Sang Hwa Lee

INST 354-0101

December 16, 2022

Case Study Report

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?

The large size lounge.

B) What is the expected monetary value of this decision?

The large monetary value is 552.25

C) Show your work in an MS Word doc for submission.

Expected value :

Small : (450 * 19.25%) + (400 * 40.55%) + (450 * 44.20%) = 447.815

Medium : (250 * 19.25%) + (500 * 40.55%) + (500 * 44.20%) = 471.875

Large : (400 * 19.25%) + (300 * 40.55%) + (800 * 44.20%) = 552.25

Small: 447.815 Medium: 471.875 Large: 552.25

2. iTech had to lay off hundreds of employees last summer and they think that this past event is influencing employees' judgments 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 judgments of the employees?

The availability heuristic is a judgment process that has seven subprocesses - (1) original storage of information in long-term memory; (2) retention of the stored information, which may also include some forgetting; (3) recognition of a situation where stored information is relevant to make a judgment; (4) probing memory for the relevant information; (5) retrieval of associated items with memory probe; (6) assessment of retrieval based on the amount, quickness, and vividness of recalled information; and (7) an estimate of the frequency or probability based on retrieval (Hastie and Dawes, 91). It can explain the biased judgments of the employees because there are several places in the process where biases might arise. These may include a bias in the storage of information in long-term memory based on the employees' experiences, a biased memory cue, and events may also vary in

vividness so that the assessment of retrieval may be affected (Hastie and Dawes, 91-92). In the specific case of these employees, their judgment process followed this concept of availability heuristic. They stored the original information about hundreds of layoffs in the past summer into their long term memory, retained their biased information, which was later recognized, probed, and retrieved when being surveyed. They then assessed this recalling of information and made their judgments, which reflected their biases.

b) What do you think the company can do to help employees make more accurate judgments about their job security? Describe one idea.

There may be a way that the company can help employees make more accurate judgments about their job security by using System 2, which is "the conscious, reasoning self that has beliefs, makes choices, and decides what to think about and what to do" (Kahneman, 21). Currently, the employees seem to be using System 1, which is automatic and quick, requiring little to no effort. To avoid this and help them make more accurate judgments about their job security, the company should provide accurate data and information about the actual likelihood of getting laid off this year so that employees can also use that information to deeply think about it before making biased judgments.

c) Include at least two citations to the assigned readings.

Hastie, Reid, and Robyn M. Dawes. Rational Choice in an Uncertain World: An Introduction to Judgement and Decision Making. 2nd ed., SAGE, 2010.

Kahneman, Daniel. Thinking, Fast and Slow. Farrar, Straus and Giroux , 2011.

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:

 # Before starting, I changed the retention plans alphabetically.

A) Celebrating employee accomplishments - 9.1% return per year

B) Increasing time off to employees - 16.1% return per year

C) Team-building events - 7.3% return per year

D) Company retreats - 5.6% return per year

E) Professional development classes - 12.3% return per year

iTech believes that offering more time off (B) and offering classes (E) 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 (D) and celebrating employee accomplishments (A) 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.

Objective Function

Max. = 0.091*A + 0.161*B + 0.073*C + 0.056*D + 0.123*E

	Constraints	**Non-negative constraints**
S.t(Subject to)	A+B+C+D+E ≤ $1,000,000	A ≥ $ 0
	B + E ≤ $ 300,000	B ≥ $ 0
	A + D ≥ $ 400,000	C ≥ $ 0
		D ≥ $ 0
		E ≥ $ 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.

I-Tech companies should use the total investment($1,000,000) to invest in training sessions that would benefit the company the most. B(Increasing time off to employees) and

E(Professional development classes) should not exceed 30 percent of the total investment, and A(Celebrating employee accomplishments) and D(Company retreats) should exceed 40 percent of the total investment.

Therefore, when creating a hypothetical linear programming model, it is judged that the most profitable training programs for the company are A(Celebrating employee accomplishments) and B(Increasing time off for employees).

The maximum expected return from investing $700,000 in session A and $300,000 in session B is $112,000.

B. Prepare a linear programming (LP) model. You can prepare it in Excel and then cut and paste into the MS Word doc.

	A	B	C	D	E	F	G	H	I	J
1										
2		A	B	C	D	E	Total profit	Created by Sang Hwa Lee		
3	Investment amount	700000	300000	0	0	0	112000			
4	Return per year	9.10%	16.10%	7.30%	5.60%	12.30%				
5										
6	**Constraints**						**Investment**	**Inequality**	**Availabilty**	
7	Total Investment	1	1	1	1	1	1000000	<=	1,000,000	
8	B+E <= 30% of total		1			1	300000	<=	300,000	
9	A+D >= 40% of total	1			1		700000	>=	400,000	
10	A>= 0% of total	1					700000	>=	0	
11	B>= 0% of total		1				300000	>=	0	
12	C>= 0% of total			1			0	>=	0	
13	D>= 0% of total				1		0	>=	0	
14	E>= 0% of total					1	0	>=	0	
15										
16										

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)?

JobSatisfaction

Before start the r studio

```
EA <- read.csv('C:/Users/sangh/Downloads/EmployeeAttrition.csv', header = TRUE)
```

- Paste your R code and results into the MS Word document

```
cor(EA$YearsAtCompany, EA$JobSatisfaction)

[1] -0.003802628

cor.test(EA$YearsAtCompany, EA$JobSatisfaction)

        Pearson's product-moment correlation

data:  EA$YearsAtCompany and EA$JobSatisfaction

t = -0.1457, df = 1468, p-value = 0.8842

alternative hypothesis: true correlation is not equal to 0

95 percent confidence interval:

 -0.05491941  0.04733403

sample estimates:

          cor

-0.003802628
```

2. Describe the results in one or two sentences

There seems to be a negative relationship between the two variables (r = -0.003802628). A negative relationship may mean that the longer they work at the company, the less satisfied they are, perhaps because they worked for a longer period of time.

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.

1.Paste your R code and results into the MS Word document

```
mod1 <- lm(EA$YearsAtCompany ~ EA$MonthlyIncome)
```

summary(mod1)

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	2.656e+00	2.338e-01	11.36	<2e-16	***
EA$MonthlyIncome	6.693e-04	2.913e-05	22.98	<2e-16	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 5.256 on 1468 degrees of freedom

Multiple R-squared: 0.2645, Adjusted R-squared: 0.264

F-statistic: 527.9 on 1 and 1468 DF, p-value: < 2.2e-16

2. **Describe in one or two sentences the prediction result with p-value and what decision would you make based on the results.**

The P value = p-value: < 2.2e-16. This shows that there is a significant relationship between YearsAtCompany and MonthlyIncome. Based on these results, it can be decided that the monthly income of an employee significantly relates to the number of years the employee worked at the company.