

SYS660 Decision and risk analysis

Homework Assignment 1

Q1.

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Q1 A friend asks you for a loan of \$1000 and offers to pay you back at the rate of \$90 per month for 12 months. Using an annual interest rate of 15%, find the net present value (to you) of loaning your friend the money.

$$\begin{aligned}\text{Annual interest rate } 15\% &= \text{monthly interest rate } 15\%/12 \\ &= \frac{15/100}{12} = 0.15/12 \\ &= \underline{\underline{0.0125}}\end{aligned}$$

a) With annual interest rate 15%.

NPV =

$$\begin{aligned}&-1000 + 90/(1+0.0125)^1 + 90/(1+0.0125)^2 + 90/(1+0.0125)^3 + \\ &90/(1+0.0125)^4 + 90/(1+0.0125)^5 + 90/(1+0.0125)^6 + \\ &90/(1+0.0125)^7 + 90/(1+0.0125)^8 + 90/(1+0.0125)^9 + \\ &90/(1+0.0125)^{10} + 90/(1+0.0125)^{11} + 90/(1+0.0125)^{12} \\ &= -1000 + 90/(1.0125)^1 + 90/(1.0125)^2 + 90/(1.0125)^3 + \\ &90/(1.0125)^4 + 90/(1.0125)^5 + 90/(1.0125)^6 + 90/(1.0125)^7 + \\ &+ 90/(1.0125)^8 + 90/(1.0125)^9 + 90/(1.0125)^{10} + \\ &+ 90/(1.0125)^{11} + 90/(1.0125)^{12}\end{aligned}$$

$$\begin{aligned}
 = & -1000 + 90/(1.0125) + 90/(1.02515625) + 90/(1.03797) + \\
 & 90/(1.05094) + 90/(1.06408) + 90/(1.07738) + 90/(1.09085) + \\
 & 90/(1.104486) + 90/(1.11829218) + 90/(1.13227083) + \\
 & + 90/(1.14642422) + 90/(1.160754)
 \end{aligned}$$

$$\begin{aligned}
 = & -1000 + 88.8888 + 87.79149 + 86.7077083 + 85.6376197 + \\
 & + 84.5801068 + 83.5359854 + 82.504469 + 81.4858676 + \\
 & + 80.4798617 + 79.4862833 + 78.5049709 + 77.5358086
 \end{aligned}$$

$$= \underline{\underline{-2.86192305667}}$$

Q2. What are your fundamental objectives in the context of selecting a job after graduation? What are your means objectives? Create a fundamental-objectives hierarchy and a means-objectives network.

Career Objectives: Seeking work opportunities that align with long-term goals and desires. We can offer positions with opportunities for advancement, skill development, and professional development in their chosen fields a higher emphasis.

Money/Funds: Many people consider salary and benefits to be important factors when choosing a job. In order to meet their financial expectations and needs, graduates typically look for positions with competitive compensation packages.

Location/Place: The workplace's location can have a significant impact. Some recent grads opt to work in specific areas in order to be closer to friends, family, or ideal living circumstances.

Job stability and security: The importance of having a solid and secure employment cannot be overstated. Jobs in companies or sectors known for their stability and low risk of layoffs may be given preference.

Networking & Contacts: Building a strong professional network is crucial for a fulfilling career. Recent graduates could search for jobs that allow them to network with experts in their industry.

Important Talent Development: My main focus is on developing and putting to use the skills I acquired in college. I can search for employment that provide the opportunity for progression in my desired disciplines as well as on-the-job training.

Work-Life balance: Maintaining a healthy work-life balance is something that I place a lot of importance on. Finding employment that offer accommodating work schedules, acceptable workloads, and a friendly work atmosphere is convenient.

Professional Goal Alignment: Work that enables me to meet both my short- and long-term goals. Jobs that fall under this category provide me the chance to explore careers supporting subjects I'm passionate about.

Opportunities of Professional Development: Continuing education and professional development are essential for job advancement. Graduates like me seek employment that provides opportunities for learning, information access, and skill development.

Fundamental Objectives Hierarchy:

Career growth and alignment: Aspiring to and having professional aspirations.
Prioritizing employment opportunities that provide opportunities for skill development and professional advancement.
Be on the lookout for jobs that support the causes I'm interested in.

Financial Well-being: I'm looking for something that meets my financial goals and offers a competitive salary.
Pay close attention to the compensation and benefits that support my way of life and financial goals.

Location and Lifestyle:Selecting a profession that allows me to lead my ideal lifestyle.

Job Stability and Security:Priority is given to positions in industries with a reputation for stability and a low likelihood of layoffs.

Professional Network Building:Accept employment opportunities that will enable me to network with industry leaders.

A solid professional network should be prioritized for career advancement.

