Cooperative game & Non cooperative game

Cooperative game

- Players are convinced to adapt a particular strategy through negotiations and agreements between players.
- Players negotiate their contracts to that they can make joint strategies.
- Games are played between buyers and sellers.
- Firms buying raw material or services can negotiate for price settlement

Examples:

- **Collective Bargaining:** Workers form unions to negotiate with employers for better wages and conditions.
- **Joint Ventures:** Companies collaborate to undertake projects that are too large or risky to handle individually.
- **Public Goods Provision:** Multiple parties contribute to the production of a good that benefits all, such as national defense or clean air.

Advantages:

- Potential for mutually beneficial outcomes and Pareto improvements.
- Flexibility in redistributing payoffs among coalition members.

Limitations:

- Complexity in forming and maintaining coalitions.
- Need for enforceable agreements to ensure cooperation.

Key Characteristics

- **Coalition Formation:** Players can form binding agreements and coalitions.
- **Transferable Utility:** Payoffs can be redistributed among coalition members.
- **Core:** The set of feasible allocations that cannot be improved upon by any coalition.
- **Shapley Value:** A method of distributing the total gains among players based on their marginal contributions.

Non cooperative game

- Game in which the players decide on their own strategy to maximize profit
- It is a game in which no form of negotiation and binding contracts.
- While setting up a price of its product & firm will take into account the other competitive firm's behaviour
- High price- No buyers

- Players decide on their own strategy to maximize their profit
- Accurate results
- Deep analysis

Key Characteristics:

- **Individual Decision-Making:** Players choose strategies independently.
- **Strategy Profiles:** A combination of strategies chosen by all players, determining the outcome of the game.
- **Payoff Function:** Specifies the payoff for each player given the strategy profile.
- **Equilibrium Concept:** Nash Equilibrium is commonly used, where no player can benefit by unilaterally changing their strategy.

Examples:

- **Prisoner's Dilemma:** Two prisoners must decide independently whether to confess or remain silent. Confessing is the dominant strategy for both, leading to a suboptimal outcome.
- **Cournot Competition:** Firms choose quantities to produce independently. Each firm's profit depends on its own production and the production of others.
- **Matching Pennies:** A two-player zero-sum game where each player chooses heads or tails. The goal is to match or mismatch the opponent's choice.

Advantages:

- Simplicity in modeling individual decision-making.
- Clear analysis using Nash Equilibrium and other solution concepts.

Limitations:

- May lead to suboptimal outcomes (e.g., Prisoner's Dilemma).
- Lack of collaboration can result in inefficiencies and conflicts.