Leveraging “Game Theory” in strategic sourcing

Transaction models such as e-auctions or online marketplaces have expanded buyers’ toolkits. Some of the most sophisticated tools come from game theory. Although their source is an established body of academic literature, the research findings are not being applied to full effect in business. One reason the theory has such potential is the way it models conflicting and cooperating goals that vie for influence in transaction negotiations. Where academic research regards these as abstract “behavioral permutations,” buyers and sellers feel the actual cut and thrust.

Sourcing managers who understand game theory gain deeper insights into the interests and objectives of participants. How can they bridge the gap from theory to practice, and which findings are most applicable? This paper explains the applications of game theory – basics of the approach/principles, practical real-life instances where the theory plays out in sourcing events, and some ground rules buyers can follow to enhance leverage of this concept in day-to-day buying.

Fundamentals of game theory and implications in the sourcing context

Game theory is behind the scenes in many familiar situations: for example, a poker game where the next call, raise or draw move is contingent on how the player expects opponents might respond. A few of the theory's concepts, such as the “winner's curse” or the “prisoners dilemma,” have found their way into popular discourse. One glaring example of winner's curse comes from the telecom industry. In an auction for wireless spectrum, incumbent telcos bid up prices far beyond the value their business could support. The unlucky winners suffered for years afterwards from heavy debt loads and low return on capital.

The prisoner’s dilemma illustrates the equilibrium concept at the core of the theory. Two people imprisoned for the same crime are interrogated separately; they can either confess or remain silent. Because of the way the consequence depends on the other player's (unknown) action, apparent self-interest leads each player to confess. This is the equilibrium outcome, even though both players would have ended up better off with a different strategy.
Because of mutually competitive mindsets, both prisoners confess and the game reaches equilibrium in the right bottom quadrant where the interrogator (buyer) wins. A similar payoff matrix results in various forms of sourcing events where game theory applies.

A buyer can structure an analogous situation by negotiating with two sellers independently. Suppose they have comparable financial strength and similar cost structures for a commoditized product. The lowest price each is willing to quote will be the same, at a minimal profit margin. If the bids are not converging, the buyer’s tactic is to continue the negotiation by revising the floor price progressively. If the bids do converge, this is a sign that the prisoner’s dilemma has played out. The bid pattern aids the buyer in price discovery even when supply market scenarios and price structures are fluid. This is especially helpful in the indirect space where not many categories are indexed and easy to track.

All the cards on the table

Real life is not always as simple as the game implies, of course. Two equal bids might instead be the result of collusion between the sellers. If they are part of a known cartel, game theory won’t apply since it works best in “oligopolistic” situations. This could have a bearing on certain indirect categories like advertising and marketing services as a result of continuous supplier rationalization and supplier stickiness factors. Certain commodities can also become cartelized because of changes in industry structure leading to formation of consortiums. As an example, the market for copier paper shrinks and marginal manufacturers exit, leading to greater concentration. Fewer players mean greater alignment of interests and easier opportunity to collude.

Even if outright collusion doesn’t happen, sellers might act in a way that sends signals to competitors, leading to higher prices. A similar outcome could result from acquisitions that eliminate competitors and reduce supply. Or sellers might restrict access by buyers, for example by devising narrowly segmented geographic regions. These forms of cartel-like behavior can occur even in the absence of any clear-cut oligopoly. Sourcing managers need to be alert to these changing dynamics in a sourcing game. One way to spot a possible cartel is to run a reverse auction in multiple rounds. Another is to shuffle the lots of an e-Rfx and check for consistency in bidding. Where bidders know one another’s price for the next round, the bids will most likely move in tandem.

When a buyer suspects collusion, is there some means of breaking the cartel? Changing the price settings might work. In a multi-round bid for contingent labor, for example, one round could set bidding for a management fee; another could ask for a minimum hourly commitment at a set price. Such tactics might throw the alignment among the cartel members out of kilter. It also helps the buyer triangulate the price structure of the service. This tactic can be useful in understanding margin structures in categories, even in actual price discovery. Another instance is that in a competitive bidding scenario, such as a reverse auction, non-binding games (where the buyer hasn’t committed to select the bidder with the lowest price) show more chance of collusion than binding games where the selection criterion is clearly spelled out and predicated on price alone.

A buyer who is new to the role or unfamiliar with the category can counter savvy sellers by mastering these techniques. A partner with deep expertise in sourcing strategy and procurement dynamics can help convert academic concepts into practical know-how. Many buyers mistakenly think game theory’s application is limited to the auction mode of negotiation. In fact, it works very well in multi-round bidding or even face-to-face negotiations. Even simple payoff matrices or “What If” scenarios are hugely helpful in designing negotiation scripts in multi-round negotiations. Astute sourcing managers are learning to apply game theory in these other situations. They also realize that inflated prices can happen not only in the simple oligopoly case, but also in other cartel-like behavior such as price signaling or industry segmentation.

