

The importance of game theory



Game Theory is basically denoting on study of mathematical model of differences and cooperation between intelligent balanced decision-makers. Game Theory enables universal mathematical techniques for analyzing situation which individuals or competitors in same segment make decision that will influence one another's interests. As such, game theory offers impending of essential importance for scholars in all branches of the social science, as well for practical decision-makers. The situation that game theories studies are not just spare time activities, as the term game might unfortunately suggest. Conflict analysis or interactive decision theory might be more descriptively precise names for the subject (B. Myerson, 1997)

Basically it may help in various twigs similar to social science and also economy not only in theatrical path but also in practical decision making process. Game theory implementing that conflict analysis or interactive decision theory. The foundation of game theory enables through its position in the mathematical narration of social science. Now days the vast advantage in the most fundamental and theoretical branches of various sciences have created a nuclear dilemma that intimidates the survival of our civilization. Due to this scope which motivated to work lot of mathematicians and social scientists in last half decades. With the advantages of this theory economist can able to understand conflict and cooperation by understanding quantitative models and real life situations (Myerson-1997).

Game theory is the study of the choice of strategies by interacting rational agents, or in other words it is a interactive decision theory. A key step in a game theoretic analysis is to discover which strategy is a person's best response to the strategies chosen by the others. Game theory is based on a

scientific metaphor, the idea that not only considers as game but also consider like economic competition, war and elections, can be treated and analyzed as we would analysis games (Leon A. petrosjan, 1996).

Importance of Game Theory

Early in the 20th century, mathematics began to study some relatively simple games and later much more complex and the studies regarding game theory begins. A game of perfect information is a game in which every player always knows every move that other players have made that will influence the result of his or her own choice of strategies. A game of imperfect information is a game in which some players sometimes do not know the strategy choice other players have made, either because those choice are made simultaneously or because they concealed. However, game theory studies the rational choice of strategies. This conception of rationality has a great deal in common with neoclassical economics. Thus rationality is a key between neoclassical economics and game theory. The standard interpretation of noncooperative game theory is that the analysis game is played exactly once by fully rational players who know all the details of the game, including each other's preference over outcomes. Evolutionary game theory, instead, imagines that the game is played over and over again by biologically or socially conditioned players who are randomly drawn from large populations. More specifically, each players is " pre-programmed" to some behavior- formally a strategy in the game - and one assumes that some evolutionary selection process operates overtime on the population distribution of behaviors. Noncooperative model represents possibilities for cooperation have been contained as executive progress in the game while

cooperative models are incomplete and allow players to take action outside of specific circumstances. An economist can construct alternative strategies on the basis of game theory because it leads to get the clear picture of current situation of particular industry or firm and link to maintain alternative views on the basis on available information. It recommends the outcomes of different strategic moves in a market place or any industry. Basically it may two player or competitors whit two strategic options. So the strategy of a particular company or industry shows that capability and responds through their strategic moves, the dominant strategy can be adopted easily but if your awareness of respond of other competitors prisoners dilemma (Jorgen W. Weibull, 1997).

Prisoner's dilemma:-

Prisoner's dilemma is a situation which depicts the movements of the participants for a particular motive. Basically there are two or more players who try to move to different segments to archive profit than their compotators or other participants. This situation would be more clear with the assistance of 2 by 2 matrix games. They have the minimal configuration necessary to be a game, which are two player with each two decision possibilities. These games can easily be examined and displayed in a matrix. The most famous 2-by-2 matrix example in this context is the Prisoner's dilemma. It is one of the most interesting games which game theory has to offer and at the same time deals with one of the most interesting thing of social science like the interaction of individual and society. Two criminals commit a bank robbery and are arrested by police. The police do not have sufficient evidence to prove their crime. In this situation they use game

theory to prove it. Basically they separated them in two cells and visit each of them and offer the same deal. If you confess and your accomplice remains silent, he gets the full 5 year punishment and you go to free as principal witness. If he confesses and you remain silent, you get the full 5 year punishment and he goes free. If you both stay silent, all we can do is give you both 1 year for a minor charge, which is illicit possession of firearms. If you both confess, you each get 4 years (The World Trade Organization, 2004).

Dominant Strategy

A strategy is dominant if, regardless of what any other players do, the strategy earns a player a larger payoff than any other. Hence, a strategy is dominant if it is always better than any other strategy, for any profile of other players' actions. Depending on whether "better" is defined with weak or strict an inequality, the strategy is termed strictly dominant strategy or weakly dominant. If one strategy is dominant, than all others are dominated. For example, in the prisoner's dilemma, each player has a dominant strategy.

