Introduction:-

Today this competitive business environment effective decision making play a vital role in such competitive business environments. One decision can change the future of the any organization because of decisions will change will have direct effect on the profit earning potential of business organization.

Decision making environments may be classified into four types:-

1. **Deterministic environment**: - In this environment decision makers know with certainty the consequence of every alternative or choice. In the type of environment decision makers have no problem while taking decision because decision maker know what is the outcome of each alternative so decision maker select best alternative which provides maximum gain.

2. **Uncertain Environment**: - In this environment there are several possible outcomes for each alternatives or choice and decision maker does not know the probabilities of the various outcomes.

3. **Risk Environment**: - In this environment there are several possible outcomes for each alternative and the decision maker known the probability of occurrence of each outcome.

4. **Conflict Environment**: - In this environment there are two or more competitors (players) are involved in decision making in anticipation of certain outcomes over a period of time. In conflicting decision environment involving the interaction between two or more competitors (players).

Economic is a study of choice how limited resources are allocated efficiently for the interest of public welfare. In a national economy, there are mainly three types of economic system. There are command economy, free-market economy and mixed economy. Many of the countries adopted a mixed economy system; this means that some co-ordinations are planned while others are left to the market. Most of the decisions are de-centralized while there are some decisions made centrally. The factors of production, capital, land and labor, are own mainly private but some owned by the public. The incentive is a mixture of both material and morale. There are four types of market structure, namely, perfect competition, monopolistic, oligopoly and monopoly. It is the interest of this paper to look at oligopoly. In an oligopoly market structure, there are a few large firms and there is a significant barrier to enter the market, while the
product differentiation is unknown. In this market, the one different characteristic compare to perfect competition and Monopoly is strategic interdependence. In oligopoly, the action of firm A will affect firm B, similarly the action of firm B will affect firm A. The firms in this market will act and re-act to each other’s decisions. It is very complex to study oligopoly due to the strategic interdependence. Economist therefore, has built a model to study oligopoly. The model is called the game theory. Game theory has a military root. It is a mathematical analysis of strategy. The analysis is done by putting oneself into the shoes of all the players. By doing so, one can predict the behavior of each player an advise the best strategy. It is the interest of economists to find out whether oligopoly market structure is Efficient and if there is equilibrium. In the analysis of game theory, it is the interest of the economist to find an equilibrium point and whether the market is efficient. In equilibrium, the concept proposed by John Forbes Hash, later name after him Nash equilibrium, states that each player will always make the best decision taking into account the decision made by the opponent.

**Game theory** model applicable in conflict environment because game theory model help to decision makers how to make optimum decision making in conflict environment. Today’s most of the market slightly converted into oligopoly market means few seller and many buyers in the market. In present global scenario the big firm acquired small firms and competition slightly converted into oligopoly market in the world. In this conflict environment game theory model work perfectly.

In conflict situation the one firm decision will affect the other firm’s decisions. In the automobile industry in India for example: - Tata Motors launched Nano Car in the market for Rs. 1lakh so dramatically affects the profitability of Maruti, GM Motors etc. It means organization cannot make important decisions without considering what competitors are doing or might do.

Game theory model is best model to consider the impact of the strategies of other & our strategies and outcomes. Normally game is a competition involving two or more competitors each one want to win. Game model study how to make optimal decisions in conflict environment. Game theory helps to find out which strategies are formulated in conflict environment.

The game theory model was developed by John Van Neumann and Oscar Morgenstern published there classic work “Theory of Games and Economics’ behaviour” in 1944. Since then game theory has been used by:-

- Army: - To plan war strategies.
- Union: - For Negotiation.
- Manager: - For optimum decision making (with the help of best strategy)
Rules of Game Theory:-

1. **The Player:** - The player is an individual a firm or a nation that make decisions.
2. **The Action:** - The actions are all the alternatives between which players decide.
3. **The Outcome:** - The outcomes are all possible combinations of all players’ possible moves.
4. **The Information:** - The information is what players know about their opponents, action, and payoff.
5. **The Communication:** - Communication is whether players can make binding agreements e.g. collude each other.

Following example based on oligopoly market how game theory model useful in such situation:-

This can be understood by looking at a typical soft drink company’s price war. Pepsi and Coco-cola is soft drink companies doing their business in India. In 2005, The Coca-Cola Company and PepsiCo together held 95% market share of soft-drink sales in India. Coca-Cola India market share was 52.5% In India soft drink market is an oligopolistic. These two companies captured most of the soft drink market in India. So in this example we considered only 300ml Pepsi and Coco-cola soft drink products. In this paper Pepsi and Coco-cola companies may come together to collude on the price. They would sell to the consumer. Since colluding is illegal therefore there is no contract to bind their agreement. Even after the verbal agreement between both owners, there are in reality two option that each of them can decide to take to set high price as agree to collude or to set allow price to come together.

