ECO 605: Module Four Case Study Guidelines and Rubric

Overview: The case studies in this course are designed to actively involve you in environmental economics reasoning and to help you apply the course principles to complex real-world situations. In the case studies, you will use data analysis to make informed recommendations and communicate in a professional manner.

The Module Four Case Study examines data with the travel cost method. In your submission, you will demonstrate the following skills:

1. Apply an appropriate type of cost-benefit analysis and compare it to the contingent valuation method.
2. Define the collection source for data.
3. Collect data on the number of visitors from each zone and the number of visits made in the last year.
4. Calculate visitation rates.
5. Calculate the average round-trip travel distance and travel time for each zone.
6. Write recommendations for an influential association of homeowners and businesses and describe the advantages of the travel cost method over other methods.
7. Construct the demand function with the use of results from regression analysis.
8. Write a summary of the benefit-cost analysis on programs to control pollution.

Prompt: The objective of this case study is to analyze data and make recommendations for the improvement of the water quality in a local lake. Describe the required data and the rationale for using the travel cost method. Prepare your analysis as though you were hired by an influential association of homeowners and businesses that are interested in the local lake's water quality. The analysis and recommendations you provide will help determine the benefits for improving the water quality of the lake. You must take the steps listed below to complete this case study.

- **Step 1**

  Describe the **rationale** for using the travel cost method. Compare the travel cost method to the contingent valuation method in your description.

- **Step 2**

  Define the **zones** surrounding the lake. These may be defined by concentric circles around the lake or by geographic divisions. Choose what makes sense, such as counties or other distinguishable boundaries that surround the lake at different distances. Add a graphic to enhance the definition and description.

- **Step 3**

  Explain how you will **collect data**. Focus on the number of visitors from each zone and the number of visits made in the last year. For this example, assume the staff at the lake has records of the number of visitors and their zip codes. This will be used to calculate the total number of visits per zone over the last year. To extend the value of the analysis, explain the value of more precise data and what it takes to analyze this additional data. More information on this approach is found on the companion website to the course textbook (relevant pages for Chapter 7).

- **Step 4**

  Calculate the **visitation rates** per 1,000 population in each zone. These are the total visits per year designated by each zone, divided by the zone's population in thousands. An example is shown below. Use Microsoft Excel (or something similar) to calculate the rates.

Visitation Rates per 1,000 Population

Zone	Total Visits/Year	Zone Population	Visits/1,000
0	400	1,000	400
1	400	2,000	200
2	400	4,000	100
3	400	8,000	50
Beyond 3	0		
Total Visits	1,600		

- **Step 5**

  Calculate the average round-trip travel distance and travel time for each zone. Assume that people in Zone 0 have a travel distance and time of zero. Every other zone has increasing travel time and distance. Next, using average cost per mile and per hour of travel time, calculate the **travel cost per trip**. A standard cost per mile for operating an automobile is readily available from AAA or similar sources. Assume that cost per mile is $.30, or use the current expense rate found on the IRS website. The cost of time is more complicated. The simplest approach is to use the average hourly wage. For this example, assume it is $9 per hour (or $.15 per minute) for all zones, although in practice it is likely to differ by zone. Generate calculations using Microsoft Excel or a similar program.

Average Round-Trip Travel Distance and Travel Time

Zone	Round-Trip Travel Distance	Round-Trip Travel Time	Distance Times Cost/Mile ($.30)	Travel Time Times Cost/Minute ($.15)	Total Travel Cost/Trip
0	0	0	0	0	0
1	20	30	$6	$4.50	$10.50
2	40	60	$12	$9.00	$21.00
3	80	120	$24	$18.00	$42.00

For additional practice, add one to two more zones with additional data.

- **Step 6**

  To estimate using regression analysis, use an equation that relates visits per capita to travel costs and other important variables. From this, **estimate** the demand function for the average visitor. In this simple model, the analysis might include demographic variables, such as age, income, gender, and education levels, using the average values for each zone. To maintain the simplest possible model, calculate the equation with only the travel cost and visits/1,000.

  $$\text{Visits/1,000} = 330 - 7.755*(\text{Travel Cost})$$

- **Step 7**

  Construct the **demand function** for visits to the lake, using the results of the regression analysis. The first point on the demand curve is the total visitors to the lake at current access costs (assuming there is no entry fee for the lake), which in this example is 1,600 visits per year. The other points are found by estimating the number of visitors with different hypothetical entrance fees (assuming that an entrance fee is viewed in the same way as travel costs). Enter the total number of visits.

Demand Function

Zone	Travel Cost plus $10	Visits/1,000	Population	Total Visits
0	$10	252	1,000	252
1	$20.50	171	2,000	342
2	$31.00	90	4,000	360
3	$52.00	0	8,000	0
			Total Visits	

For additional practice, add one to two more sets of data.

This gives the second point on the demand curve (enter the sum of the total visits into the gray shaded area). Use the total number of visits and multiply it by an entry fee of $10. Then calculate in the same way for the number of visits at each of the increasing entry fees to get the totals listed below. (Use a program such as Microsoft Excel to enter data and then plot a graph.)

Entry Fee	Total Visits
$20	409
$30	129
$40	20
$50	0

These points give the demand curve for trips to the lake.

- **Step 8**

  Now estimate the **total economic benefit** of the lake by calculating the consumer surplus (or the area under the demand curve). This results in a total estimate of economic benefits from the lake uses around $23,000 per year, or around $14.38 per visit ($23,000/1,600). Remember that the objective is to determine whether it is worthwhile to spend money to protect the lake by