IIT ROORKEE

NPTEL ONLINE CERTIFICATION COURSE

# Project Management for Managers

## Lec – 26

## Decision Tree Analysis- I

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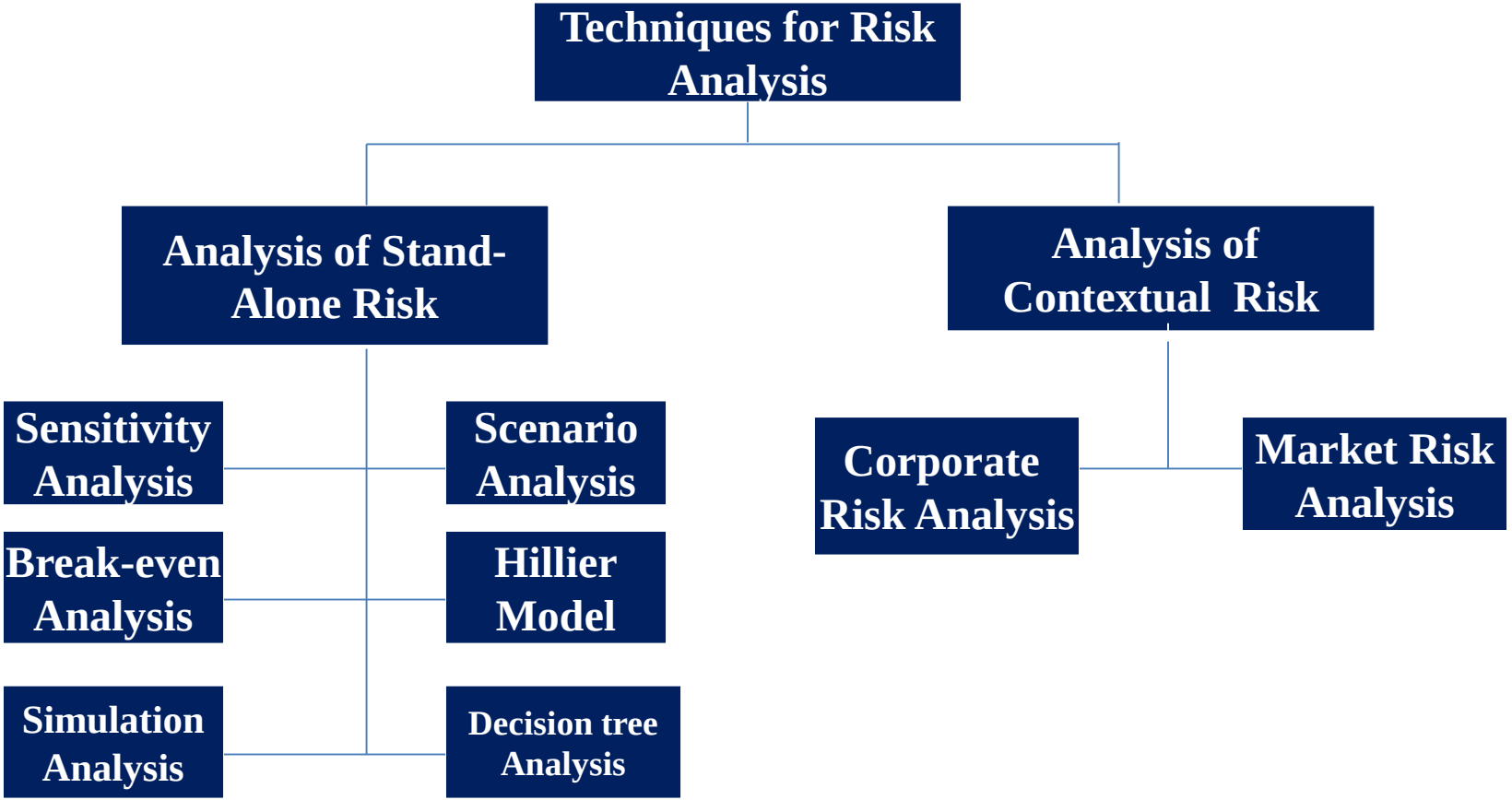
Techniques for Risk Analysis
Analysis of Stand-Alone Risk
Analysis of Contextual Risk
Sensitivity Analysis
Scenario Analysis
Break-even Analysis
Hillier Model
Simulation Analysis
Decision tree Analysis
Corporate Risk Analysis
Market Risk Analysis

# Decision Tree Analysis

- Decision tree analysis is a tool for analysing situations where sequential decision making in face of risk is involved.

-New molecule-pilot production-test market-mfg – small and large plant ,etc.

- The key steps in decision tree analysis are:

1.Identifying the problem and alternatives- Imaginative efforts –risk and uncertainty

2.Delineating the decision

3.Specifying probabilities and monetary outcomes

4.Evaluating various decision alternatives

# Decision Tree

The decision tree, exhibiting the anatomy of the decision situation,shows :

- The decision points (also called decision forks) and the alternative options available for experimentation and action at these decision points.
- The chance points (also called chance forks) where outcomes are dependent on a chance process and the likely outcomes at these points.

The decision tree reflects in a diagrammatic form the nature of the decision situation in terms of alternative courses of action and chance outcomes which have been identified in the first step of the analysis.

# Decision Tree

A decision tree can easily become very complex and cumbersome if an attempt is made to consider the myriad possible future events and decisions. Such a decision tree, however, is not likely to be a very useful tool of analysis. Over-elaborate, it may obfuscate the critical issues.

Hence an effort should be made to keep the decision tree somewhat simple so that the decision makers can focus their attention on major future alternatives without being drowned in a mass of trivia

# Specification of Probabilities and Monetary Value of Outcomes

Once the decision tree is delineated, the following data have to be gathered :

- Probabilities associated with each of the possible outcomes at various chance forks, and
- Monetary value of each combination of decision alternative and chance outcome.

## Specification of Probabilities and Monetary Value of Outcomes

The probabilities of various outcomes may sometimes be defined objectively. For example, the probability of a good monsoon may be based on objective, historical data. More often, however, the possible outcomes encountered in real life are such that objective probabilities for them cannot be obtained. How can you, for example, define objectively the probability that a new product like an electric moped will be successful in the market? In such cases, probabilities have to be necessarily defined subjectively.

# Evaluation of Alternatives

Once the decision tree is delineated and data about probabilities and monetary values gathered, decision alternatives may be evaluated as follows :

1. Start at the right-hand end of the tree and calculate the expected monetary value at various chance points that come first as we proceed leftward.
2. Given the expected monetary values of chance points in step 1, evaluate the alternatives at the final stage decision points in terms of their expected monetary values.

# Evaluation of Alternatives

3. At each of the final stage decision points, select the alternative which has the highest expected monetary value and truncate the other alternatives. Each decision point is assigned a value equal to the expected monetary value of the alternative selected at that decision point.
4. Proceed backward (leftward) in the same manner, calculating the expected monetary value at chance points, selecting the decision alternative which has the highest expected monetary value at various decision points, truncating inferior decision alternatives, and assigning values to decision points, till the first decision point is reached.

# case

The scientists at a comapny have come up with an electric moped. The firm is ready for pilot production and test marketing. This will cost Rs.20 million and take six months. Management believes that there is a 70 percent chance that the pilot production and test marketing will be successful. In case of success, company can build a plant costing Rs.150 million. The plant will generate an annual cash inflow of Rs.30 million for 20 years if the demand is high or an annual cash inflow of Rs.20 million if the demand is moderate. High demand has a probability of 0.6; Moderate demand has a probability of 0.4. To analyse such situations where sequential decision making is involved decision tree analysis is helpful.