In this example (the following assumption are made) Pepsi 300ml bottle and Coco-cola 300ml bottle price is same Rs.5 per bottle. The following assumption is made: - both the companies sell 1cr product as bottle per month. A research done by an independent agency shows that if the company charged Rs.4 per bottle it is possible to sell 1.5 cr per month. If both companies decided to cut price to charged Rs4 per bottles then both companies will only be able to sell 1cr bottles per month the assumption above indicate that the profit taken by both companies if they sell at Rs.5 per bottle. Multiply in 1cr.bottles equal Rs.5cr. per month.

**Here is how the analysis done:-**

Coco-cola best reply to Pepsi when Pepsi charging Rs.5 per bottles has to drop price to Rs.4 per bottles because the profit Rs.6cr is greater than profit Rs.5cr. on other hand if Pepsi is charging
Rs.4 per bottle than the best reply by Coco-cola is also charging Rs.4 per bottle. This is because the profits Rs.4cr is greater than Rs. 2.5cr Coco-cola did not drop the price similarly for Pepsi

the best reply to Coco-cola if Coco-cola charging Rs.5 per bottles is to charge Rs 4 per bottles again looking the profit when Pepsi chare Rs.4 per bottles knowing the Coco-cola that Coco-cola will charge Rs 5 per bottles the profit is Rs. 6cr per month. This is greater than Rs 5 cr, so the best reply for Pepsi is to drop its product price to Rs.4 per bottles. The same strategy apply if Coco-cola dropped price to Rs.4, Pepsi will also drop the price to Rs.4 per bottle because the profit Rs 4cr is greater than Rs 2.5 cr

Both Coco-cola and Pepsi will always play the best option that is by dropping the price of its product to Rs.4. It can be observed from the table that the profit Rs.4 cr being underline this means Nash equilibrium for Coco-cola and Pepsi. It can be observed that at this point of equilibrium. If both the companies collude and fixed the price at Rs.5 both will make a profit Rs.5cr. which is 1cr more Studies show that the best way to play “the prisoner’s dilemma” game is by “tit for tat” strategy. Tit for tat strategy “A type of Trigger Strategy usually applied to the repeated prisoners dilemma in which a player respond in one period with the same action his opponents used in the last period. Tit for tat strategy can be played by Coco-cola and Pepsi and both will gain profit greater than if they have played a defected strategy the game start by Coco-cola and Pepsi charging Rs.5 per bottles. Since both companies are doing nice to each other and would not drop price both companies will have Rs.5cr per month.

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If one of the companies decided to drop price to Rs.4 while the other company remained at Rs.5, the company which drop product price would capture 1.5cr bottles per month and leaving .50cr bottles per month. to the company which did not drop the price, therefore the profit taken by company that drop product price to Rs4. per bottles multiplies by 1.50cr equal to Rs6cr per month. While the profit taken by the other company which did not dropped the product price is Rs.5 per bottles multiplies by .50cr bottles per month equal to Rs 1.50cr. Per month.
Finally when both companies decided to have a price war both will drop the price to Rs.4 per bottle. Therefore the profit taken by both firm. Is Rs 4 per bottles multiplies by 1cr bottles equals to by 4cr.per month. From the data gathered above a table can be constructed to analyze how each company can play the game.

Coco-cola may first to break and start to lower the product price Rs4 per bottle so Pepsi should follow. After same times, Coco-cola increase the price back to Rs-5 per bottles again Pepsi should follow. Pepsi may break from the lower price at charged Rs.5 per bottles. In this case Coco-cola should follow and increase the product price to Rs.5 per bottles. when both companies always follow what the other company is follow there will not be fierce price war that may done the company profit down, In the long run the profit made by both Coco-cola and Pepsi will be higher If they used tit for tat strategy.

**Limitation of Game Theory:-**

- Limitation is the assumption made on information. In the assumption we simply state that player knows about their opponent, actions and payoffs. In real world it is complicate to know about the competitor’s action.
- The player act rationally and intelligently.
- Each player has all relevant information available.
- Each player can use the information in finite number of moves with finite choices for each move.
- Player makes independent decision of course of action without consultation.
- Player plays the game for optimization.
- The payoff is fixed and known in advance.

**Conclusion:-**

The game theory is a very powerful tool used by economist to anticipate the next step that the completion would take. It is also a tool for the firm gauge the current position that the firm is in. Some firms may not have any ideas that they may be charging higher price compare to the competitors and losing customer day by day. By using game theory the firm can decide what they would do next in an oligopoly market. In using the game theory in a “Prisoner’s Dilemma Game” the player could play the game with tit for tat strategy for the optimum payoff. Although there are some limitations to this theory it has become critical tool for studying the oligopoly market.

**References:-**

- Managerial Economics, Dwidevi, TMH
- Operations Research - Paneersevam – Prentice Hall of India