

The position, as well as fully understanding

[Business](#), [Management](#)



The term "Game Theory" can be described as a mathematical analysis in which has the intent of indicating optimal choices that will lead to a desired outcome. The idea of game theory was first explored by John von Neumann and Oskar Morgenstern in 1944. Game theory has been used as a management tool for more than 50 years. It helps to create a structure of analysis for making or arriving at logical decisions in competitive environments. Businesses face optimal decisions on an everyday basis that require some use of game theory. Game theory was originally zero sum games, in which one person's gain resulted in a loss for all other participants. It is now more commonly used today for behavioral relations in assuming the next move of a competitor. Understanding competitors and their position, as well as fully understanding your own position and dealing with it accordingly, in any given situation is ultimately the way of mastering game theory.

Being able to anticipate the next move of rivals, customers, and investors is essential when trying to obtain a competitive advantage. The game theory has several applications including: biology, psychology, politics, and economics, among others. In game theory each player in the "game" aims to apply a strategy that will maximize their own gain therefore seeking an optimal strategy. Those involved in the game are considered players. Each player will face a choice amongst two or more possible strategies. Optimal choices are usually used in single-agent decision theories, with multiple agents the best strategy will be contingent on the choices of others. Often time trees and matrices are used for visual representation of optimal choices in a given situation.

It is assumed in game theory that players are rational and strive to maximize their own payoffs. Some solution concepts consist of dominant strategy equilibrium, Pareto optimality, and Nash equilibrium. Equilibrium is achieved when both players in the game have made their decisions and an outcome is reached.

One of the applications in game theory that directly relates to Operations Management is the context of determining a location for a business. This is done through the creation of an effective business strategy. Game theory forms a powerful tool for strategizing how a business will compete in a given environment and position itself among its competitors.

The game theory may present a business owner with a detailed strategic analysis that is essential in determining the best location for the business. An analysis such as this provides accurate predictions of the outcomes of a company in a given area by projecting how the action of the business would affect the performance of competing firms. The game theory considers the potential effects of the rivals when choosing the location for a business. A business owner must take all this into account before determining a location for the business. Firms first try to attract a location with potential in market share, and quality that will be able to attract customers. (Hendrix, 2015) For example, there is a new electronics store debating whether they should open a new store in downtown Nevada. They are well aware of another electronics store that opened not too long ago, and know that if they open there that will be a little bit of competition. They are seriously considering this option because of the heavy traffic in Las Vegas.

The other option is to open the location in a city in Texas. Where the competition isn't bad, but there's a big demand for an electronics store in this area. The firm owner has to now analyze the move of their competitors in order to determine a location for this electronics store. The next application applies to economics which is determining price. In this context there are similarities to the Prisoners Dilemma. The prisoners dilemma is a paradox used in decision analysis. It shows why two individuals/corporations might not cooperate even if it would be beneficial for them to do so.

It's used as a prison example, to say if two parties were in separate interrogation rooms, both of the individual in the party want to minimize their own jail sentences. Weighing out which decision is more beneficial for the deciding party is a Prisoners Dilemma. (Deng, 2010) In this situation operations managers face a similar strategy which is price-setting to the Prisoner's Dilemma. In a situation where oligopoly exists, businesses can set prices if they decide to cooperate with one another; thus, they can sell at higher prices and receive higher profits. However, if one of the competing businesses decides to lower their prices, they will achieve higher sales and earn larger profits than its rivals. If all competing businesses decide to lower their prices, then there will be a conflict in the market, and none of them will benefit due to the reduced revenue. The last application is inventory in game theory.

Inventory is used as a type of protection against risk of stock being out when there is uncertainty present. Grocery stores, for example have quick turnover with their inventory in the meat department. The characteristics of

perishable products are those in which have a limited shelf life in which the overproduction and storage of such products is not recommended. In order for the business owner to know when to re-order inventory for such products they usually focus on rational system planning, improved communication among the supply chain players, well-coordinated and fast distribution channels and the clarification of organizational goals. (Kumar, Mustafee, Katsaliaki, 2014). A store owner has to be able to predict the demand of meat for the week or whenever their re-order point is, based on previous sales and local competitors.

The firm's relationship with their suppliers are vital for the business to survive. A firm must order the right amount of inventory for the products because failure to do so can lead to the meat expiring because it's been on the shelf too long; or continuously running out of meat before the re-order point and having to spend an additional fixed cost of redelivery for the week. There are many other factors to consider when ordering inventory for perishable items, but this is where firm owners need to start.

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