IM 502: Decision Modeling and Analysis

(의사결정모형 및 분석)

Spring 2013

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1. Nature and Objective of the Course

Decisions have to be made at all times. Some may be obvious, but others have significant impact in the future. In this class, we will learn how to make quality decisions in a decision environment characterized by major uncertainties and multiple objectives. It will provide the fundamental framework and approach for the major decisions we will make in our life. Also, we will discover many errors people commonly make when they make decisions and then learn how to overcome these errors.

Therefore, the learning objectives of the course are

1). Explain the descriptive, normative and prescriptive side of the decision-making process.
2). Explain how to structure and solve decision problems using different decision technologies.
3). Explain the inherent problems of human judgment in the decision situations and how to overcome them.

4). Learn how to solve real world problems using decision analysis modeling approach, techniques, software (Precision Tree).

Generically, we learn the following concepts in the class,
1) Students will understand global business issues,
2) How to make a convincing presentation for the business decision at hand,
3) How to make a strategic thinking, and
4) Apply the decision concepts to the IT and media domains.

2. Course Material

Required textbook:

Paul Goodwin & George Wright, Decision Analysis for Management Judgment (**DAMJ**), 4th Edition, Wiley, 2009.

Reference material:

Cases and readings will be available through a reader or files.

- *Judgment Calls: Twelve Stories of Big Decisions and the Teams That Got Them Right* (2012), Thomas H. Davenport, Brook Manville, Laurence Prusak , Harvard Business Press, Forthcoming

- *Thinking, fast and slow* (2011), Daniel Kahneman. (생각에 대한 생각, 이진원 역, 김영사).

- *Making Hard Decisions* (MHD): Introduction to decision analysis (2005), Robert T. Clemen and Terry Reilly, 3rd Ed, Duxbury Press, Ch. 12 (Value of information), Ch. 13 (Risk preference), Ch. 15 (Multiple objectives).

- Korean students read a Korean paper titled, 불확실성 하에서의 의사결정 프로세스: 우면산 터널 민자사업에의 응용, Manuscript, 2007.

Software: Precision Tree

3. Policy on Academic Misconduct

Academic misconduct includes cases of cheating and plagiarism in assignments, cases, projects, or exams. It is important for the students to avoid any misconduct during the class exams. Whenever you cite somebody else's work, make sure that you cite the reference.

4. Evaluation:

Individual	Class Participation	10%
Individual	2 Homework Set	20%
Individual	Final Exam	50%
Group	2 Case Analysis	20%
	TOTAL	100%

5. Class Participation

The constructive participation in class discussions is an important part for me to assess you and your team's performance. Also, you are encouraged to discuss issues through the MS Outlook folders and share relevant materials if you have any.

6. Homeworks:

- HW#1: Past and Future decisions.

1) Past decision:

- What **was** the wrong decision that you have ever made in your professional or personal life? What do you think the reasons or causes for your wrong decision?

2) Future Decision:
- What **is** the major decision you have to make in your personal life or in the company? (It should be the decision you have to make in the future).

Note: Describe each decision in one or two pages, and upload it in a MS Word file format on the class web folder.

- HW #2: Problem Set #1.

- HW #3: Case Analysis #1 (Freemark Abbey)

- HW #4: Case Analysis #2 (Avalanche Corporation)

- HW #5: Problem Set #2.

Course Schedule

Week 1 (April 2, 4)

Introduction

Topic 1: Course Overview, Good outcome and good decision, Decision analysis cycles, Decision quality

Reading: DAMJ (Decision Analysis for Managerial Judgment), Ch. 1 & 2.

- Dan Ariely (2010), Good Decisions, bad outcomes, HBR, Dec, p.1.

HW #1: Past and Future decisions, Due on April 9.

Week 2 (April 9, 11)

Framing and Decision Basis and Structuring

Topic: Framing, Decision Basis: Alternative, Information and Preference.

Reading:
- DAMJ Ch. 7.

- Thomas H. Davenport (2009), Make better decisions, *Harvard Business Review*, November, pp. 117-123. ; Process for better decision making

- Shane Frederick (2011), The persuasive power of opportunity costs, *Harvard Business Review*, Jan-Feb, pp. 38.

HW #2: Exercises (up to SA and Tornado diagram).

Week 3 (April 16, 18)

Decision Structuring -continued

Topic: Three step structuring process; Decision tree and influence diagram; Other structuring tools

Readings: DAMJ Ch. 7.

Making Choices and Risk Profile

Topic: Non-Probabilistic Method, Probabilistic Method, Risk profile

Sensitivity Analysis &Tornado Diagram

Topic: Sensitivity analysis, Modeling approach, Interpretation of tornado diagram

Readings: DAMJ Ch. 3, 6

Note 1: Bring your own laptop in the next session with Precision Tree software installed.

Week 4 (April 23, 25)

Computer Laboratory I

Topic: Precision Tree Software for Decision Analysis

HW #2, Due on April 30.

Week 5 (April 30, May 2)

HW #3: Case Analysis #1 - Freemark Abbey

Session 1: Subjective Probability

Topic: Subjective probability; Verbal statement for probability; Conditional probability; Bayes Theorem.

Reading: DAMJ Ch. 5, 9

Reference:
- Bayes Rule Primer, HBS, Jan 1999.

Week 6 (May 7, 9)

Encoding Subjective probability and Heuristics and Bias

Topic: Assessing probability, Probability wheel; Heuristics for probability encoding and bias

Reading: DAMJ Ch. 10.

Reference:
- Amos Tversky; Daniel Kahneman (Sep. 27, 1974), Judgment under Uncertainty: Heuristics and Biases, *Science*, Vol. 185, No. 4157, pp. 1124-1131

Value of Information and Control

Topic: Bayes Theorem, Value of perfect information; Value of imperfect information; Value of Control; Examples.

Reading: MHD Ch. 12.

HW #4: Case #2 - Avalanche Corporation

Week 7 (May 14, 16)

Risk Preference

Topic: Risk attitude; Utility measurement; Risk sharing and management

Reading: MHD Ch. 13

Dealing with Multiple Objectives

Topic 1: Additive function; Tradeoff assessment

Reading: MHD Ch. 15

Reference:
Philip C. Beccue and Jeffrey S. Stonebraker (2007), Balancing environmental and operational objectives in nuclear refueling strategies, in Advances in Decision Analysis, pp.564-581.

Note: Problem Session: TBD

Week 8 (May 21, 23)

Behavioral Aspect of Decision-Making: Decision Traps

Topic 1: Heuristics and Bias in decision-making, Class Wrap-up

Reading:
John S. Hammond, Ralph L. Keeney, and Howard Raiffa, (2006), "The Hidden Traps in Decision Making," *Harvard Business Review*, January, pp. 118-126.

Reference:
Benedetto De Martono, and et. al. (2006), Frames, Biases, and Rational Decision-Making in the Human Brain, *Science*, Vol. 313, August 4th, pp. 684-687.

Daniel Kahneman, Dan LOvallo, and Olivier Sibony (2011), Before you make that big decision, *Harvard Business Review*, June, pp. 51-60.

Note: HW #5 Due on May 21.

Topic 2: Final Exam