To execute the game is by categorizing two player or competitors involving in the game and each player form the alternative strategies to perform well. In case of two player game, the action of first player from the rows, and the actions of the second one in the columns of given matrix. In this case is demonstrating by two players who are caught for a crime by police. Each suspect is placed in different cells and offering to confess.

Not confess

Confess

Not confess

5, 5

-4, 10

Confess

10, -4

1, 1

More utility are mentioned as higher number. If any suspect confesses, they might go free, and split the proceeds of their crime which we respect by 5 unit of utility of each suspect. The first feature of this game is the pasteurization of a verity of significant situation. In economics it considered as eternality. If there are two competitors in the same market, it is best for both to keep the price high but best each individual to fix a lower price while the competitor fix high price. In the second feature depicts that how clever individual should behave. In the case of economics no matter what individual firm beliefs its competitor is going implement, it is always best to follow the strategy what the company formulated. The third feature this game is denoting in a very significant way if the game is repeated. However in economics, repetition gives a possibility of getting benefit or loss in the future for same strategy. This also gives an opportunity to the competitors to work corporately (Levine (n. d)).

Assumptions of Game Theory

Game theory is a study of strategic decision making. More formally, it is the study of mathematical models of conflict and cooperation between intelligent rational decision makers. An alternative term suggested as a more descriptive name for the discipline is interactive decision theory. Game theory is mainly used in economics, political, science, and psychology, as well as logic and biology. The subject first addressed zero sum games, such that one person's gains exactly equal net losses of the other participants.

Individuals those are instrumentally rational always have first choice over different things. Technically individual must have preference ordering that will make them to formulate judgment above various actions fulfill our preferences in diverse extent. In game theory we usually make the following assumptions;

Each player will be available to make two or more than plays

Each possible place make the player to a specified end, state that conclude the game

Player should have detail knowledge about the game and of his opponent

All players are rational

(Shaun P. Hargreaves Heap, 2004)

Literature Review

One of the major problems in the game theory is that each players are aware about the movements of the games and the preferences of the other players

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for each result. Basically complete availability of information is the main problem (Dominici, 2011). Every player is very much aware of the each one's cost functions of other player's. but in this case the root and style of action of competitor is highly confidential so it makes difficult to the others. Moreover it is much more difficult to determine the costs and motivations of others players (LaValle, 2012).

Usually player's takes decisions based on the maximization of the utility function; in case of any uncertainty the player may makes subjective prediction based on the probability to calculate his utility function. Every player in the market is having the rational thinking and they predict the thinking of rivalries as well. Thinking about what would be the best possible solution he would take, if he was in the same position of another player. The situation of players, as well as the environmental factors can be changed, therefore most games are non-static and do not apply a single move solution. Interdependence in decisions is the problem and it results in unilateral results are not possible. The length of the game also matters a lot in this game (Dominici, 2011). In fact game theory is not free from criticism as well. In some situations, the assumptions of game theory in which management has to take strategic marketing decisions (time, dynamism, interdependence and interactivity). The professionals in marketing do not use game theory to take decisions. The axiomatic approach to define the players is arguable, because of the approach to define player of the game clashes with the marketing research approach, which is completely relying on the empirical observations, measurement analysis of consumers' responses (Dominici, 2011)

The importance of game theory is very vast in the formulation of strategies in the field of economic and social science. Researcher have adopted game theory in different field and result were significantly blond.

Application of Game Theory

Application of gamer theory is expressing through the help of Pepsi Co and Coca Cola. Cola has facing a really challenging situation with Pepsi Co. The below diagram depicts about practically of game theory in the real world.

Low Price Coca Cola High Price

1. 6 1. 6

1. 6

1. 8

1. 2

1. 2

1. 8

1. 4

1. 4

Low Price

PepsiCo

High Price

In the first quadrant where both have lower pricing strategy. In this case the advantage is for both companies, they are able to sell 1.6 million products every day. In the second quadrant cola has higher pricing and Pepsi got lower pricing. This made a various difference in their sales. Pepsi was able to catch the market better than cola. In the third quadrant Pepsi got higher pricing strategy and cola got lower pricing strategy. Due to this cola was able to catch the market than Pepsi. In the fourth quadrant both have high pricing strategy. This made a result of both having a equal share in the market but lesser than the lower pricing strategy. From this it shows that the strategy of one company affects the other ones market share. If one was able to know the others strategy that will led to a dominant strategy. But in this case both had dominant strategy as low pricing. In other hand the present situation is the repetition of the game. This gives an opportunity for both competitors to benefit for the same strategies.

CONCLUSION

Game theory is a classic theory which applicable all most all the field. The main significant of game theory is to formulate the alternative strategy to compete with one another and in the same sense it is an essential tool for decision making process according to fluctuations in relevant contents.

Game theory is inspiring because the terms and ideology are comparatively trouble-free than other theories in this segment.