Means-Objectives Network:

Career Growth and Alignment:Look for job opportunities that permit skill development and on-the-job training.

Establish short- and long-term career goals and create a professional plan.

Financial well-being:When assessing job offers, think about the remuneration package as a whole, including income and benefits.

Consider financial planning and budgeting to align with compensation expectations.

Location and lifestyle:High attention given to job searches in locations that fit my ideal lifestyle or preferred geographic locations.

Look into my remote or flexible employment possibilities.

Professional Network building:

Maximizing the networking potential of social media and online business platforms.

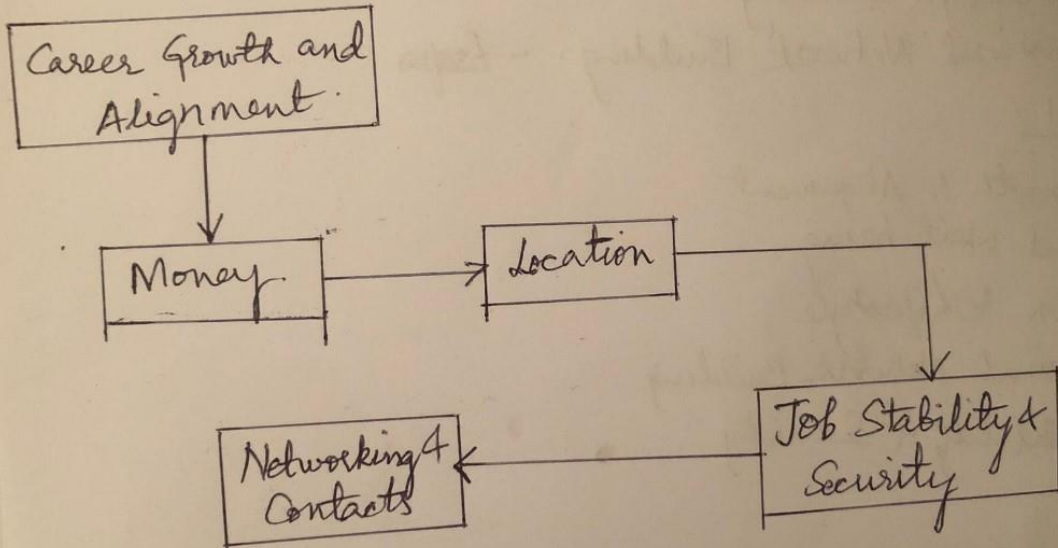
For mentoring and assistance, consult seasoned professionals.

Job stability and security:

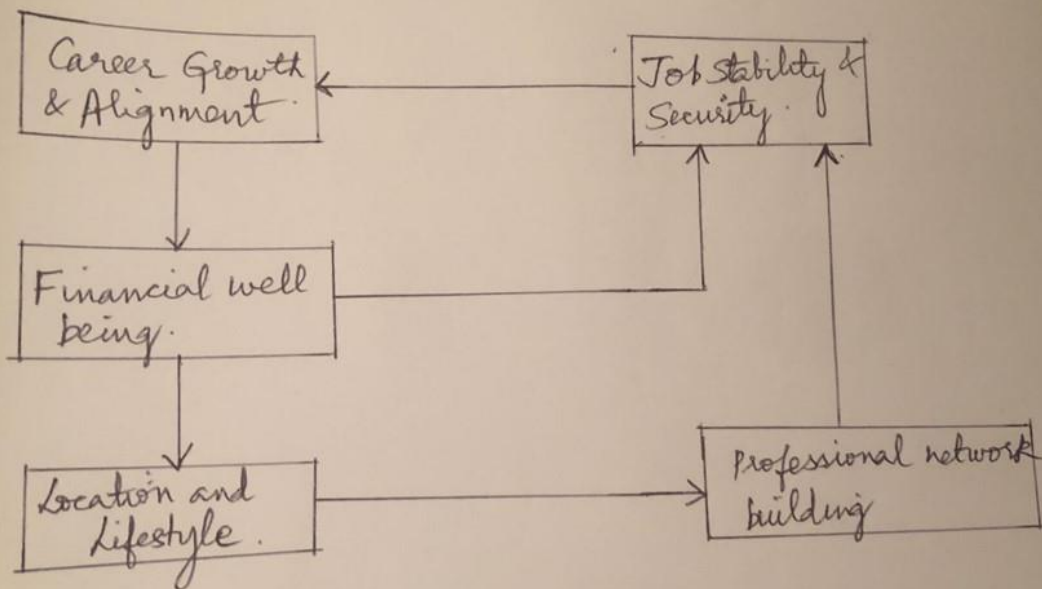
Make sure the company is stable and financially sound before accepting an offer.

Fundamental Objective Hierarchy and Means Objective Network in the next page

Fundamental Objective Hierarchy.



