Decision Making Theory

Week 1 – Introduction and Class Management

Agenda

- Introduction : 30 minutes
- Short quiz : 10 minutes
- Discussion : 110 minutes

Lecturer

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Class Management

- You are NOT ALLOWED to use LAPTOP, HANDPHONE, or any other ELECTRONIC DEVICES without permission
- You are NOT ALLOWED to EAT in the classroom
- Students with attendance LESS THAN 75% is NOT allowed to enter the FINAL EXAM

Grade Composition

- Mid-Term Exam : 30%
- Final-Term Exam : 30%
- Assignments and Quizzes : 40%

Grading

Score	Grade
$80 < NSM$	A
$70 < NSM \leq 80$	AB
$65 < NSM \leq 70$	B
$60 < NSM \leq 65$	BC
$50 < NSM \leq 60$	C
$40 < NSM \leq 50$	D
$NSM \leq 40$	E

Reference

Main Reference

- Nagraj Balakrishnan, Barry Render, Ralph M. Stair. 2013. **Managerial Decision Modeling with Spreadsheets, 3rd edition**. New Jersey: Prentice Hall

Additional Reference

- Barry Render, Ralph M. Stair, Michael E. Hanna, Trevor S. Hale. 2015. **Quantitative Analysis for Management, 12th Edition**. New Jersey: Prentice Hall
- Bernardus Y. Nugroho, Ferdinand D. Saragih, Umanto Eko. 2012. **Metode Kuantitatif**. Salemba Humanika

Weekly Schedule

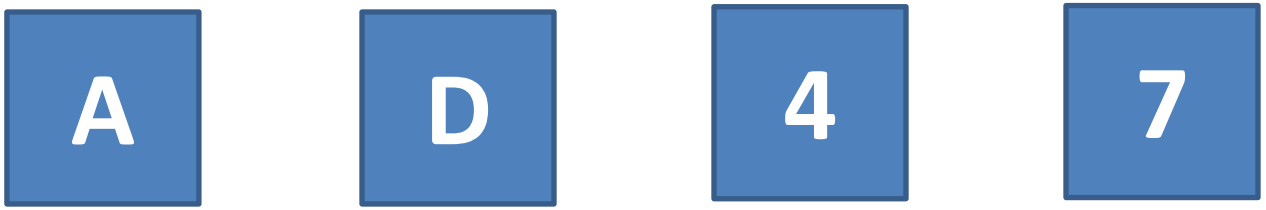
Week 1 – Introduction and Class Management
Week 2 – Linear Programming (Formulation and Graphic Method)
Week 3 – Linear Programming (Simplex Method, Maximization)
Week 4 – Linear Programming (Simplex Method, Minimization & Non-standard)
Week 5 – Transportation Model (Initial Solution)
Week 6 – Transportation Model (Optimization)
Week 7 – Assignment Model
Midterm Exam
Week 8 – Decision Analysis: Decision Table
Week 9 – Decision Analysis: Decision Tree
Week 10 – Analytical Hierarchy Process (Part 1)
Week 11 – Analytical Hierarchy Process (Part 2)
Week 12 – Project Management (Part 1)
Week 13 – Project Management (Part 2)
Week 14 – Review and Quiz
Final Term Exam

SHORT QUIZ

1

Suppose each card has a number on one side and a letter on the other. Which of the following card(s) are worth turning over if you want to know whether the following statement is false?

“If a card has a vowel on one side, then it has an even number on the other side.”



2

At a dinner party this weekend, a friend introduces you to a woman named Genevieve. He tells you that Genevieve recently graduated from Bryn Mawr College with a B.A. in philosophy, where she was an active volunteer in an advocacy group for women's health and edited a literary magazine. You're interested in talking to Genevieve about [Georg] Hegel, the subject of her senior thesis, but your friend jumps in and asks you to rank the following statements about Genevieve in order of their probability:

2

(1) Genevieve is a feminist.

(2) Genevieve is looking for a job as a sanitation worker.

(3) Genevieve is a feminist who is looking for a job as a sanitation worker.

Given what you know about Genevieve, rank the statements from most likely to least likely.

3

Is the height of Mount Everest greater or less than 45,000 feet?

4

What is the height of Mount Everest (in feet)?

5

Read the following description of an individual:

- Intelligent
- Skillful
- Industrious
- Warm
- Determined
- Practical
- Cautious

Now in each of the following pairs, circle the word that best describes the above individual.

a. Generous or Ungenerous

5

Read the following description of an individual:

- Intelligent
- Skillful
- Industrious
- Warm
- Determined
- Practical
- Cautious

Now in each of the following pairs, circle the word that best describes the above individual.

b. Unhappy or Happy

5

Read the following description of an individual:

- Intelligent
- Skillful
- Industrious
- Warm
- Determined
- Practical
- Cautious

Now in each of the following pairs, circle the word that best describes the above individual.

c. Irritable or Good-Natured

5

Read the following description of an individual:

- Intelligent
- Skillful
- Industrious
- Warm
- Determined
- Practical
- Cautious

Now in each of the following pairs, circle the word that best describes the above individual.

d. Humorous or Humorless

5

Read the following description of an individual:

- Intelligent
- Skillful
- Industrious
- Warm
- Determined
- Practical
- Cautious

Now in each of the following pairs, circle the word that best describes the above individual.

e. Sociable or Unsociable

5

Read the following description of an individual:

- Intelligent
- Skillful
- Industrious
- Warm
- Determined
- Practical
- Cautious

Now in each of the following pairs, circle the word that best describes the above individual.

f. Popular or Unpopular

DISCUSSION

Introduction

Decision models can be used to:

