Economia Aziendale online 2000 Web©
International Business and Management Review

N. 1/2008
Special Issue

3rd International Economic Scientific Session
International Scientific Conference

"European Integration New Challenges for the Romanian Economy"

University of Oradea, Romania
May 25th – 26th, 2007

Economia Aziendale online 2000 Web ©
International Business and Management Review
Editor in Chief: Piero Mella
ISSN 1826-4719
Reg. Trib. Pavia - n. 685/2007 R.S.P.

Pavia, January, 2008
No. 1/2008 – Special Issue

FACULTATEA DE STIINTE ECONOMICE
UNIVERSITATEA DIN ORADEA
educatie
performanta
profesionalism

Strategic games theory from the perspective of ethic behaviour in business

Ioana Pop Cohut
Faculty of Economics, University of Oradea, Tel: 0722/721380
Email: ipop@uoradea.ro

Abstract

The dilemmas of business conduit can find answers in the analysis of strategic games. These offer different variants of decision which can be included or not in ethical conduit in business. Appling the games theory, businessmen are supposed to make decision between "cooperation" and "trade" in their business relation and can analyze the cost for their decision.

Keywords: Prisoner's dilemma, the farmer's theory, the theory "tit for tat", cooperation in business, ethics in business.

The game theory deals with the mathematic analysis of the conflicting situations through which the most rational strategies are set up for each participant or player, having opposed interests, in an open frame of precise rules.

The *game theory* was drawn up by the mathematician John von Newman and the economist Oskar Morgenstern (1944), John Nash, John Harsanyi and Reinhard Selten winning for the research within the game theory the Nobel Prize in 1994.

According to the game theory – through game we understand the schemes of those situations with conflicting character in which the intellectual capacities of all the partners intervene and the role of the accident is limited through the latter's way of behaving.

The game's component elements are the following: a succession of foreseen accidental acts which have a succession of rules previously set up; a number of people involved in the game which are called partners, parties or adversaries; a number of numeric functions, equal with the number of partners, defined on the succession of the strategic game acts.

The essential principle of the game theory consists in selecting a way of action in such a manner that it should take into consideration the behaviour of the adversary which affects the most the result expected.

A main concept of the game theory is that of *strategy* – defined as an assembly of rules, actions of a player, each representing an answer to the adversary's strategy.

Solving a game – consists in setting up the optimal strategies of the players which, when the game is repeated for many times, ensures the best possible average result.

The *optimisation* in the context of game theory includes in the same problem aspects of maximisation and minimisation (that is the setting up of the maximum value in a minimum aggregate determination of the minimum value in a maximum aggregate).

The salesman can *interact strategically* in a considerable variety of ways and an important of these have been studied using the mechanism of the game theory. Starting from these premises, we will see how it functions and how it can be used in the study of the economic behaviour on the market with imperfect competition (duopoly or oligopoly), as well as in the study of the ethical behaviour in business which provides a considerable diversity of situations of strategic interactions, which allow the salesmen to act taking into consideration the reactions and the strategies of the other salesmen.

The game requires the matching of costs and benefits for all the possible strategies adopted by one of the players, with the possible strategies of the competitor, and the gains of each player will depend on the other player's strategy. Then, each set of possibilities resulted is analysed in order to set up an *equilibrium which occurs when each player obtains the optimum*. Therefore, the main idea is that each firm has a set of strategies from which it will choose the most advantageous one, taking into account both its strategy as well as the competitors' strategy. The strategy chosen will be the one maximising the minimum gain and is minimising the maximum loss.

Imagine that you have to choose between cooperating with the members of the group you belong to and having in view your own interests, which could be to the others detriment. Such conflicting situations are everywhere, for example, an employee can be tempted to stand out, shadowing the other members of his team which will harm the image of the team; a manager may want to get a bigger part of the company's profit etc. In every situation, the individual can earn more having in mind his own interests; but if each member of a group has in mind only his own interests, in the end all of them will obtain worse results than if they had cooperated one with another.

