



Games managers should play

Game theory can help managers make better strategic decisions when facing the uncertainty of competitive conduct. If you don't change your game to gain advantage, one of your competitors will.

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Call it revenge of the nerds if you like, but many high-school chess club presidents are landing the most coveted strategic-planning positions at major corporations. Chess players realize that good strategic decisions require you to take into account the likely moves and countermoves of other players. They study their competitors' approaches to the game and identify the likely sequence of moves that will follow any particular move they make. By looking forward and reasoning backward, they drive the game toward a checkmate victory.

This ability to look forward and reason backward is enormously valuable to strategic-decision makers. When a company builds a new chemical plant or paper mill, its profitability will often turn on whether or not competitors add capacity as well. Similarly, the success of new marketing or pricing strategies depends on whether competitors replicate them. In oligopoly markets, it is hard to identify a strategic decision that isn't influenced by the retaliatory countermoves it sets off. The best business strategists must be skilled at predicting future rounds of competitive conduct.

Yet this is easier said than done. Uncertainty often surrounds competitive conduct, and many managers either expect the companies they compete against to engage in the kind of competitive behavior they see as normal or make some other educated guess. But such assumptions can be dangerous. Managers unwittingly set off value-destroying price wars, get buried when incumbents retaliate in markets those managers have attempted to enter, and cannibalize their own core markets because they have either ignored or made the wrong guesses about the reactions of competitors.

The good news is that game theory provides a structured process that can help managers make better strategic decisions when faced with the uncertainty of competitive conduct. Game theory isn't new; economists, mathematicians, and political scientists have been developing it for more than 50 years. What is new is an increased emphasis on game theory as a practical tool that real-world managers can use for making strategic decisions. For example, most participants in the recent US personal communications services (PCS) spectrum auctions hired game theorists to develop their bidding strategies. What follows is a systematic game theory

process that has been applied successfully in more than 100 company situations in the past five years.

The rules of the game

A good game theorist gets inside the heads of other players to understand their economic incentives and likely behavior. To do this, you should focus on five key elements of competitive intelligence.

Define the strategic issue

What decision are you trying to make: pricing, capacity, market entry? How is it related to other strategic decisions being made in the market? If you are trying to make a decision on capacity investment, for example, it is vital that you know whether others in the market are also considering entering or leaving it.

Determine the relevant players

Which players' actions will have the greatest impact on the success of your strategy? A common mistake is to assume that all your strategic games are played against competitors and that there is always a winner and a loser. Many of your strategic decisions turn on the actions of other players in the market—suppliers, distributors, providers of complementary goods—and "win-win" outcomes are attainable. For example, a computer hardware manufacturer attempting to stimulate demand for its product must focus on the economic incentives of software producers to provide products consistent with its operating system. A thorough understanding of these incentives allows the hardware producer to structure contracts, joint ventures, or alliances that make both parties better off.

Identify each player's strategic objectives

In real business games, players often base decisions, at least in the short run, on criteria such as market share or growth

Textbook game theory commonly assumes that the players seek rational, profit-maximizing objectives. However, in real business games players often base decisions, at least in the short run, on criteria such as market share or growth. It is extremely important to get such criteria right. If you make the decision to enter a new market in the belief that the incumbent players are profit maximizers when they are really driven

primarily by short-run market share objectives, you might suffer unexpected losses when the incumbents slash prices to maintain share.

Identify the potential actions for each player

For each player in the game, including yourself, develop a list of potential actions on the strategic issue. Generate this list from the perspective of the other players, not just your own. What options might they be considering? How will they evaluate these options? Don't assume that you and your competitors have the same set of strategic options. Competitive role-playing exercises involving external experts and your management team can help generate these lists.

Determine the likely structure of the game

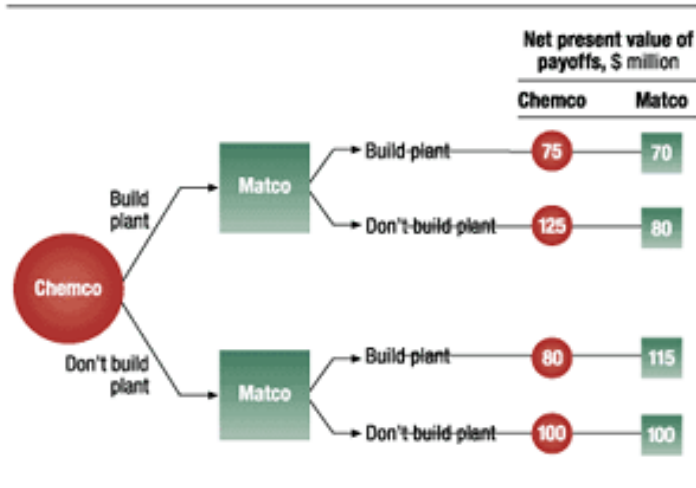
Will decisions be made simultaneously, in isolation, or sequentially, over time? If sequentially, who is likely to lead and to follow? Will this be a one-shot decision, or will it be repeated? Most business games are repeated, sequential games; pricing decisions, for example, are made over and over in sequence in most markets.

