INST 354.0101: Decision Making for Information Science
Fall 2022 | Case Study Report (final assignment)
Due by Fri, Dec 16, 11:59 PM | Possible points: 10

This Case Study Report is the last assignment of the course. **This is individual work**. Please submit your own work, in your own files. *Name your files "YourLastName_CaseStudyReport" (e.g., "Ali_ CaseStudyReport.doc").*

Submission: Please submit your answers in an MS Word document on ELMS. You should also upload an Excel file to show your work for question 3.

Background

In this class, we have covered many different ways to look at the decision-making process. In fact, you can think of the whole class as being split up into four main modules:

- **Decision Analysis** involves using decision rules to determine the best alternative. We've used tools such as expected values and present value, and methods such as payoff matrices and rolling back decision trees, to help break down complicated decisions.
- **Decision Theories** in the decision-making process involves using theories such as utility theory and prospect theory along with analysis of biases and heuristics and different ways of thinking (system 1 versus system 2) to explain why people make decisions in the way that they do.
- **Linear Programming** provides a way of making decisions when your decision variables are continuous and can take on many values. Even though there are many possibilities, tools such as Excel Solver help find the answer with relative ease.
- **Data Analysis** techniques (regression modeling, classification trees) can help remove as much personal bias as possible, and provide a way to make decisions that are data-driven.

These are all very different ways of approaching the subject of decision-making, and in this Case Study Report assignment, you'll focus on all of them.

Requirements of Case Study Report

Answer each of the questions below as you would in a typical exercise. But please write out your answers using sentences as you would in a report. At the end of each question, I give some guidance about how long I think that each answer should be. Please aim for clear and concise answers that address all parts of the questions. In your submission, I recommend removing the question text and just include the question numbers and answers.

Case Study Scenario

Let's say you are a senior consultant for iTech, a relatively large technology company with $800 million in revenue per year and 1,233 employees. Many of their employees have recently left the company. Job attrition is costly for the company. The hiring, training, and integration of each new person costs money, not to mention the work lost during the search process.

Now, you are asked to help iTech in identifying important areas for improvement with respect to employee retention.

1. iTech plans to build a new coffee lounge in their headquarters to promote interaction between employees. The company is trying to decide between making a small, medium, or large lounge. The payoffs received for each size of the lounge depends on the market demand for labor in the area, which could be low, medium, or high. The payoff matrix for this decision problem is:

	Labor Demand		
Size of Lounge	**Low**	**Medium**	**High**
Small	450	400	450
Medium	250	500	500
Large	400	300	800

Note: Payoffs in $1000s

The owner of the company estimates a 19.25% chance that labor demand will be low, a 40.55% chance that it will be medium, and a 44.20% chance that it will be high.

   a) **What decision should the company make in order to maximize profits?** *(Recommended answer: 1 sentence)* 1 point
   b) **What is the expected monetary value of this decision?** *(Recommended answer: 1 sentence)* 1 point
   c) **Show your work in an MS Word doc for submission.** 0.5 point

2. iTech had to lay off hundreds of employees last summer and they think that this past event is influencing employees' judgements about their current job security. You test this hypothesis by surveying their employees and asking them to report their perceived likelihood of being laid off this year. On an average, they reported 35% likelihood of being laid off. However, iTech reported to you that the actual likelihood of layoffs this year is only 5% based on current revenues.

   a) **What is the availability heuristic, and how can it explain the biased judgements of the employees?** *(Recommended answer: 1 paragraph)* 1 point
   b) **What do you think the company can do to help employees make more accurate judgments about their job security? Describe one idea.** *(Recommended answer: 1 paragraph)* 1 point
   c) **Include at least two citations to the assigned readings.** 0.5 point

3. iTech wishes to start investing a total of $1,000,000 in employee retention programs next year. They have identified five different strategies that will yield a return on each dollar that is spent. Their goal is to maximize their expected return by investing in a mix of these strategies. Assume that the return on investment (RoI) remains fixed, and once their investment plan is selected they do not change their mind. The retention plans offered are:

S1) Celebrating employee accomplishments	9.1% return per year
S2) Increasing time off to employees	16.1% return per year
S3) Team-building events	7.3% return per year
S4) Company retreats	5.6% return per year
S5) Professional development classes	12.3% return per year

iTech believes that offering more time off (S2) and offering classes (S5) will take time away from work and therefore should be done in moderation, so they want a maximum limit of 30% of their total investment placed in these two programs. Adding company retreats (S4) and celebrating employee accomplishments (S1) were recommended by their board of directors, so they want at least 40% of their investment total placed in these programs.

   a. **Prepare a linear programming (LP) model that includes all of the constraints. You can prepare it in Excel and then cut and paste into the MS Word doc**. Points 1.0.

4. Make a hypothetical Linear Programming Model for iTech. An initial rough idea could be that the company needs to organize various types of training sessions for its employees. Each type of training might differently work on retaining the employees. The model should include a mix of the training sessions, a number of constraints, and purpose. Please feel free to be innovative to answer this question. In the MS Word doc:
   a. In a few sentences, describe relevant aspects of the model including training sessions, constraints, and purpose. (0.5 points)
   b. Prepare a linear programming (LP) model. You can prepare it in Excel and then cut and paste into the MS Word doc. (1 point)

5. iTech wants to know which employee characteristics are associated with staying at the company (i.e., YearsAtCompany variable in the data provided). If they can figure this out, they believe they will develop better programs to help keep employees within the company. They provide you with their employee database (EmployeeAttrition.csv) for statistical analysis.

   a. Tell us at least one employee characteristics that, you find, is associated with the number of years that an employee has worked at the company (e.g., YearsAtCompany variable)?

i. Paste your R code and results into the MS Word document (0.25 + 0.25 = 0.5 point)
ii. Describe the results in one or two sentences (0.5 point)

b. **Select one of the employee characteristics and test whether it significantly predicts the number of years that an employee has worked at the company (i.e., YearsAtCompany variable). 'YearsAtCompany' is a continuous variable; you should fit a regression model for this task.**
    i. Paste your R code and results into the MS Word document (0.25 + 0.25 = 0.5 point)
    ii. Describe in one or two sentences the prediction result with *p*-value and what decision would you make based on the results. (0.5 + 0.5 = 1.0 point)

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