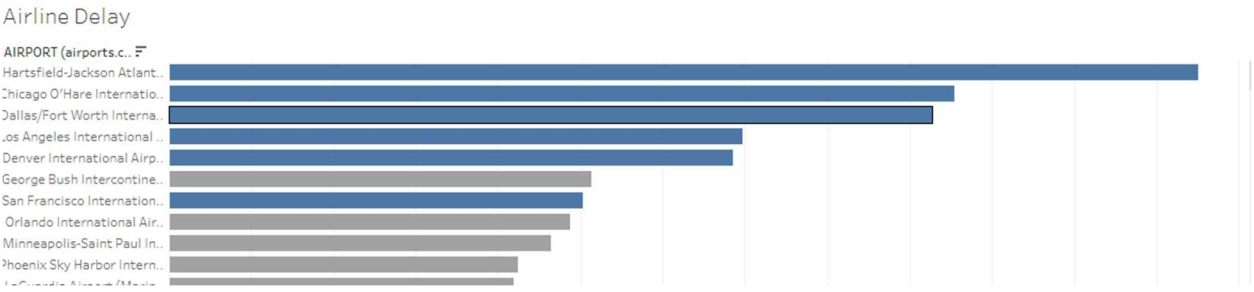

Figure 5

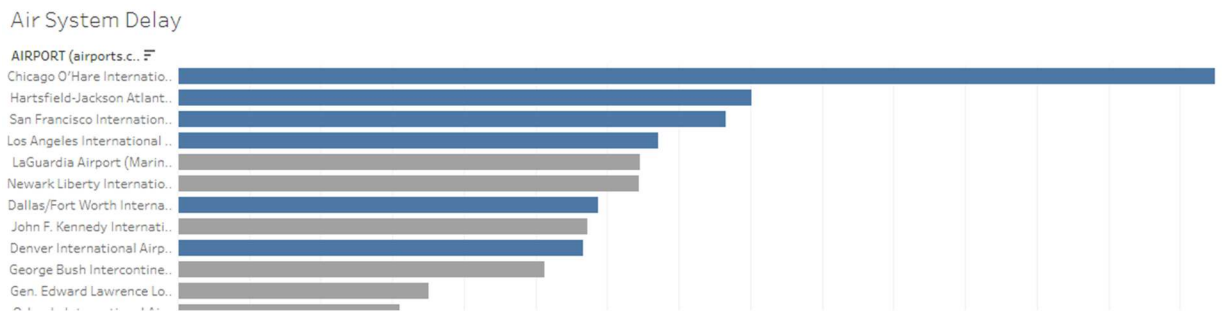

Figure 6

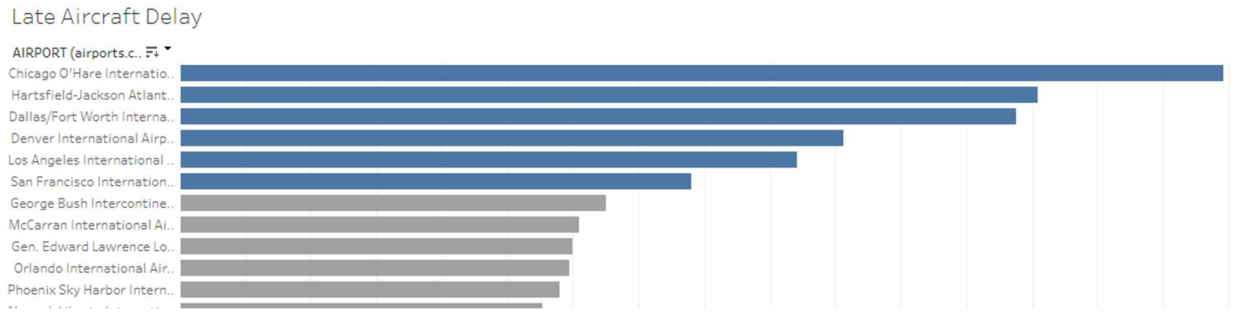

Figure 7

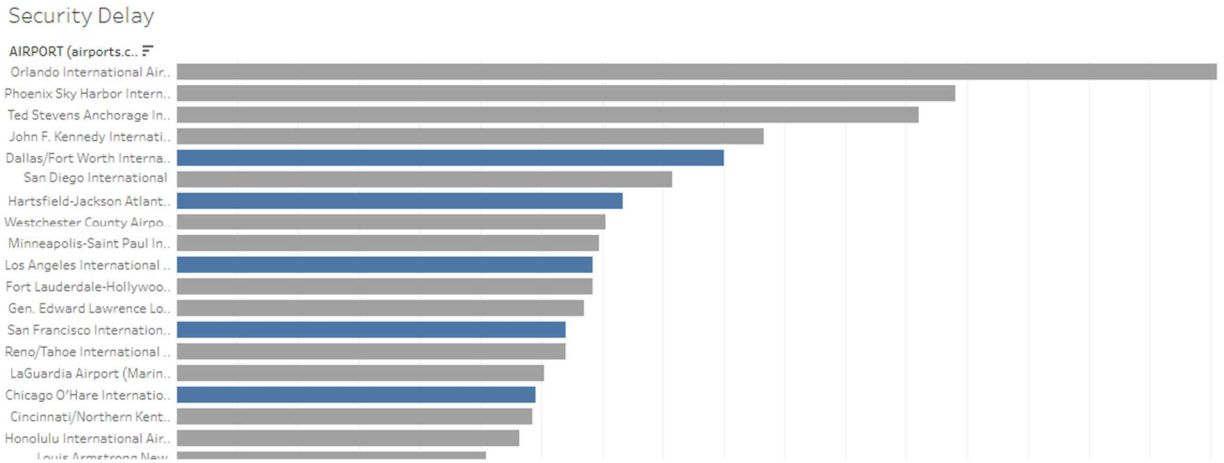

Figure 8

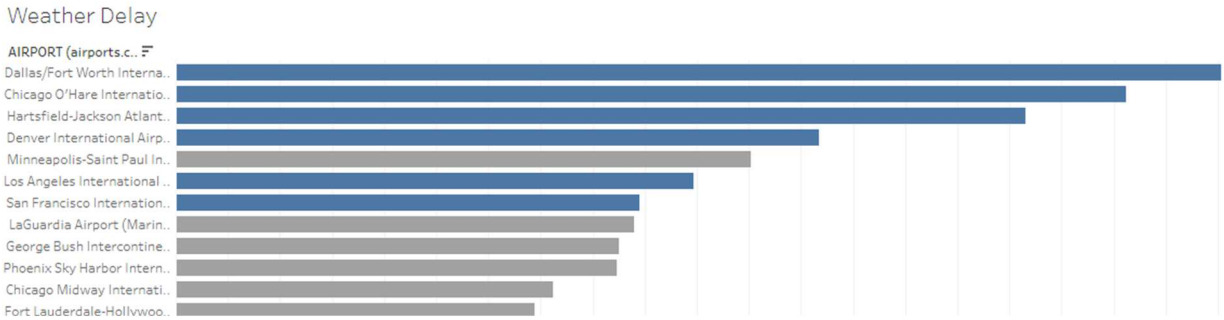

Figure 9

When revising the mentioned figures, it is obviously that the highest 6 airports in total delay are among the highest airports in airline delay, air system delay, late aircraft delay, & weather delay. Also, it is obviously that security delay is not a reason of delay in these airports.

In the same time, further investigations are needed to see the effect of these delays on monthly basis (hence the filter by month is put in the sheets).