Research shows that application of game theory payoff matrices helps buyers navigate all possible scenarios of the event outcome well in advance and select tactics accordingly to influence the most desired outcome. Before flagging off an event you should be able to predict the final outcome and work backwards to configure the rules of the game (in contrast to the business rules that bridle an e-Auction) for your desired outcome. Much like Six Sigma is designed to minimize variations in a process, applying game theory in strategic sourcing and reverse auctions aims to reduce the variability in the bidding process.
Down to the bottom line

Taken together, these broader views mean that game theory is not a mere novelty or niche tactic, but in fact has wide applicability. Game theory principles can potentially get 100 – 200 basis points more in a negotiation process over traditional techniques. What this means in $ terms is on a typical overall spend base of $1 billion this could result in incremental savings of $6 million – $10 million.

For categories with low leverage, applying game theory techniques greatly helps where natural spend aggregation is not a very effective option.

The different models for category execution suggest the following guidelines for buyers. To leverage game theory with these techniques requires deep understanding and experience in sourcing from the buyer organization and its business partners.

**One size doesn’t fit all**: Classify categories where there is low market leverage – One way of doing this is to have a list of parameters that qualify “leverage” such as Brand Reputation, the impact your business has on the supplier’s growth, past stickiness of your suppliers, your current vendor churn, current Supplier Management Systems and also a comparative price benchmarking with some of your competitors. Typically for categories where you don’t have high leverage with the vendor base, you can design a sourcing script that aggregates all “What If” scenarios before going to the negotiation table.

**Change the game after each round**: More often than not, smart suppliers can see through the pattern of your negotiation; hence, manipulate their pricing structures accordingly. It’s important to change the negotiation script at each stage. For example, for a Contingent Labor category, if the first round is all about margin structures, the next round could be about deconstructing the cost of operations in a specific project and the third could be changing the parameters and scope of the project itself. Before initiating a game, buyers must also be well aware of their total costs, risks and trade-offs.

**Optimize on a few factors not all at the same time**: When sourcing organizations arrive at a negotiation table trying to optimize on all fronts, they fail to create a mutual supplier win-win. For each category it’s important to extract value over a sustained period of time rather than putting in all boundary conditions all at once. This leads to poor supplier relationships and is difficult to sustain leverage over time. If the first wave was Unit Price reduction, the following rounds could include Payment Terms or Minimum Order quantities. For game theory to play out evenly in a balanced two-sided manner, it’s important to have some occasional hooks – in the prisoner dilemma context, adequate incentives that compel one of them to confess.

**Structuring and timing e-Auctions carefully**: Lots of companies use e-Auctions as the most effective and first line of defense for speedy realization of value. While the whole auction concept is largely predicated on tapping on “competitive” behavior and psychology, timing it well and structuring it with care could yield close to 7-14% of savings in a specific category. New auction formats like the Dutch and Brazilian auctions cover a broader product spectrum for online allocation, especially for a category like Utilities. For multiple lot rounds, putting small lots first over big lots is a smart idea, as many times, the converse

How a buyer can deploy these tools

To put these abstract ideas to practical use requires careful judgment about where and how they apply. One consideration is how much impact a given category has on the buyer organization’s financial performance: revenues, margins, and risk exposure. Another is the degree of leverage the buyer has in the supply marketplace, such as obtaining better commercial terms. Figure 3 shows how the criteria of impact and leverage affect different category execution models. Each model draws upon specific abilities and knowledge on the part of the sourcing practice.

In a sample study for an Indirect Spend base of $6.6 billion (averaged across verticals) ~ $3.5 billion (>50%) spend for top 15 categories could be explored for Game Theoretic Sourcing Techniques. Typical categories include Facilities, Plant and Equipment, Select Non-Specialized Professional Services, IT Telecom, HR, MRO and Transportation & Warehousing.

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Figure – 2 Game Theory principles can be applied to at least 50% of the spend base across key verticals

**Figure 3 - The four distinct Category Execution Models.**

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makes the supplier lose focus on the small lots after the big lots are allocated. Buyers need to know their markets well in order to predict auction outcomes well in advance. This also means that buyers should develop enterprise reverse auction strategies on which individual buyers can then base their tactics for each category. They should also clearly establish, communicate and adhere to the business rules diligently.

Robust Supplier management / development programs:
One of the critical success factors of game theory is the buyer’s understanding of the supplier psyche. This comes once you know your supplier base and their cost structure well enough to then influence their decision-making. Supplier Management programs that go beyond just risk assessment at the time of on-boarding really help. Tools such as Achilles, Hiperos, and Sci-Quest help sourcing teams to manage supplier evaluation and ongoing development in a more fact-based manner. Firms also need to ensure that they create a structure that helps both parties learn from each successive sourcing event.

Conclusion
Even an efficient sourcing operation can raise its game and achieve rapid payback using game theory. An academic concept is finding increasing buyer acclaim for its effectiveness. Buyers need to learn how to apply the theory to bidding matrices and spend profile by category. Category playbooks or commodity dossiers should incorporate game theory principles to bolster strategic sourcing rigor. By learning these practices, buyers will find they can benefit in a wide range of negotiations.