The idea that *having in mind his own interest can sometimes be disadvantageous*, leading to results opposed to those desired, represents the base of social and ethical dilemmas, in such a dilemma what is good for one is bad for all. *If each has in mind the biggest benefits for himself, then each will obtain the smallest benefits*. The analysis of these ethical dilemmas is concentrated on the relations between the purposes the individuals have in mind and it is meant to evaluate the

competitive or collaborating nature of their behaviour, as well as the conflicting or harmonious nature of the relations among them. This kind of relations can be studied in its most abstract from through conceiving some “games” with two or more competitors.

The game theory is based on an example of a simple game called “*the prisoner’s dilemma*". The original discussion of the game took into consideration a situation in which two prisoners who were partners in committing a murder, start by being questioned in separate rooms. Each prisoner has the possibility to confess the murder, therefore, to involve the other one or to deny having participated to crime. Even though the policemen suspect them of committing a serious crime, the proofs that they have allow them to ask their trial only for committing a minor crime. The only chance to accuse them of committing the major crime is to convince one of the two arrested to testify against the other. The two arrested are completely isolated from each other, without any possibility to communicate. Each of the suspected criminals – be it A and B – is presented by the policemen with the same alternatives, both A and B being informed that the same offer has been made to each of them. If none of them testifies against the other, both will walk with a lighter conviction for committing a minor crime (let’s say one year in prison). If each accuses the other, both will be convicted for the most serious crime, but they will get – due to the collaborating attitude during investigation – a less harsh conviction (let’s say five years in prison). Finally, if only one of them testifies against the other, then the one confessing will be acquitted, while his accomplice, who kept the silence, will get the maximum conviction (let’s say ten years). But the dilemma is this: if they both confess, each will get a conviction of 5 years. If none of them confesses, each will get only 1 year in prison.

The dilemma of the prisoner does not have any solution. Judging only from the point of view of selfish interest, which does not take into account the other’s interest, the confession is the only rational solution for each of the two under investigation, and if each behaves rationally from the perspective of his own interest, both will lose as compared to what they would have achieved by cooperating. *This is how the following of only their own selfish interests leads to results worse than those achieved through cooperation.*

This situation can be analysed also from the point of view of moral behaviour. There are several situations in real life which strikingly resemble the dilemma of the arrested men. Each of us can realise the fact that it is more advantageous, in a building on fire or on a sinking ship, to escape as soon as possible, running to the fire exit or to the saving boats and trying to overpass all the others. The result? More will die because of panic. More lives would be saved if people went in an organised way to the exit or to the saving boats. Similarly, two countries engaged in an arms race would have more to gain if, by stopping this, would spend less resources to produce and upkeep such mass destroying arms, but none of them makes the first step because it does not want to be left behind, thus becoming vulnerable.

The oligopoly market can resemble very much the two convicts. Sometimes the oligopolists too are in a "prisoner's dilemma". We assume that we approximate the situation of the convicts with two firms A and B which sell the same product and are in a fierce competition. The competition between them is so fierce that each of them earns 10,000 m.u. profit. Recently the two firms have decided to join a corporation, where each of them agrees to raise the prices and once raised, not to sell cheaper than the other. If they cope with the deal, each firm will gain a profit of 50,000 m.u., but if one of the firms copes with the agreement, and the other does not, the latter will obtain a profit of 100,000 m.u., and the first firm will obtain 5,000m.u. Obviously, if both firms break the agreement, both will be in the situation from where they started – gaining 10,000 m.u.

Most of the economists foresee that the firms will end up by being in the situation mentioned last, gaining the profits before entering a corporation and they will be again in competition, a situation they did not want to get out of.

In applying the game theory a *Nash equilibrium* can be determined, an equilibrium which is set up for the pair of strategies for which the A's choice is optimal, giving a chance to B, and the B's choice is optimal by giving a chance to A.

We have to mention that no participant to a game knows which strategy the other player will choose, then when he has to choose his own strategy, but each player will have some feelings on what the other player will choose. Therefore, the Nash equilibrium can be interpreted as a pair of expectations on the choices of each player.