Note: The bar charts are the most appropriate visualization used to compare discrete values together, along with the blue color that is appropriate to such visualization.

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3. **What is the role of geographical locations in delay due to weather?**

It is clear from question 2 that weather is one of the major factors that causes delay. Now a question jumps to the mind. Does the geographical location affect the delay due to weather?

Figure 10 will answer this question.

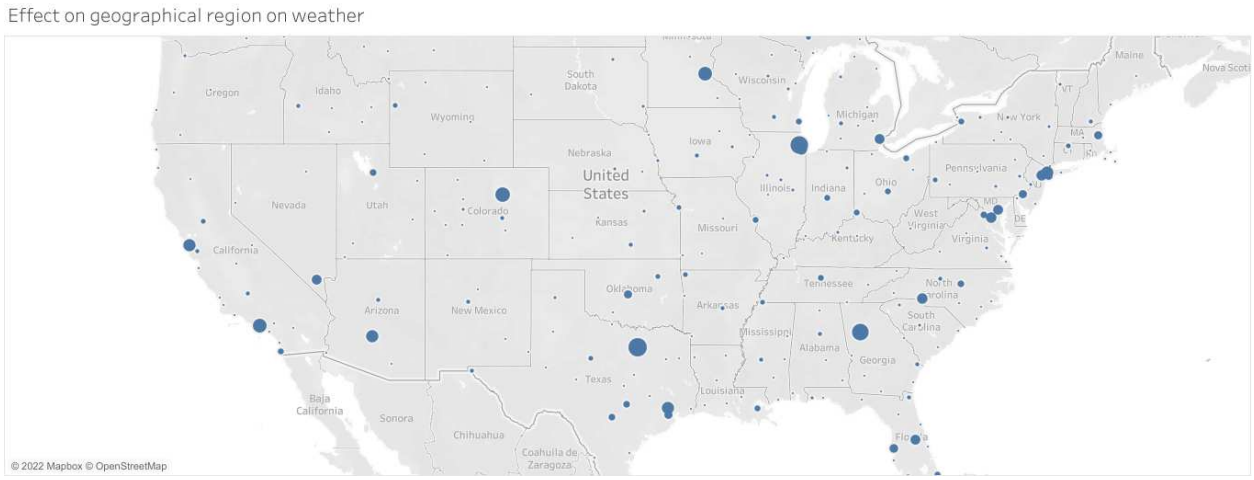

Figure 10.