Playing the game: Chemco vs. Matco

These five elements of competitive intelligence define your business game, but more work is generally required before such information can be used to "solve" it. A thorough economic analysis of the industry—including market research and estimates of your competitors' costs and capacity—is usually needed to estimate the payoffs of different strategies for different players, given their strategic objectives. This information is summarized in a payoff diagram (Exhibit 1) and can be used to guide strategic decision making.

EXHIBIT

To build or not to build? Chemco vs. Matco



The exhibit is based on a duopoly chemical market case in which two competitors—call them Chemco and Matco—are each deciding whether to build a new plant. It is unclear which will be the first to reach a conclusion, but the decisions will certainly be made sequentially; for simplicity, this diagram assumes that Chemco moves first. Each company's long-term objective is

to maximize profits, so the numbers in the payoff diagram represent calculations of net present value (NPV). For example, if neither builds a new plant, each player should earn an NPV of 100.

Chemco ought to look forward and reason backward to make its decision. If Chemco builds a new plant, the payoffs suggest that Matco will not; these decisions will earn Matco an NPV of 80 and Chemco an NPV of 125. However, if Chemco decides not to build the plant, Matco should choose to build instead; this will earn Matco and Chemco NPVs of 115 and 80, respectively. The diagram also shows that while it is profitable for one new plant to be built in the industry, two new plants will lead to significant excess capacity, deep price discounting, and lower profits for both players.


What strategic insights can be learned from this exercise? First, it illustrates the first-mover advantage in the game; by making a commitment to new plant capacity before Matco does, Chemco can influence Matco's incentives to build and avoid a dismal outcome in which both players bring on new plants. It also demonstrates the symmetry of the first-mover advantage: Matco has its own incentives to move first, suggesting that Chemco must credibly commit itself—perhaps through real bricks and mortar—to new capacity as soon as possible. In addition, the case demonstrates how important it is for both players to understand the limited prospects for growth in market demand. If Matco believes, erroneously, that the market can profitably support both new plants, its plans to expand capacity won't be influenced by Chemco's commitments to build.

Many business games are more difficult to define and solve. In fact, this duopoly chemical case was more complicated than shown here, because capacity decisions were repeated over time, and Matco and Chemco competed across a broad range of product lines. Some economists even argue that real-world business games are so complex, and their solutions so sensitive to model assumptions, that game theory is irrelevant for business decision making. This is not so. First, a surprising number of oligopoly strategy problems can be modeled as simple, quantifiable games: pricing, capacity management, marketing, new-entry, bidding, and contract design problems are particularly common.

Second, game theory applications need not identify unique, robust equilibrium solutions to be valuable strategic-decision-making tools. Since the process itself forces managers to think explicitly about the incentives and likely moves of other players, it can generate a breakthrough in strategic insight even when the game can't be modeled explicitly. Qualitative role-playing exercises and structured game theory discussions may generate enough insight to lead to a change of direction on new-entry, capacity addition, pricing, and other fundamental strategic decisions.

Game theory can help you play your current game better, but often its greatest value is to help players define new games

Third, and perhaps most important, while attempting to model the current industry, game managers invariably develop insights about how to change games to drive more favorable outcomes. Unlike board games such as chess, business games don't have fixed rules, players, and potential moves. Although game theory can help you play your current game better, its greatest value often comes from helping players define new games. In some cases, for example, game theory predicts that current market conditions make price wars highly likely because customers switch easily between competitors. The current game-modeling exercise identifies the need to change the game by implementing customer loyalty programs, such as frequent-flyer discounts, that create value for customers and companies and decrease incentives for destructive price competition.

Apply game theory the next time you need to make a strategic decision about which competitive interactions matter. Look forward and reason backward to generate insights about how to play your current business game more successfully. At the same time, make sure you leverage these insights to define better games to play. If you don't change your game to gain advantage, one of your competitors will, and there is not much value in being the best chess player when everyone else is playing checkers. 

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Hugh Courtney is a consultant in McKinsey's Washington, DC, office. This article is adapted from one that appeared in *World Economic Affairs*, Autumn 1997. Reprinted by permission of the publisher. Copyright © 1997 World Economic Affairs. All rights reserved.