Another example of game is that in which there are only gains for both players – the mixed strategies. The *mixed strategy* is the one in which each player chooses the combination of games and sets up a set of probabilities for each strategy. The Nash equilibrium of the mixed strategy refers to an equilibrium in which each salesman chooses the optimum frequency to play his strategies with, due to the frequency choices of the other salesman.

The prisoner's dilemma is still not an appropriate model of economic relations. Much more closed to the reality of the partnership in business and of the ethical behaviour is another kind of social dilemma described by Peter Singer, replacing the story of the two criminals with the history of two farmers.

Max is a small agriculturalist whose crop must be picked. On the horizon there are black clouds. If he does not get help, Max will not be able to pick the crop on his own before the storm comes, and the crop left on the field will be lost. Therefore, Max asks his neighbour Lyn – whose crop is not ready to be picked – to help him. In exchange, he promises her that he will help her when her crop is ready to be picked. Obviously, it is to Max's advantage to be helped by Lyn. But what does she get instead? If Max keeps his promise she is in advantage because it is difficult

for her to pick the crop alone. But if Max breaks the agreement, then Lyn will lose helping Max instead of cleaning the land of weeds. Max's problem is therefore to convince Lyn that he is trustworthy.

In business, Max and Lyn can sign an agreement which if they break, Max will have to pay his neighbour certain damages and compensations. But if neither of them wish under any circumstances to sign an agreement, Max's only chance is to win Lyn's trust. If he ahs already had the reputation of a trustworthy man, there wouldn't be any problem. But how could he win such a reputation? In a small community, whose members know each other very well, Max's chances to win and moreover to keep a good reputation through lies and cheats are minimal so that being a real trustworthy man is the only strategy that can give results.

Singer considers that there is a similitude between the Convict's Dilemma and the *Farmer's Dilemma*, both being two aspects of a general problem. The Arrested Dilemma is a non-repeating situation. Each of the two criminals has to decide only once if they cooperate or compete against each other – and the decision, once made, cannot have other consequences than the alternative provided by the investigators. No matter the consequences, the two acolytes will never be in the same situation. Whereas Max and Lyn are neighbours or business partners and they will probably have the same relation for long time. There is more than probable that they will need each other's help in the future too. This fact is introducing a new variable, extremely important in setting up by each person of what is in his own interest. The two of them know that if they help each other in a crisis situation, and one of them does not return the favour, then, in the future too, probably, many years ahead, they will not help each other anymore. Therefore, on long term, the refuse to keep his promise would cost him more.

Unlike the simple game, in which there is only the "cooperate" or "compete" alternative – the only rational solution of the selfish being to attack the other – the repeated game, with several halves, offers a larger spectre of possible strategies, not being so obvious which of them is the most profitable.

Obviously, the repeated game provides an important variety of possible strategies. Can we establish which of these is more advantageous? It is the question that Robert Axelrod tried to answer the question, obtaining a range of important discoveries regarding the nature of cooperation. He restated the Prisoner's Dilemma as a game whose purpose is to accumulate as many points as possible (or as much money as possible). In order to see which strategies give the best results, Axelrod organised a tournament where several creators of computer simulated strategies registered, each strategy being confronted 200 times with each of all the other strategies, but with itself also, at the end of the game adding the points accumulated by each participant.

Axelrod redefined the game as follows: each player can choose one of the "cooperate" or "betray" movements instead of years in prison (the less, the better), the competitors accumulate a certain number of points (the more, the better), given according to the following rules: "mutual cooperation" or mutual - 3 points; "betrayal attempt" 5 points; "punishment for mutual betrayal: -1 point; finally, "the fool's reward", 0 points.

There were 14 participants, some of them with very sophisticated strategies. The tournament was won by the shortest and simplest strategy, having only two rules:

- at the first movement, always cooperate;
- for each of the following movements reply with the same movement your adversary made.