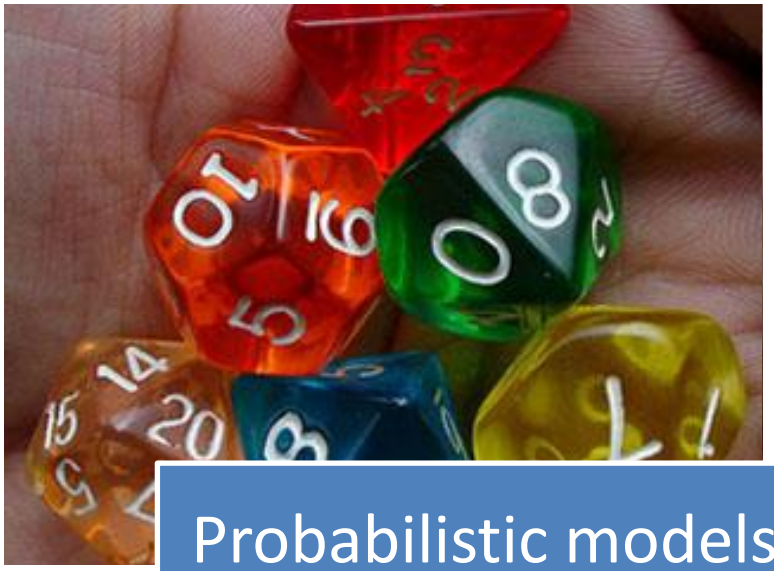
- Solve **complex** problems.
- Provide **analytical framework** for evaluating modern business problems.
- Provide **techniques** applicable in many areas -
  - Accounting, Economics, and Finance
  - Logistics, Management, and Marketing
  - Production, Operations, and Transportation
  - Decision models subject to limitations

Decision Making Theory

- A scientific approach to decision-making.
- Also referred to as
  - Quantitative analysis
  - Management science
  - Operations research

Decision Models

Deterministic models



Probabilistic models

Deterministic Models

- Deterministic models assume
  - Complete certainty.
  - All information needed is available with fixed and known values.
- Most commonly used deterministic modeling technique is **Linear Programming**.

Probabilistic Models

- Probabilistic models are also called stochastic models.
- Probabilistic models
  - Assume some of data is not known with certainty.
  - Take into account information will be known after decision is made.

Steps Involved in Decision Modeling

1. Formulation.
2. Solution.
3. Interprétation.

Step 1: Formulation

- Defining the problem.
  - Develop clear and concise problem statement.
- Developing a model.
  - Select and develop a decision model.
  - Select appropriate problem variables.
  - Develop relevant mathematical relation for consideration and evaluation.

Step 1: Formulation (Continued)

- Acquiring input data.
  - Collect accurate data for use in model.
  - Possible data sources are:
    - Official company reports.
    - Accounting, operating, and financial information.
    - Views, and opinions from knowledgeable
    - individuals.

Step 2: Solution

- Developing a solution involves:
  - Manipulating model to arrive at best (optimal) solution.
  - Solution of set of mathematical expressions.
  - Alternative trial and error iterations.
  - Complete enumeration of all possibilities or utilization of an **algorithm**
    - Series of steps repeated until best solution is attained

Step 2: Solution (Continued)

- Testing a solution involves:
  - Prior to implementation of model solution, testing solution.
  - Testing of solution is accomplished by examining and evaluating:
    - **Data** utilized in model and
    - On **model** itself.

Step 3: Interpretation

Interpretation and **What-if Analysis**

1. Analyzing the results and sensitivity analysis
   a. Vary data input values and examine differences in various optimal solutions.
   b. Make changes in model parameters and examine differences in various optimal solutions.

Step 3: Interpretation (Continued)

2. Implementing the results.
   a. Optimal solution must be implemented carefully.
   b. Solution implementation usually requires making changes within the organization.
   c. Recommendations often require changes in data, data handling, resource mixes, systems, procedures, policies, and personnel.
   d. Managers and others may resist recommended solutions.

Possible Problems in Developing Decision Models

- Defining Problem.
- Conflicting Viewpoints.
- Impact on Other Departments.
- Beginning Assumptions.
- Solution Outdated.
- Developing a Model.
- Fitting Textbook Models.
- Understanding Model.

Possible Problems in Developing Decision Models

- Acquiring Input Data.
- Using Accounting Data.
- Validity of Data.
- Developing a Solution.
- Hard-to-Understand Mathematics.
- Only One Answer is Limiting.
- Testing Solution.
- Analyzing Results

Implementation – Not Just The Final Step

- Decision models assist decision maker by providing scientific method, model, and process which is defensible and reliable.
- Overcome sole reliance upon intuition, hunches, and experience.
- A Swedish study found
  - 40% of projects suggested by decision analysts were ever implemented.
  - 70% of modeling projects initiated by users, and 98% of projects suggested by top managers, were **implemented**

Summary

Decision Models and Modeling

- Scientific approach to decision making in practice faced by managers.
- Decision models classified into two categories:
  - Deterministic models.
  - Probabilistic models.
- Approach includes three primary steps:
  - Formulation.
  - Solution.
  - Implementation.

Summary (Continued)

Decision Models and Modeling

- Potential problems to consider:
  - Conflicting viewpoints.
  - Model impacts on other departments.
  - Outdated solutions.
  - Understanding model.
  - Acquisition of good input data.
  - Hard-to-understand mathematics.
  - Solution testing.
  - Results analysis.

Summary (Continued)

Decision Models and Modeling

- Potential problems to consider:
  - Lack of commitment to approach.
  - Resistance to change.

See You Next Week

THANK YOU