

# Game Theory in the Application of Modern Business Management

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**Abstract.** This article describes the origins of game theory and points out to that if companies want to acquire an invincible position in the fierce competition market; they can not only be strength, but also to focus on strategy. In the modern enterprise management, game theory is playing an irreplaceable important role. By analyzing the "Prisoner's Dilemma" and "Clever Pig Game" and other classic cases of game theory applying in business management, which gives many hits for the bosses, for example, a number of economic issues which were the nature and the mechanisms leading to these difficulties, and thus help them acquire economic activity law, to improve the efficiency of management decision-making.

## Introduction

Game theory is also called countermeasure theory or competition theory, it is the study of confrontation or mathematical theories and methods of the competitive nature of the phenomenon, which is a new branch of modern mathematics, originated in the early 20th century. In 1944, von Neumann and Morgenstern coauthored "Game Theory and Economic Behavior" which laid the theoretical basis of game theory. Say simply, game theory is the study of decision-making under a given information structure to maximize its own utility to decision-making and the equilibrium of different decisions between the main body [1].

Game theory studies how individuals in a complex interaction concluded that the most reasonable strategy. In the competitive business world, experience is like the enterprise management, competitive strategy and game theory of the technique, method, way, way to master game than enterprise managers often don't understand the way of a game of more rational and wise. Since founded von Neumann of game theory, game theory has been from the early to the dynamic game, static game development and in business; law, psychology, and other fields are widely used. Many human activities, especially in the economic activities are interdependent decision-making process. This is made up of more than one party and interdependent decision-making process is a game, it not only refers to the competition and cooperation. For example, enterprise decision-making and interdependence between the national policy. Sometimes, cooperation is more complex. Dynamic game is interactive decision-making change over time. In the optimal decision, just before the next moment might no longer be optimal, time to put on the dynamic game [2]. Relevant strategic interaction idea of game theory can be traced back to the ancient Chinese military scientist sun 's the art of war, in which the thought of "the enemy and know yourself, fight", has revealed the importance of interaction between decision makers in game theory research. The strategy affects each other, and the result of the decision also depends on the strategy of all parties concerned. Any company, for example, at the time of market development, total want to consider the other competitors on the market and potential rivals, these are all game.

## **The Importance of Game Theory in the Modern Enterprise Management**

In today's world, network, communication and information technology rapid development, especially the popularization and application of Internet technology, is changing the world. Great changes have taken place in enterprise operation environment, the complementarily between enterprises and enhancing the dependence and conditionality, cooperation more become very necessary. [3] Since the economic system reform in our country, enterprise and individual growing independence and initiative in economic activity. As the global economic integration trend is accelerated, the multinational companies have swarmed into China's market; increasingly fierce competition in the domestic market internationalization, enterprise management environment is also more complex. To be in an impregnable position in the intense market competition, the enterprise not only with power, should notice more discretion, in the modern enterprise management, game theory is play an irreplaceable role. For the business operators, therefore, how to understand the game theory, using the principle of game theory to guide the enterprise effective management is worth thinking about. In price and output decision, economic cooperation and trade negotiations, the introduction and development of new technology or new product, to participate in bidding auction, dealing with labor relations, and in such aspects as relations and cooperation with the government, the game theory are also very effective decision-making tool business operators, or at least more scientific decision. "Prisoner's dilemma" and "boxed pigs game" and so on many of the game theory model and the essence of the operator is prompted many economic problems for the enterprise and lead to the difficulties of mechanism, thus to master the regular pattern of economic activity, improve the efficiency of economic decision-making. Many problems are business operators in the economic activities, often encountered problems and may also be more complicated. Learn the principle of game theory, master game way of thinking and skills, for modern enterprise operators and managers have a very important role.

## **The Application of Game Theory in the Modern Enterprise Management**

With the development of game theory in economics, more and more application of game theory in modern enterprise management. Here are a few instances application of game theory in enterprise management.

