

Casey Kelly

GE 585: Activity 12

1.

Consequence Table						
Attribute	Unit	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Mode of Travel	Vehicle	Car	Carpooling	Bus	Train	Airplane
Time to travel round-trip way (BU to Penn Station)	hours	8.5	8.5	9.5	9.5	4.25
Cost to travel round trip (5/10-12)	USD	107.00	26.75	80.43	166.00	195.00
Level of Comfort	Categorical (Least 1-3 Most)	3	3	1	2	1
Risk of cancellation /delay	Categorical (Least 1-3 Most)	2	2	3	1	3
CO2 emissions per passenger	lbs CO2/person	239	59.75	14.01190476	107.8	126.6666667

3.

a. Brief summary of methodology:

Car: I chose the cheapest car rental which was a Chevrolet Sedan for Friday through Sunday for \$80.43. This car gets 32.5 mpg (average), holds 12.2 gallons, and assumed the cost of gas is \$2.82/gallon. The quickest route was 210 miles long and I assumed that gasoline emits 19.6 lbs of CO2 per gallon. So I found that travelling 420 miles total with the mpg would use about a tank of gas. This comes to a conservative calculation of \$34 assuming you don't drive when you get to NYC and your hotel has free parking. For carbon footprint I multiplied the amount of gallons in a tank (12.2) by 19.6lbs of CO2 per gallon

Carpooling: I used the same assumptions as the car but divided the cost and carbon footprint by 4 instead of 1 to represent more passengers in the car.

Bus: Megabus leaving Boston South Station on May 10th and returning May 12th has a round-trip cost of \$80.43. To calculate CO<sub>2</sub> per person I divided the miles driven, 210 miles, by the 6 mpg (average of buses) and then multiplied it by the pounds of CO<sub>2</sub> in a gallon of diesel, 22 lbs. I divided that amount by the number of passengers on a full Megabus which is \$56.

Train: Amtrak Northeast Regional leaving from Boston South Station on October 5 at 9:25 am and arriving at NY Penn Station at 1:48 pm has a ticket cost of \$129.00. Amtrak Northeast Regional leaving Boston South Station on December 7 at 8:30 am and arriving at NY Penn Station 12:45 pm has a ticket cost of \$49.00. I add the time spent biking to the station (20min) to get there 10 minute early (30 min total). Biking would not produce CO<sub>2</sub> emissions. I assumed that the train is holding 300 passengers and emits 140 lbs CO<sub>2</sub> per mile. The distance travelled is 231 miles

Plane: Flying round-trip from Logan to JFK is \$195. I assumed that I did not have any checked baggage and therefore did not have to include that additional costs to the trip. I included 3 hours to the flight time, 1.25 hours, to account for having to go to the airport early for security checks. The flight distance between Boston and NYC is 190 miles and I assumed the airplane had 150 passengers and it emits 100 lbs CO<sub>2</sub> per mile.

For comfort rating I used my own subjective rating of level of comfort I feel on each mode of transportation using past experiences I've had on each.

For risk of cancellation/delay I combined on-time performance statistics I have found ([https://www.washingtonpost.com/news/wonk/wp/2014/07/10/the-sorry-state-of-amtraks-on-time-performance-mapped/?noredirect=on&utm\\_term=.b39596bf6301](https://www.washingtonpost.com/news/wonk/wp/2014/07/10/the-sorry-state-of-amtraks-on-time-performance-mapped/?noredirect=on&utm_term=.b39596bf6301)) in addition to my own personal experience with delays/cancellations from each mode of transportation. I considered the possibility of bad weather, holidays/traffic inducing events, and my own perceived level of risk in addition to on-time performance statistics. I then applied my own subjective rating to assign a score to each mode.

## **B. Rationale for eliminating other alternatives**

The reason for not taking a car is that renting one is too expensive, especially with an under-age driver fee. The car also has the largest carbon footprint and is not that much faster (25 minutes) than the cheaper option of taking the bus. Additionally you have to worry about where you will park the car when you get to NY which can get expensive and time consuming very quickly. The benefit of having a car is the freedom to travel when one would like. Unlike the bus, train, or plane, when I want or need to leave NYC back to Boston I have the freedom to without having to wait. I would choose renting the car if I could carpool with others in Boston to drive to NYC. This would decrease the cost and individual carbon, but may result in having to compromise on my ability to return to Boston at my choosing.

The train is more expensive than the bus and car and takes a similar amount of time as the bus, so paying more doesn't get you to your destination faster. The benefit of a train is that you

would not have to worry about traffic making the trip longer than anticipated, and the train is more comfortable than riding the bus. The train also has the second largest carbon footprint so I would not choose a more carbon intensive mode.

The airplane is the fastest choice, but is the most expensive and has the second largest environmental footprint. Like the bus the airplane is more vulnerable to inclement weather cancellations/delays than the car or train. For these reasons I would not choose an airplane.

#### **4. Final Decision**

I chose the bus because it is the cheapest, has the lowest carbon footprint, and is comparable time wise to the other options. Taking the bus is significantly cheaper than taking a train or plane, and does not face the hidden costs of taking the car (i.e. tolls, parking fees, gas). The time spent travelling for the car, train, and bus is close enough that the marginal cost outweighs the marginal benefit of getting to my destination an hour earlier. The bus is also the most environmentally friendly option which is important to me, but not as important as time or money. If I was able to find people to carpool with to NYC I would probably choose to rent the car because then the cost would be significantly cheaper than every other options. This would make the car more economical than the bus. Carpooling would also reduce my carbon footprint, but not make it smaller than if I had taken the bus.