Suggested by Anatol Rapoport, a well-known psychologist and specialist in game theory from Toronto, this strategy was called *Tit for Tat* – in an approximate translation, but faithful "eye for eye" because it replies the adversary in the same manner. If he is kind and cooperates, he will get an answer by accepting the cooperation. If the opponent is selfish and attacks, there will be a counter strike.

The creators of some sophisticated strategies have been very intrigued by the fact that a simple childish style of game could win the tournament. Axelrod organised the second tournament, with 62 competitors who were prevented by the efficiency of the game *Tit for Tat*, so that everybody tried to win against it. But *Tit for Tat* won again in a decisive manner.

Why did *Tit for Tat* manage that well? First of all, Axelrod thinks, because it is so friendly and nice which offers cooperation. Even if it is nice, this strategy obtains much better results than mean, hostile strategies which start by being selfish. This fact is not available only for *Tit for Tat*. All nice strategies obtained, as a whole, better results than the mean strategies. Generalising and applying the results of his analyses in the field of evolutionist biology, Axelrod reached the conclusion that all the beings inclined to cooperate with their mates have higher chances within the natural selection than the selfish beings. These are Axelrod' key discoveries:

1. Having in mind his own advantage, Tit for Tat helps all the other nice strategies be in advantage too. In other words, the number of point accumulated by Tit for Tat and other nice strategies they play with is maxim because all these strategies start by suggesting cooperation and continue cooperating until the game is over, generally nice strategies help each other.

2. In a total contrast with nice strategies, mean strategies cancel each other's chances of success when they play against each other. All the games in mean strategies end up with very bad results.

3. When nice strategies compete against mean strategies, the nice strategies are doing well because they react at the first hostile action of the adversary.

From the perspective of the analysis of these strategic games, it results that the selfishness

must be avoided both in business as well as in the evolution processes because, applied constantly, it proves a self-destructing strategy for all the competitors, but the clear rejection of selfishness does not match the full stating of generosity, that many people associate with morality. *Tit for Tat* gives good results because it is a "nice" strategy ready to cooperate; but "kindness" does not mean weakness: *Tit for Tat* is ready to react whenever the adversary tries to be aggressive. Consequently, what should a businessman do if he wants to react rationally?

He should take into consideration the friendly strategies, based on trust, honest communication and fair treatment of all the employees, associates, competitors. The positive, constructive attitude has, on long term, clear advantages.

Therefore, the main principle of the game consists in selecting a way of action in such a manner that it should take into consideration that behaviour of the adversary that affects the most the result desired. The game theory does not always provide the warranty of the best choice, but it facilitates the decision process especially if it emphasises general welfare and not the individual advantage on short term.

We finish by mentioning that the game theory can be an important instrument of synthetic analysis of the consequences of the conflicting relations in conditions of risk and uncertainty, providing thus the possibility of a more exact interpretation of the strategic interactions that take place within the market.

Studying the game theory determined a long string of research in a field which proved to be very vast. Out of this string, there are detaching more and more the research that this theory makes on the subject of conflicting situations, analysing more and more the cooperation, negotiation and ethical behaviour among the salesmen.

References

Arnold R.A. (1992), *Microeconomics*, West Publishing Company, St. Paul

Bergstrom T.C. (1993), *Intermediate microeconomics*, W.W Norton & Company

Boyes M. (1991), *Microeconomics*, Houghton, Miflin Company, Boston

Byrnes R.T. (1994), *Microeconomics*, Harper Collins, College Publishers

Crăciun D., Morar V. and Macaviciuc V. (2005), *Etica afacerilor*, Ed. Paidea, Bucureşti

Ionescu, Gh.Gh. and Vădăşan I. (2005), *Etica afacerilor*, Ed. Universitatea de Vest, Timişoara

Pop Cohuț I. (2006), Introducere în etica afacerilor, Ed. Universității din Oradea, Oradea

Popescu – Nistor M. (2003), *Cultura afacerilor*, Ed. Economică, Bucureşti

Varian H.R. (1995), *Intermediate microeconomics*, W. W. Norton & Company