**"prisoner's dilemma" and pricing strategy.** The specific content of the "prisoner's dilemma" model, for example after two criminals committing crime was arrested by the police, locked in separate room interrogation, the police told them that if both of them confess, then each six years in prison. If two people are denial, each sentenced 1 year; If one of them frankly, another denial, frank person released, denial of 15 years in prison. Through analysis we know that each prisoner has two kinds of strategies: frank or denial. In this game, the Nash equilibrium is (confess, confess). Although the overall, (denial, denial) are the result of good for both sides, but in fact the result is not the case. [4]

The "prisoner's dilemma" model to our enlightenment is: mutual benefit is the basis of cooperation, cooperation bring efficiency; But the strict system is the guarantee to maintain cooperation. In real life, why not appear (denial, denial, for short) is the best results? Is because there is no strict system to ensure that crime for the sake of their own interests, to prevent the other choose to confess, he can only choose to confess first, as a result, both confessed.

"The prisoner's dilemma" model is a classic example of game theory; it is under the complete information static game. In real life, many of the economic, political, military, society and daily life game phenomenon can be explained by the game model. For example, we are familiar with domestic price war. In our life we often encounter all kinds of price wars, I cut today, tomorrow you incentives, price war, the endless. Due to excessive price war, make many manufacturers basically no profit, even lost, will ultimately affect the long-term development of the enterprise itself. The classic example is the mobile phone price alliance events of 2012. In June 2012, nine mobile-phone giant price union meeting in shenzhen, asked all members shall not reduce the price, otherwise will be punished, but the ink, the

members are in violation of the agreement, racing to depreciate, because none of the league members will believe that rivals will earnestly implement the commitment of the agreement. [5]Here, they will face a "prisoner's dilemma" problem. We know that, although all don't reduce the price for the mobile phone giant integral is the best choice, but their rational began to work, as a rational economic man may be thought of in your commitments, one thousand other businesses, prices has been the result must be their own market occupation, so is to reduce the price, you can first. So, the final choice is to reduce the price, and then the phone price alliance was declared bankrupt.

**The application of "boxed pigs game" theory.** In team construction and incentive theory" Boxed pigs game" is also a classic case of game theory. Its concrete content is: pens have a big pig, a pig; pig sty a trough, on the other side to install the control the supply of food for button, click on the button will have a certain unit of hogwash into the slot. If is the press of a button the pig, big pig will eat up all the food in front of the pig to the trough, if it is a big pig to press a button, the big pig to the trough can only and some pigs eat the rest of the state. Now that the work shall not eat the pig, the pig will not take the initiative to press the button, and the big pig in order to survive, although only part to eat, or will choose labor (button). [6]So, what would take two pigs each strategy? The answer is: pig will comfortably at the edge of the trough, and big pig to press the button.

In this case, for the pig, whether big pig press the button, waiting for is always the best choice. And big pig knows the pig is not to press the button, only press the button for myself. This "boxed pigs game" model to our enlightenment is: select priority strategy. In this model, waiting for is the pig's strategic priorities.

In the construction of enterprise group, as a "boxed pig's game" things happen from time to tome, referred to as the "free-rider" phenomenon. Because of performance incentive is usually based on the team's collective performance, so the weak (pigs) take the initiative to work, may be for the collective performance improvement is very limited, and cannot receive, then the weak will choose to wait. [7]And the strong (big pig) in order to get bonus can only choose actively work to improve the collective performance, and the weak and the performance bonus to common distribution. So over time, the strong (big pig) there would be no active labor force, the results may be left, looking for better enterprise incentive mechanism. Therefore, in the modern enterprise human resources management, incentive system design, the team leader should be based on the internal management by objectives to decomposition of work, determine the performance produced by each team member, and the corresponding reward or punishment. So, always waiting for the person will not be able to get any reward, and even punished because of his bad performance. Therefore, team performance incentive decomposition is an effective way to solve the "free-rider". Back to "boxed pigs game" cases, doing so is equivalent to the hurl food button and feed trough together, and reduce the investment appetite, who is the press of a button (labor), who can eat the food, and not work shall not eat. Tell us "boxed pigs game" model, to establish a high performance team can't focus only on the team's performance management, but also attach importance to the role of team members performance matching and decomposition, let each team member to be able to really give full play to the role, and thus improve the performance of the whole team. [8]

**The game between the size of the shareholders in corporate governance.** Our country basically is the result of the existing enterprise restructuring of listed companies, naturally formed "a dominant" equity structure. Despite the emergence of large shareholders are beneficial to the supervision of the company's operation and management, but most of the listed companies in China in the reform of major shareholders, the board of directors and general manager of the inherent pattern of the trinity, made in the game process between large and small shareholders more urgent to protect the interests of small shareholders. However, due to the imperfect capital market in China, the legal system is not reasonable; the protection of the interests of small shareholders natural is not very good. In this case, the small shareholders of rational choice is the emergence of the "free rider" behavior, when their own

interests are violated, but small shareholders can only choose to leave the market. Why will appear this kind of situation?