Means Objective Network.



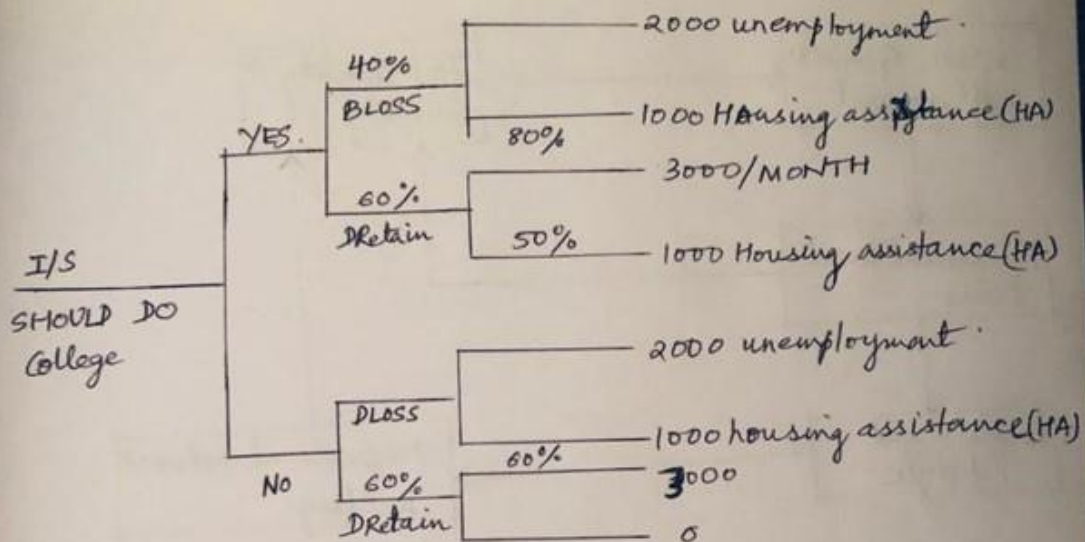
Q3. Susan Cooper currently works as an assistant manager at Joe's Coffee and Tea, a national chain of over 200 coffee shops. Susan has worked at Joe's for 4 years. Feeling that her career was stalling, she enrolled part time ago at a local beauty college to earn a beautician license. She was planning to leave Joe's to attend college full time, but the recession hit, and her husband, Denzel, found his job as a personal banker to be in jeopardy. If Denzel loses his job while she is attending school full time, they are concerned that their \$10,000 in savings will run out. Without recourse to any other funds, running out of money could result in dire consequences, including eviction from their rented apartment.

Susan and Denzel's expenses amount to \$5,000/month, of which \$2,000 is rent. Susan contributes \$2,000 to their monthly expenses, while Denzel contributes \$3,000. Denzel believes there is a 40% chance of losing his position. If that happens, unemployment will provide \$2,000 for 6 months. Denzel plans to become a mortgage broker if he loses his job and has every reason to believe that he will earn at least \$3,000 per month after 6 months. If either Susan or Denzel is not earning income they can apply for housing assistance, which is \$1,000/month for 6 months. If Susan quits and Denzel is laid off, they assess an 80% chance of obtaining the assistance. If, however, only Susan is without an income, then they believe there is a 50-50 chance of assistance. If Susan does not quit, but Denzel is laid off, the probability of obtaining assistance increases a bit to 60%.

If Susan stays at Joe's, it will take her 18 months to finish school. If, however, she attends school full time, then she will finish in 3 months. She believes that it will take her another 3 months to build up her clientele to match her \$2,000/month contribution. To simplify the problem, ignore the tax rate and assume all the values have been converted to NPV.

Structure Susan and Denzel's decision as decision tree. What would you recommend they do? Why?

PTO for the answer



HA = Housing Assistance.

We calculate here, in case if she joins college:

$$\text{Net income} = (40\% * 2000 + 80\% * 1000) + (60\% * 3000 + 50\% * 1000)$$

$$= 800 + 800 + 1800 + 500$$

$$= 1600 + 1800 + 500$$

$$\text{Net Income} = 3900.$$

If she continues her job

$$\text{Income} = (40\% * 2000 + 60\% * 1000) + (60\% * 3000 + 0) + 2000.$$

$$= 800 + 600 + 1800 + 0 + 2000$$

$$= 1400 + 1800 + 2000$$

$$\text{Income} = 5200$$

It should be clear from this that, should she decide to discontinue the project, they will have \$3900 to cover their remaining expenses of \$5,000. This will cover their expenses, but not those of others, and continuing for a half year would make things difficult.

Even if her significant other loses his or her job, they can nonetheless cover the charges in the event that she continues with her activity.

So she shouldn't quit her career and pursue her education.