Part 2 ‐ Experiment and metrics design

The neighboring cities of Gotham and Metropolis have complementary circadian rhythms: on weekdays, Ultimate Gotham is most active at night, and Ultimate Metropolis is most active during the day. On weekends, there is reasonable activity in both cities.

However, a toll bridge, with a two way toll, between the two cities causes driver partners to tend to be exclusive to each city. The Ultimate managers of city operations for the two cities have proposed an experiment to encourage driver partners to be available in both cities, by reimbursing all toll costs.

1. What would you choose as the key measure of success of this experiment in encouraging driver partners to serve both cities, and why would you choose this metric?

In my understanding, the goal of reimbursing all toll costs for the toll bridge is to encourage driver partners to be available in both cities, and not be exclusive to one city. Therefore, the key metric to consider is the number of toll bridge crossing for the driver partners. To reach the goal, we would like to see the significant increase of the driver partners crossing the toll bridge which indicates that less drivers are exclusive to one city.

That being said, the Ultimate managers should also consider the operation cost of reimbursing the toll costs as well as worsening traffic crossing the bridge. I think it is important to identify what benefit the city can achieve by allowing drivers to not be exclusive to each city. Perhaps monitoring the revenue is one good way to check if this idea will be beneficial to the company.

2)  Describe a practical experiment you would design to compare the effectiveness of the proposed change in relation to the key measure of success. Please provide details on:

a) how you will implement the experiment

Assuming the goal of this experiment is to encourage driver partners to be available in both cities only, we should consider the number of toll bridge crossing for the driver partners. To monitor the toll bridge crossing, we can track the driver and count the number of bridge crossings before and after implementing the system. Perhaps a cheaper method is installing cameras on toll bridge to count the driver partners crossing the bridge, since the license plates of the driver partners should all be in record.

b)  what statistical test(s) you will conduct to verify the significance of the observation

For simple comparison, I can use the hypothesis A/B testing on the number of toll bridge crossings before and after the reimbursement. As usual, the alpha can be 0.05.

c)  how you would interpret the results and provide recommendations to the city operations team along with any caveats.

If we can successfully monitor the drivers crossing the bridge, I can report on the percent increase of the mean toll bridge crossings along with the p value. This should be enough to assess if the reimbursement encouraged drivers not to be exclusive in one city.

For company’s profit perspective, I would also like to calculate the increased cost by allowing free toll pass for the driver partners, or any other cost associated with the increased traffic crossing the bridge. On the other hand, I can calculate the revenue increase by the driver partners. Then find the profit. This metric could be a good indicator to see if implementing this idea will be financially beneficial to the company.

*Note: The two cities of Gotham and Metropolis are not in the provided dataset; however, you do not need this information to answer Part 2.*