It is clear that the east coast has higher delays than the west coast. Then the weather at the east has more effect in delay than that of the west.

Note: The use of the map in this visualization is the most appropriate to compare different locations.

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4. **Does the airtime have a role in delays?**

Another important point to investigate is the airtime, it is supposed that as the airtime the delay will increase, lets see from figure 11 whether this statement is right or no.

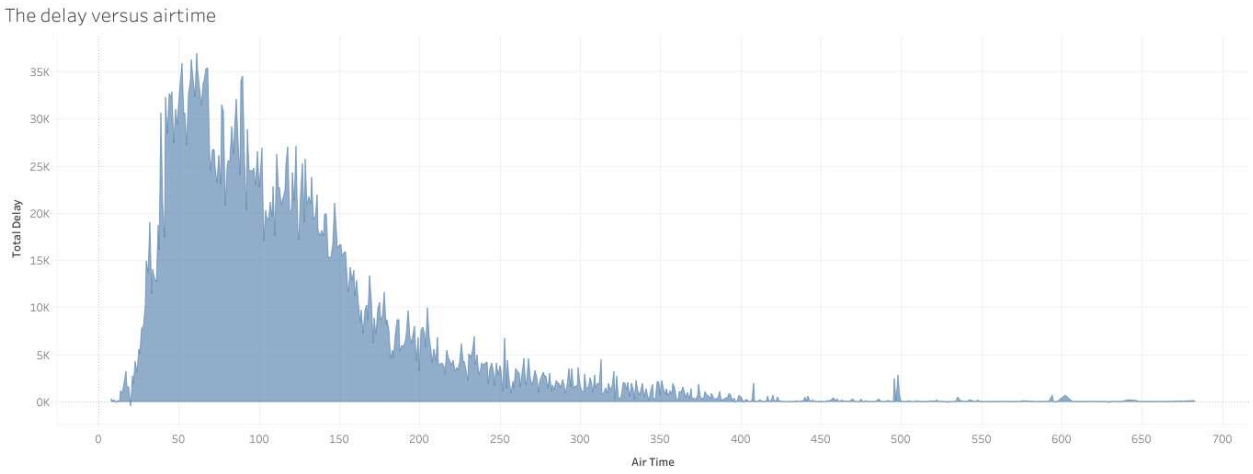

Figure 11

From Figure 11, we can see that the highest delay happened when the airtime is between 52 & 68 minutes. In the same time, as the airtime increases, the delay decreases. That means the above statement is not right. Further investigations are needed to know why the short flights have the highest delay time.

Note: The shaded line chart conveys the message clearer because the time is a continuous value. In the same time, the shading is more comfortable to the eye than the normal line chart.

Conclusion:

Flight delays is a serious problem that causes losses either to passengers or airlines.

Airline's delay, air system delay that includes include: non-extreme weather conditions, airport operations, heavy traffic volume, air traffic control, etc. delays that occur after Actual Gate Out are usually attributed to the NAS, late aircraft delay are under control. These types of delay can be improved to decrease the delay.

Weather delay is out of control, but airlines & airports specially that work in the East of USA can choose the most appropriate time to fly.

Security delay -unexpectedly- causes minimum delay to the highest delay airports.

Further investigations are needed to know more about the causes of delay as well as offering solutions to these delays.

Links to sheets, dashboard & stories

Question 1: (Dashboard)

What are the airlines & airports that cause the worst delay?

https://prod-useast-a.online.tableau.com/t/cairohf/authoring/Question1/Dashboard1#2

https://prod-useast-a.online.tableau.com/#/site/cairohf/workbooks/426040/views

Question 2: (Story)

What are the main causes of delay?

https://prod-useast-a.online.tableau.com/t/cairohf/authoring/Question2/Story1#1

https://prod-useast-a.online.tableau.com/#/site/cairohf/workbooks/426055/views

Question 3: (Sheet)

Role of weather delays in geographical area

https://prod-useast-a.online.tableau.com/t/cairohf/authoring/Question3/Sheet1#1

https://prod-useast-a.online.tableau.com/t/cairohf/authoring/Question3/Sheet2#1

https://prod-useast-a.online.tableau.com/#/site/cairohf/workbooks/426062/views

Question 4: (sheet)

The delay versus airtime

https://prod-useast-a.online.tableau.com/t/cairohf/authoring/Question4/Sheet2/Sheet%202%20(2)#5

https://prod-useast-a.online.tableau.com/#/site/cairohf/views/Question4/Sheet22?:iid=1

Personal Space link:

https://prod-useast-a.online.tableau.com/#/site/cairohf/personalSpace?:iid=1