In economics, the public goods refers to the effect cannot take goods, such as air quality improvement, road improvement, etc. These effects can not be the contributor to enjoy alone, at this time there is a so-called "free-rider" phenomenon, everyone wants to be contributive to provide public goods, and they don't have to pay the price they can enjoy the results. In corporate governance, "supervision" is a public good, if a shareholder causes the improvement of corporate performance, the supervision of all shareholders will benefit. Because the supervision is a price, so every shareholder hopes other shareholders to supervise, over you, this is the "free rider" behavior between the shareholders. [9]In this kind of situation, the size of the shareholders between two pure strategy Nash equilibrium, namely (supervision, supervision), and (not supervision, supervision).As rational investors, big shareholders only choose to supervise, small shareholders chose not to supervise, this is the standard of "boxed pigs game", big shareholders is equivalent to "big pig", small shareholders is equivalent to "pig". Small shareholders do not participate in supervision and can share the achievements of supervision, which are consistent with the actual situation of the securities market in our country, that is more than 80% of the small shareholders have never participate in supervision.

As a result of the existence of small shareholders "free-rider" phenomenon, is fundamentally because of the cost of the supervision. To solve the problems of the small shareholders "free-rider", will solve the problem of supervision cost of small shareholders. If the enterprise to put forward the strategies of the "supervision and I pay you including supervision cost and incentive mechanism, in this case, the small shareholders' supervision and choice, but how to define the supervision cost and how to design the incentive mechanism, it needs further exploration. In addition, to strengthen the exchange and communication between the sizes of the shareholders, which changes the size of non-cooperative game between shareholders to cooperative game? On the basis of cooperative game, the size between shareholders will no longer be considered to monitor and supervision problem, but pay attention to common interests brought by the supervision after allocation problem.

For the large shareholders to use its control to encroach on the behavior of small shareholders, we should from the following several aspects to improve. First of all, in the aspect of legal system, further perfect the company law and securities law and other relevant laws and regulations, establish an effective system of independent directors. Gradually improve China's legal system, strengthen the protection of minority shareholders. To protect minority shareholders interests from damage, in the aspect of law also should do well in two aspects: on the one hand, promote the exercise of the minority shareholders the right to vote. [10]Due to the smaller number of small Stockholders equity scattered, it is often difficult to play its voting rights, can adopt the cumulative voting rights and the entrusted agency the right to vote and restrict big shareholder voting rights and other methods, to a certain extent, balance the interests of the shareholders size relations; On the other hand to further improve the litigation system of small shareholders and the civil compensation system, if the system is not perfect will lead to the justice in law enforcement and supervision department lack of necessary means and dynamics, the court can't claims shall be accepted for small shareholders, such not only harm the interests of small shareholders, also encourage the autocratic of large shareholders.

## **The Conclusion**

For enterprise managers, how to understand the game theory, how to use game theory to guide the enterprise effective management is worth thinking about. In price and output decisions, economic cooperation and trade negotiations, the introduction and development of new technology or new product, to participate in bidding auction, processing enterprise internal relationships, as well as the relations and cooperation with the government in many aspects, such as game theory is a very effective decision-making tool for enterprise managers, or at least more scientific decision. "Prisoner's

dilemma" and "incentive paradox" and so on the basic game theory models or proposition for the enterprise managers, prompt the essence of many economic problems and causes the difficulties that they master the mechanism of economic activities, improve the efficiency of economic decision-making. Many managers in game theory problems are economic activity, often meet the problem may be more complicated. Learn the principle of game theory, master game way of thinking and skills, for modern enterprise operators and managers have a very important role.

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