Assignment 05

1. Problem 1

What methods might you use for estimating the value of the benefits for each of the following? In each case, give two examples of methods that could apply, and describe the steps involved for that exact situation. In each case, give one example of a method that would NOT work well, and describe why.

(a) An hour of reduced commuting time

(b) The conversion of 15 kilometers of unused railway tracks near a city of 300,000 into a new bike path

(c) A reduction in annual flood risks from the Mississippi River for St. Louis by 5%

(d) The creation of a new national park in the Okanagan region of BC

(e) Saving a human life

(a) A way to estimate benefit is through finding how much fuel was saved resulting from the reduced commuting time by the vehicle. This will be based on the average fuel/electric consumption of the vehicle and the costs associated with it. Another way is through contingent valuation method where people can weigh the benefits of things associated with reduced commuting time.

A method that would not work too well is wage earnings method, as this will be very hard to measure across individuals and businesses, since they have different incomes and potentially different hours of working.

(b) Contingent valuation method will also work here as there are many people who are directly affected by the new bike paths, such as residents and cyclists. Averting expenditures method is also another good way to estimate as this can tell us if more people are taking cycling as a form of transportation, leisure, or both.

Hedonic price method is not a good estimate as land speculation can affect property values and create uncertainties.

(c) Relocation and replacement costs methods can be helpful in determining how much more or less damage there was from flooding. This is done through gathering historical flood data and seeing how much worth of damages there are as the years go by, and that these numbers also need to be translated to present day values for comparison.

Contingent valuation method can also work in this scenario by assessing how much people value what had been done to reduce this risk assessment, although this method does not work as well since impacts are more long term and might not be felt immediately by potential respondents.

(d) Hedonic price method can be used here as national parks can potentially increase value of homes close to the park. Travel costs method can measure expenditures that are incurred when one decides to visit another national park, which may be far away and be significantly more expensive to visit.

Averting expenditure method does not work as well because this involves a large scale project, and is a type of project that would not typically change people's behaviours.

(e) Averting behaviour/expenditure method can be used as people will be willing to pay more to not be in danger. This is also similar to the wage earnings method, where one person might be more willing to earn less to have a less risky job.

Dose-response method would not work as this is a more specific method that deals more with effects of chemicals and pollutants, which are long term and for most chemical or pollutants are not as much of an immediate concern.

2. Problem 2

A highway bypass will completely circle the city.

(a) Name at least three benefits and three costs associated with the bypass.

(b) What stakeholder viewpoints will need to be considered?

(c) Discuss potential data sources and methods for estimating each of the benefits and costs.

(a) Some benefits for the bypass include reducing traffic congestion in the city by removing travellers that do not need to actually go into the city, shortening travel time between destinations connected by the highway, and improves safety by potentially reducing car-pedestrian interaction in intersections in the city.

Costs of the bypass include the construction costs needed to make the bypass, the opportunity cost that resulted from this construction (e.g. a mass transit system could be built instead, in a similar scenario to Washington DC's Metro), and the environmental costs to the project.

(b) The viewpoints that need to be included here are commuters and motorists who will be affected by this rerouting, land owners who will need to give or sell land for the project, and residents of the city in general as this highway will completely encircle the city, which will affect everyone living there.

(c) Data sources can come from surveys (which in turn can use cameras or GPS) to determine traffic and traffic/foot patterns in the city. Costs for building the highway can come from similar projects that have been done elsewhere. Relocation cost method can be used for those proposed to be displaced by the highway, travel cost method to assess travel behaviours for those using the highway, and hedonic price method can be used to assess land values. Lastly, contingent value method can assess people's reception to the idea of a highway bypass being built.

3. Problem 3

Ten capital spending proposals have been made to the budget committee as the members prepare the annual budget for their firm. Each independent project has a five-year life and no salvage value.

Project	Initial Cost ($ thousands)	Uniform Annual Benefit ($ thousands)	Computed Rate of Return (%)
A	$20	$6.0	15.2
B	15	4.3	13.3
C	5	1.4	12.4
D	20	5.5	11.6
E	15	4.1	11.4
F	30	10.0	19.9
G	5	1.6	18.0
H	10	2.5	7.9
I	25	8.5	20.8
J	10	3.3	19.4

(a) On the basis of a MARR value of 12%, which projects should be considered further?

(b) For each option, calculate the Net Present Worth, and the ratio of NPW to the Present Worth of the cost (both rounded to 2 decimal places).

(c) Rank-order all the projects in order of desirability, using the ratio calculated above.

(d) If only $85,000 is available to invest for initial costs, which projects should be approved?

(a) From the Computed Rate of Return given, projects that should be considered further are: A, B, C, F, G, I and J

(b)

Project	NPW	NPW/PW of Cost
A	$1,628.66	0.08
B	500.54	0.03
C	46.69	0.01
D	(173.73)	(0.01)
E	(220.42)	(0.01)
F	6,047.76	0.20
G	767.64	0.15
H	(988.06)	(0.10)
I	5640.60	0.23
J	1895.76	0.19

(c)

Project	NPW	NPW/PW of Cost
I	5640.60	0.23
F	6,047.76	0.20
J	1895.76	0.19
G	767.64	0.15
A	$1,628.66	0.08
B	500.54	0.03
C	46.69	0.01
D	(173.73)	(0.01)
E	(220.42)	(0.01)
H	(988.06)	(0.10)

(d) I, F, J, G and B should be approved. Although A is highr in our list of options than B, there is no money for it, and to fit in A, we would need to remove G, which will be replaced by project C, with a lower rank of desirability. If B was removed to fit in A, then we would be including projects with a negative net present worth.

4. Problem 4

The WhatZit Company has decided to fund six of nine project proposals for the coming budget year, using the most common analysis method used by private industry. Determine the next capital budget for WhatZit. What is the opportunity cost of capital?

Project	Initial Cost	Uniform Annual Benefit	Life (years)
A	$15,000	$4,429	4
B	20,000	6,173	4
C	30,000	9,878	4
D	25,000	6,261	5
E	40,000	11,933	5
F	50,000	11,550	5
G	35,000	6,794	8
H	60,000	12,692	8
I	75,000	14,058	8

Project	Payback Period (years)
A	3.39
B	3.24
C	3.04
D	3.99
E	3.35
F	4.33
G	5.15
H	4.74
I	5.34

The six projects are: C, B, E, A, D, F.

The capital budget is: $180,000

The opportunity cost is $60,000 (from Project H, the best project that remains unfunded)