



Transport Planning Lab Assignment 1

Complete both questions and then submit your answers in a Word or PDF file through Turnitin. You should also submit your Excel workbook for Q1 and your R or Rmarkdown file for Q2.

The deadline for submission is noon on February 13th 2023.

Question 1

There is a plan to construct a highway segment in a rural area. The state department of transportation had estimated the capital cost of the project to be \$10,000,000. The segment will shorten a route by 2 km and reduce travel times by an average of 5 minutes each. The project is further expected to reduce traffic accidents by an average of 5 per year and to reduce annual maintenance costs by \$5,000.

Average daily traffic (ADT) on this road is currently 7,000 with a load factor of 1.5 persons per vehicle. Traffic is expected to increase linearly over the 20-year life period of the project, such that it is 10% higher at the end of the period.

Assume vehicle operating costs are \$0.10/km, travellers value their time at \$3.00/hour and the average cost of a traffic accident is \$20,000 and the interest rate is 8%.

- a) Using the information above, construct a worksheet using Excel (or other suitable software) to calculate the net present value of the investment. Explain how you calculate the relevant quantities. **You must submit this spreadsheet file through Moodle.**
- b) What is the net present value of the investment (write down the number)? What is the benefit cost ratio? Should the investment go ahead? Justify your answer and explain what is meant by net present value.
- c) Suppose we are uncertain about how much the investment will cost. What is the maximum we should be willing to pay i.e. what cost would render us indifferent between undertaking the investment and not?
- d) Suppose traffic is expected to grow at 30% over the 20-year period. What would this do to the net present value?

Question 2

You have been asked to summarise the trip data for Snohomish County in the Puget Sound region for the local council.

Trip data from the household travel survey can be downloaded from here: <https://household-travel-survey-psregcncl.hub.arcgis.com/> (the person, household, vehicle and survey days datasets are not required for this exercise). More information about the survey, including the **questionnaire** and a **codebook**, can be found here: <https://www.psrc.org/our-work/household-travel-survey-program>

You should:

- Extract the data where sample_county is Snohomish and the survey year is 2019.
- For each person surveyed, calculate the number of trips and the average distance per trip (for the latter use trip_path_distance).
- Merge this data about trip characteristics with data about the person's characteristics from the main dataset. The variables considered should include: age, gender, employment status, household income, home rent/ownership status and at least two other variables that you think that the council would be interested in.
- Use descriptive statistics to examine the trip number and distance data overall and compare results based on personal characteristics. Use data visualisation to display the relationships.

After completing the analysis, you should write up your analysis and results in a format which would be suitable for sharing with the local council. You should briefly summarise your approach, highlight the main findings, include tables and/or graphs to support your points, and reflect on any implications for transport planning.

Additional information:

- The summary should be short (no longer than one side of A4 including all graphs and tables).
- No references are required, although you may wish to link to the location where you obtained the data.
- You should submit your R code as well as your one page write up.
- Graphs and tables should be labelled and numbered.
- During your analysis you should consider whether or not you wish to merge any categories and you should think about how you are going to treat missing data.