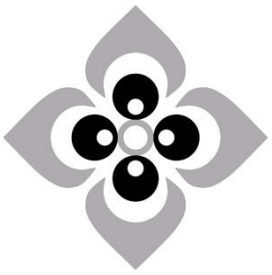

[Glossary]

Decision Theory

Subject:	Business Economics
Course:	B.A., 4th Semester, Undergraduate
Paper No. & Title:	Paper – 403 Quantitative Techniques for Management
Unit No. & Title:	Unit - 4 Theory of Game, Decision Theory and Decision Analysis
Lecture No. & Title:	Lecture – 2 Decision Theory

Glossary

Two-person game: If a game involves only two players, then it is called a two-person game.

n - person game: If the numbers of players are more than two, the game is called n-person game.

Zero sum game: If in a game the gains of one player are exactly equal to the losses of another player, so that the sum of gains and losses equals zero, then the game is called a zero sum game.

Pure strategy: It is a decision rule which is always used by the player to select the particular course of action. Thus each player knows in advance of all strategies out of which he always selects only one particular strategy irrespective of the strategy others may choose. The objective of the players is to maximize gains and minimize losses.

Mixed strategy: When both the players are guessing as to which course of action is to be selected on a particular circumstance with some fixed probability, it is a mixed strategic game. The objective of the players is to maximize expected gains or to minimize expected losses.

Two person zero sum game: A game with only two players, say player A and player B is called a two-person zero sum game, if say player A's gain is equal to the loss of player B, so that total sum is zero.

Payoff matrix: The payoffs in terms of gains or losses, when players select their particular strategies, can be represented in the form of a matrix, called the payoff matrix.

Dominance rule: The rules of dominance are used to reduce the size of the payoff matrix. These rules help in deleting certain rows and/or columns of the payoff matrix which is inferior to

atleast to one of the remaining rows and/or columns in terms of payoffs to both the players.

Course of action (Acts): A decision is made among a set of defined alternative course of action. These are also called actions, acts or strategies and are under control and known to the decision-maker.

States of nature (Event): Outcomes of any course of action are dependent upon certain factors beyond the control of the decision-maker. These factors are called states of nature.

Expected monetary value: Expected monetary value (EMV) for a given course of action is the sum of the weighted average payoff, which is the sum of the payoffs for each course of action multiplied by the probabilities associated with each state of nature.

$$\text{EMV } (A_j) = \sum a_{ij} * p_i$$

Expected Opportunity Loss: An alternative approach to maximizing EMV is to minimize the expected opportunity loss, also called expected value of regret. The EOL is the difference between the highest payoff for state of nature and the actual profit obtained for the particular course of action taken. EOL is the amount of payoff that is lost by not selecting the course of action that has the greatest payoff for the state of nature that actually occurs.

$$\text{EOL } (A_j) = \sum l_{ij} * p_i$$

Expected Value of Perfect Information: EVPI represents the maximum amount of money the decision-maker has to pay to get this additional information about the occurrence of various states of nature before a decision has to be made.

EVPI = Expected value with perfect information under certainty – Expected profit without perfect information