Ultimate Challenge - Part 2 – Experiment and metrics design

I would propose to the city operations team that they initiate a month-long pilot project that reimburses the tolls for driver partners. I am basing this suggestion on the assumption that data for the number of cars crossing the bridge is available for the month prior to the pilot project. The project should then measure the mean number of cars per day that cross the bridge. This metric would be chosen because the goal is to see an increase in this number.

I would then propose three separate statistical tests:

H_0: There is no increase in the mean number of cars crossing both ways on the weekends.

H_1: There is an increase in the mean number of cars crossing both ways on the weekends.

H_0: There is no increase in the mean number of cars crossing from Ultimate Gotham to Ultimate Metropolis during the day on weekdays.

H_1: There is an increase in the mean number of cars crossing from Ultimate Gotham to Ultimate Metropolis during the day on weekdays.

H_0: There is no increase in the mean number of cars crossing from Ultimate Metropolis to Ultimate Gotham during the night on weekdays.

H_1: There is an increase in the mean number of cars crossing from Ultimate Metropolis to Ultimate Gotham during the night on weekdays.

These metrics are important because it is reasonable to expect that any increase will happen in the direction of the city with low activity to the city with high activity. On the weekends, activity is similar in both cities.

A two-sample t-test with a significance level of 0.05 would be appropriate for all of the above tests.

If the tests show a statistically significant increase in the number of cars crossing the bridge, then we can recommend to the team that they could implement the reimbursement plan across the board. If we see mixed results, we could recommend that the reimbursement plan only be available during certain times of the day. If no increase is seen, then the reimbursement plan should not be implemented.

Some caveats to keep in mind:

Data from two different months will be compared and factors such as big events or weather could have an effect on the numbers.

Also, a pilot project of this nature could produce some initial excitement and the numbers seen in the first month of such a project may not hold up in future months.