



**CHAPTER**

**1**






**Making Hard Decision** **Third Edition**

# Introduction to Decision Analysis


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**CHAPTER 1. INTRODUCTION TO DECISION ANALYSIS** **Slide No. 1**

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# Introduction to Decision Analysis

- **General Definition:**  
*“Decision Analysis is an analytic and systematic approach to studying decision making”*
- A good decision is one that is based on logic, considers all available data and possible alternatives, and applies the qualitative and quantitative approaches to solve them.



## Introduction to Decision Analysis

- Decision Analysis is a method by which non transparent situations can be made transparent so that every one knows what to do relative to their objectives.
- In fact, if situation were transparent enough, people probably would not make bad decisions.



## Introduction to Decision Analysis

- Decision Analysis (DA) provides structure and guidance for thinking systematically about hard decisions.
- It allows a decision maker to take action with confidence gained through a clear understanding of the problem.
- Along with a conceptual framework for thinking about hard problem, DA provides analytical tools that can make the required thinking easier.



## Why Study Decision Analysis

- The purpose of studying decision analysis is to help a decision maker think systematically about complex hard decisions.
- To improve the quality of the resulting decisions.
- It is important to distinguish between a good decision and a luck outcome.



## Why Study Decision Analysis

- A good decision is one that is made on the basis of a thorough and complete understanding of the problem and careful thought regarding the important issues.
- A good decision does not depend upon the outcome:
  - The equality of the decision depends upon what one knows and how logical the decision is made.



## Why Study Decision Analysis

- Outcomes, on the other hand, may be lucky or unlucky regardless of decision quality.
- In the long-run, you will more often achieve your goals (min costs, max profit) if followed.
- In the short-run, however, may not get the best answer.



## The Decision-Making Environment

- Decision making is used to identify decision in three Environment/Cases:
  - Decision-making Under Certainty
  - Decision-making Under Uncertainty
  - Decision-making Under Risk



## Decision-Making under Certainty

- In this case the decision-maker tends to maximize return or minimize his cost so she/he chooses the decision that satisfies such criteria in a problem where she/he knows the outcomes with certainty.



## Decision-Making under Uncertainty

- In this case the problem is uncertain, i.e., the decision-maker cannot estimate or anticipate the probability of occurrence of the events (outcome) with each decision alternative.
- Three types of decision making are used
  - Optimistic (Maximax)
  - Conservative (pessimistic, Maximin), and
  - Minimum regret method (Minimax)



## Decision-Making under Risk

- In this case the problem is probabilistic, i.e., the decision-maker can estimate or anticipate the probability of occurrence of the events (outcomes) that she/he cannot control, which is called state of nature associated with each decision alternative.
- In this case, the decision maker tends to maximize his expected return or minimize the expected loss. The expected criteria is used in this case.



## Types of Decisions

- Simple Decision (Certain Environment)
- Hard Decision (Uncertain and Risky Environment)
  - Sequential Decisions
- Objective of Decision Analysis
  - Single objective
  - Multiple objectives



## Types of Decisions (cont'd)

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- Conflicting objectives
- Hierarchy of objectives
- Decision Tree for Multiple Objectives.